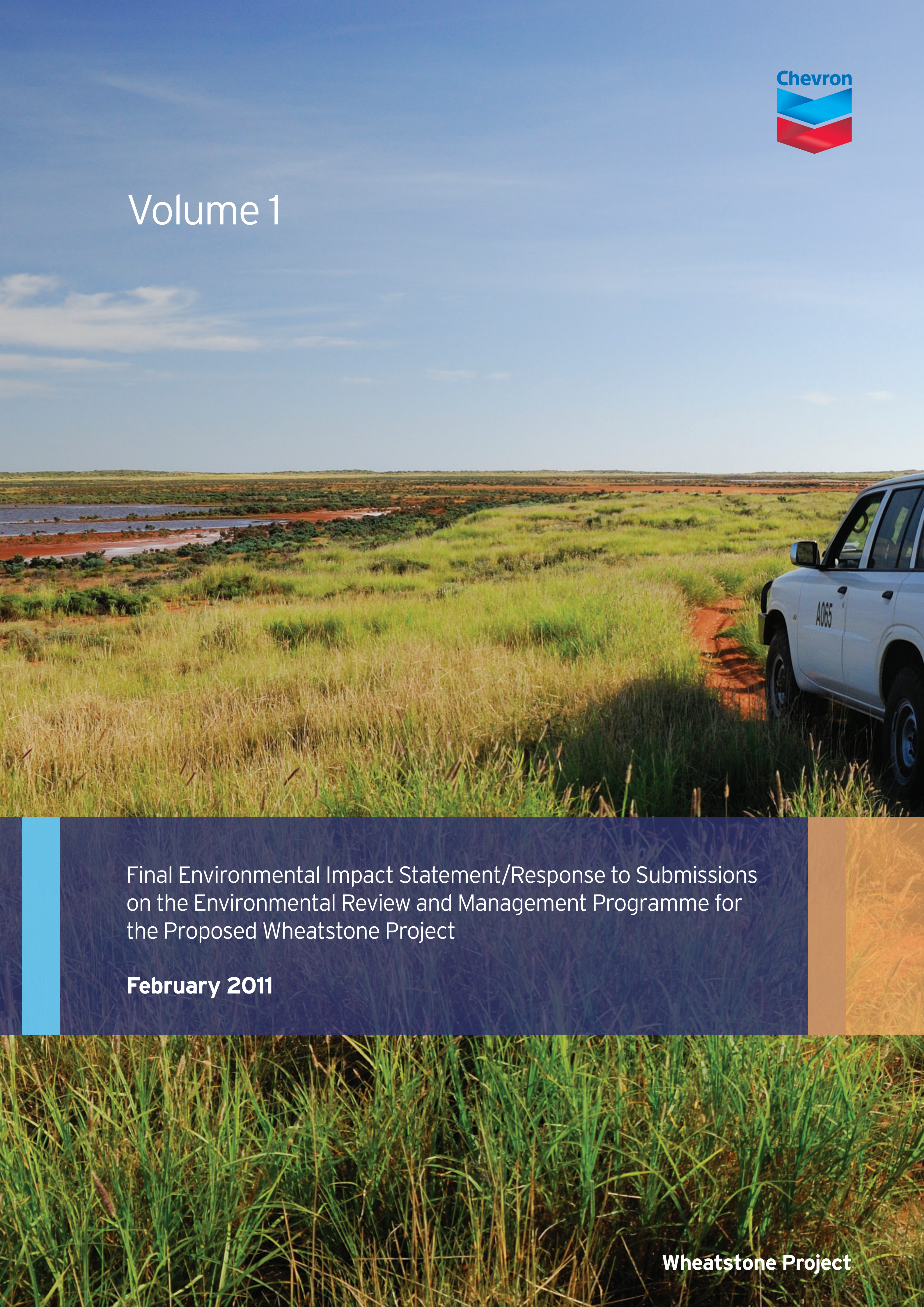

Chevron

Volume 1

Final Environmental Impact Statement/Response to Submissions on the Environmental Review and Management Programme for the Proposed Wheatstone Project

February 2011

Wheatstone Project

Disclaimer

In preparing this Final Environmental Impact Statement/Response to Submissions on the Environmental Review and Management Programme (Final EIS/RTS), Chevron Australia Pty Ltd (Chevron) has relied on material provided by specialist consultants, government agencies and other third parties who are identified in the Final EIS/RTS. Chevron has not verified the accuracy or completeness of the material provided by these consultants, government agencies and other third parties, except where expressly acknowledged in the Final EIS/RTS. Should there be any difference or inconsistency between the material presented in this Final EIS/RTS and that in any third-party document referred to herein (including assessments, findings, opinions, project descriptions, proposed management measures and commitments), the material presented in the Final EIS/RTS alone shall be taken to represent Chevron's position.

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ISBN 978-0-9808122-2-0

Title: Volume 1: Final Environmental Impact Statement/Response to Submissions on the Environmental Review and Management Programme for the Proposed Wheatstone Project

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1.0

Introduction

1.0 Introduction

1.1 Proposal

In August 2004, a significant gas discovery was made at the Wheatstone-1 well in Petroleum Title WA-253-P, located offshore approximately 225 km north of Onslow in Western Australia (WA). This complemented the discovery in 2000 of natural gas in Petroleum Title WA-17-R, located approximately 10 km from WA-253-P.

Chevron Australia Pty Ltd (Chevron) declared its intention to develop an LNG and domestic gas (domgas) project in March 2008. Since then, Chevron has completed a seven-well appraisal program to further understand the potential of Petroleum Titles WA-253-P and WA-17-R, both held 100 per cent by Chevron companies. These locations are detailed in Section 1.6 of the Draft Environmental Impact Statement (EIS) and Environmental Review and Management Programme (ERMP), hereafter referred to as the Draft EIS/ERMP. Third-party gas will also be processed by the first two Wheatstone Project (Project) LNG trains and by additional trains as they come online.

An offshore platform will provide initial treatment of the gas and natural gas condensate (condensate), which will then be transported via a subsea pipeline to an onshore LNG processing facility. The resultant LNG and condensate will be shipped to worldwide markets. Gas from the plant will be made available to the Western Australian domestic market via an onshore pipeline installation.

1.2 Environmental Assessment Process

The Project is subject to environmental approval from both the Western Australian and Commonwealth governments under the *Environmental Protection Act 1986* (EP Act) and *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), respectively.

In September 2008, the Project was referred to the Western Australian Environmental Protection Authority (EPA) under the EP Act (WA) and to the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) under the EPBC Act (Cth). In October 2008, the EPA determined the level of assessment at Environmental Review and Management Programme (ERMP). This level of assessment is applied to projects considered to be of State interest and is a comprehensive and detailed level of assessment. Also in October 2008, DEWHA determined that the proposal was a "controlled action" and the level of assessment was set at Environmental Impact Statement (EIS). In setting the level of assessment, DEWHA determined that the proposal may have significant impact on the following matters of National Environmental Significance (NES):

- Listed threatened species and communities
- Listed migratory species
- Commonwealth marine areas.

At the request of the EPA, Chevron agreed to trial the implementation of a risk-based approach to the environmental assessment of the Project. The objectives and draft methodologies for risk-based EIA, described in the EPA draft guideline Paper 10 *Application of risk-based assessment in EIA 2009*, have been applied in preparation of the Draft EIS/ERMP. Requirements of the EPBC Act (Cth), and the EP Act (WA), have also been taken into consideration. More specifically, the Project has adopted the EPA's recently released *Environmental Assessment Guidelines – No. 4 Towards Outcome-based Conditions, Draft, December 2009.*

The Draft EIS/ERMP describes the Project and its likely effects on the environment (Chevron Australia 2010). It was submitted to the EPA and DEWHA (now the Department of Sustainability, Environment, Water, Population and Community [DSEWPaC]) for endorsement for release for public review and was subsequently published and released for a statutory ten-week public review period commencing on July 26, 2010 and closing on October 4, 2010.

This Final EIS/Response to Submissions on the ERMP (Response to Submissions) has been prepared to meet both the EPA Guidelines for Preparing a Public Environmental Review/Environmental Review and Management Programme (2007) and the DSEWPaC Guidelines for the Content of a Draft Environmental Review and Management Programme/Environmental Impact Statement (2008). It will be assessed in a parallel/coordinated approach by the EPA and DSEWPaC, as outlined in Figure 1.1.

1.3 Purpose and Scope of Document

The Environmental Impact Assessment (EP Act, Part IV Division 1) Administrative Procedures (2002) state that the Proponent is required to:

- Prepare a summary of the pertinent issues raised in public and government agency submissions
- Respond in writing to the summary of issues and any other issues the EPA may consider need to be addressed
- Amend the proposal and change environmental commitments where appropriate.

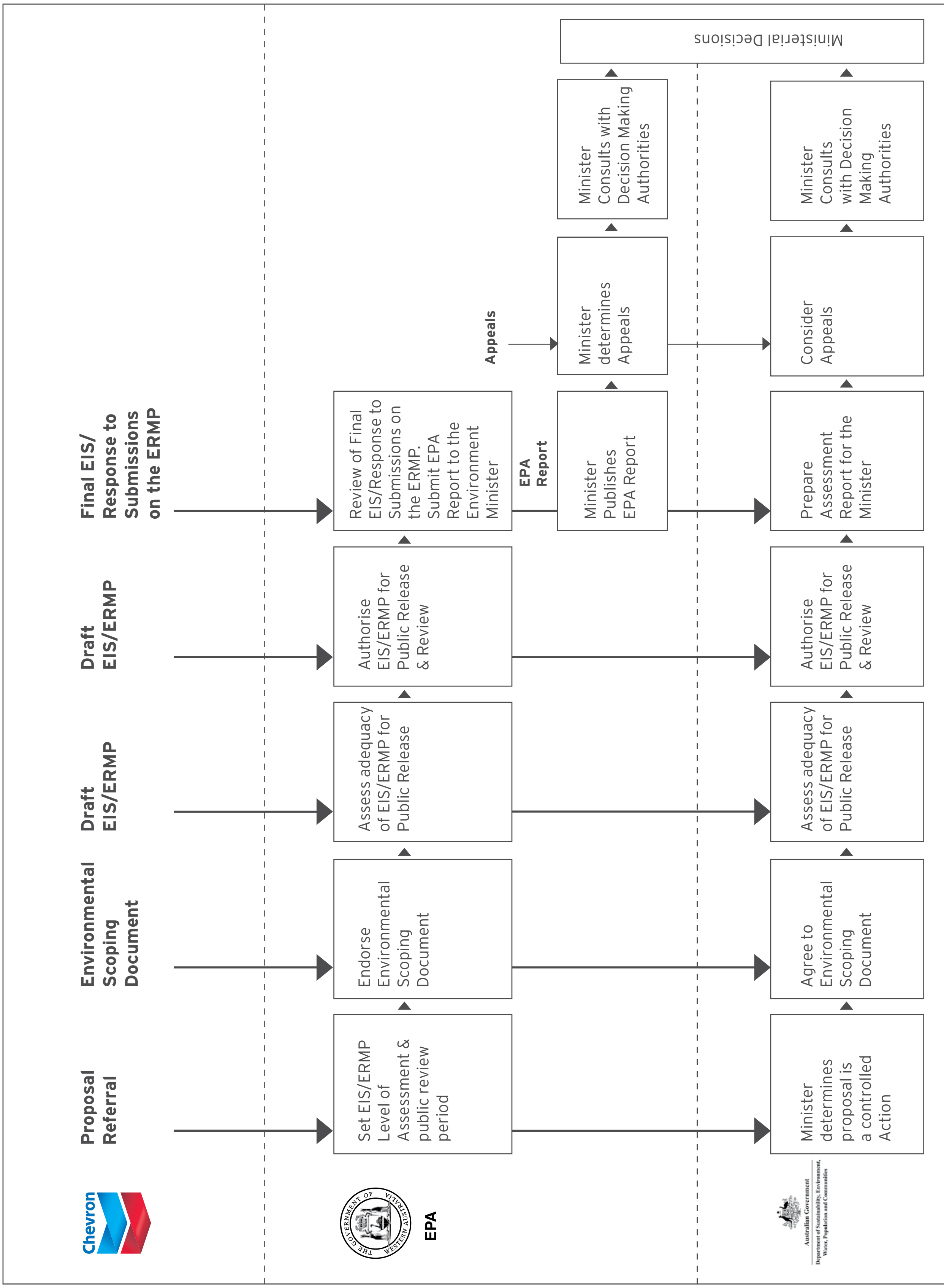

Figure 1.1: Wheatstone Project Environmental Assessment Process

The purpose of this document is to provide Chevron's response to key issues raised in public and government agency submissions in relation to the Draft EIS/ERMP. A summary of submissions was prepared and provided to the Office of the EPA on October 29, 2010. This summary covered submissions received through to October 25, 2010. Responses to all of these submissions are included in this Response to Submissions document.

Given that many of the responses are of a similar nature, such questions and statements are grouped together rather than repeated throughout the document. They have also been categorised (based on question/statement themes) into chapters that correspond to relevant chapters in the Draft EIS/ERMP.

An electronic copy of the Response to Submissions document is included with this document. This data CD enables readers to conduct word searches that will assist navigation to submissions and responses of interest. Appendix A, which maps the location of responses to individual comments, is also designed to assist document navigation.

The Response to Submissions will be considered by the EPA and DSEWPaC during their respective assessments of the proposal. They will also be considered when deciding whether or not to approve and set conditions for the Project.

This document also outlines changes to the Project that have occurred since the public release of the Draft EIS/ERMP. These changes are unlikely to significantly increase any impact that the proposal may have on the environment and are submitted to the EPA for its consent in accordance with section 43A of the EP Act (WA).

This document also reports the outcomes of additional geotechnical and archaeological investigations undertaken as directed by the EPA under Section 40(2b) of the EP Act (WA) (Appendix FK). These investigations have provided an improved understanding of the Project area and technical feasibility of the location, design and construction methods for the infrastructure described in the proposal.

Finally, it should be noted that Proponent contact details for the Project have changed. Section 1.1.2 of the Draft EIS/ERMP listed Geoff Strong as the key contact. However, Brian Smith now carries this role. Hence, Proponent details are as follows:

Key Contact: Brian Smith
General Manager, Wheatstone Development
Phone +61 8 9216 4000
Fax +61 8 9216 4055.

2.0

Project Refinements and Clarifications

2.0 Project Refinements and Clarifications

Since the release of the Draft EIS/ERMP, the advancement of front-end engineering and design (FEED) work has continued to result in improved definition and a number of refinements to the development concept outlined in the Draft EIS/ERMP.

The following sections describe the outcomes of progress in this area. In particular, FEED work has resulted in:

- Improved definition of the location or footprint of development components
- Design optimisations with implications to footprint or location described in the Draft EIS/ERMP
- Design optimisations that have no footprint or location implications
- The choice of the preferred option for development components for which a number of alternatives were outlined in the Draft EIS/ERMP.

A description of the relevant updates to the proposed Project is provided in Table 2.1. The first column of this table indicates whether an update is a deletion, revision, engineering selection, clarification, or addition when compared to the Draft EIS/ERMP.

Table 2.1: Project Updates

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
Onshore					
1.	Update	LNG Facility 2.2.3.1	The following list summarises the various process units that are expected to comprise the LNG facilities: • Inlet facilities/stabiliser systems • MEG recovery (future trains) • Acid Gas Removal Unit (AGRU) • Dehydration and mercury removal • Liquefaction and methane compression, including Nitrogen Rejection Unit (NRU) • Heavy hydrocarbon removal and fractionation • Flare and vent systems • Refrigerant storage • Diesel storage and distribution • Fuel gas • Condensate storage and loading • LNG storage and loading • Pentane storage and handling • Process and stormwater treatment • Power generation • Firewater • Heat medium • Plant and instrument air • Water • Inlet air humidification • Nitrogen.	The same summary list applies with the addition of a Submerged Combustion Vaporiser (SCV). It is proposed that this unit be added to the LNG facility to allow for the continued supply of domestic gas (domgas) when either the offshore production platform or the main LNG facilities experience planned or unplanned conditions such that domgas is not in production. The unit will convert LNG from the LNG storage tanks, back to its natural gaseous state, to ensure continued domgas supply. Figure 2.1 shows where the unit fits into the facility. The SCV unit is entitled "LNG Vaporizer". It is proposed that there is only one additional unit, which will service the two-train foundation project and any expansion to the full 25 MTPA facility. The unit is proposed to have a production rate of 220 MMscfd of domgas, with a stack height of 13 m.	**No** – SCVs do produce emissions and wastewater. The key emissions produced by the SCV are NO_X, CO, and PM. SO_X are not anticipated as there is no sulphur in the source gas. The unit will only be utilised when the offshore production facility and the main LNG plant are in operation. Therefore, the SCVs will not add to the net air emissions modelled in the Draft EIS/ERMP. The unit will be equipped with water injection emission controls or equivalent emission reduction controls, and will be limited to a maximum operational use of 15 days per year. The water used in the process will be treated prior to discharge via the offshore outfall at the 5 m contour. The discharge will comply with the relevant ANZECC water quality guidelines. There is not considered to be any potential for odour production from the unit as there is no sulphur in the source gas and there will be no injection of mercaptans. Refer to Section 2.1.1 for further details on potential impacts on the environment.

2.	Update and Clarification	Water Supply 2.3.3.3	Water source options for the Project are currently being evaluated. Freshwater supplies for the construction works may be provided by a desalination reverse osmosis (RO) plant which converts seawater or saline groundwater to drinking water. Water may be sourced from an open-sea or nearshore intake, a deep-water bore, or a combination of these.	Water source options for the Project are currently being evaluated. Freshwater supplies for the construction works are likely to be provided by a desalination reverse osmosis (RO) construction plant which converts saline water to drinking water. Water is likely to be sourced from a nearshore intake, or possibly from an open-sea intake, a groundwater bore(s), or a combination of these. Prior to the commissioning of the construction RO plant, a temporary supply of water will be required for drinking water and for use in construction activities. This temporary source is likely to be from a nearshore intake or from Beadon Creek, or from a combination of the two. In the unlikely event that these sources are not suitable then shallow groundwater wells on the Twitchen Road or at the Accommodation Village site will be investigated. Any permit to use these wells will be sought from the appropriate departments prior to utilisation. This water will be processed by a temporary RO Plant.	**Yes** – There may be minor impacts on the terrestrial environment (potential construction of temporary pipeline to truck filling point). Refer to Section 2.1.1 for details on potential impacts on the marine environment. Refer to Update 12 for details on traffic for impacts on the social environment.

<table>
<tr><th rowspan="2">Update No.</th><th rowspan="2">Category</th><th rowspan="2">Aspect (and section reference)</th><th colspan="2">Description</th><th rowspan="2">Change to Environmental Impact?</th></tr>
<tr><th>Draft EIS/ERMP</th><th>Final EIS/ERMP</th></tr>
<tr><td></td><td></td><td></td><td></td><td>Prior to the use of this temporary water source it is likely that potable water will be transported to site from a regional source.
The proposed schedule for water supply based on the preferred options is:
<table><tr><th>Indicative Timing (month)</th><th>Method</th></tr><tr><td>0 - 3</td><td>Transport of potable water to the site</td></tr><tr><td>1 - 22</td><td>Extraction of water from Beadon Creek* and use of temporary RO plant</td></tr><tr><td>22 - 60</td><td>Construction RO Plant</td></tr></table>*the Beadon Creek option is proposed for a maximum of 22 months with the temporary RO plant taking an increasing load.
The water use from Beadon Creek will gradually increase to a maximum 100 000 m^3/month. Use of the Beadon Creek source will gradually decrease as the temporary RO plant commences operation.</td><td></td></tr>
</table>

				The transportation of water from Beadon Creek will result in increased vehicle movements between Beadon Creek (truck filling point to be determined) and Ashburton North.	
3.	Addition (of Compaction Water Beach Plant Pipeline)	Estimated Water Use and Water Source Section 2.3.3.3	Water source options for the Project are currently being evaluated. Freshwater supplies for the construction works may be provided by a desalination reverse osmosis (RO) plant which converts seawater or saline groundwater to drinking water. Water may be sourced from an open-sea or nearshore intake, a deep-water bore, or a combination of these. The preferred water source for construction is via a nearshore intake. The open seawater intake for construction would be built separately from the operational water intake structure, however detailed design of the structure is still being finalised.	The temporary compaction water beach plant will be located in the north-east of the plant site. A corridor of 75 m width is required for placement of the intake/outfall pipelines that connect the RO plant with the nearshore water source. This plant and pipeline is expected to be in place for approximately three years before being deconstructed. If the site is not required for operational use, it will be rehabilitated. The TAA boundary to the east of the pipeline corridor has also undergone minor alteration to allow for construction activities associated with the eastern breakwater alternative.	**Yes** – Minor increases in the TAA and the disturbance to vegetation communities. Refer to Section 2.1.3 for further details on the environmental impacts.
4.	Revision (of Shared Infrastructure Corridor width)	Onshore Support Facilities Section 2.2.3.4	The site will be serviced by a 20 km Shared Infrastructure Corridor (SIC), which includes an access road off Onslow Road servicing both the accommodation village and the plant site.	The State requires that the SIC be up to 500 m wide to ensure sufficient access for future proponents to the Materials Offloading Facility. The Project will utilise up to 300 m of the available width of the SIC.	**Yes** – Impacts are within the scope of those described in the Draft EIS/ERMP. However, vegetation disturbance calculations have been increased (see Section 2.1.3) based on a "maximum clearance scenario" (see Draft EIS/ERMP Section 9.5.5.1).

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
5.	Addition (of Northern Access Construction Track Option)	Figure 2.18	No specific text relating to Northern Access Track.	The current alignment of Northern Access Track intersects the Macedon lease area. Negotiations are underway between Chevron and BHP Billiton to determine whether Chevron will be able to utilise this track during construction. Should Chevron not have access to this track, realignment will be required, as shown in Figure 2.2. Chevron will only require the clearing of one of these tracks during construction.	**Yes** – Increase in the area of the TAA and increase in the disturbance to vegetation communities (Section 2.1.3). However, given that only one track will be utilised, no material difference to expected impacts.
6.	Clarification	Waste – 4.6.2.1	General solid waste, including scrap metal, plastics, glass, other inert wastes, hydrocarbon contaminated materials, spent process chemicals and containers, will be transported to the onshore facilities for appropriate treatment and disposal.	General solid waste, including scrap metal, plastics, glass, other inert wastes, hydrocarbon contaminated materials, spent process chemicals and containers, will be transported to onshore facilities for appropriate treatment and disposal.	**No** – Original wording (specifically the term "*the* onshore facilities") implied that waste would be taken to the Wheatstone onshore facilities. This is unlikely to be the case. Waste will still be disposed of at a licensed facility.

7.	Revision	Stormwater	Clean (non-contact) stormwater from non-process areas and undeveloped portions of the site will be routed to sedimentation ponds. Clean stormwater volumes will vary due to the erratic local rainfall patterns, but may be up to 9600 kL/day. Potentially contaminated (contact) stormwater from general process areas will be routed to "first flush" retention basins to capture oily or other types of potential contamination from the first 25 mm of rainfall on these areas. The retention basins may be equipped with oil skimmer devices, and with pumps to transfer the contents to process wastewater treatment if significant contamination is found. Contaminated stormwater from known oily areas (pump pads, etc.) will be routed to collection sumps and pumped to process wastewater treatment.	Surface run-off from LNG Plant areas will be classified according to potential level of contamination. Surface run-off from areas of the plant that have the potential for contamination with oil or soluble chemical will be segregated from "clean" stormwater run-off. The design for handling stormwater run-off will be based upon a "first flush" philosophy. Surface run-off equivalent to the first 25 mm of rainfall will be considered potentially contaminated with oils or water-soluble chemicals (glycols, amines). The first 25 mm of rainfall (considered potentially contaminated surface run-off) will drain to a series of first flush sumps located in appropriate operating areas throughout the LNG Plant. Water in the first flush sumps will be pumped to a common header that discharges into the oily water treatment system.	**No** – First flush capture will be contained in sumps within the plant prior to discharge to the stormwater ponds.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	**Final EIS/ERMP**	
				Surface run-off in excess of the first 25 mm of rainfall will overflow from the sumps into unlined ditches that drain to several unlined sedimentation ponds located throughout the facility. Water collected in the sedimentation ponds will re-enter the natural environment through evaporation into the air or percolation into the soil Surface run-off from plant areas which are considered non-contaminated (such as roads and buildings) will drain to a peripheral open ditch system which also flows to the sedimentation ponds. Any overflow from the sedimentation ponds will be routed to the natural drainage system surrounding the plant. The outfall will be designed with velocity reduction structures such as rip/rap to prevent erosion.	

8.	Revision (of Domgas Pipeline Route)	Vegetation Clearing Section 9.5.5.1	Of the 3100 ha (approximately) of native vegetation to be cleared for the Project, approximately 439 ha will be cleared from within the DEC's proposed extension to the Cane River Conservation Park (CRCP [Chapter 6, Overview of Existing Environment illustrates the CRCP and domgas pipeline route]). At this stage, the final location of the domgas pipeline has not been determined. Therefore, a conservative approach has been taken by assuming a 100 m wide section of the domgas pipeline corridor will be cleared. In reality, once a final location has been determined, only a 30 m wide corridor (where practicable) will be cleared. A total clearing area (439 ha) has been calculated using this conservative approach.	The Department of Regional Development and Lands has issued a Notice of Intention to Take (NOITT) land. This notice will facilitate the creation of a 60 m wide domestic gas pipeline corridor from the ANSIA to the Dampier Bunbury Natural Gas Pipeline. As a result of the NOITT, it is necessary for Chevron to amend the proposed alignment of its domestic gas pipeline. It is expected that both the Wheatstone and Macedon projects will utilise this corridor for their domestic gas pipelines. Therefore, Chevron has reduced the width of the pipeline corridor from 100 m to 60 m to align with the NOITT. Chevron will also use the same turnaround areas as those utilised by Macedon to reduce vegetation clearing, if practicable. Note that Chevron has recently undertaken additional surveys of the proposed pipeline route. Chevron may request alterations to the NOITT alignment if the additional surveys identify that a positive environmental, heritage or construction outcome is possible. Should any further realignment be required, Chevron will seek the appropriate approvals.	**Yes** – Decreases in the area of the TAA and amount of disturbance to vegetation communities. Refer to Section 2.1.3 for further details on the environmental impacts.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
9.	Revision (to Accommodation Village Construction Road Alignment)	Vegetation Clearing Section 9.5.5.1	No specific text relating to Accommodation Village Construction Road.	Part of the Accommodation Village Construction Road has been altered to align with the current pastoral tracks. This realignment will reduce the amount of vegetation clearing required for the Project.	**Yes** – Decrease in the area of the TAA and reduction in the amount of disturbance to vegetation communities. (Refer to Section 2.1.3 for further details on the environmental impacts).
10.	Addition (of Construction Access Road to Borrow Site 4)	Vegetation Clearing Section 9.5.5.1	Additional temporary construction road to Borrow Site 4 not identified in the Draft EIS/ERMP.	Further work conducted on potential Wheatstone borrow sites has identified the requirement for an additional temporary construction road linking Borrow Site 4 to an access road identified in the Draft EIS/ERMP. The temporary road is approximately 700 m long, within a corridor 50 m wide. The alignment of the track has been designed to avoid conservation significant vegetation communities and flora.	**Yes** – Increase in the area of the TAA and increase in the disturbance to vegetation communities (Refer to Section 2.1.3 for further details on the environmental impacts).

11.	Revision	Health and Wellbeing 10.7.4.2	It should be noted that most heavy vehicle traffic will bypass the town of Onslow.	It should be noted that most heavy vehicle traffic will bypass the town of Onslow, however there will be additional traffic along Beadon Creek Road as the Project will need to utilise the Beadon Creek Maritime Facility (Onslow Port) and facilities at the Light Industrial Area. Expected activities along this route include, but are not limited to: • Transport of water from Beadon Creek (truck filling point to be determined) to the ANSIA during early stages of the Project • Transport of goods and materials through the Beadon Creek Maritime Facility until the MOF is commissioned • Transport of staff involved in marine-based activities (e.g. offshore personnel) from Beadon Creek Maritime Facility to the ANSIA • Other activities that may require Chevron to utilise facilities and services in the Light Industrial Area and Beadon Creek Maritime Facility.	**No** – However, there could be an increased risk of motor vehicle accidents due to increased traffic. In order to reduce the risk to the public of an increase in motor vehicle accidents, traffic management measures will be developed in consultation with Main Roads WA and the Shire of Ashburton that are consistent with standard AS 1742.3-2009 to cover the construction and operational phases of the Project.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
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				Depending on traffic volumes along Beadon Creek Road that result from the above activities, it may be necessary to improve road markings and road signs at the intersection of Onslow Road and Beadon Creek Road. There may also be a need to undertake some localised pavement widening on Onslow Road to allow for separation of right-turning and through traffic at the intersection.	
12.	Revision	Health and Wellbeing 10.7.4.2	Based on currently available information, it was established that the current available capacities of NWCH and Onslow Road are sufficient to accommodate additional traffic associated with the construction phase of the Project without compromising the operating conditions. If new information becomes available to Chevron that materially changes the assumptions used to assess the Project's impact on traffic, additional traffic modelling will be completed.	Based on currently available information, it was established that the current available capacities of NWCH and Onslow Road are sufficient to accommodate additional traffic associated with the construction phase of the Project without compromising the operating conditions. If new information becomes available to Chevron that materially changes the assumptions used to assess the Project's impact on traffic, additional traffic modelling will be completed. If the new modelling indicates a need to upgrade roads, Chevron will liaise with Main Roads WA to help them understand the scope of the upgrade as Onslow Road is a State Road.	It is assumed that Main Roads WA will be responsible for attaining additional required environmental approvals should Onslow Road need to be upgraded.

13.	Deletion	2.3.2.2 Beach Crossing Design Concept	For the selected beach crossing location at the periphery of the mangroves, an open cut trench is feasible but not considered technically optimum due to the length of open cut excavation required and the nature of the environment. This option may have a negative impact on the immature mangroves in this area.	Micro-tunnelling has been confirmed as being technically feasible at the selected beach crossing. As a result and in order to reduce the potential environmental impacts of the Project, the open trenching option has been discarded.	**Yes** – Potential environmental impacts to marine water quality and immature mangroves associated with the trunkline beach crossing have been reduced as a result of discarding the open-trenching installation option.
14.	Update	Dredge Material Placement	An estimated maximum of 10 Mm^3 of the dredged material may be placed at the onshore dredge material placement site.	Given the design, cost, schedule and environmental considerations outlined in Section 2.1.5, onshore placement is no longer an option. Full offshore placement of dredge material is the preferred option for the Project.	**Yes –** risk to mangroves, surface and groundwater from onshore placement are no longer present. Notably the placement of dredge material offshore was modelled and assessed based on the entire volume of material to be dredged, thus no further modelling or change in risk assessment is required. Refer to Section 2.1.5 for further details.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
Nearshore					
15.	Revision	MOF	The MOF configuration is described in Chapter 2 and the impact to BPPH is described in Section 8.3.5.1.	An alternative to the current proposed MOF layout is to build only a single breakwater, not two as per the current design (see Figure 2.17 in Section 2.3.3 of the Draft EIS/ERMP).	**Yes** – The layout change affects coastal impacts modeling completed to support the Draft EIS/ERMP for coastal processes; dredge plume modeling for the nearshore area; and hydrocarbon spill modeling for the MOF. Key coastal processes impacts are similar for both layouts, with some change to sediment accumulation and slight alteration to the main zone of erosion to the east of the MOF. However, the overall sediment budget for both layouts is similar. In terms of dredge plume modeling, while the change in MOF layout does lead to a significant change in the impact predictions for Dredge Scenario 3, the contingency in the scenario modeling approach ensures that the overall prediction using the base-case layout can be considered to also cover the alternative layout of the MOF. Further, for the hydrocarbon spill modeling, only the simulated spill within the MOF changes significantly with the alternative MOF layout.

					The design of the base-case layout encloses the spill within the MOF, while the alternative layout often induces a stronger eddy circulation running through the MOF basin, which may draw the spill out from the MOF basin. This will likely result in a higher probability, but shorter time of exposure for the alternative layout compared to the base-case layout of the MOF. Refer to Section 2.2.1 of this document. Refer to Appendix FJ for further detailed information.
16.	Revision	Trunkline trenching and stabilisation	Trunkline route as shown in Figure 8.13 in Section 8.2.5.4 of the Draft EIS/ERMP.	Potential alternative trunkline routes are shown in Figure 2.6 of this document.	**Yes** – The alternative route will also result in potential impacts to BPPH. However, the level of BPPH loss will be less than originally predicted in the Draft EIS/ERMP because the alternative trunkline route will be shorter than the original proposed trunkline. Refer to Section 2.2.2 of this document.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
17.	Revision	Trunkline trenching (trenching trial)	The trunkline route is shown in Figure 8.13, Section 8.2.5.4 of the Draft EIS/ERMP. A trenching trial was performed with a post lay mechanical trencher in March 2010 to assess the suitability of the vehicle to dig a 2 m deep trench in seabed conditions representative of those expected to be encountered along the nearshore portion of the Wheatstone trunkline out to KP36.	The trials confirmed that the trencher can effectively trench through the cemented and un-cemented sand sections of the route. Performance through the rock portions of the route was variable depending on the strength, stratification and presence of voids within the rock. Certain areas of the rock seabed were able to be trenched to a depth of 2 m, albeit at low production rates, with the trencher being unable to penetrate down to depth in other areas. Study work is now ongoing to determine which areas of the trunkline route are viable for post-lay mechanical trenching based on results of the trial in combination with geophysical and geotechnical data. These results are expected in Q4 2010. Investigations are ongoing in parallel with the trenching machine designer and operator to determine if it is possible to modify the design of the vehicle to improve trenching through sections of the seabed that could not to be trenched during the trial.	**No** – The impact predictions given in the EIS/ERMP are based on dredging, rather than trenching. Therefore, the impact prediction in the EIS/ERMP is worst case because trenching will result in much less seabed disturbance and considerably smaller turbidity plumes. No additional impact predicted. Based on preliminary observations during the trial, the trencher generated a small and localised turbidity plume that did not appear to extend far beyond the source.

				Due to water depth restrictions nearshore, the highly variable nature of the seabed along the trunkline route and the presence of hard seabed areas, currently beyond the ability of post lay trenchers to cut, it is unlikely that post lay mechanical trenching will provide a secondary stabilisation solution for the full nearshore route. It is therefore possible, after receipt and evaluation of the geotechnical data, that the final secondary stabilisation solution may include a considerable proportion of more conventional methods such as pre-lay dredging and rock dump.	
18.	Clarification	Vessel movements associated with Project construction and operation	Commitment as per Table 8.48 in Chapter 8 of the Draft EIS/ ERMP. "Humpback whale and Dugong observations and response procedures, including not commencing dredging or disposal if whales or Dugongs are sighted within a 300 m observation zone and ceasing dredging activities if whales or Dugongs enter a 100 m exclusion zone, as outlined in Figure 8-3 of the DSDMP".	Management of cetacean/ vessel interactions will be in accordance with the requirements for cetacean interactions specified under Part 8 of the EPBC Regulations 2000 (Cth), the Australian National Guidelines for Whale and Dolphin Watching. See details in the Marine Fauna Management Plan.	**No** additional impact.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
19.	Update	Nearshore Construction	During construction and installation, there may be a requirement for additional offshore accommodation in the form of a floatel or similar. This may be near the proposed platform location.	During construction and installation, there may be a requirement for additional offshore accommodation in the form of a floatel or similar. This update confirms Chevron's intent to carry the option to accommodate dredge personnel offshore.	**Yes** – However, the use of a floatel to accommodate personnel offshore will be of minor consequence and pose a low risk to the marine environment in the Project area. Refer to Section 2.2.3.
Offshore					
20.	Revision	Waste – 4.7.3	During construction and installation, there may be a requirement for additional offshore accommodation in the form of a floatel or similar. This may be near the proposed platform location. All solid wastes generated offshore during construction and operations will be transported to shore for onshore disposal. The only exception to this would be putrescibles organic matter and sewage. This would be treated in line with MARPOL requirements.	During construction and installation, there may be a requirement for additional offshore accommodation in the form of a floatel or similar. Non-controlled solid wastes may be incinerated onboard the floatel, or transported to an appropriate waste disposal facility on the mainland along with all controlled wastes. Putrescibles organic matter and sewage will be treated in line with MARPOL requirements.	**Yes** – It is possible that a floatel may be required at the offshore platform location. In addition, there is a possibility that a floatel may be required nearer to shore to accommodate the dredging crew. However, if the floatel is required it is predicted that impacts to the marine environment will be ecologically insignificant due to the following mitigation measures: • The mooring location would be identified in consultation with the appropriate regulatory authorities to reduce impacts to sensitive habitats. • Putrescibles organic matter and sewage will be treated in line with MARPOL requirements. An incinerator will dispose of non-controlled solid waste (such as cardboard, paper etc.) whereas non-treatable wastes and non-incinerable wastes will be transported to shore for onshore disposal.

21.	Revision	Hydrate Management Philosophy	Insulate & Blowdown with intermittent MEG injection.	Insulate and Blowdown with intermittent MEG injection, plus a number of utility lines continuously inhibited with MEG. These utility lines will be used to *flow test* wells and to assist with certain well start-ups.	**No** – The continuously injected MEG will be isolated from the environment. In addition, the volume of intermittently injected MEG that is discharged to the marine environment is likely to be reduced.
22.	Revision	MEG system	Once-through MEG system with all MEG that is injected being ultimately discharged to marine environment from the platform.	Platform features a MEG recovery and regeneration system. The majority of injected MEG will be recovered and regenerated for reuse.	**No** – The regeneration of the MEG will reduce the volume of MEG released to the marine environment. There is likely to be some salt production associated with this process configuration. These salts originate in the produced water and may be discharged as brine or disposed of as a solid waste. The volume of these salts is expected to be small. The toxicity of the salts is also considered to be low.
23.	Clarification	Solid Waste	All solid wastes generated offshore during construction and operations will be transported onshore for disposal – with the exception of putrescibles, organic matter and sewage.	All solid wastes generated offshore during construction and operations will be transported onshore for disposal – with the exception of putrescibles, organic matter, drill cutting, sewage and possibly some salts.	**No** – Some salts may be produced by the MEG/produced water treatment process. These salts originate in the produced water and may be discharged as brine or disposed of as a solid waste. The volume of these salts is expected to be small. The toxicity of the salts is also considered to be low. Drill cuttings were discussed in the Draft EIS/ERMP in Section 4.6.2.5. It has always been Chevron's intent to discharge drill cuttings in-situ, and therefore there is no increase to the predicted level of impact.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
24.	Revision	Logistics	There is no requirement for back-hauling of MEG.	Depending on operating performance and the process configuration adopted it may on occasion be necessary to back-haul MEG from the platform for offsite reprocessing (MEG reclamation).	**No** – treatment would be at a licensed onshore reprocessing facility.
25.	Revision	Flaring during well clean	Flaring during well clean-up is likely to be approximately 60 MMscfd over a 72 to 84 hour period.	Flaring during well clean-up is likely to be approximately 100 MMscfd over a 48 hour period.	**No** – The total volume of gas flared during well clean-up is unchanged given the shorter clean-up durations.
26.	Clarification	Waste Heat Recovery Units	Selection of waste heat recovery units offshore.	Selection of waste heat recovery units offshore for the gas turbine driver electrical power generators.	**No** – The risk assessment was based on waste heat recovery units on electrical power.
27.	Revision	Electrical Generator Turbine Selection (Offshore Platform)	Equivalent to the Solar Mars 90 and the General Electric LM2500 turbines.	Equivalent to the Solar Mars 90 or 100 turbines.	**No** – Turbines are slightly larger; however, all emissions modelling was undertaken on worst-case emission factors, which encompasses this change.
28.	Revision	Electrical Generator Turbine Selection (Offshore Platform)	9 MW (ISO rating).	Approximately 10 MW (three turbines to be installed).	**No** – Turbines are slightly larger; however, all emissions modelling was undertaken on worst-case emission factors, which encompasses this change.

29.	Revision	Marine water quality	Table 8.18 states "Control, rate, timing and characteristics of discharge of MEG with the objective of maintaining discharge water quality at a level not in excess of 50 mg/L local to the platform (or at an agreed distance from the platform)."	Design: The discharge pipe's depth and diameter shall be designed to promote MEG dispersion. Mitigate: Frequency of MEG discharge events will be minimised. Compliance with Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS) regulations. Monitor: Monitor PW concentrations prior to discharge to ensure compliance with regulations.	**No** – As per Section 8.2.5.9 of the Draft EIS/ERMP, MEG is low toxicity biodegradable and short-term exceedances above 50 mg/L into an open and highly mixed marine environment is unlikely to result in long-term and widespread impact to marine water quality.
30.	Revision	Marine fauna Residual risk summary	Table 8.48 states: "Control, rate, timing and characteristics of discharge of MEG with the objective of maintaining discharge water quality at a level not in excess of 50 mg/L local to the platform (or at an agreed distance from the platform)."	Design: The discharge pipe's depth and diameter shall be designed to promote MEG dispersion. The Proponent will determine PNEC for PW discharge through ecotoxicity testing and benchmarking against similar reservoirs. Mitigate: Frequency of MEG discharge events will be minimised. Compliance with OPGGS Regulations (Cth). Monitor: Monitor PW concentrations prior to discharge to ensure compliance with regulations.	**No** – As per Section 8.2.5.9 of the Draft EIS/ERMP, MEG is low toxicity, biodegradable and short term exceedances above 50 mg/L into an open and highly mixed marine environment is unlikely to result in long-term and widespread impact to marine fauna.

Update No.	Category	Aspect (and section reference)	Description		Change to Environmental Impact?
			Draft EIS/ERMP	Final EIS/ERMP	
31.	Revision	Marine water and sediment quality	Draft EIS/ERMP Section 8.2.5.9. The heated seawater is discharged back to the ocean at a maximum temperature of 45 °C via a caisson. Table 8.18: Design: Diffuser design and size of mixing zone shall take into consideration the agreed target for CW plume.	Design: The heated seawater is discharged back to the ocean at a maximum temperature of 50 °C via a caisson. Diffuser design and size of mixing zone shall take into consideration the agreed target for CW plume. Mitigate: Compliance with OPGGS Regulations (Cth).	**No** – While the discharge temperature is being increased from 45 °C to 50 °C the overall quantity of heat being dissipated is relatively constant, since cooling water volumes will be decreased significantly. Any decrease in cooling water volumes would be associated with lower anti-foulant loadings. Preliminary modelling predicts temperatures at the surface are <3 °C above ambient within the active mixing zone. The discharge location is into an open and highly mixed marine environment. The increase in discharge temperature is unlikely to result in long-term and widespread impact to marine water quality.

2.1 Onshore

2.1.1 Impact Assessment on the Estuarine Environment for the Proposed Water Abstraction from Beadon Creek

2.1.1.1 Existing Environment

Beadon Creek is situated about 2.5 km south-east of Beadon Point at the site of the Onslow local boat harbour. A 500 m long breakwater trains the western side of the creek. The tidal creek is typical of creek systems in the Onslow region. To the east of the mouth is a broad tidal flat and sandy beach. The eastern side of the creek remains untrained with an entrance sandbar encroaching westward. In order to maintain vessel access, the entrance to Beadon Creek is also periodically dredged. Water flow through the tidal creek provides the major exchange of sediment between the nearshore marine and terrestrial areas (Draft EIS/ERMP, Appendix P2). Extreme flows occur when ebb flows are reinforced by fluvial run-off and when flood flows are linked to higher than average sea level and arid conditions. During arid conditions water in these creeks are 1.2 to 1.4 times the salinity of normal seawater, indicating losses of water from high evaporation rates and concentration of seawater salts (Draft EIS/ERMP, Appendix G1). The propagation of tides does not generally extend above 2 m AHD (Australian Height Datum). Above this elevation the catchment comprises mudflats and salt flats in the supratidal reaches.

Away from the creek mouth the banks of Beadon Creek are lined with a belt of mangroves approximately 10 to 20 m wide, with the exception of areas that have been cleared for the existing boat harbour infrastructure. The mangrove species composition includes *Aegiceras corniculatum*, *Avicennia marina*, *Ceriops australis*, and *Rhizophora stylosa* and cover approximately 133 ha (Draft EIS/ERMP, Appendix N11). The associated mud flats have a high organic content, and support high microbial activity and large densities of invertebrate fauna (Draft EIS/ERMP, Appendix N4). The waters that tidally flush these creek systems are nursery habitats that contain an array of vertebrate and invertebrate fauna including zooplankton and larval/juvenile biota.

Beadon Creek is traditionally an important fishing (recreational and commercial) and maritime support/services port for the town of Onslow. More recently Onslow Salt Pty Ltd has constructed a sea water intake in the eastern arm of Beadon Creek to supply its evaporative salt production pond system. It is estimated that approximately 245 000 m^3/day of seawater taken from Beadon Creek is required on average to achieve an annual salt production of around 2.5 million tonnes (Straits Salt 2008).

2.1.1.2 Proposed Activity/Development

Chevron proposes to build a temporary water abstraction facility adjacent to existing infrastructure in Beadon Creek. The facility will be located on an existing industrial area.

The facility will have a maximum seawater intake of 100 000 m^3/month, for a period of approximately 20 months. There will be no planned discharges associated with this task.

2.1.1.3 Potential Estuarine Impacts and Risk Ranking

The marine factors identified in this risk assessment as being potentially affected by this activity are water quality and marine fauna.

The construction of the facility has the potential to create temporary increases in turbidity levels within the creek, namely from the installation of the intake pipe(s). However, the increased turbidity is likely to be very short in duration and have little intensity in comparison to natural levels of turbidity, maintenance dredging of the creek mouth and daily vessel movements. No detectable change to water quality in Beadon Creek is expected to result from the operation of the water abstraction facility.

Changes to water flows in Beadon Creek as a result of seawater extraction are likely to be negligible. The entrance to Beadon Creek is permanently open to Onslow Bay at LAT (Lowest Astronomical Tide) therefore allowing sea water entry to the creek at all times. Onslow Salt extracts a greater volume of water than the proposed facility and this does not appear to influence water levels in Beadon Creek.

The extraction of water from Beadon Creek has the potential to entrain (remove via the intake pipe) marine fauna. The extraction of larval fauna and zooplankton are the principal concern. However, designed flow velocity at the face of the intake pipe will be designed to meet industry practices to manage entrainment and impingement issues (Draft EIS/ERMP, Chapter 4). Flow velocity at the face of the intake structure will be a maximum of 0.15 m/sec in order to minimise the impingement and entrainment of marine fauna and debris on the intake screen structure. No detectable impacts to communities and populations of marine fauna are expected to result from the operation of the facility.

The proposed facility is likely to have minimal impact on the marine environment. Using the consequence definitions provided in the Draft EIS/ERMP the assessed consequence and likelihood and residual ranking is presented in Table 2.2.

Table 2.2: Summary of Predicted Impacts and Risk to the Environment

Factor	Impact	Consequence	Likelihood	Residual Risk Ranking	Mitigation
Alteration of water flows	Change in tidal water movements or water heights	Minor	Remote	Very Low	nil
Localised turbidity during civil works construction of intake pipe	Increased turbidity above background levels	Negligible	Remote	Very Low	nil
Entrainment of marine fauna (including larvae)	Loss of marine fauna	Minor	Unlikely	Very Low	Industry standard diffuser and intake rates designed to meet a flow velocity at face of approximately 0.1 m/s.

2.1.1.4 Summary

With the implementation of the mitigation measure described in Table 2.2 it is possible that the installation and operation of the proposed water abstraction facility in Beadon Creek will have little impact on the marine environment. The residual risk to the environment was assessed as being "Very Low" – of "Negligible" consequence arising from no detectible impacts on fauna populations, and no detectible change to background water and sediment quality in Beadon Creek, and impact is "Unlikely" to occur.

Chevron is proposing to construct the onshore Wheatstone Facility in phases. The water supply options for the various phases differ. It is considered that the following water supply options will be utilised.

Phase	Source	RO Brine Discharge
Caravan / Fly Camp	Beadon Creek	None. Brine will be used for dust suppression.
Fly / Construction Camp	Sea water	Reuse for dust suppression where practicable. Temporary outfall.
Operations	Sea Water	Outfall on the jetty at the 5 m contour.

Any discharges will comply with ANZECC Water Quality Guidelines. Please refer to Chapter 8; Tables 8.10 and 8.18 and Section 8.2.5.6 of the Draft EIS /ERMP for further information.

2.1.2 LNG Facility

2.1.2.1 Concept Outlined in the Draft EIS/ERMP

A summary list of the various process units that are expected to comprise the LNG facilities was provided in Section 2.2.3.1 of the Draft EIS/ERMP.

2.1.2.2 Description of Change

It is proposed that a Submerged Combustion Vaporiser (SCV) unit be added to the LNG facility to allow for the continued supply of domestic gas (domgas) when either the offshore production platform or the main LNG facilities experience planned or unplanned conditions such that domgas is not in production. The unit will convert LNG from the LNG storage tanks, back to its natural gaseous state, to ensure continued domgas supply. Figure 2.1 shows where the unit fits into the facility. The SCV unit is entitled "LNG Vaporiser".

It is proposed that there is only one additional unit, which will service the two-train Foundation Project and any expansion to the full 25 MTPA facility.

The unit is proposed to have a production rate of 220 MMscfd of domgas, with a stack height of 13 m.

2.1.2.3 Potential Impacts

SCVs do produce emissions and wastewater. The key emissions produced by the SCV are NO_X, CO, and PM. SO_X are not anticipated as there is no sulphur in the source gas. The unit will only be utilised when the main plant is not in operation. The unit will not, therefore, add to the net air emissions modelled in the Draft EIS/ERMP.

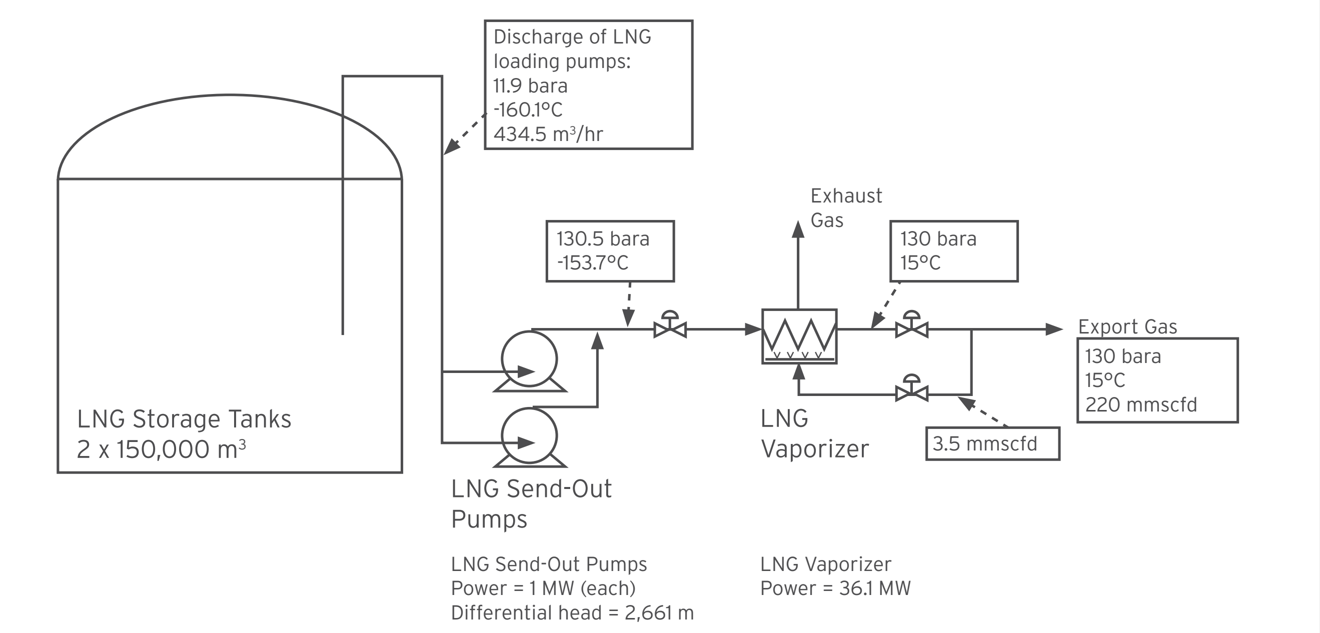


Figure 2.1: Submerged Combustion Vaporiser (SCV)

The water used in the process will be treated prior to discharge via the offshore outfall. The discharge will comply with the relevant ANZECC water quality guidelines.

There is not considered to be any potential for odour production from the unit as there is no sulphur in the source gas and there will be no injection of mercaptans.

2.1.3 Vegetation Clearing

2.1.3.1 Concept Outlined in the Draft EIS/ERMP

Clearing of approximately 3100 ha of terrestrial native vegetation is required in order to facilitate the construction of the onshore Project infrastructure. For the purpose of this impact assessment, a conservative approach has been taken which assumes that all vegetation within the Project area will be cleared ("maximum clearance scenario"). This total area of vegetation to be cleared is expected to be less than the "maximum clearance scenario".

The flora and vegetation surveys found five species of threatened flora within the survey area. Although some priority flora and potentially undescribed flora may have to be cleared, all of these flora have also been recorded outside of the Project area. In addition, the Project will require the clearing of over 44 per cent of locally significant vegetation unit C3 (low *Tecticornia* shrubland in saline claypans) in a "maximum clearance scenario". The actual proportional clearing of vegetation unit C3 would be expected to be considerably less than 40 per cent. Although some vegetation communities are classified as locally significant, none are declared matters of national environmental significance under the EPBC Act 1999.

2.1.3.2 Description of Change

Updates to the Project conducted since the publication of the Draft EIS/ERMP has led to an alteration to the Terrestrial Assessment Area (TAA). Subsequent changes to the Draft EIS/ERMP that affect the proposed vegetation clearing include:

- Addition of northern access construction track option (Project Update 1)
- Addition of compaction water beach plant pipeline (Project Update 2)
- Revision of Shared Infrastructure Corridor width (Project Update 3)
- Revision of Accommodation Village construction road alignment (Project Update 4)
- Addition of construction access road to Borrow Site 4 (Project Update 5)
- Revision of domgas pipeline route (Project Update 6).

Figure 2.2 depicts the location of each of the terrestrial Project updates.

Additional works relating to the vegetation and flora of the Project have also been conducted since the publication of the Draft EIS/ERMP:

- Outback Ecology Services (July 2010) – Vegetation and flora survey of borrow site 4. No conservation significant flora located. Increase in extent of survey area of approximately 785 ha. An update to mapped vegetation units is provided in Figure 2.3.
- URS Australia Pty Ltd (August 2010) – Targeted Conservation Significant Flora Survey. Fourteen populations of three conservation significant flora were located outside of the Terrestrial Assessment Area and Ashburton North Strategic Industrial Area. Additional large populations of a flora of conservation significance, *Stemodia* sp. Onslow were located. *Stemodia* sp. Onslow was subsequently removed from the list of conservation significant species.
- Reclassification of Threatened flora by the Western Australian Herbarium:
    - Flora of Conservation Interest *Bonamia aff linearis* collected at the Wheatstone site were reclassified as *Bonamia alatisemina* (not of conservation interest).

Table 2.3 documents the additional populations of conservation significant flora that were located during the URS 2010 survey. These populations are included in an updated Threatened Flora Location figure (Figure 2.4).

2.1.3.3 Environmental Implications

Clearing of approximately 3300 ha of terrestrial vegetation will now be required to construct the Project. For the purpose of this impact assessment, a conservative approach was taken which assumes that all vegetation within the Project area will be cleared ("maximum clearance scenario").

The updated area required for clearing has led to changes to the expected impacts to vegetation units within the proposed Project footprint. Specific changes to locally significant vegetation units are summarised in Table 2.4.

The addition of the Project updates and subsequent minor increase in required vegetation clearing has not significantly altered the impacts to vegetation and flora within the Project. Therefore, the residual risk ranking to flora and vegetation from vegetation clearing remains at "Medium".

No additional impacts to terrestrial fauna, soils and landforms, surface water and groundwater are anticipated due to the Project updates. Therefore, there have been no changes to the risk rankings of any of these factors.

Table 2.3: Additional Conservation Significant Flora Locations

Species	Conservation Significance	Populations Located	Approximate Number of Individuals
Abutilon uncinatum ms	Priority 1	3	>40
Triumfetta echinata	Priority 3	4	>35
Abutilon sp.	Undescribed	7	>50

Table 2.4: Changes to Locally Significant Vegetation Units

Vegetation Code	Extent Within Survey Area (ha)[1]	Extent Within Project Footprint (ha)	Percentage of VU to be Cleared Within the Survey Area	Local Conservation Significance
ID1	247.53	101.90	41.17	**High**
ID2	221.58	24.38	11.00	**High**
ID4	12.48	0	0	**High**
C3	1089.38	522.54	47.97	**High**
C3 / CP1	58.42	1.80	3.08	**High/Moderate**
C3 / C2	17.18	0.00	0.00	**High/Low**
CP1	802.74	88.24	10.99	**Moderate**
CS1 / CP1	138.50	0.00	0.00	**Low/Moderate**
CS4 / CP1	29.12	4.26	14.62	**Low/Moderate**

1 Updated Survey Area encompasses approximately 13 000 ha.
An additional 20.12 ha of already cleared land (tracks and roads) exists in the Project footprint, of a total of 165.22 ha of cleared land in the survey area.

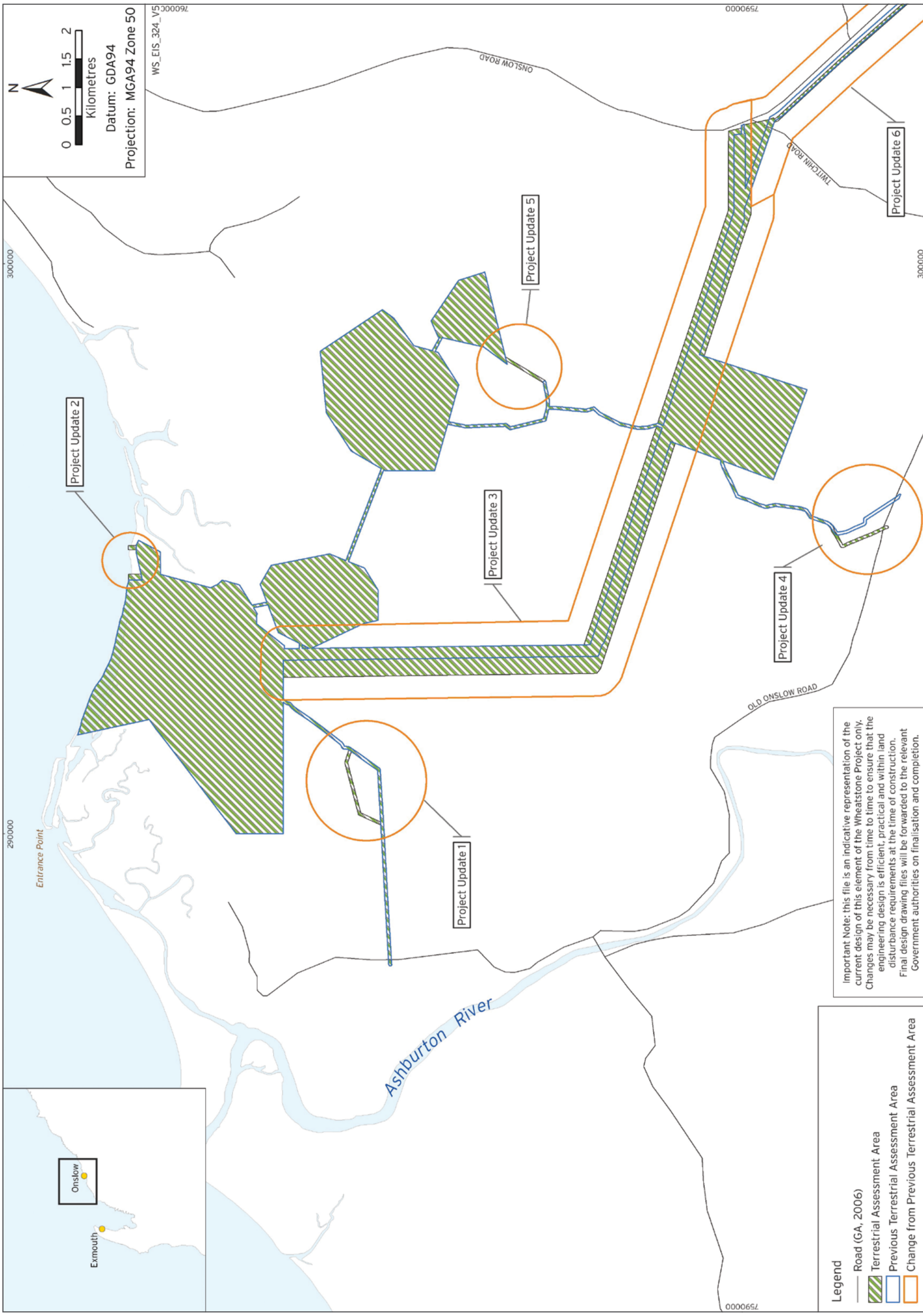


Figure 2.2: Location of Terrestrial Project Updates

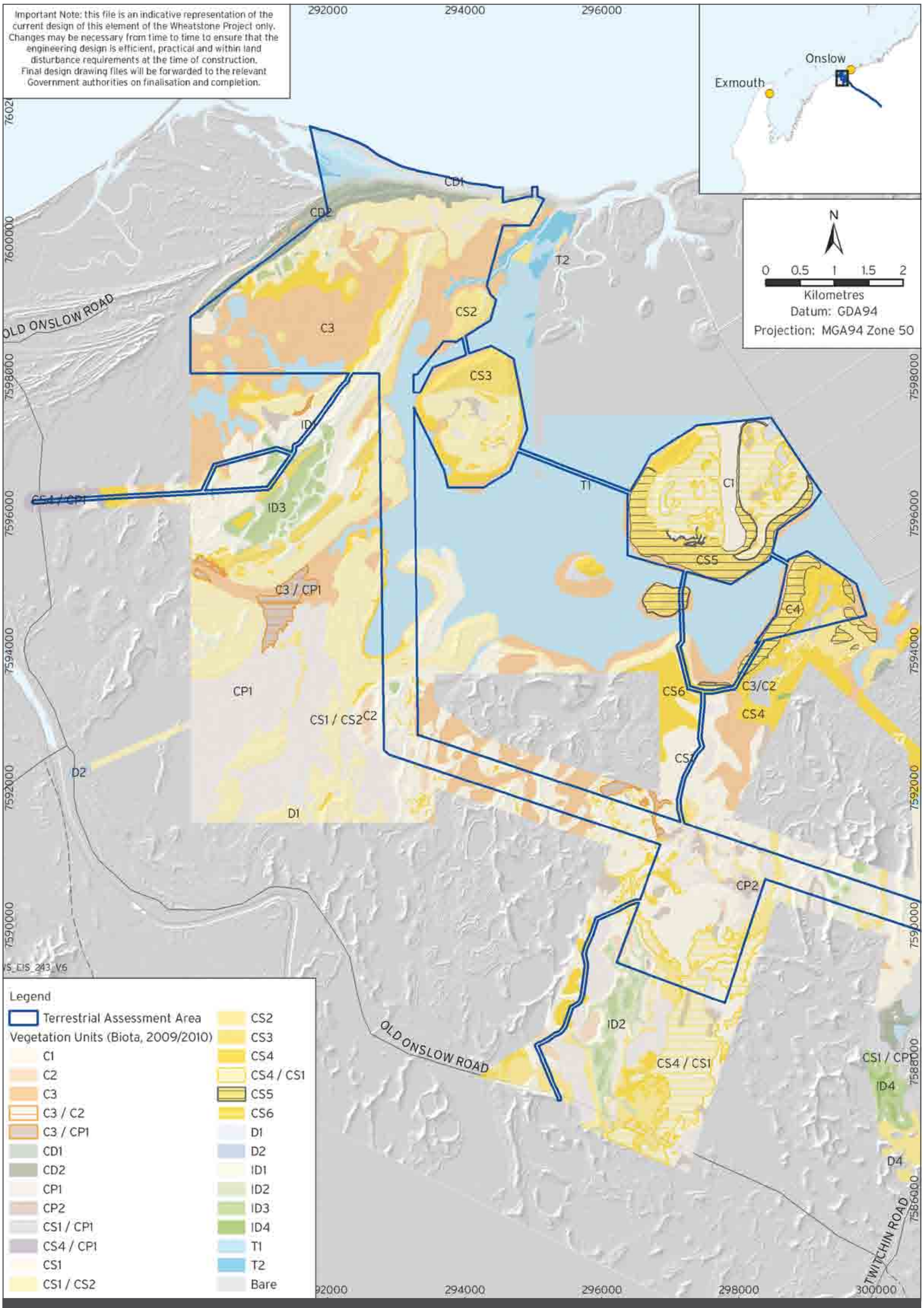


Figure 2.3: Vegetation Mapping with Borrow Site 4 Update

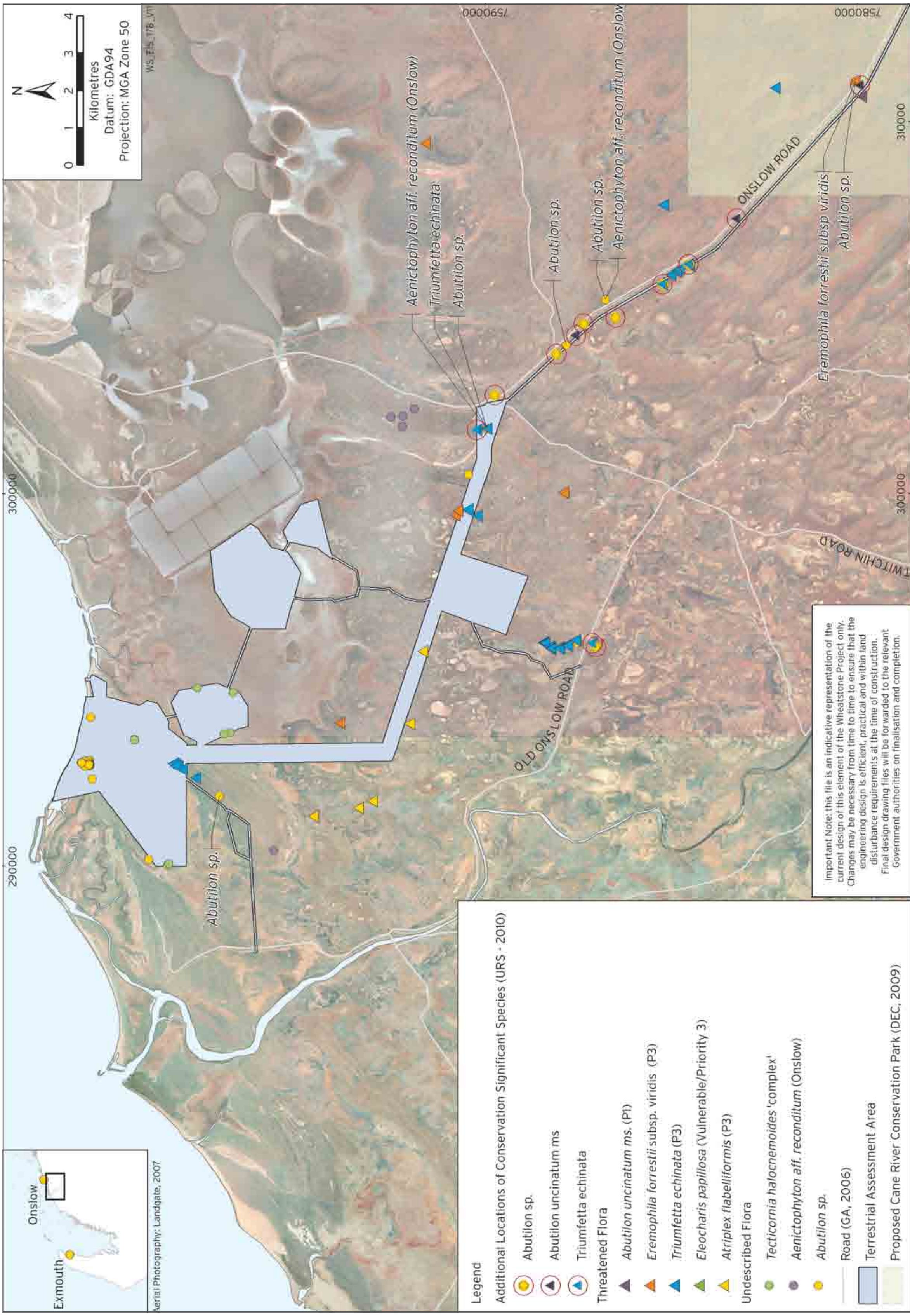


Figure 2.4: Threatened Flora Location

2.1.3.4 Management Measures
No change to those described in the Draft EIS/ERMP.

2.1.4 Beach Crossing Design Concept

2.1.4.1 Concept Outlined in the Draft EIS/ERMP
For the selected beach crossing location at the periphery of the mangroves, an open-cut trench is feasible but not considered technically optimum due to the length of open-cut excavation required and the nature of the environment. This option may have a negative impact on the immature mangroves in this area.

2.1.4.2 Description of Change
Microtunneling has been confirmed as being technically feasible at the selected beach crossing. As a result and in order to reduce the potential environmental impacts of the Project, the open trenching option has been discarded.

2.1.4.3 Environmental Implications
Potential environmental impacts to marine water quality and mangroves associated with the trenching option for the trunkline beach crossing include:

- Increases in localised and temporary turbidity in adjacent waters and within the lagoon created by the construction and removal of the trench berms
- Changes to water flows east of the rock berms and coffer dam, and potentially restricted tidal flushing
- Temporary disruption to coastal processes with potentially sediment accretion on the western side of the berms and erosion on the eastern side
- Limited destruction of mangrove seedlings and samphires in the lagoon during construction works.

The assessment of the trenching option for the trunkline beach crossing determined a "Medium" residual risk to marine water quality and a "High" residual risk to benthic habitats, namely mangroves. Discarding the open trenching option effectively eliminates these risks.

The assessment of the microtunneling option for the trunkline beach crossing determined a "Low" residual risk to marine water quality and a "Low" residual risk to benthic habitats, namely mangroves.

The overall environmental implication for the change is a considerably lower residual risk for both water quality and mangroves at the selected beach crossing location.

2.1.4.4 Management Measures
No management measures are applicable to this update.

2.1.5 Alternatives to Sea Disposal

In addition to the preferred alternative; offshore disposal of all dredge material, and a combination of offshore and onshore dredge material placement has also been evaluated as required under the Environmental Assessment Guideline No. 7 (EPA 2009) and the National Assessment Guidelines for Dredging (NAGD) (Commonwealth 2009). A Dredge Placement Report has been drafted to present this in full and will be appended to the official Sea Dumping Permit Application. A summary of the main findings are presented in the following.

The final selection criteria for dredge material placement focused on the following key considerations:

- Reduction of environmental impacts
- Optimisation of cost and schedule impacts
- Optimisation of construction logistics
- Dredge material characteristics (i.e. sands, fines, clays etc.).

2.1.5.1 Evaluation of Disposal Site Alternatives
The nearshore dredging requires the use of a Cutter Suction Dredge (CSD). This type of dredging plant delivers material from the seabed hydraulically by pipeline. Options for disposal of material dredged by CSD is discharged to a placement site by pipeline, discharged to barges for offshore disposal or discharged to the seabed for subsequent re-dredging by trailer suction hopper dredger (TSHD) and offshore placement. At this site the re-dredging option (double handling) is a possible method of material removal and transport.

Double handling of dredged material in the MOF may involve a CSD hydraulically removing material from the MOF area, pumping it through a pipeline and placing it within the navigation channel further offshore. A TSHD would re-dredge this material and transport it to an offshore placement site. The material will be contained within the TSHD and placed via bottom-dump hull doors to the sea bottom within the defined placement site(s).

With the type of large CSD likely to be required to undertake the works at the MOF, pipeline discharge for distances up to about 3 km is likely to be practical. This introduces the possibility of discharging material from the CSD to an onshore placement area. To explore this option further cost estimates have been developed for the maximum quantities of material which are technically feasible to place onshore. This volume of 10.2 Mm^3 (measured in-situ) is based on all the material required to be dredged within 3 km of the shoreline.

Three Scenarios have been evaluated for this cost illustration:

1. No onshore placement of the nearshore material (~10.2 Mm^3)
2. An optimised onshore placement plan of about 6.8 Mm^3 onshore and 3.4 Mm^3 offshore
3. No offshore placement of the nearshore (~10.2 Mm^3) material.

A unit rate of about \$41 p/m^3 is assumed for offshore placement and a unit rate of about \$50 p/m^3 for onshore placement is assumed. For onshore placement there are significant additional costs associated with procurement of suitable fill for constructing the onshore bunds. Subsequent engineering, maintenance of these bunds and related control structures for the onshore placement site also drive substantial costs.

Scenario 2 is considered to be the optimised case for onshore placement maximising the volume of onshore placement whilst minimising the costs for onshore engineering. With increased volumes for onshore placement there are additional engineering costs for bunding further areas of the site. Table 2.5 summarises the cost estimates.

The onshore placement considered here is simply onshore discharge of the material arising from the dredging activity. The material placed onshore is not selectively sandy or gravelly in nature but a mixture of the materials arising from the action of the CSD. It is anticipated that the fines content of the mixture arising will be in the region of 40%. The material discharged onshore will thus not all be suitable as fill or for reuse elsewhere on the site. To maximise recovery of coarse material from the onshore placement would require a proportionally greater footprint for the fill area to manage physical separation of the coarser material from the fines. This would further increase costs for onshore placement.

Notwithstanding the increased costs associated with onshore placement options, further consideration is given to the design and impacts associated with onshore placement of some of the material arising from the dredging.

2.1.5.2 Suitability of the Site for Onshore Placement

The geotechnical nature of the onshore Project site, which consists mainly of clay plans and tidal flats, indicates that it is not sufficiently stable to support the weight/construction of containment bunds.

The proposed LNG Plant site, due to its low lying nature, demands large quantities of fill material that is not readily available in close vicinity. Onshore placement of dredge material will require bunds with significant height to provide sufficient air volume to manage the soils, protection against storm surges and soil stabilisation for construction of bunds. These requirements would result in the need for large quantities of imported fill material for building the bunds; hence significantly reducing the net recovery of suitable fill material.

Due to the previously mentioned high cost of imported fill material for construction of containment bunds and the extensive amount of bunding required to recover the dredge material, investigations also indicate that the cost of placing material onshore is relatively higher compared to the "all offshore placement" option.

2.1.5.3 Schedule

Schedule considerations also impact on the feasibility of onshore placement of dredge material. The initial dredging work is driven by the need to complete the MOF as this is a critical component of the overall Project schedule. During initial dredging work, access to the site will be limited and bunds will not be available for containment of dredge spoil onshore. Therefore, it is necessary to place the early dredge spoil offshore, further reducing the net recoverable fill material.

Table 2.5: Cost Estimates for Dredging and Disposal of 10.2 Mm^3 of Nearshore Material

Scenario	Placement Volume (Mm^3)		Cost breakdown ($ million)			Total Cost ($ million)
	Offshore	Onshore	Placement Offshore	Placement Onshore	Onshore Engineering	
1	10.237		423			423
2	3.454	6.783	143	339	100	582
3		10.237		511	195	706

In all possible dredge placement scenarios, a considerable quantity of dredge material is required to be placed offshore. A combined approach utilising both offshore and onshore placement of dredge material introduces additional environmental risks, these include potential impacts on:

- Groundwater flow and quality
- Surface water drainage and quality
- Vegetation and fauna habitat
- Nearshore marine water quality.

These environmental risks are discussed in more detail in the following.

2.1.5.4 Environmental Considerations for Onshore Placement

The onshore placement area has the potential to impact groundwater, the mangroves, and the nearshore environment as a result of the decant water outfall.

Groundwater

Dredge material placed onshore typically has solids to water ratio of 1:5. During the drying process, the water runs off as decant water evaporates, seeps out of the bunds to run off into the southwest catchment, or seeps directly into the groundwater below the placement area. The potential groundwater impacts related to the onshore placement include:

- Mounding of the local water table due to the infiltration of seawater within the placement area
- Increased salt loadings to the water table.

Mounding of the Water Table

Mounding of the water table is predicted to occur due to the infiltration of seawater from the placement area. The mounding propagates from, and expresses as, groundwater seepage on the perimeter of the containment bunds of the placement area. The water table is predicted to mound beneath the placement area 18 months after the dredging campaign. After the cessation of the dredge material disposal, the mounding of the water table is anticipated to progressively decay. The decay occurs in response to dewatering and consolidation of the disposed dredge material and water losses to seepage and evaporation.

Ultimately, a modified steady-state water table mound is likely to occur beneath the dredge material placement area and Plant Pad. After 50 years, the water table is predicted to have decayed to a steady-state with subtle (about 0.5 to 1.0 m height) mounding above the baseline water table elevations. This likely residual mound will be due to an altered water balance (with increased recharge across the raised placement area and Plant Pad), with radial groundwater flow. The elevated groundwater level has the potential to impact the mangroves by altering their habitats such that the roots are consistently waterlogged rather than exposed to tide-dependent rising and falling water levels.

Changes to Groundwater Quality

The placement area naturally contains brackish to saline groundwater in shallow water table settings. The mounded water table will contain, to a large extent, seawater that infiltrates from the disposed dredge material within the placement area. The infiltration of seawater may alter the local salinity profiles within the local Dune Sands and Ashburton River Delta Alluvium. Thereafter, it is expected that the consolidated and dewatered dredge material will hold about a 90 tonne mass of salt, and that the salt in storage above the water table will eventually be dissolved and mobilised by rainfall infiltration, enter the water table and be transmitted to local receptors.

The baseline salinity of the shallow groundwater beneath the placement area is saline to hypersaline, being typically 50 000 to 150 000 mg/L in the Ashburton River Delta Alluvium and 20 000 to 120 000 mg/L in the Dune Sands. Dissolved salts in the seepage water would mix with the local groundwater. The mixing with the groundwater and ultimate flow paths would be controlled by the salinity (density) of the seepage water compared with those of the shallow groundwater.

Potential impacts on salt loadings to and salinity concentration of the shallow groundwater from the infiltration of seawater would be reduced by enabling consolidation and dewatering of the disposed dredge material. The rapid lowering of the mounded water table within the disposed dredge material would reduce the concentration effects of evaporation, thus reducing both the potential salt loadings and concentrations of infiltrates, potentially impacting the mangrove habitats normal salinity level.

Potential Mitigation Measures

- Drainage of decant water over the placement area will be to the south away from the mangrove systems therefore managing the potential impact from rising ground water levels
- Seepage will concentrate on the southern perimeter bund
- Where practical, placement in the eastern half of the placement area will be preferred to limit water levels in (and seepage from) the western half of the placement area
- Placement approach to promote trapping of fines in the settled material, reduces amounts of fines in suspension, and potentially reduces water levels in the placement areas and seepage
- Bunds will be designed to withstand erosion during inundation events
- Discharge of decant water during the first 18-24 months will be pumped via pipeline to a marine outfall
- A drainage ditch (with sump and pump system) will be installed to collect and divert seepage away from the Ashburton Delta system
- Groundwater monitoring bores will be installed to detect any alteration of groundwater conditions that may indicate a potential risk to the Ashburton Delta system.

Surface Water

Dewatering of the dredge material will occur during and after the placement through the decanting of supernatant seawater, with consolidation processes aided by evaporation, seepage into the groundwater environment and leakage into the surface water environment. Potential surface water impacts to the environment related to the onshore disposal of dredge material may occur due to:

- Overtopping of available storage
- Seepage and leakage from the dredge material placement area expressing as surface water flows on and adjacent to the perimeter bunds of the dredge material placement area.

Overtopping

The disposal of decanted seawater and unexpected overtopping of the available storage may impact the hydrology and flow characteristics of the receiving environments. These impacts may be temporary, for the duration of the dredge material placement and shortly thereafter.

Overtopping of the dredge material placement area may result in the uncontrolled discharge of surface water (seawater and runoff) into Southwest Sub-catchment and Ashburton River Delta. Such an occurrence may impose on the immediate Southwest Sub-catchment a potentially turbid surface water stream that exceeds baseline values both in terms of flow volumes and quality. Potential impacts are expected to be short-term and temporary, given possible concurrent flood and tidal occurrences, the dynamic nature of the local environments and proximity to the marine interface.

Seepage to Surface Water

Seepage of water from the dredge material placement area may express as discharge on the ground surface and associated surface water flows within the Southwest Sub-catchment and Ashburton River Delta. After the cessation of the dredge material disposal, the seepage through the dredge material placement area bunds, and the surface expression of seepage due to mounding of the water table progressively decays. The decay of seepage rates occurs in response to dewatering and consolidation of the disposed dredge material.

Seepage that expresses as surface water flows has the potential to both change the frequency of surface water flows on local watercourses and lead to water-logging of watercourses and surrounds, including mangrove habitat. Seepage is anticipated to occur on the southern perimeter within the Southwest Sub-catchment or on the western perimeter of the placement area. The seawater seepage expressed as surface water flows may discharge to marine habitats of the Ashburton River Delta. This surface water discharge may potentially impose impacts to the marine habitat; discussed in the following.

Potential Mitigation Measures

- Dredged material will be contained in a bunded area to prevent unconfined release of seawater and sediments
- The placement of material into the sites will promote trapping of fines in the settled material and reduce the amounts of fines in suspension

- Drainage of decant water over the placement area will be to the south away from the mangrove systems therefore managing the potential impact from rising ground water levels
- Seepage will concentrate on the southern perimeter bund
- The placement approach will potentially reduce water levels in the placement areas and seepage
- Where practical, placement in the eastern half of the placement area will be preferred to limit water levels in (and seepage from) the western half of the placement area
- Bunds will be designed to withstand erosion during inundation events
- Water levels within the bunded area will be managed to avoid overtopping of the bunds, even during extreme high rainfall
- A drainage ditch (with sump and pump system) will be installed to collect and divert seepage away from the Ashburton Delta system
- Containment of dredge material in a bunded area to prevent unconfined release of seawater and sediments.

Mangroves

The Ashburton River Delta supports 526 ha of mangroves and diversity of mangrove assemblages. The EPA Guidance Statement (GS No. 1) for protection of tropical mangroves along the Pilbara coastline (EPA, 2001) identifies the Ashburton River Delta as a Guideline 1 Area of very high conservation value and "regionally significant". In addition, the EPA Environmental Assessment Guideline 3 (Protection of Benthic Primary Producer Habitats in Western Australia's Marine Environment) links the above advice to EAG 3 Category A and provides the guidance that "No development activities should take place in these areas, nor should there be any development elsewhere, that would cause direct or indirect damage/loss of Benthic Primary Producer Habitat (BPPH, for example mangroves) or ecological integrity of these areas. (Cumulative Loss Guideline = no loss of BPPH)".

Potential Impacts to Mangroves

As part of baseline surveys for the Project the distribution of intertidal habitats (including mangroves) within the Ashburton River Delta have been mapped (see Figure 6.32 in the Draft EIS/ERMP). Importantly, it is understood that habitats occurring along the more landward parts of the mangrove zone are adapted to the fluctuating water tables with levels being typically:

- 0.5 to 1.0 m below ground level during the neap tide phase when tidal inundation/recharge is less frequent
- Close to the ground surface during the spring tide phase when tidal inundation/recharge occurs twice daily.

The altering of this water table fluctuation can cause localised mangrove mortality. Potential impacts to the mangroves arise from the mounding water table (see Section 8.3.5.9 in the Draft EIS/ERMP) which leads to the creation of hydrostatic pressure head altering water tables immediately adjacent to (~100 m) the placement area and forcing highly saline groundwater into this zone. They can also arise from seepage to the surface water which subsequently runs off into the mangrove system.

In several case studies where similar ponds have been constructed close to mangroves, the seepage outside of levee walls has caused water logging and localised mangrove mortality. An example of this effect was from the construction and filling of a concentrator pond (for solar salt production) at Port Hedland. The pond was located on high tidal mud flats at the landward edge of the mangrove zone and was filled with seawater to a depth of approximately 1 m. Rising groundwater levels resulted in water logging and saturation of the mangrove root zone causing deterioration in mangrove condition (ranging from partial to complete defoliation) within about 100 m of the pond levee.

Due to the highly regulated and sensitive nature of the mangroves, this potential risk requires extensive mitigation to monitor for and prevent negative impacts to this system.

Potential Mitigation Measures

- Selection of placement site to avoid direct loss of mangroves
- Drainage of decant water over the onshore placement area will be to the south away from the mangrove systems therefore managing the potential impact from rising ground water levels
- The onshore dredge material placement area will be designed to incorporate internal bund walls and settlement ponds to ensure maximum settlement of fines prior to the discharge of decant water
- Groundwater monitoring bores installed to detect any alteration of groundwater conditions that may indicate a potential risk to the Ashburton Delta system
- A drainage ditch (with sump and pump system) will be installed to collect and divert seepage away from the Ashburton Delta system

- A comprehensive mangrove monitoring program will be designed and implemented on the basis of the potential for change to mangrove health and mangrove habitat condition as a result of Project activities. Monitoring will include:
  - Mangrove tree species composition and density
  - Mangrove tree health (canopy density and/or tree condition data)
  - Groundwater/soil water salinity and water table depth
  - Sediment heights and ground levels
  - Hydrocarbon and heavy metal concentration in mangrove sediments and selected mangrove-dependant fauna
  - Diversity and abundance of mangrove-dependant fauna
  - Mapping of mangrove habitat distribution and coastline movements.

Nearshore Environment

The decanted tailwater will be discharged into the nearshore environment via ocean outfall. Stilling ponds will be created to settle fines prior to release from a shoreline outfall located to the west of the MOF. Scenarios that have been modelled that include onshore placement have indicated the decant water discharge is lost within the plumes generated by the nearshore dredging activity. There is no BPPH sensitive to turbidity in the nearshore zone immediately adjacent to the plant site. Therefore, no direct loss of BPPH is anticipated from this activity.

Mitigation measures for decanted tailwater impacts may include:

- The decanted seawater will be managed such that the ANZECC Guideline Electrical Conductivity and turbidity trigger values are not exceeded
- Monitoring of the decant water discharge will be undertaken
- Discharge of decant water from the onshore reception area will be via a controlled point which will include the use of a weir box to control water height. Discharge water quality into the near-shore water will not exceed ANZECC values for electrical conductivity and turbidity
- The onshore dredge material placement area will be designed to incorporate internal bund walls and settlement ponds to ensure maximum settlement of fines prior to the discharge of decant water.

Given the design, cost, schedule and environmental considerations outlined above, full offshore placement of dredge material is the preferred option for the Project.

2.2 Nearshore

2.2.1 Materials Offloading Facility (MOF)

2.2.1.1 Concept Outlined in the Draft EIS/ERMP

The Draft EIS/ERMP assessed a MOF comprising two combined breakwater and sediment infill protection walls which enclose a small boat harbour and cyclone shelter on the western side, plus three large-vessel berths that can all be operated concurrently (see Figure 2.17 of the Draft EIS/ERMP). As part of the continued development of the Project design, an alternative MOF layout to the base case assessed in the Draft ERMP/EIS has been proposed.

2.2.1.2 Description of Change

The key differences between the layout assessed in the Draft EIS/ERMP and the alternative layout include the following:

- The Draft EIS/ERMP base case layout has a main western and an eastern breakwater. The alternative layout has a single western breakwater.
- The western breakwater for the alternative layout is extended seaward by about 250 m. The present document compares the key potential impacts from the alternative layout with the base case layout assessed in detail in the main Draft EIS/ERMP documents.

A MOF layout change affects the modelling carried out to support the Draft EIS/ERMP in three key areas:

- Coastal processes and impacts
- Dredge plume modelling for the nearshore area
- Liquid hydrocarbon spill modelling for the MOF.

Remodelling of the three key areas with the alternative MOF layout has been carried out and compared to the findings for the base case layout for all three components. The results are summarised in the following sections. The alternative layout is presented in Figure 2.5, and a more detailed assessment is found in Appendix FJ of this document.

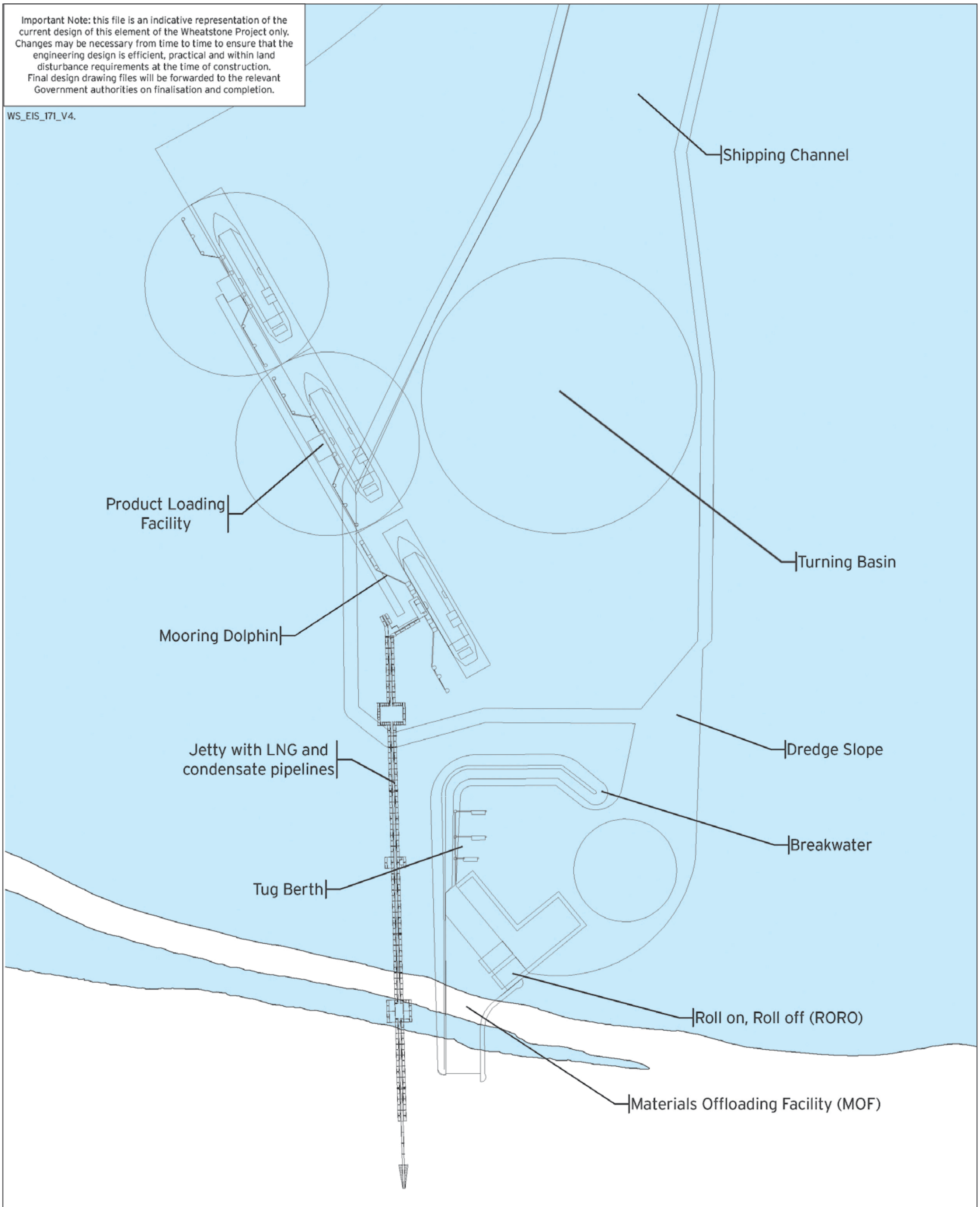


Figure 2.5: Alternative MOF Layout

2.2.1.3 Environmental Implications

Coastal Impacts

The key impacts, which are related to a complete blockage of the littoral sediment transport by the MOF and associated dredged access channel, are similar for the two MOF layouts. Unmitigated, this will on average lead to a build-up of sand to the west of the MOF, and erosion to the east of the MOF, although there may be years with a reversal of this pattern, in particular under influence of cyclones.

Sediment accumulated on the eastern side of the eastern breakwater in the base case MOF layout will tend to be transported into the MOF basin for the alternative MOF layout. Whereas the sediment accumulation in the downdrift sheltered zone for the base case MOF layout will initially cause an additional lack of sediment further to the east in the overall sediment budget, this will stabilise within a few years as a new quasi-equilibrium state of the coastline is reached. For the alternative MOF layout, regular maintenance dredging of the MOF basin will be required to maintain it as fully operational, and this will prevent a new quasi-equilibrium coastline to establish on the downdrift side of the MOF. A continued "sediment sink" is therefore expected for the alternative MOF layout.

The differences in sheltering zones by the two layouts considered leads to some differences in the main zones of erosion to the east of the MOF. The sheltering by the eastern breakwater in the base case MOF layout tends to stretch further eastward than the sheltering induced by the alternative MOF layout during summer conditions. This would likely lead to a shift westward of the main erosion zone for alternative MOF layout compared to base case MOF layout. This may, however, be balanced by protective exposed rock in this area. The erosion will gradually migrate further eastward if left unmitigated.

The overall impacts on the coastal morphology will depend on the coastal management strategy implemented. Appropriate management of the difference in coastal impacts between the two layouts will be restricted to a difference in the coastal configuration in the vicinity of the MOF. The overall sediment budget will be similar. Consequently the environmental impact predictions presented in the Draft EIS/ERMP are also applicable to the alternative MOF layout.

Dredge Plume Impacts

The changes in current patterns due to the different MOF layout are localised and will not impact the farfield plume dispersion, but will impact the initial dispersion from the source(s) when dredgers are working within or in the vicinity of the MOF.

The largest differences in plume dispersion for the alternative MOF layout are realised for Dredge Scenario 3 with CSD dredging inside the MOF during winter. Whereas the plume from the cutter head to a large extent remains within the MOF for base case MOF layout, it is pushed seaward during winter and mixes with the plume from the overflow and the simultaneous TSHD dredging for the alternative layout, leading to higher combined concentrations and larger predicted impact zones.

Dredge Scenario 2 also has CSD dredging in the nearshore area, but outside the MOF, such that the difference between the two MOF layouts for this dredge scenario is insignificant. Although Dredge Scenario 2 does not include simultaneous TSHD dredging, the nearshore impact zones derived from this dredge scenario are larger than the impact zones for Dredge Scenario 3 for the base case MOF layout, and fairly similar to the impact zones derived for Dredge Scenario 3 for the alternative layout.

Whereas the change in MOF layout does lead to a significant change in the impact predictions for Dredge Scenario 3, the contingency in the scenario modelling approach of having other dredge scenarios with similar spills outside of the MOF ensures that the overall impact prediction can be considered to also cover the alternative MOF layout.

Overall it is concluded that the dredge plume modelling carried out in support of the impact assessment based on the base case MOF layout can also be deemed to cover the alternative layout for the MOF. Thus the alternative layout does not change the environmental impact predictions on dredge plume impacts presented in the Draft EIS/ERMP.

Spill Modelling

Only the simulated spill within the MOF changes significantly with the alternative MOF layout. The base case MOF layout encloses the spill within the MOF. Depending on wind and tide, the spill may remain within the MOF for an extended period of time before gradually "escaping" the MOF. The alternative layout in contrast often induces a stronger eddy circulation running through the MOF basin, and this may draw the spill out from the MOF basin.

Whereas the patterns vary with current and wind conditions, it generally leads to a higher probability of exposure and a shorter time to exposure for the alternative layout compared to the base case layout of the MOF. The implementation of appropriate spill response will ensure that the environmental impact predictions presented in the Draft EIS/ERMP are applicable to the alternative MOF layout.

2.2.2 Trunkline Route Nearshore

2.2.2.1 Concept Outlined in the Draft EIS/ERMP

The nearshore component of the trunkline route assessed in the EIS/ERMP is shown in Figure 2.6 as the "Original Route". The Draft EIS/ERMP presented a worst-case assessment of potential impacts arising from trunkline installation works because the installation methods were not yet confirmed. This worst case was based on the assumption that the trunkline would be installed into a trench dredged by cutter suction dredge (CSD) pumping directly into adjacent hopper barges with overflow.

2.2.2.2 Description of Change

Updates to the Project conducted since the publication of the Draft EIS/ERMP have led to the consideration of a potential change in route for the trunkline where it passes to the west of Thevenard Island. Alternative routes currently under investigation are shown on Figure 2.6. Confirmation of the proposed trunkline alignment in this area is ongoing. Consequently, approval is now sought for installation of the trunkline along an alignment to be confirmed within the green hatched area shown on Figure 2.6, labelled as "Refined Investigative Area".

2.2.2.3 Environmental Implications

The alternative alignments presently under consideration are shorter than the base case alignment, and pass closer to Thevenard Island and Brewis Reef, but further from Bessieres Island, than did the base-case alignment. Therefore the scale of both direct and indirect impacts on BPPH predicted in the Draft EIS/ERMP is likely to reduce as a result of the reduction (~ 3 km) in trunkline length in this sector of the route. Furthermore, it is expected that the reroute will result in a reduction in the length of trunkline that crosses hard seabed areas increasing the viability of other methods such as Trailer Suction Hopper Dredgers (TSHD) and post lay trenching techniques that cause less turbidity than the base case CSD model. However the impact zones arising from the worst-case dredging method assessed in the Draft EIS/ERMP will now move closer to Thevenard Island.

2.2.2.4 Environmental Assessment of Alternative Route

Predicted potential BPPH losses in this revised alignment have been estimated based on results of dredge modelling for the trunkline presented in the Draft EIS/ERMP for the base case (Refer Appendix S2). The assessment predicted that the maximum ***direct losses*** of BPPH from within the trunkline footprint (based on a 50 m wide corridor of permanent disturbance) would be:

- Approximately 85 ha of filter feeder habitat (instead of 100 ha for base case).

Maximum ***indirect losses*** of BPPH arising from turbidity and sedimentation resulting from dredging and disposal operations for the trunkline were assessed to be:

- Approximately 1650 ha of filter feeder habitat (8.9%) in LAU 2D (instead of 2000 ha in base case)
- Approximately 1000 ha of filter feeder habitat (5.3%) in LAU 3A (same as base-case).

Brewis Reef was identified at potential risk of damage under certain conditions and appropriate management and mitigation measures will need to be adopted to minimise this risk during trunkline construction if this alignment is adopted. Coral reefs at Thevenard Island are unlikely to be damaged, but the Zone of Influence (turbidity but no damage) may extend over these reefs at various times during the trenching operation. Refer to Figure 2.7.

2.2.2.5 Environmental Assessment of Cumulative Impacts

An assessment of the potential cumulative impacts arising from trunkline installation works occurring at the same time as the dredging for the navigation channel has also been undertaken. A scenario assessment (modelling of various installation methods over a 14 day period) of potential cumulative impacts (presented as Appendix B within Appendix FN) demonstrates that simultaneous dredging for the navigation channel and the trunkline under worst-case climatic and dredge conditions can lead to a significant extension of the impact zones along the trunkline route if the two predicted plumes overlap. This has demonstrated the need for careful management of the trunkline installation works.

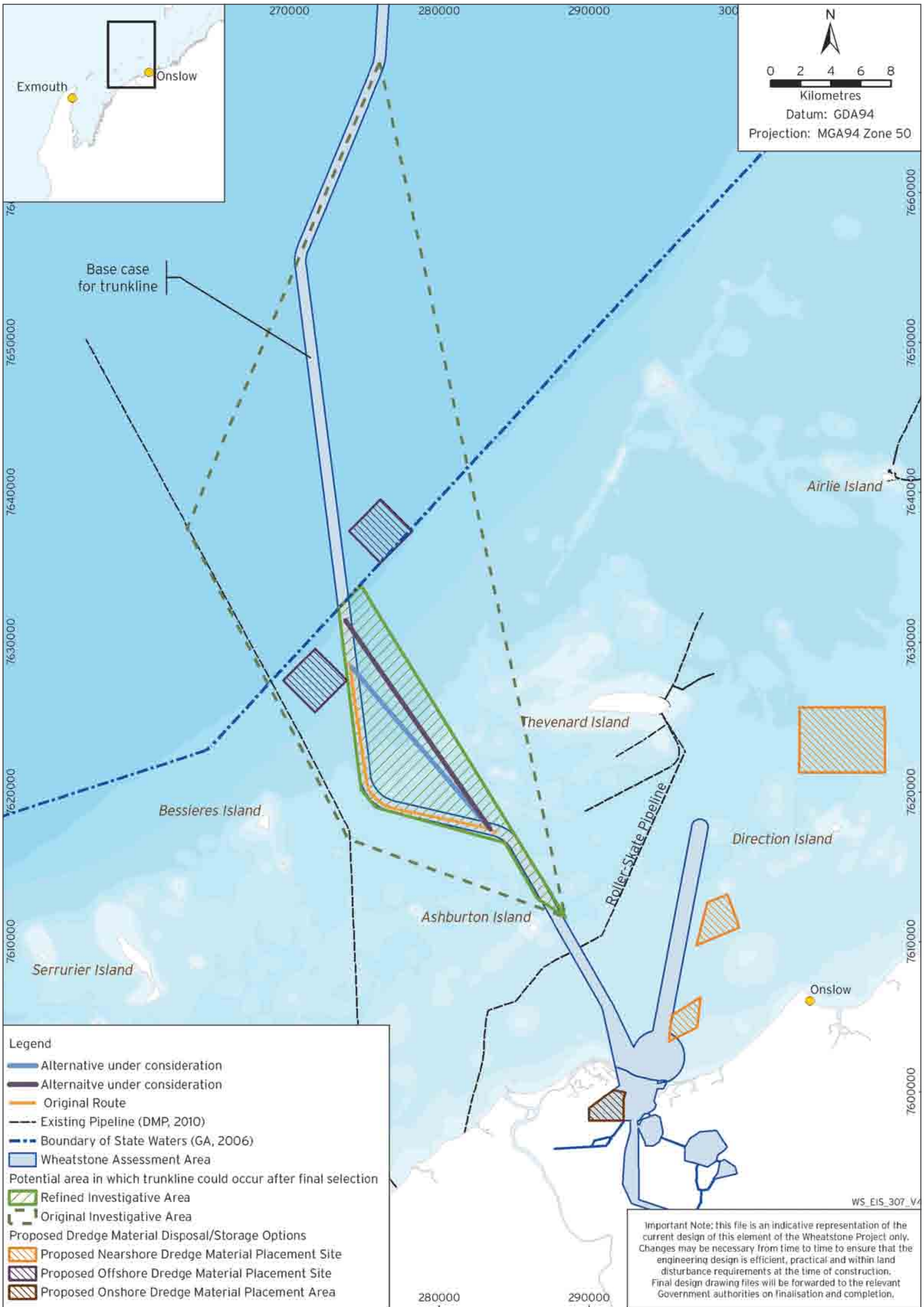


Figure 2.6: Nearshore Trunkline Route Alternatives Currently under Investigation by Chevron

Figure 2.7: Location of Live Coral Habitat in Project Area

2.2.2.6 Environmental Management

A number of management options are available to reduce the potential cumulative impacts, including:

- Avoiding overlapping plumes from other dredging activities, either by avoiding simultaneous dredging and/or dredging in areas along the same plume extension direction.
- Targeting seasons with the least risk of impacts, such as summer conditions, when dredging east of Ashburton Island.
- Reducing total sediment release and release rates, such as through the choice of methodology, or adapting methods of release reduction during the pipe laying.
- Monitoring to demonstrate that there will be no mortality of coral reef habitats as a result of trenching activities, including coral monitoring sites at Brewis Reef and Thevenard Island and the establishment of adequate reference sites.

Modelling has been carried out to investigate the efficiency of sample management options and has demonstrated that there is good scope for minimising the impacts through management of release e.g. reduced sediment release dredging and directing the sediment release away from sensitive habitats (refer to Appendix FN).

The range of management and mitigation options available enables avoidance of additional losses of BPPH arising as a result of undertaking both dredging programs synchronously. Consequently, additive impacts on BPPH resulting from synchronous dredging operations are not anticipated.

2.2.2.7 Conclusion

The Proponent now seeks approval to potentially adopt a shorter trunkline alignment to the west of Thevenard island within the area indicated on Figure 2.6, and commits to protecting the coral reefs around Ashburton and Thevenard islands and Brewis Reef from damage as a result of pipeline installation works, by adopting whichever mitigation action is considered to be most appropriate under the climatic conditions prevailing at the time of construction.

The worst-case scale of impacts assessed in the Draft EIS/ERMP are still applicable in the event that the base-case alignment is ultimately selected. However, if a shorter alignment is ultimately selected, then the scale of impacts to BPPH should reduce accordingly.

2.2.3 Offshore Accommodation - Floatel

2.2.3.1 Concept Outlined in the Draft EIS/ERMP

"During construction and installation, there may be a requirement for additional offshore accommodation in the form of a floatel or similar. This may be near the proposed platform location" (Draft EIS/ERMP Section 4.7.3).

2.2.3.2 Description of Change

The development of the nearshore infrastructure at the Ashburton North SIA requires a major capital works dredging program to construct navigable channels and basins for both a nearshore MOF and a product loading facility (PLF) and the installation of a subsea trunkline. The dredging program is anticipated to last for up to four years. This remote location requires an accommodation facility close by, to facilitate the work and enable operations with a double shift 24 hours a day, seven days a week. The use of a floatel for accommodating dredge personnel is proposed as one option. The alternate option is an onshore construction workforce accommodation village as discussed in the Draft EIS/ERMP.

The floatel will be a nominal 10 000 DWT, with at least 2500 KW generator capacity. The floatel will contain a waste water treatment plant (WWTP) of sufficient capacity and capabilities to meet MARPOL requirements. The WWTP will collect liquid waste from various facilities onboard including black and grey water. The floatel will have a reverse osmosis desalination plant capable of supplying the needs of the floatel. Brine from the RO plant will be discharged from the floatel. Non-controlled solid waste (cardboard, paper etc.) will be incinerated. Non-treatable and non incinerable waste will be barged to a port outside the Shire of Ashburton. Resupply to the floatel will be via barge from Dampier or other close port. Refuelling of the floatel with marine diesel will occur from bunker barges from Dampier or another port and compliance with a spill prevention plan will be compulsory. A multi-point mooring system will be used to anchor the barge.

The floatel is expected to be moored in the nearshore waters, away from sensitive marine receptors such as turtle nesting rookeries and coral reef assemblages described and delineated in the Draft EIS/ERMP. The mooring location will be identified in consultation with the appropriate regulatory authorities. Refer to Figure 2.8.

2.2.3.3 Environmental Implications

The marine factors identified as potentially being impacted by the floatel activities are:

- Marine water and sediment quality
- Benthic primary producer habitat
- Marine fauna.

Marine Water and Sediment Quality

Solid Waste

All solid wastes generated offshore will be transported to shore for onshore disposal. The only exception to this would be putrescible organic matter and sewage, which would be treated in line with the MARPOL requirements.

Liquid Waste

Liquid wastes to be discharged from the floatel will include RO brine, domestic grey water and treated sewage. Cooling water from the generators will also be discharged. The amount and nature of liquid waste will be assessed when the floatel specifications are known relating to liquid emissions. Liquid wastes will be treated to relevant standards then released to the environment in accordance with regulations. Approvals for discharges will be sought with the Works Approval.

Accidental Release

The floatel will require refuelling, loading and unloading of materials, and effluent and rubbish removal. In the unlikely event of an accidental release to the environment, the nature of the release could be some hydrocarbon or sewage effluent. Emergency plans will be drafted to mitigate any release to the environment.

BPPH (Benthic Primary Producer Habitat)

The floatel is a floating structure maintained in place by anchors. The site-selection process will locate the floatel away from known sensitive BPPH receptors including reefs and denser seagrass beds in the Project area. The floatel structure could be temporarily colonised by algae and corals while on location.

Marine Fauna

Fish

The presence of a floating structure could attract fish similar to those that congregate under piers and around docks. Fish are usually attracted to shade and would likely congregate under the structure.

Invertebrates

Some planktonic invertebrates would settle on the submerged part of the structure, which would provide a substrate for various growth forms.

Marine Mammals

It is expected that marine mammals would be indifferent to the structure. The potential noise generated by the floatel could modify foraging behaviours of marine mammals. The location of the platform will be considered to minimise disruption to marine mammals.

Seabirds

Seabirds will likely be attracted to the fish aggregations expected to form in the vicinity of the floatel. They may also seek to rest on the structure of the floatel itself.

Turtles

The light emitted by the floatel could potentially affect sea turtle navigation at certain times of the year. The site-selection will need to avoid location in areas where light emissions may impact known seasonal nesting sites located on offshore islands in the Project area.

Introduced Marine Pests

A specific risk assessment for the floatel in relation to Introduced Marine Pests (IMPs) would be required.

2.2.3.4 Risk Ranking

With the implementation of the mitigation measure described in Table 2.6 and adherence to MARPOL, it is expected that a marine construction supply vessel floatel will have little impact on the marine environment in the Project area. The residual risk to the environment was assessed as being "Low" – of "Minor" consequence arising from a local, short-term, and small reduction in water quality, with no exceedance of background and applicable ANZECC/ARMCANZ water quality (WQ) guidelines, and impacts are "Likely" to occur.

Table 2.6: Residual Risk Ranking for the use of a Floatel

Factor	Impact	Consequence	Likelihood	Residual Risk Ranking	Mitigation
Marine water and sediment quality	Liquid discharges leading to decreased water quality	MINOR (Local short term and small reduction in water quality with no exceedance of background and applicable ANZECC/ARMCANZ WQ guidelines	Likely	Low	Discharges in conformance with MARPOL and relevant standards
BPPH	Shading of BPPH	NEGLIGIBLE (No irreversible loss of BPPH)	Possible	Very Low	Avoid locating floatel near sensitive BPPH receptors
Marine Fauna	Disruption of some marine fauna	NEGLIGIBLE (No detectable impacts to communities and populations)	Possible	Very low	

2.3 Revision of Project Characteristics Description

2.3.1 Updated Project Description

The result of the Project Updates described in the sections above is that the Project Description Table presented in the Draft EIS/ERMP must be presented with the revised information. Please see the updated Project Description in Table 2.7.

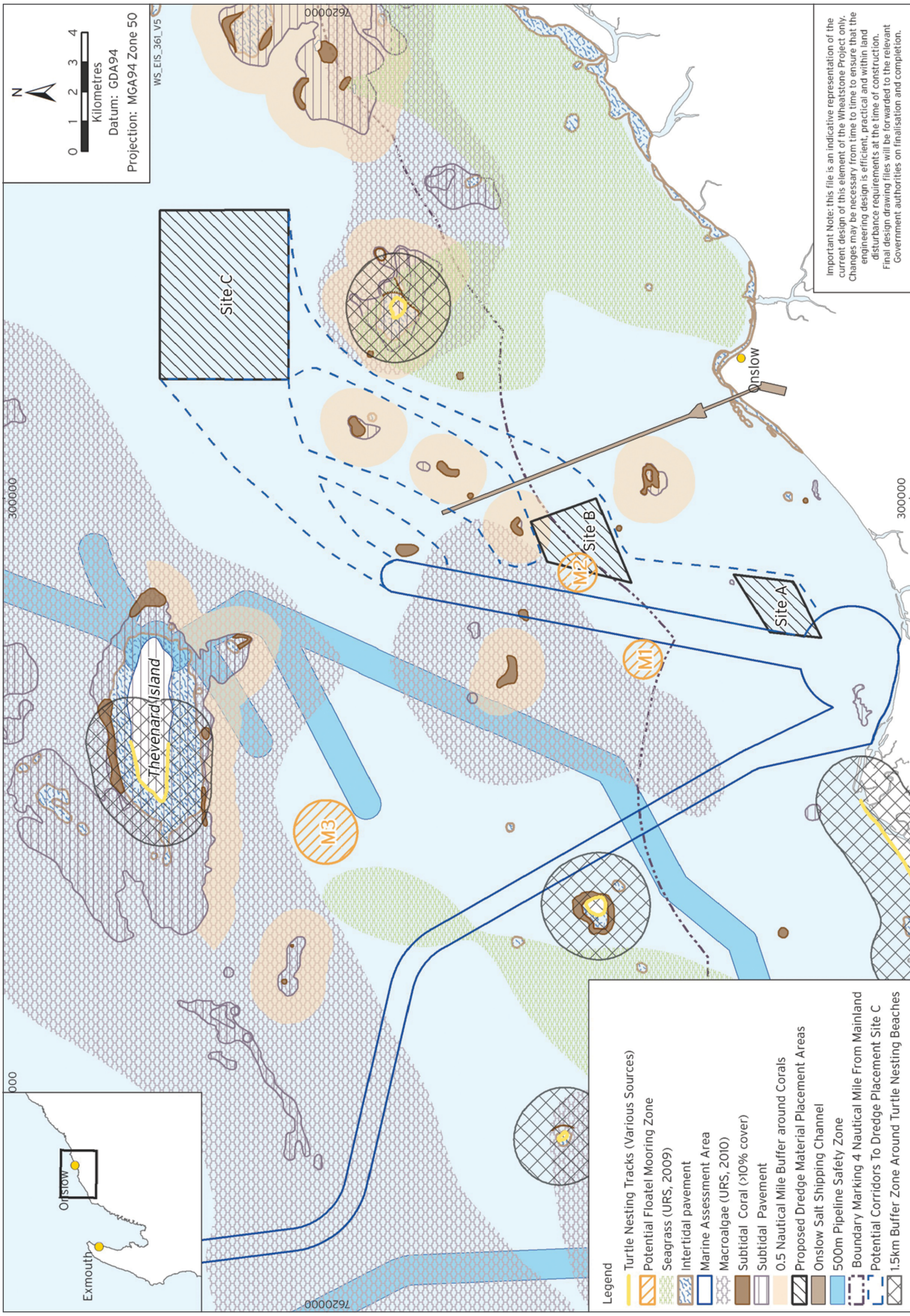


Figure 2.8: Proposed Mooring Location of Floatel

Table 2.7: Project Description Table

Facility	Element		Description
Offshore Facilities			
Drilling		Subsea Wells	Up to 35 production wells.
		Cuttings	~500 to 700 m^3 per well.
		Flaring	~100 MMscfd (over a 48-hour period, per well) for well clean up.
Manifolds and Interfield pipelines (Connecting wells to offshore Platform)			Up to 11 manifolds. Multiple interfield lines servicing wells.
Wheatstone Platform (WP)	Details	Location	145 km off the north-west coast of WA in the West Carnarvon Basin, 220 km from Onslow.
		Processing Capacity	~9 MTPA of LNG.
		Structure	1 central (gravity-based, steel or concrete) platform, with provision for additional support structures if required, in approximately 70 m water depth. Alternate option is a four legged steel frame jacket.
		Persons on Board (POB)	Up to ~100 people.
	Utilities	Power Generation	~30 MW – Configuration: 3 x 50% Generators (10 MW per unit) with waste heat recovery.
		Water Usage	~1.2 m^3/hr – sourced from RO unit.
		Flaring Volumes (feed gas)	Typical blowdown and start-up of topsides ~115 000 m^3. Blowdown and restart of entire gathering system ~8 500 000 m^3. Normal operations ~60 000 m^3/day.
	Discharges	Produced Water (PW)	~6600 m^3 per day. Treated PW discharged overboard or reinjected.
		MEG	A total of 2700 m^3 of MEG injected during an entire gathering system start-up (150 m^3 per hour for 18 hours). No MEG recovered to the process. Alternate and most likely option is for a total of 1400 m^3 injected during an entire gathering system start-up. As much MEG recovered to the process as practicable.
		Cooling Water	~182 000 m^3/day.
		RO Brine	~114 m^3/day.
		Sewerage	29 m^3/day treated to MARPOL requirements.
		Waste Disposal	General solid waste, including scrap metal, plastics, glass, other inert wastes, hydrocarbon contaminated materials, spent process chemicals and containers, will be transported to onshore facilities for appropriate treatment and disposal.
Trunkline (from WP to onshore facilities)			One pipeline, up to 1.2 m (48”) diameter and approximately 225 km long from the WP to the shore crossing. Additional (future) tiebacks to shore will require own separate approvals. Open trench method with up to 3 000 000 m^3 dredge spoil (offshore pipe stabilisation).

Facility	Element		Description
Nearshore Facilities			
Product Loading Facility (PLF)			Up to 2.5 km long with export facilities for up to three LNG tankers and up to two condensate tankers.
Materials Offloading Facility (MOF)			One MOF to accommodate onshore construction.
Discharge lines			Wastewater discharge pipe(s) either on the PLF and/or separate subsea lines(s), to approximately the 5 m water depth contour for LNG trains 1 and 2. One produced water (PW) pipeline up to 0.51 m (20″) diameter and up to 50 km long from the onshore facilities to approximately 20 m water depth contour for LNG trains 3+.
Dredging			Up to 45 000 000m^3 of dredge material: • Approx 16 to 18 km long navigation channel • MOF • Turning basins • LNG/Condensate tanker berths.
Trunkline Shore Crossing			Microtunneling 2 to 3 m diameter tunnels (up to six tunnels), 1200 to 1400 m long.
Onshore Facilities			
LNG Facility	Details	Location	Ashburton North SIA, 12 km south-west of the town of Onslow in the Pilbara region of WA.
		LNG Technology	ConocoPhillips Optimised Cascade for the first two trains. Design is expandable to multiple trains.
		Final Processing Capacity	~25 MTPA.
		LNG Train Size	~4 to 7 MTPA.
		Number of LNG Trains	Up to six.
		Number of Storage Tanks	Up to four x 180 000 m^3 LNG tanks. Up to four x 120 000 m^3 Condensate tanks.
		Flare Design	The LNG plant will feature three above-ground flare groupings of High Pressure (HP) and Low Pressure (LP) flare stacks. The product offloading facilities will include three above-ground flare stacks.
		Facility Footprint	Total Project disturbance area (onshore) ~3300 ha. Breakdown: • LNG Plant (including CUCA, laydown areas etc) ~1010 ha • Shared Infrastructure Corridor (including Accommodation Village Area) ~1000 ha • Construction areas (roads, fill source etc.) ~980 ha • Domgas pipeline ~320 ha.

Facility	Element		Description
	Utilities	Construction Power Generation	~15 MW from onsite diesel generators. (No power will be sourced locally from Onslow). Construction power requirements for the development of LNG trains 3+ may source some power from the LNG facility.
		Operations Power Generation	~400 MW.
		Construction Water Usage	~4 232 000 m^3 of water is required for the construction of the 2 x 4.3 MTPA LNG facility. ~6 134 000 m^3 of water is required for the construction of 25 MTPA LNG facility (includes water use for construction of accommodation facilities).
		Operations Water Usage	150 m^3/hr potable (for 25 MTPA).
	Discharges	Produced Water (PW)	Up to 13 200 m^3 per day (~83 000 bbls/day), based on 25 MTPA case. LNG Trains 1 and 2 feed gas PW will be discharged at WP.
		Stormwater	Clean stormwater volumes will vary due to erratic local rainfall conditions, but may be up to 9600 kL/day.
		Cooling Water	None as LNG facility is Close Circuit Air cooled system.
		Flaring	No routine flaring.
		Construction Sewerage	~2-78 m^3/hr.
		Operations Sewerage	~5-18 m^3/hr.
		Construction Waste	~11 800 MTPA. Disposed of at an appropriately licensed third-party waste facility.
		Operations Waste	~1600 MTPA. Disposed of at an appropriately licensed third-party waste facility.
Accommodation Village	Details	Location	Approximately 5 km inland of LNG facility within the Ashburton North Strategic Industrial Area (ANSIA).
		Capacity during LNG Construction	~5000 people.
		Capacity during Operations	~400 people. Operations workforce accommodation options may be located in town. This is currently under discussion with the Shire.
	Utilities	Power Usage (During LNG facility Construction)	~10 MW from on-site diesel generators. No power will be sourced locally from Onslow.
		Power Usage (During Operations)	Electrical power delivered from LNG facility.
		Water Usage (During Operations)	Considered part of the LNG facility operations water usage (quoted above).

Facility	Element		Description
	Discharges	Construction Sewerage	~76 m^3/hr based on 5000 workers during construction of the first two trains.
		Operations Sewerage	Up to ~18 m^3/hr.
		Construction R.O. Brine	~433 m^3/hr.
		Operations R.O. Brine	Up to 5600 m^3/day.
		Construction Waste Disposal	~5500 metric tons/year disposed of at an appropriately licensed third-party waste provider. Considered part of the LNG facility construction waste (quoted above).
		Operations Waste Disposal	~175 metric tons/year disposed of at an appropriately licensed third-party waste provider. Considered part of the LNG facility operations waste (quoted above).
Domgas Plant		Capacity	~15% of Higher Heating Value of the LNG produced.
		Pipeline length	Two pipelines up to 0.91 m (36″) diameter and approximately 75 km long connecting to the existing Dampier-to-Bunbury Natural Gas pipeline.

2.4 Additional Information

2.4.1 Social

2.4.1.1 Information for the EPA and DSEWPaC

Chevron has assessed the impact of constructing an operations workforce camp in the ANSIA. The Shire of Ashburton has indicated in its submissions that this location is not supported by the Shire. The Shire has also formally resolved to not initiate an amendment to its Town Planning Scheme that would provide for the operations workforce to be housed within the ANSIA. Chevron is currently unable to assess another location, as no alternative sites have been identified for the operations workforce camp, which is currently not expected to be required until 2016. But it is expected that the impacts will be similar to those assessed for the ANSIA. When a suitable alternate site is identified Chevron will assess the impact of that alternative and seek a change to its approved proposal if required.

2.4.2 Marine

There is no additional information for Marine.

2.4.3 Terrestrial

There is no additional information for Terrestrial.

2.4.4 Cumulative Impacts

This addendum to the Draft EIS/ERMP is included following consultation with the Office of the Environmental Protection Authority (OEPA), which requested cumulative impact assessment to BPPH from:

- Additional future trunklines within the Project trunkline corridor
- Trunklines located outside of the Project trunkline corridor
- The shoreline crossings of potential future trunklines
- The construction of third-party additional Product Loading Facility (PLF) trestle and berth.

Where the information is not already included in Chapter 11 of the Draft EIS/ERMP, the cumulative impact assessment for other marine factors is also included. The evaluation of potential cumulative impacts is largely qualitative due to a lack of publicly available information on proposed actions.

2.4.4.1 Considered Actions

Wheatstone Trunkline Corridor

The development of the Project as a 25 MTPA multi-train LNG facility reduces the potential requirement for future expansion of Chevron's gas-processing facilities in the Ashburton North SIA, and lessens the need for future LNG-related port developments in the Pilbara. The SIA will act as a processing hub to facilitate development of additional offshore gas resources in the Carnarvon Basin and potentially other areas, from both Chevron operated leases and those operated by other parties. Further Petroleum Titles to supply gas to the Project are as yet unspecified.

The export trunkline for the Foundation Project has been designed to transport gas from the Petroleum Titles included in the Draft EIS/ERMP. This includes gas from third parties to reduce the need for further trunklines. There will be no spare capacity in the trunkline for the first 20 years of Project operations. Following this period the trunkline may have capacity for transporting gas from additional, but as yet unspecified, fields. The viability of other fields using potential future spare capacity in the Project trunkline will need to be evaluated at the time. This viability would be influenced by the chemical composition of the gas to be exported, the location of the gas fields, the spare capacity of the trunkline and volumes of gas to be exported, and the ability to reach commercial agreements with field and pipeline operators.

To facilitate future trunklines to the Project LNG precinct, the trunkline corridor allows the option for incorporating up to two additional trunklines. The decision to utilise the Project trunkline corridor will include considerations on the location of the gas fields and obtaining any statutory approvals required. Use of the Project trunkline corridor reduces the potential for further impacts to the environment as disturbance will be restricted to a single location.

When spare capacity becomes available in the Project trunkline, current design facilitates access from potential further as yet unspecified Petroleum Titles through a Trunkline In-line Tee Assembly located 70 km from the Project platform (Figure 2.9). Potential tie-in would also be possible at the Project platform location.

Future Ashburton North SIA Trunklines

Proponents of potential future developments within the Ashburton North SIA may seek to export gas from as yet unspecified fields to facilities separate from the Project. At the time of writing, no such developments were proposed or information available, therefore the route of any future trunkline(s) is unknown.

Shoreline Crossings

Using microtunneling to bring trunklines ashore under the coastal lagoon habitat is the preferred method to access the Project LNG precinct (Figure 2.9) or ANSIA. As described in Section 2.3.2, this technique reduces the risk of disturbance of the lagoon, dune system and Ashburton River delta mangroves.

Additional PLF Trestle and Berth

Should a future proponent utilise the ANSIA and proposed navigation channel presented in the Draft EIS/ERMP, additional PLF trestle and berth facilities will be required. Construction and installation of these facilities would require additional capital and maintenance dredging to that presented in the Draft EIS/ERMP. At the time of writing, no such development had been proposed, nor had the proponent of any such development publically announced any final concept decisions for development. Furthermore, the proponents of such a development will be responsible for undertaking the assessment and obtaining any statutory approvals this development will require.

Based on volumes calculated for Project and professional judgement, constructing a berth pocket could equate to dredging approximately 2 Mm^3 of material (conservative estimate). This represents a small percentage increase to the 45 Mm^3 of material that will be removed during the Project capital dredging campaign. The Project capital dredging campaign is described fully in Section 8.2.5 of the Draft EIS/ERMP. It is assumed that the dredging campaign for this future proponent may take less than one year. It is also assumed that the dredge material would be placed at a suitable offshore spoil ground.

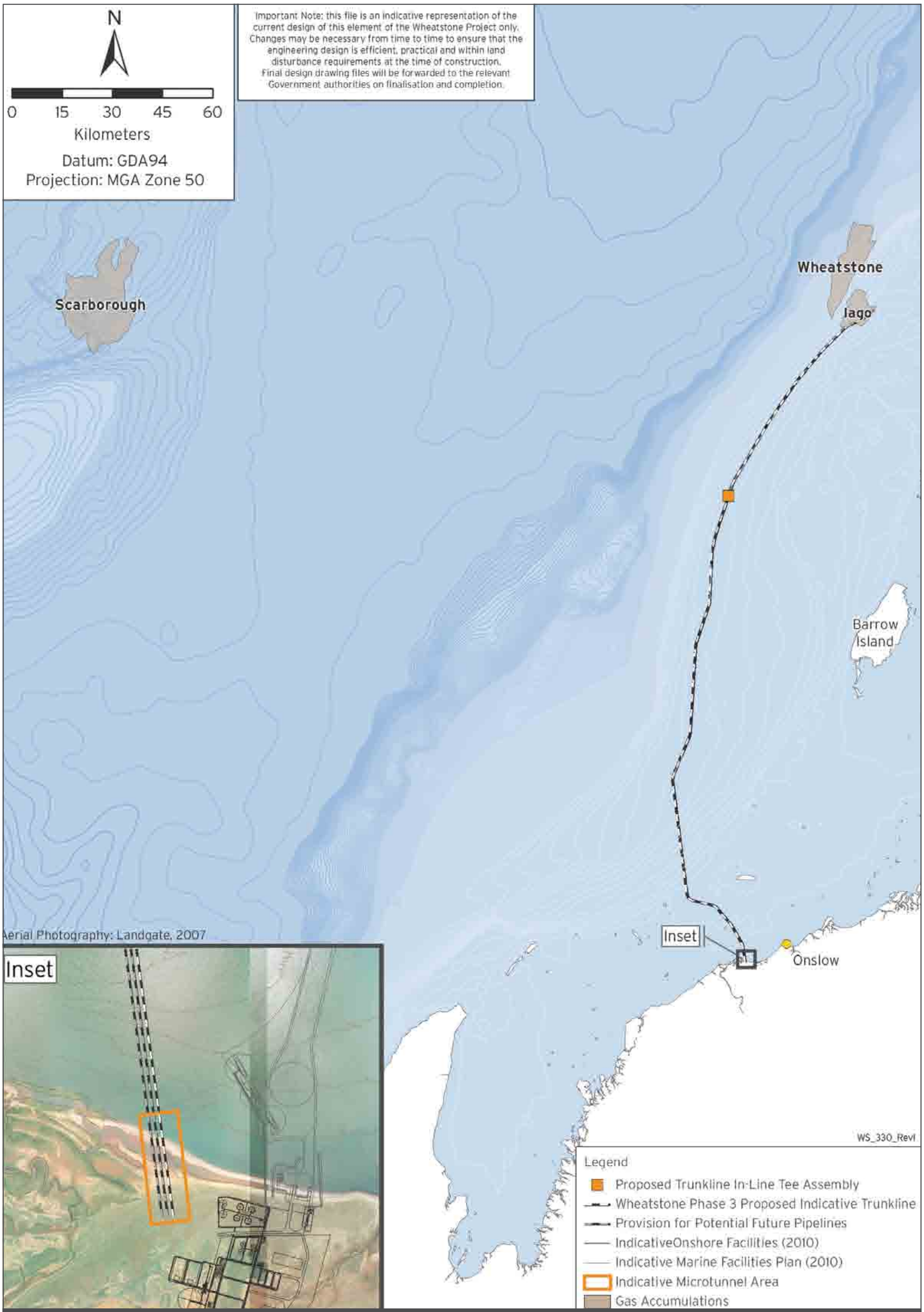


Figure 2.9: Proposed Wheatstone Trunkline Corridor

2.4.4.2 Cumulative Impact Assessment Additional Information

Marine Water and Sediment Quality

The addition of up to two further trunklines located within the nearshore Project trunkline corridor may cause impacts to water and sediment quality through trenching and stabilisation activities. However, potential impacts associated with these activities are likely to result in localised, short-term exceedence of background turbidity levels and sedimentation. During trenching, there will be localised and short-term exceedence of the ANZECC/ ARMCANZ water quality guidelines. It is unlikely that these activities would occur concurrently with the proposed Project trunkline construction activities and therefore significant cumulative impacts are unlikely.

The route of potential future trunkline(s) that are not situated within the Project trunkline corridor is unknown. However, it is likely that impacts to water and sediment quality will be similar to those described in the paragraph above. Similarly, construction activities would occur subsequent to the Project construction phase and significant cumulative impacts are unlikely.

The shoreline crossing for the Project trunkline corridor is assessed in Section 8.2.5.5 of the Draft EIS/ERMP. Microtunneling results in very little disturbance to the surface environment. As described in Section 2.3.2 of the Draft EIS/ERMP, it involves the construction of a tunnel of approximately 3 m in diameter beneath the dune system and lagoon. Section 8.2.5.5 describes the potential impacts to water and sediment quality. Turbidity impacts will be localised and short term and barely measurable against the existing high background turbidity in nearshore waters. Any future microtunneling will pose a low risk to water and sediment quality.

To construct an additional PLF trestle and berth, dredging will be required. The dredging would most likely occur subsequent to the Project dredging campaign and be of considerably less size and duration (see above). As a result, there will be short-term exceedence of background water turbidity and sedimentation and ANZECC/ARMCANZ water quality guidelines. Consequently, impacts to water quality are likely to be localised and temporary. The dredging would most likely occur subsequent to the Project dredging campaign and it is unlikely that this activity would contribute to significant cumulative impacts.

Significant contribution to cumulative impacts on marine water and sediment quality from the described activities is not expected. The potential impacts are predicted to be subsequent to the Project construction phase and are localised, temporary and manageable (Table 2.8).

Benthic Primary Producer Habitat

The addition of up to two further trunklines to be located within the Project trunkline corridor may cause impacts to BPPH; a wider corridor will be required to accommodate the supplementary campaigns and direct impact will occur where BPPH is encountered (See Section 8.3.5.6 of the Draft EIS/ERMP). Secondary impacts may occur through changes to water and sediment quality during dredging and other construction-related activities. It is likely that this will impact an area similar to that affected by the construction of the proposed Project trunkline. However, areas of BPPH that have recovered or partially recovered from Project activities may experience further impact,

Table 2.8: Potential Impacts to Marine Water and Sediment Quality

Potential Future Development	Potential Impact[1]	Potential Contribution to Cumulative Impacts
Additional trunkline within nearshore Wheatstone trunkline corridor	Localised and temporary	No significant contribution to cumulative impacts
Additional trunkline outside of the Wheatstone trunkline corridor	Localised and temporary	No significant contribution to cumulative impacts
Shoreline crossing microtunneling	Localised and temporary	No significant contribution to cumulative impacts
Dredging for extra PLF trestle and berth and offshore material disposal	Localised and temporary	No significant contribution to cumulative impacts

1 Definitions used here for potential impacts are consistent with Section 8.2.5 of the Draft EIS/ERMP: Localised (Within BPPH Management Unit) and temporary/short term (<5 years)

which will delay the recovery period. The lack of available information relating to the likely trenching method and time of installation prevents a qualitative impact assessment.

It is possible that impacts to BPPH may occur if the future trunklines are routed through or in close proximity to sensitivities, through direct impacts or secondary impacts from resulting changes to water and sediment quality during associated construction activities. It is expected that an assessment of potential impacts would occur through the design phase and approvals process of any such development and appropriate mitigation and management measures applied. A contribution to cumulative impacts may occur and could be temporary. Further assessment is not possible due to the absence of information on the route of any potential future trunklines.

Impacts to BPPH from the proposed Project shoreline crossing by microtunneling are assessed in Section 8.3.5.7 of the Draft EIS/ERMP. Microtunneling is unlikely to result in significant impacts to BPPH. Similarly, it is unlikely that there will be significant direct or indirect impacts to BPPH from future trunkline shoreline crossings. The route of potential future trunkline(s) that are not situated within the Project trunkline corridor is unknown. However, by using microtunneling technology significant impacts to BPPH are unlikely.

Dredging activities to extend the berth pocket and construction of the additional PLF trestle are unlikely to directly impact BPPH because the construction area and placement sites are characterised by sand without seagrass (see Section 8.3.5.1 of the Draft EIS/ERMP). Significant secondary impacts to BPPH through changes to water and sediment quality are also not predicted as the nearest significant areas of BPPH are unlikely to be exposed to turbidity and sedimentation levels at intensities and durations sufficient to result in long-term impacts (see Section 8.3.5.2 of the Draft EIS/ERMP). The volume of material to be disposed at the offshore dredge material disposal grounds will also be considerably less than, and disposed subsequent to, Project capital dredging activities (approximately 2 Mm^3 versus 45 Mm^3). Figure 8.26 of the Draft EIS/ERMP shows the location of the MOF and Project berths and dredge material placement sites in relation to BPPH.

Significant contribution to cumulative impacts from the described activities is not expected. The potential impacts are predicted to be subsequent to the Project construction phase and are localised, temporary and manageable (Table 2.9).

Marine Fauna

Activities relating to the addition of up to two further trunklines to be located within the nearshore Project trunkline corridor are unlikely to result in long-term impacts to critical fauna habitats or cause declines in threatened marine fauna populations. Marine fauna temporarily displaced are predicted to resume normal behaviours following completion of the construction phase.

The route of potential future trunkline(s) that are not situated within the Project trunkline corridor could potentially impact marine fauna if critical fauna habitats are affected. It is expected that such areas would be identified during the design phases and approvals process and appropriate mitigation and management measures applied.

Activities relating to the construction and operation of an additional PLF trestle, extension of the berth pocket and new infrastructure in the ANSIA may disturb individual cetaceans, Dugong, dolphins and turtles due to increased underwater noise levels during construction and light emissions during operations. As stated in Sections 8.4

Table 2.9: Potential Impacts to Benthic Primary Producer Habitats

Potential Future Development	Potential Impact[2]	Potential Contribution to Cumulative Impacts
Additional trunkline within nearshore Project trunkline corridor	Localised	Yes, contribution to cumulative impacts
Additional trunkline outside of the Project trunkline corridor	Localised	Yes, contribution to cumulative impacts
Shoreline crossing microtunneling	Negligible predicted impact	No significant contribution to cumulative impacts
Dredging for Extra PLF trestle and berth and offshore material disposal	Negligible predicted impact	No significant contribution to cumulative impacts

2 Definitions used here for potential impacts are consistent with Section 8.3.5 of the Draft EIS/ERMP: Localised (Within BPPH Management Unit)

and 11.5.1.3 of the Draft EIS/ERMP, temporarily displaced marine fauna, such as Dugong and dolphins, due to construction activities are predicted to resume normal behaviour during the operational phase when vessel activity and related noise emissions decline. Light emissions from the new infrastructure will add to existing sky glow, although the increase is likely to represent only a small percentage increase of the Project light emissions and unlikely to disrupt the behaviours of turtle hatchlings or nesting adults. Potential risk to marine fauna will be identified during the approvals process and appropriate mitigation and management measures implemented. It is predicted that these additional activities will not result in population changes in marine fauna nor impact critical fauna habitat.

The shoreline crossing of future trunklines by microtunneling is not predicted to add to the cumulative impacts to marine fauna.

Coastal Processes

Potential future trunklines are not likely to contribute significantly to cumulative effects. The pipeline will most likely be trenched in nearshore areas and subsurface via microtunneling at the shoreline. Water and sediment movement is therefore not predicted to be affected.

The construction of an additional PLF trestle and berth is unlikely to contribute to cumulative impacts to coastal processes. Water and sediment movement will move relatively unimpeded past the trestle, which may be constructed with pilings. The extended berth pocket may result in an increase in the amount of sediment that will accumulate in the dredge footprint, but is unlikely to have a significant impact on coastal processes.

Table 2.10: Potential Impacts to Marine Fauna

Potential Future Development	Potential Impact[3]	Potential Contribution to Cumulative Impacts
Additional trunkline within Project trunkline corridor	Negligible predicted impact	No significant contribution to cumulative impacts
Additional trunkline outside of the Project trunkline corridor	Negligible predicted impact	No significant contribution to cumulative impacts
Shoreline crossing microtunneling	Negligible predicted impact	No significant contribution to cumulative impacts
Construction and operational phases of extra PLF trestle and berth	Negligible predicted impact	No significant contribution to cumulative impacts

3 Definitions used here for potential impacts are consistent with Section 8.4.4 of the Draft EIS/ERMP: Localised (within the Project area) and temporary/short term (<5 years)

Table 2.11: Potential Impacts to Coastal Processes

Potential Future Development	Potential Impact[4]	Potential Contribution to Cumulative Impacts
Additional trunkline within Project trunkline corridor	Negligible predicted impact	No significant contribution to cumulative impacts
Additional trunkline outside of the Project trunkline corridor	Negligible predicted impact	No significant contribution to cumulative impacts
Shoreline crossing microtunneling	Negligible predicted impact	No significant contribution to cumulative impacts
Dredging for extra PLF trestle and berth	Negligible predicted impact	No significant contribution to cumulative impacts

4 Definitions used here for potential impacts are consistent with Section 8.5.5 of the Draft EIS/ERMP

2.4.4.3 Summary

The proposed Project development incorporates a number of design features to reduce potential cumulative impacts. These include:

- The incorporation of third-party gas in the Project trunkline to reduce the need for additional trunklines
- The inclusion of a Trunkline In-line Tee Assembly to facilitate tie-in from potential further as yet unspecified Petroleum Titles
- The potential to locate up to two additional trunklines in the Project trunkline corridor, including the shoreline crossing area
- Dredging of a single shipping access channel
- Construction of a MOF and CUCA suitable for use by multiple proponents.

The development of the Project as a 25 MTPA multi-train LNG facility also reduces the potential requirement for future expansion of Chevron's gas-processing facilities in the ANSIA. The development of the Project as an LNG hub will lessen the need for future LNG related port developments in the Pilbara. Therefore, the potential for future cumulative impacts not included in this assessment is reduced.

This evaluation of potential cumulative impacts has been assessed largely via a qualitative approach. The cumulative impacts arising from the Project and other actions included in this assessment are considered to be either not significant or manageable through the incorporation of appropriate mitigation measures.

2.5 Corrections to Draft EIS/ERMP

EIS/ERMP Chapter or Appendix	Document Reference	Print version Reference	Error	Correction
Chapter 6	Table 6.9	Page 278	Particulate concentration measurements displayed as "mg/m3" (milligrams per cubic metre).	Measurements should appear as "µg/m^3" (micrograms per cubic metre).
Chapter 8	8.3.5.8	Page 517, right hand column, 2nd paragraph	"It is therefore considered highly likely…"	"It is therefore considered highly unlikely…"
Chapter 8	8.2.7 and 8.3.7 (residual risk summary tables)	Page 470 and Page 543	Diffusers will be utilised during offshore dredge material placement via the CSD.	Diffusers will be utilised during nearshore dredge material placement via the CSD.
Chapter 8	8.4.6 (residual risk summary table)	Page 634	In the event that a Humpback or Dugong is sighted within the 300 m observation zone, the dredge will relocate to a distance of at least 300 m.	Humpback whale and Dugong observations and response procedures include not commencing dredging or dredge material placement if whales or Dugong are sighted within a 300 m observation zone, and ceasing dredging activities if whales or Dugong enter a 100 m exclusion zone (Draft EIS/ERMP, Appendix S1 Dredging and Spoil Disposal Management Plan [Figure 8.4]).
Chapter 8	8.2.7 (residual risk summary table)	Page 469	Increased turbidity and light attenuation exceeds agreed water quality targets.	Increased turbidity and light attenuation exceeds ANZECC/ARMCANZ (2000) water quality targets.

3.0

Response to Submissions

3.0 Response to Submissions

A total of 32 submissions were received on the Draft EIS/ERMP for the Proposed Wheatstone Project.

Chevron would like to acknowledge all groups and individuals who chose to forward a submission to the EPA as part of this environmental impact assessment process.

This section of the document contains Chevron's responses to these submissions, which comprise approximately 550 separate questions or comments. Chevron has responded to each question or comment with the most accurate information currently available.

Questions, comments or issues have been coded according to the submission number (see Appendix A) and the number of the comment/question within the submission. For example, the 28th comment raised by Submitter number 25 is listed as 25.28. The individual comments from submissions and Chevron's responses are presented below and are arranged according to the structure of the Draft EIS/ERMP chapters and sections. A note indicating the sections for which no comments were received is included under those section headings. Please note that each separate issue identified from the submissions appears only once in this document. Chevron has nominated the location within the structure where the issue fits best. Please refer to Appendix A for direction as to where each issue is addressed within this Response to Submissions.

Executive Summary & 1.0 Introduction

Executive Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.0 Introduction

1.1 Overview

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.2 Purpose and Scope of this Document

22.1	The purpose and scope of the document does not mention the Strategic Industrial Area (SIA), located to the south of the Wheatstone industrial site.
	Chevron does not seek approval for facilities or development in the Strategic Industrial Area outside of the Project area. Chapter 1 (Section 1.2) of the Draft EIS/ERMP, which details the purpose and scope of the Project, therefore does not include this detail. Chapter 2 (Section 2.1) fully describes the offshore and onshore components of the Project for which approval is being sought.

1.3 Project Background

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.4 Current Status of the Wheatstone Project

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.5 Consequences of Not Proceeding

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.6 Wheatstone Project Location

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

1.7 Site Selection Process

23.20	Section 1.7 Site Selection Process (pg. 11) states "Two independent reviewers from the John Curtin Institute of Public Policy were contracted to observe the site consultation process and provide an independent opinion on the methodology used and transparency of the site-screening and selection process. These reports have been provided to the EPA and DEWHA". This fails to mention that neither the Site Selection Study nor results of in the independent review have been made available to the public, those not invited to participate or those unable to be involved in the site selection process. In addition, there is no mention of any methodology or strategic environmental assessment by the Government in the pre-selection of Ashburton North as a Strategic Industrial Area, calling into question the whole site selection process.
	Open public consultation meetings were held in Karratha and Onslow in late 2008 and key government and non-government stakeholders were invited to a site-selection briefing in Perth around the same time (see Table 5.2 in the Draft EIS/ERMP). Summaries of the methodology and the site-selection report were presented at these meetings and specialists involved in compiling the report presented at the meetings. At both the open public meetings in the Pilbara and at the Perth site-selection workshop, issues surrounding the site-selection process were reviewed and workshopped by participants with the assistance of independent facilitators. In addition, a selected cross-section of Pilbara stakeholders participated in a full-day site-selection workshop held in Onslow in December 2008.

	The McKenzie/Singleton independent review examined the consultation process rather than the content of the earlier site-selection report. Chevron cannot comment on what information the State Government made publically available during its assessment of the ANSIA.
1.8	**Relationship to Other Projects in the Region**
20.11	1.8 "Onslow Salt .... incorporates .... a 10 km navigation-channel for shipping in the nearshore area". Is it possible to enlarge the existing Onslow Salt dredged channel to *reduce the necessary environmental impact of having two large dredged channels* within 10 kms?
	The Onslow Salt channel is not of the required dimensions to allow movement of Project vessels between the offshore and the ANSIA. The Onslow Salt channel would require widening to 235m and deepening to a maintained depth of 13.5m LAT. There would then be a requirement to dredge an additional 10km through shallow water (less than 5m of water) to the proposed ANSIA. In addition, a wider transition channel to allow vessels to navigate between the two channels would be required. These additional dredging requirements would be less efficient than a single dredged channel between the proposed product loading facility and the nearest area of deep water.
1.9	**Proponent's Environmental Commitment**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
1.10	**Chevron Guidance Policies**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
1.11	**State and Commonwealth Considerations for Sustainability**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
1.12	**Relevant Legislation, Policies and Guidelines**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
1.13	**Environmental Assessment Process**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
1.14	**Subsequent Approvals**
22.3	Key subsequent approvals that will be required for the Wheatstone Project must include DPA's Development Approval, as required under the WA Port Authorities Act 1999. Chevron must apply and receive formal development and construction approval from the DPA prior to any works commencing within areas to be vested in the DPA.
	Chevron acknowledges the comment made by the DPA.
22.4	In addition, the approval for the proposed fill source within the Onslow Salt Agreement area should also be included.
	The excavation of four borrow pits may be required to provide fill for the Wheatstone Plant Pad, and is included in the Draft EIS/ERMP application for approval. Please refer to Section 2.3.3.1 and Figure 2.18 for details. Chevron acknowledges that approval will be sought from the relevant stakeholders should excavation of the borrow pits be required.
1.15	**Structure of the Document**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	

2.0
Project Description

2.0 Project Description	
2.0	**General Comments**
6.2	Turning to what little can be made of the inconclusive and imprecise documentation we comment as follows: Project Description Chapter 2 purports to describe the Project but it fails to describe marine constructions that have already occurred and the environmental impact of those constructions. From our members' observations as many as twenty cyclone moorings have been established in Mangrove Passage. We assume that the Department of Transport has approved their construction for the safety of boats in cyclones but given the requirements of S. 171 of Fish Resources Management Act 1994 we are disappointed that there has been no reference to the fishery that now so badly affected. It appears that seven or eight of the moorings have been placed by, or on behalf of, Chevron Australia Pty Ltd.' They are a navigational, operational and safety hazard that is already facing the Onslow Prawn Managed Fishery. We can find no description of the moorings or their environmental impact in the EIS/ERMP. Noting the EIS/ERMP Disclaimer it is assumed that Chevron Australia Pty Ltd is responsible for excluding the information from the EIS/ERMP.
	Chevron acknowledges these concerns associated with the installation of moorings in Mangrove Passage. The moorings referred to have not been put in place for the Wheatstone Project and therefore have not been included in the Draft EIS/ERMP. Should moorings need to be installed in the future for Project operations, Chevron will consult with the affected fisheries and obtain all necessary approvals, including those that may be required by the Dampier Port Authority.
32.1	The ERMP states that water source options for the Project are still being investigated, and DoW supports the case for a desalination reverse osmosis (RO) plant for construction and operations. The existing allocation for the Birdrong aquifer in the Pilbara is based on limited information, so applications for an allocation above the present limit would need further technical justification by Chevron. The DoW encourages Chevron to work with other users of the Onslow Strategic Industrial Development Area (Macedon and Scarborough projects) to assess the viability of a single water provider to the three projects. It is preferred that the development of a new water source be undertaken in an integrated manner, to benefit all stakeholders. The DoW is working with industry and government stakeholders through the Infrastructure Coordinating Committee to develop this concept. The DoW also supports Chevrons commitment to water use efficiency and conservation.
	Chevron acknowledges the DoW's comment and its preference for a single water source for the ANSIA. However, for the purposes of the Wheatstone Project environmental approvals, Chevron is seeking approval for use of the water sources identified in Table 2.1. It should be noted that the proposed Macedon Project is currently undergoing design and the Scarborough development has not publically announced any final concept decisions for the development, its location, or when the development is likely to begin. Therefore limited information exists on the water resourcing of these potential developments.
2.1	**Introduction**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
2.2	**Major Infrastructure Components**
4.2	The ERMP indicates that very significant volumes of rock will be required for the offshore pipeline stabilisation, MOF breakwaters and site bunding, which will be transported by road to the Project site. The inland sources of rock are unidentified, which I assume will also require environmental assessment. The findings of material investigations should be discussed with Main Roads by the proponent to avoid potential issues relating to sites, extraction and environmental impact.

	Chevron will discuss with Main Roads WA the findings of investigations for road base materials and inland sources of rocks. Chevron will make the decision about the source of such materials and their transport. Bechtel will be responsible for the transport of materials and this information will be contained in the Traffic Impact Assessment and the Project's development application. Chevron states in Section 2.3.3 of the Draft EIS /ERMP that "Onshore fill material may need to be sourced from a third-party quarry, if it cannot be sourced locally from on-site borrow-pits. This material will initially be transported to the site by road. The proposed quarry locations are yet to be determined and will form part of a third-party contracting strategy. The offsite quarries used to source the fill material will have the appropriate government licences and approvals." Chevron understands the sensitivities of the area and will only use quarries that have the appropriate government licences. These facilities would have undertaken their own environmental approvals in order to obtain their licence to operate.
15.9	This proposal for the Wheatstone development is based on a three train gas plant. However it is indicated that there is the intention to expand to a five train plant. We are uncertain whether this expansion would require additional port facilities and further dredging. If this is the case then additional dredging that may be required should be described or a statement made that no further dredging is needed.
	As discussed in Chapter 2, the environmental impact assessment provided was based on the full 25 MTPA five-train development. No further construction dredging of the proposed navigation channel will be required to meet the full 25 MTPA capacity for the Project.
30.48	What is the source of rock armouring for pipeline and MOF and terrestrial elevation armouring material? How much fill (sand and rock) is needed for the elevated areas? How much fill will the identified borrow areas provide?
	The rock armouring for the site may be sourced from a number of possible locations. Primary armour for the MOF may be sourced from an overseas supplier while the core armour is likely to be sourced from a third party quarry. Detailed engineering studies, in conjunction with baseline flood studies, will be conducted to determine the height of the elevated areas. Once these have been completed, an accurate assessment of fill required to elevate the site can be calculated. Regardless, preliminary geotechnical investigations indicate that Borrow Sites 1 to 4 will be able to supply sufficient general fill for the site. It is currently estimated that Borrow Sites 1 to 4 contain approximately 19.5 Mm^3 of fill material, with 8.5 Mm^3 of this fill expected to be utilised for the foundation project.
2.2.1	**Offshore Facilities**
9.13	The survey indicates that two areas of sand-waves exist on the western edge of the study area. Trunkline stability analysis should be conducted if it has to pass sand-wave fields. Local scour and migration of sand-waves may lead to pipeline suspension from seabed over a lengthy span or sagging into the scour hole. As the flow passes underneath a pipeline vortex shedding induced vibrations may occur. Those vibration and sagging mechanisms will increase the likelihood of server leakage and pipeline failure.
	Trunkline on-bottom stability analysis is being conducted along the entire route. Generally, the trunkline routing design avoids areas of rough seabed. Where free spans cannot be avoided, the length of free spans will be limited to comply with the offshore pipeline code AS2885.4 and the pipeline spanning code DNV RP F105. This will be done by pre-lay intervention or post-lay span supports. The effects of seabed scour are taken into account in the span and support designs. The allowable span lengths are calculated to avoid vortex induced vibrations (VIV) with safety factors recommended in DNV RP F105. Both Cross-flow and In-line vortex induced vibrations are considered in the design.
20.7	What provision has been made in the Wheatstone Project to accommodate further tie-backs? Will the pipelines accommodate significant volumes of additional gas eliminating the need for additional future infrastructure for Chevron and other operators? What is the capacity of the Wheatstone Project for additional gas supplies? If all gas discoveries in the region to date were developed would Wheatstone's capacity be able to expand to accommodate these or would it be likely another Greenfield site be required?

	The capacity of the platform and the trunkline matches the capacity of the first two LNG trains. The trunkline has no room to accommodate significant volumes of additional gas. Additional offshore gas supplies for trains 3, 4 and 5 will be permitted separately and are expected to tie directly to the onshore plant. The onshore permit covers the processing of these additional trains so no further greenfield development is anticipated.
20.8	"the truckline will cross between 14 and 24 other pipelines and umbilicals" Please provide details of these pipelines (include map). Also please expand on assessment of each of these pipelines for potential tie-ins and use of alternative processing plant/site.
	Section 2.3.1.3 of the Draft EIS/ERMP provides details of the proposed processes for crossing the existing and proposed pipelines and umbilicals along the trunkline route. The environmental impacts of this have been described in Section 8.5. A map has been requested for details of the proposed crossing locations. As in most projects at this stage of development, maps with this level of detail have not yet been prepared and therefore are not currently available. However, this does not mean that the environmental impacts related to these crossing cannot be assessed and approved at this time. The environmental impacts are assessed in Chapter 8 and the proposed management approach is set out in Chapter 12. This enables the environmental impact to be assessed, and approved as part of the Project subject to relevant management controls, even though the detailed information requested is not available. All of the pipelines crossed have different design flow rates, pressures, temperatures, material specifications and fluid compositions. The pipelines are owned by various companies. This means that tie-ins at these crossing locations are not feasible.

2.2.1.1 Wells and Subsea Components

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.2.1.2 Platform(s)

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.2.1.3 Trunkline

30.7	Marine Issue – Trunkline Key Project Characteristics listed in Table 2.1 and section 2.2.1.3 (Volume 1) includes a Trunkline from the Wheatstone Platform to the onshore facility which is described under "Key Project Characteristics" as consisting of a single pipeline (up to 1.2meters diameter, 225 km long) constructed in the "Trunkline Corridor". However it is noted in Section 2.3.2.4 that it is anticipated that future "trunkline systems" will be installed adjacent to the Wheatstone trunkline, and that the trunkline corridor has been designed to accommodate an additional two similar pipeline systems. It is noted that the term "systems" is used in the Draft EIS/ERMP and presumably this may refer to either a single pipeline or a number of pipelines. The issue is again mentioned in Appendix N14 section 1.2 which notes that the proposed pipeline corridor is being planned to incorporate requirements from other potential plants to be built on the site. Clarification is sought as to whether this current ERMP is seeking approval for the Wheatstone pipeline only (it need to be clarified whether it is one pipeline or a pipeline system) or also for pipelines that may be used by other companies in the future?
	Chevron aims to ensure that the initial trunkline is positioned in such a way as to enable the future installation of additional micro-tunnels without any significant increase in environmental impact (i.e. with similar impact levels as the initial trunkline installation). However, the future campaigns are not part of this assessment. Only the single trunkline for the Project, the nearshore approach corridor and the onshore micro-tunnel area are included in this assessment. The intent is to seek approval for the base case trunkline and shore crossing for the Project, but not any future trunklines. The Proponent(s) for such future trunklines would be responsible for the obtaining necessary assessments for construction and operation of additional trunklines.

30.8	Marine Issue – Trunkline Laybarge Activities and Impacts (associated with the construction of the Trunkline) are described on page 55. These include anchoring of barges and potentially the release to the marine environment of seawater (used to provide ballast to the pipeline in the event of a cyclone during construction) that has been treated with chemicals to control oxygen. A management plan for this activity has not been identified as one of the "Statutory Plans". The proponent is requested to explain this omission.
	The key environmental issues around the discharge of seawater is the chemical content and discharge flow rate/depth/location. Chemical selection will be guided by the Oslo and Paris Commissions Recommendation 2000/4 on Harmonised Pre-screening scheme for Offshore Chemicals (Ch 4, section 4.6.2.3). This scheme requires that chemicals for use in the offshore petroleum industry consider toxicity, biodegradation and bioaccumulation in selection of chemicals. Should a Management Plan be developed this plan will be for internal purposes only and will not be submitted to departments for approval. This approach is consistent with the desire of both the Environmental Protection Agency and Chevron to reduce the occurrence of Management Plans and increase the reliance on Outcome-based Conditions.
2.2.1.4	Offshore Support Facilities
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
2.2.1.5	Fibre Optic Telecommunications Cable
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
2.2.2	**Nearshore Marine Components**
22.7	Marine Infrastructure Hydrodynamic modelling results should be provided to demonstrate that the current configuration of the MOF facility and associated channels have been optimised to minimise maintenance dredging requirements.
	Several concepts were developed during the evaluation process associated with the materials offloading facility. Operating criteria, including sedimentation and maintenance dredging, was one of the key elements in the decision process used to select the preferred alternative. Hydrodynamic modelling was used to estimate maintenance dredging for the MOF.
2.2.2.1	Pipeline Shore-crossings
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
2.2.2.2	Nearshore Infrastructure
22.5	Marine Infrastructure Details of the design, specification and operatability of the actual facilities will be covered under DPA's Development Application Process. However, it should be noted that there is limited detail in the Draft EIS/ERMP of how the MOF and/or breakwater/s will be constructed.
	As noted, further details on the MOF will be provided during the development application process.

22.6	Marine Infrastructure Chevron has indicated that a diesel fuel storage facility will be developed in the MOF to service support vessels. No details have been provided on the fuel source (direct import trucking from Karratha, barge supply vessel from Dampier). DPA would like this information tabled, along with proposed diesel storage tank sizes and locations. This has important implications for the design of the facility, as well as assessment of the risk and associated oil spill response.
	DPA has requested information and assessment about fuel sources and storage. The specific regulation of fuel supply and storage issues is dealt with under other laws, including Part V of the EP Act, and it is therefore not necessary to deal with these regulatory issues in the EIS. Neither, in accordance with standard engineering practice, is it possible to deal with specific design issues at this stage of the project engineering. Note however that the environmental impacts associated with diesel fuel spill in the MOF have been assessed in Section 8.4.5.7 of the Draft EIS/ERMP. This enables the environmental impact of a diesel spill to be assessed, as a worst-case spill resulting from the "entire loss of the diesel tank (135 m^3)" was modelled and assessed. An Oil Spill Response Plan will be developed as part of the Project's Emergency Response Plan.

2.2.3 Onshore Facilities

2.2.3.1 LNG Facility

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.2.3.2 Domgas Plant

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.2.3.3 Domgas Pipeline

25.28	Domgas pipeline corridor Recommendation 43: That the proposed Wheatstone domgas pipeline be located within, or, if this is not possible, directly adjacent to the proposed Macedon domgas pipeline corridor. Discussion: In early discussions with BHP Billiton regarding the proposed Macedon domgas pipeline, BHP Billiton indicated an intention to construct a pipeline with the capacity to accommodate domgas from the Wheatstone Project. However, the Wheatstone ERMP does not indicate intent to share the pipeline or the pipeline corridor, except for within the Ashburton North Strategic Industrial Area, where a single multi-user infrastructure and access corridor is proposed. DEC recommends that a single multi-user domgas pipeline corridor to the Dampier to Bunbury Natural Gas Pipeline be negotiated to minimise impacts on conservation values and the land proposed for addition to Cane River Conservation Park. The proposed Wheatstone pipeline should be located adjacent to the proposed Macedon pipeline, using any previously cleared tracks, turnaround areas and lay down areas, where practicable.
	Recommendation 43: Chevron can confirm that the Department of Regional Development and Lands (DRDL) has issued a Notice of Intention to Take (NOITT) that will facilitate the creation of a 60 m wide shared pipeline corridor from the Ashburton North Strategic Industrial Area to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The centre lines of both proposed Wheatstone and Macedon domestic gas pipelines will be positioned within this shared corridor. While discussions are ongoing with BHP Billiton regarding the feasibility of sharing a common pipeline, the current base case is to proceed with separate pipelines due to associated technical and commercial constraints. Chevron has recently undertaken topographical and geotechnical surveys of the proposed pipeline corridor to identify opportunities to optimise the pipeline route and reduce disturbance where practicable. Should these opportunities prove feasible, further discussions will be arranged with BHP Billiton and the relevant government authorities.

2.2.3.4	Onshore Support Facilities
	No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.
2.3	**Construction Activities**
2.3.1	**Offshore Construction**
2.3.1.1	Drilling and Well Completion
	No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.
2.3.1.2	Platform Installation and Connection
	No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.
2.3.1.3	Trunkline Installation
20.32	"In addition, backfill rock volumes of up to 1.85 million could be required to provide the necessary stabilization" Please clarify if this volume is in addition to the 1.85 million tonnes required for "a continuous full berm" described on page 53.
	The "in addition" statement refers to the 1.85 million T of rock required to backfill a pre-lay trench option. This is not additional to the 1.85 million T required for a continuous full berm; just another option. In summary, the 1.85 million T of rock is the most that Chevron anticipates for the nearshore stabilisation works.
2.3.2	**Marine Nearshore Construction**
6.4	Shipping channel changes to water flows. The EIS/ERMP is vague about the exact location of the proposed shipping channel and the changes that will occur to the water flows (speed and direction) as a result of the construction of the channel. Prawns, their larvae/post larvae and the resultant nauplii utilize natural water flow for movement onto, and off, nursery and breeding grounds. Dependent upon the quantum, when and where the new water movements occur, none, some or all of the prawn population of Area 1 of the Onslow Prawn Managed Fishery could be relocated to habitat that cannot support them. Analysis of the relative cross sectional volume of the proposed channel to the natural profile of the seabed parallel to the shore in waters less than 5 m (critical prawn habitat) suggests that much of the natural tidal movement will become alongshore movement into and out of the proposed channel on the rise and fall of the tide.
	The Draft EIS/ERMP presents sufficient detail on the location of the proposed shipping channel. Additional information outlining potential impacts of water flow on the Onslow Prawn Managed Fishery has been included in Appendix FH of the document.
22.8	Marine Infrastructure What is meant by the temporary access channel? Where is the channel located? and what purpose will it serve?
	The temporary access channel will be dredged from approximately the eight metre water depth contour towards the shore to provide access for dredge vessels to the proposed materials offloading facility and allow service vessels access to the Ashburton North SIA. Once the materials offloading facility has been dredged, the product loading facility turning basin will be dredged. On completion of this, the proposed main shipping channel will be widened from the temporary access channel. Thus the temporary access channel will be enveloped by the shipping channel.

22.9	Marine Infrastructure Spoil grounds - The DPA has serious concerns about the location of dredge spoil locations A and B. Please refer to concern regarding coastal processes and associated modelling below. DPA are concerned that the material will be remobilised during storm and cyclonic events which may result In environmental impacts and/or the blocking of the current or future shipping channels.

The use of Site A is proposed to facilitate early inshore dredging with cutter suction dredge before barges may be able to reliably access a nearshore loading position. Site A represents a practical option for relocation of some of the initial material that must be dredged until a suitable location for inshore barge loading can be created for transport of materials to Site C. By using a diffuser to place material at Site A, the rates of dispersion of fines during placement will be minimised. Site A has not been selected as a non-dispersive disposal site but as a location that can, within the overall dredge plan, practically minimise adverse risk to sensitive BPPH receptors.

Material to be placed at Site A will be of variable grain size. The bulk of the material placed is expected to remain in situ. This conclusion is based on the following key observations:

- Some of the fines will be lost during the dredging and placement process and the placed material will not be fully broken up. The percentage of coarser material (including lumps) will therefore be significantly higher than corresponding to the in-situ material to be dredged in a fully broken up (pulverised) state.
- Weening out of the fines from the top layers at the placement site will lead to a self-armouring process with the remaining coarser and lumped fractions covering the fines buried underneath.
- The finer material will be partly cohesive, which will add an additional stabilising force.
- The spoil material will consolidate with time – in effect increasing the cohesive forces and therefore the shear stresses required to mobilise it.
- Observations from the Onslow Salt spoil grounds – although data is not available to quantify it – indicate that most of the material under similar conditions has remained in place.

During the placement process, some of the fines in the dredged material will be released to the wider environment. The effects of this have been assessed through sediment plume modelling with source terms representative of the release of fines during placement. This is expected to be a realistic worse case release rate under normal conditions at this site. Dispersion of fines from the volume of material proposed to be placed at Site A during or following placement has not been shown to represent a significant risk to nearby receptors.

Loss of sand from Site A will make little difference to transport rates in the nearshore area as there is an existing supply of mobile material in this area. Whilst some of the material placed at Site A will be mobile, the rates of transport will be low. Modelling of sand transport indicates that transport fluxes of 200 μm sand are weak in the Project area and are not expected to give rise to significant infill in future dredged areas of the Project. This prediction is consistent with the available information regarding present day infill in the Onslow Salt Channel.

Site B will only be used if it is demonstrated that, within the overall placement plan, its use minimises risk of adverse impact to the BPPH receptors from dispersion of fines. Material placed at Site B will have similar low mobility to that at Site A. There are greater sensitivities to the use of Site B compared to Site A as it is located closer to sensitive BPPH receptors. Any use of this site will be carefully considered. This will be informed by the early monitoring of dredging and placement activities at Site A.

Tropical storms and cyclones impact the area on a regular basis. Under these conditions, the overall mobilisation of the seabed and the sediment transport rates are a scale factor higher than the rates experienced under "normal" conditions. This is valid for the existing seabed as well as the dredge material placement sites. Whereas more extreme conditions can cause some damage to local habitats, the habitats can be considered, overall, to be adapted to these conditions. In terms of channel sedimentation, a single cyclone is estimated to potentially cause sedimentation several times the expected annual channel sedimentation depending upon cyclone intensity and location of landfall. The channel may have to be surveyed following a severe cyclone with a potential requirement for maintenance dredging. Whereas the potential downtime caused by this is an operational issue, the sedimentation caused by cyclones has been considered in the overall channel sedimentation and maintenance requirements.

29.143	DSEWPaC notes the additional information provided in Draft EIS/ERMP regarding microtunnelling. DSEWPaC expects further assessment and discussion of impacts to be provided following conclusion of the geotechnical work and that this will be provided in the Supplementary EIS.
	Microtunneling is the preferred option. Microtunneling will not result in direct impacts to the Ashburton East Lagoon, however there will be localised impacts where the seaward side of the tunnel enters the marine environment. These impacts include direct disturbance of the seafloor and indirect impacts associated with turbidity caused by disturbance of the seafloor. As suggested in Appendix N1: Benthic Primary Producer Habitat Loss Assessment, turbidity impacts from microtunneling are likely to be masked by the turbidity plume resulting from construction dredging in adjacent waters. Drill cuttings and fluids will be retained and disposed on land.
30.19	Trenching or microtunneling for shore crossing – when will this be decided? Preferably this should be decided before the end of the assessment to facilitate the assessment. Also whether dredge spoil would be placed on shore or not should be decided before the assessment concludes.
	Chevron can confirm that the open cut trenching option is no longer a consideration for the shore crossing installation. The base case for the placement of dredged material is that all dredge material will be placed offshore, pending approval of placement sites A to E.

2.3.2.1 Beach Crossing Location

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document

2.3.2.2 Beach Crossing Design Concept

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document

2.3.2.3 Material Removal and Disposal

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document

2.3.2.4 Future Pipeline Approaches

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document

2.3.2.5 Materials Offloading Facility (MOF)

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document

2.3.2.6 Product Loading Facility (PLF)

22.12	Common User Infrastructure and Corridors DPA will be requiring a single outfall for the discharge of fluids (brine line) within Port waters for all developments (current and future), and, as such the placement of these facilities should be located within areas that have an acceptable level of environmental impact, sized to accommodate future growth and do not inhibit future development. The draft documentation indicates that the Product Loading Facility (PLF) will have an outfall facility within a water depth of approximately 5 metres. DPA would like to see the justification for this proposal. There is also mention of an Offshore discharge line. What will this facility be used for? It was mentioned that the line may be required for additional trains and 3rd parties. DPA would like to know the location of the point of discharge, what will be discharged, the location of the pipeline and will it be proud of the sea floor (critical importance for navigation).

Chevron acknowledges the Dampier Port Authority submission. The EIS/ERMP considers environmental impacts associated with the Project and other "reasonable foreseeable" projects. The proposed offshore discharge line is proposed to be located along the trunkline pipeline corridor with an anticipated discharge location at the 20 m contour line. This outfall line is proposed to handle any treated produced water that may result as part of the expansion of the initial two trains to the full plant capacity of 25 MTPA.

As in most projects at this stage of development, the exact location of the outfall has not yet been determined and so cannot be provided. However, this does not mean that the environmental impacts related to the outfall cannot be assessed and approved at this time. The environmental impacts are assessed in Section 8.2.5.7 Discharges from Onshore Operations and the proposed management approach is set out in Table 8.18 in the Draft EIS/ERMP. This enables the environmental impact of Produced Water discharges during operations to be assessed, and for the outfall location to be approved as part of the Wheatstone Project subject to relevant management controls, even though the detailed information that Dampier Port Authority has requested is not available.

2.3.2.7 Onshore Placement of Dredge Material

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.3.3 Onshore Construction

20.31 "Between 760,000 and 1,850,000 tonnes of rock may be required"

Please clarify where this rock will be sourced from? CCG holds major concerns about any quarrying of limestone from regions of the Cape Range due to the extremely high value of the Cape Range karst system. The Cape Range karst system is internationally recognised for its unique, diverse and endemic subterranean fauna with significant geoevolutionary values, including evidence of evolutionary processes, speciation and fragmentation of Gondwanaland. CCG therefore requests that limestone associated with this Project is sourced from alternative sites.

The proposed quarry location(s) has not yet been identified. Chevron states in Section *2.3.3* of the Draft EIS/ERMP that "Onshore fill material may need to be sourced from a third-party quarry, if it cannot be sourced locally from on-site borrow-pits. This material will initially be transported to the site by road. The proposed quarry locations are yet to be determined and will form part of a third-party contracting strategy. The offsite quarries used to source the fill material will have the appropriate government licences and approvals."

Chevron understands the sensitivities of the area and will only use quarries that have the appropriate government licences. These facilities would have undertaken their own environmental approvals in order to obtain their licence to operate.

2.3.3.1 Onshore Site Preparation

20.33 "Rocks imported to the site from as yet undefined quarry locations"

Have these quarry locations been decided? If so where are they?

The possible quarry locations have not yet been determined. As stated in Section 2.3.3.1, "Onshore fill material may need to be sourced from a third-party quarry, if it cannot be sourced locally from on-site borrow-pits. This material will initially be transported to the site by road. The proposed quarry locations are yet to be determined and will form part of a third-party contracting strategy. The offsite quarries used to source the fill material will have the appropriate government licences and approvals."

2.3.3.2 Onshore Construction Facilities

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.3.3.3	Estimated Water Use and Water Source
13.2	Water 1. Quality alone is not the deciding factor for the use of recycled water, and proposals for approval for the use of treated sewage effluent for dust suppression and vehicle wash downs must examine treatment process, quality assurance and the method of use. Recycled water use for dust suppression etc must address the issues and quality requirements of the (draft) Guidelines for the Use of Recycled Water in Western Australia. It should be noted that approval is required for all recycled water projects.
	Chevron, and its contractors, will ensure their compliance with the relevant guidelines for the use of recycled water. Due to the scarcity of water in the region, Chevron would prefer to use recycled water for dust suppression, if practical. This proposed use of recycled water will be assessed to ensure that any potential health impacts are minimised in accordance with the guidelines.
13.3	Section 2.3.3.3 Estimated Water Use and Water Source does not refer to sharing Onslow's water supplies, but Table 6.37 Onslow Public Utilities does, and includes water as a Potential Issue Associated with Population Change and Industrial Expansion. This is a concern: • Table 6.37: Onslow Public Utilities, (Volume 1. Draft Environmental Impact Statement/Environmental Review and Management Programme for the Proposed Wheatstone Project), notes that the current Onslow water supply is at capacity (this has been reinforced by Water Corporation advice to the Shire of Ashburton, effectively capping the number of future connections which will be permitted until alternative water supply can be developed). • While the Chevron site is intended to have private reverse osmosis as a water source in the long run, Table 6.37 states that 'During construction, potable water needs to be shared' with Onslow. This is of concern when the existing water supply is at capacity. • Table 6.37 refers to exploratory bores with a 2 year planning to operation period on a critical path. However, this presumes that the exploratory bores will be viable, will proceed and will be online when required. • No detail is provided on the proposed draw down volumes or the period of time it is intended to share the town water supply. • There is no indication that provision has been made for the risks, in the event that the exploratory bores are not available when Chevron wishes to draw down on the (currently fully allocated) Onslow water supply.
	Chevron acknowledges the Department of Health's concern regarding water use and water source options. Chevron is aware of the water supply constraints in Onslow. Chevron is, therefore, proposing to establish a dedicated water supply for its activities as soon as practicable. Chevron is intending that this water supply be available during the early stages of construction; however, it is possible that any Chevron personnel accommodated in existing Onslow facilities will use water from the existing sources for personal purposes, such as washing. Chevron's preferred water source option is for seawater desalination. Should Chevron propose to abstract groundwater, then appropriate testing and permitting will be carried-out in consultation with the Department of Water to ensure that there is no impact on Onslow's water supply. Chevron also participates in the Ashburton North Infrastructure Working Group which is responsible for dialogue on such issues and is in the process of negotiating a significant funding contribution towards a future water supply and waste water treatment facilities that can service the Onslow community.
13.4	As desalination/reverse osmosis is proposed for drinking supplies, the proponent should note that a Drinking Water Quality Management Plan for all bridging and permanent water supplies is required. A Guidance model has been previously provided. Questions on the issue may be directed to WA Health.
	Chevron is proposing to develop a Water Management Plan as part of the Construction Environmental Management Plan. This Plan will incorporate details on drinking water quality and reflect requirements of the guidance model.

13.5	Water 4. A1.6 Relevant Commonwealth Policies and Guidelines needs to include the Australian Drinking Water Guidelines 2004. A 1.8 Relevant Western Australian Polices and Guidelines needs to include the (draft) Guidelines for the Use of Recycled Water in Western Australia.
	Chevron acknowledges the Department of Health's submission on policies and guidelines and proposes to comply with the policies and guidelines noted.
20.45	Will the desalination plant have open ocean water intake? If so, what measures will be put in place to reduce as low as practicable injury and mortality to ocean life?
	Ocean water intake pipes will be utilised. Designed flow velocity at the face of the intake will be designed to meet industry practices to manage entrainment and impingement issues.
22.13	Common User Infrastructure and Corridors DPA would like to know the proposed location and capacity of the water intake lines. This is critical to ensure the location of such infrastructure is sized for future developments, and does not impede future development in that area.
	While it is anticipated that the permanent water intake line will be located on the PLF, as in most projects at this stage of development, the exact intake location and line capacity detail has not yet been determined. However, this does not mean that the related environmental impacts cannot be assessed at this time. The potential volumes of water required for the development of the Project are detailed in Table 2.3. The intake will be designed and located to minimise debris and marine life impingements
28.1	These sections [*2.3.3.3 and 2.5.5.1*] refer to the possible construction of a desalination plant, however the potential impact that the saltwater intake may have on larval fish and prawn populations does not seem to have been considered in the marine risk assessment and management chapter. Issues such as entrainment, etc need to be discussed and more details of the proposed desalination plant should be included.
	The proposed intake structure is likely to be located on the product loading facility, potentially close to the vessel berthing jetty. Multiple cylindrical wedge-wire screens will be attached to the intake as a filtration device. These screens generally have openings ranging from 0.5 mm to 10 mm and are usually oriented on a horizontal axis with screens sized to maintain a velocity of less than 15 centimetres per second to minimise debris and marine life entrainment. The close proximity to the shore, the velocity controls and the screens should minimise any impact on larvae. Additionally, flow velocity at the face of the intake pipe will be designed to meet industry practices to manage entrainment and impingement issues (Draft EIS/ERMP, Chapter 4). Additional information on predicted impacts to the Onslow Prawn Managed Fishery has been provided in Appendix FH of the document.

2.3.3.4 Stormwater and Wastewater Treatment

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.3.3.5 Waste Management

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.3.3.6 Power Supply

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.3.3.7	Accommodation Village
1.1	The Accommodation Village is identified in the Draft EIS/ERMP Vol 1: • To be used from construction through to early operational periods as well as being a safe haven for events such as cyclones. It is not clear if the safe haven function will continue into ongoing operation [Section 2.3.3.7] • To house 400 operations personnel in the draft [Table 2.1] • Described to house both construction and operations staff [Section 2.2.3]. I could not identify any other accommodation provisions for ongoing operations personnel.
	The final decision on where the operations workforce will be located has not yet been made. Discussions are ongoing with the Shire of Ashburton, which has resolved not to support the housing of operations workers in the ANSIA. However, in order to assess the environmental impact of the Project, the Draft EIS/ERMP considers the option of locating the majority of the workforce in a dedicated Construction Workforce Accommodation Village approximately 15 km south-west of the town of Onslow. Other options being considered include locating them within the town site of Onslow. Notwithstanding the above, Chevron acknowledges the DMP's concerns associated with providing suitable protection for personnel in the event of a cyclone. All accommodation constructed for the Project will be designed in accordance with the relevant Australian Standards to provide a safe haven for personnel in the event of a cyclone. In addition, detailed Emergency Response Plans, including a Cyclone Response Plan will be implemented during the construction and operations phases of the Project.
1.2	The concern is that ongoing operations personnel maybe accommodated close to the pipeline. Given there is considerable space in the proposed village, it appears to be approx 2km x 2km of land, it should be possible to locate the facilities to be used by the operations personnel away from the infrastructure corridor. It will be a matter of ensuring that conditions from the approval do not encourage the village to be in close proximity to the pipeline. And if necessary Petroleum Safety would need to request an approval condition regarding the separation of the accommodation and the onshore pipeline.
	Chevron is committed to ensuring the safety of its workforce and the public. A Pipeline Risk Assessment, based on the guidance in AS2885, will be conducted during the design phase. This risk assessment will include a review of the complete pipeline easement and will focus on the safeguards required during construction to ensure the system is safe from third-party activities and conversely third parties are protected from the pipeline throughout operation. The potential impact to the Construction Workforce Accommodation Village will be covered in this study and any requirement to increase separation distances identified.

2.4 Commissioning and Start Up Activities

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5 Operations Activities

2.5.1 Operations Philosophy

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5.2 Offshore Operations

2.5.2.1 Hydrate Mitigation Strategy

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5.2.2 Alternative Hydrate Management Concepts Considered

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5.3	**Marine Operations**
6.3	Seawater demand for desalination. Chapter 2.0 Project Description (p.68) provides to only "near" definitive statement about desalination. 'Some, or all, of the intake water is likely to be sourced from inshore waters. Saltwater intakes can result in entrainment and entrapment of larval, fish and invertebrates (including prawns) and may have the potential to ingest and kill prawn larvae and nauplii and disrupt critical alongshore water movement and salinity. The "Average" seawater demand is said to peak at 350 cuM/hour approximately 8400 tonnes of seawater/day) but the "Average" does not reveal the quantum of the expected peak demand or when or where that will occur. More details of the location, times of water extraction and modelling of inshore water movement patterns, changes to inshore salinities and impacts on prawns and fish and their larvae are required to determine potential impacts on prawn production. Dependent upon the quantum, when and where the intake occurs, the entire production of the Onslow Prawn Managed Fishery could be ingested and killed in the desalination process.
	The proposed intake structure is likely to be located on the Product Loading Facility, potentially close to the vessel berthing jetty. Multiple cylindrical wedge-wire screens will be attached to the intake as a filtration device. These screens generally have openings ranging from 0.5 mm to 10 mm and are usually oriented on a horizontal axis with screens sized to maintain a velocity of less than 15 centimetres per second to minimise debris and marine life entrainment. The close proximity to the shore, the velocity controls and the screens should minimise any impact on prawn larvae. Additionally, flow velocity at the face of the intake pipe will be designed to meet industry practices to manage entrainment and impingement issues (Draft EIS/ERMP, Chapter 4).
2.5.3.1	Product Export

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5.4	**Operation of Port Facilities**
2.5.4.1	Maintenance Dredging

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.5.5	**Onshore Operations**

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

2.6	Decommissioning
29.147	Section 2.6 (p69) The text regarding decommissioning does not commit to ensuring that infrastructure will be designed such that it will be technically and economically feasible to remove all infrastructure above the seabed at the time of decommissioning. This is a requirement consistent with the conditions attached to recent approvals, and will likely be a focus of any conditions for this development.

Chevron will design all offshore infrastructure to be decommissionable.

As noted in Chapter 12 of the Draft EIS/ERMP, Chevron will develop a Decommissioning Environmental Management Plan (The Plan) for approval prior to decommissioning. This will contain a review of the environmental and safety implications of decommissioning the offshore facilities. The Plan will assess individual elements of the Project and determine the best environmental and safety option (in consultation with the Commonwealth Regulator) for decommissioning. The Plan will also assess the removal (full or partial), recycle, beneficial reuse or abandonment in place for specific infrastructure components. Special attention will be given to abandonment strategies that reduce environmental impact.

It is currently envisaged that the following decommission strategy would be implemented for the Project's offshore facilities:

Subsea

- Removal of infield flexible flowlines, rigid / flexible jumpers and umbilicals
- Removal of subsea infrastructure (manifolds, subsea Christmas trees etc)
- Killing, plugging and capping of wells and removal of wellheads to mudline
- Cleaning and leaving the rigid steel flowlines and trunkline in-situ (this is currently considered to be best environmental practice as the potential environmental damage from removing a pipeline after 30 years is considered to be greater than leaving it in-situ. There is also a considerable number of safety issues associated with the removal).

Platforms

Platform decommissioning would include the following steps:

- Cleaning and purging of all topsides process and utility equipment, waste shipped to recognised waste treatment facilities
- Removal of riser(s), and caisson sections between topsides and steel gravity base
- Remove welds between topsides and steel gravity base
- Removal of topsides using float through barge
- Reactivation of steel ballast, pumped to recovery vessel
- De-ballasting of all wet spaces
- Tow to recognised scrap yard.

This is a reversal of the installation procedure. At present, technology and vessels are available to complete this process. A review of the potential environmental and safety implications for removal of the gravity base will be undertaken prior to decommissioning being undertaken. This will determine whether greater environmental damage could be caused by removing the base, in which case the base would be cleaned and left in-situ to reduce environmental impacts associated with full removal. However, it is currently considered that the platform can be removed in a safe manner. A suitable contingency had been allowed for possible future removal of the facility if this is deemed to be the most appropriate course of action.

All removed structure will be evaluated for recycle or beneficial use (i.e. artificial reef potential).

It should be noted that Chevron will comply with all applicable regulations at the time of decommissioning so this strategy would need to be reviewed and amended in consultation with the relevant authorities.

3.0 Project Alternatives and Site Selection

3.0 Project Alternatives and Site Selection	
3.0	**General Comments**
20.6	Can you please provide details on the 'community and specific stakeholder groups' consulted during the site selection process? In particular did these include NGOs or environmental advocates?
	The information in response to this concern is located in Chapter 3 (Table 3.6: Project Community Stakeholder Engagement Process Summary for Site Selection) of the Draft EIS/ERMP, which states that on December 3, 2008 "Non-government organisations were invited but did not attend" a Stakeholder Open Forum in relation to the site-selection process. Further to the discussion in Chapter 3 of the Draft EIS/ERMP, Chevron would refer the Cape Conservation Group to Appendix B: Stakeholder Consultation (Table 2: Summary of Stakeholder Consultation Completed to Date) of the Draft EIS/ERMP. As indicated in Table 2, the following groups were invited for consultation or were consulted in relation to the site selection between July 2008 and December 2008: • Chevron Community Reference Group • Thalanyji representatives • Shire of Ashburton • Vince Catania • Shire of Roebourne • Beadon Creek Harbour Marine Advisory Committee • Yaburara / Mardudhunera • Wonn-Goo-Tt-Oo • Pilbara Native Title Service (for Kuruma Marthudunera) • Karratha CRG members • Select Karratha and Onslow stakeholders • (representing education, health, Ashburton and Roebourne Shires, Karratha and Onslow communities, local industries and, Pilbara Project Commission) • Select government stakeholders (DEC, DoF, EPA, DoIR, DPI) • Note: Conservation Council of WA failed to respond to numerous invitations and WWF declined to attend. Chevron is committed to an ongoing stakeholder consultation program, including with the Cape Conservation Group.
3.1	**Introduction**

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.2	Project Alternatives
12.1	Woodside does not agree with Chevron's statements that third-party production facilities on the Burrup Peninsula have limited potential for project development in a timely manner (Section 3.0 - Project Alternatives and Site Selection). With over twenty five years of operating experience on the Burrup Peninsula, Woodside makes the following observations: • There is sufficient capacity on the Burrup Peninsula for expansion at North West Shelf and Pluto for at least seven new LNG trains (in addition to Pluto's train one and North West Shelf's trains one to five) • North West Shelf is a long established gas precinct of which Chevron is a part owner • Environmental impacts on the Burrup are known and manageable • Pluto was established as a regional hub to support Woodside and third party resource development. Plans to expand Pluto are well advanced • Woodside has the ability and expertise to develop LNG projects in a timely manner. This is currently being evidenced at Pluto, which is on track to become the world's fastest developed LNG project, from gas discovery to first production within six years • Resource development, transport and social Infrastructure is well established in the Karratha region, with a forward-looking plan by government to meet future development and community needs in the region.
	Within Chapter 3 there are two references that indicate that developing the Project in the Burrup Peninsula may have project development timeframe implications. These implications refer to the ability to develop the gas fields and providing "first gas to market" in accordance with regulatory timeframe conditions pertaining to Chevron's petroleum permit/lease retention. Chevron would add that, after considerable analysis, it was determined that pursuing the expansion of the Pluto site would result in no real advantage in terms of environmental or commercial benefit and would not align with Chevron's strategic benefit strategy for the development of future West Carnarvon Basin reserves. While Chevron could pursue the expansion at Pluto and the NWSJV LNG plants, other reserves located within the West Carnarvon Basin would be left relatively remote from suitable processing facilities and therefore require a greenfield development closer to these fields. In 2008, the Premier and the Minister for State Development authorised the State to commence planning for the Ashburton North Strategic Industrial Area (ANSIA) to assist with the establishment of hydrocarbon-related industries (including the Wheatstone LNG plant) to develop the West Carnarvon Basin.

3.2.1 No Action Alternative

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.2.2 Development Alternatives

3.2.2.1 Floating LNG

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.2.2.2 Tie-back to Third-party Infrastructure

12.2	Chevron also states that 'potential cumulative impacts arising from further expansions at this location (Pluto) would require significant assessment and consideration". In response, Woodside does not view "additional studies" as a "disadvantage" as stated in the Draft EIS. In fact, Woodside supports such studies as prudent and responsible measures that provide the necessary detail for full and transparent consideration by State and Federal environmental regulators. In fact, Woodside agrees with Chevron that the environmental impacts on the Burrup are known and manageable.

	Chevron invests considerable resources into conducting environmental studies and research to support both Western Australian and Federal approval processes. This has been demonstrated for both the Gorgon and Wheatstone projects. Chevron did not indicate that "additional studies" were a "disadvantage". To the contrary, this statement highlights that to pursue any expansion for the tie-back to Pluto LNG, new environmental applications (State and Federal) would be required to assess and manage the environmental and cumulative impacts and that these processes would require a significant contribution.
20.5	This table does not separate the 2 possible tie-back options. Are both sites affected by those identified for tie-backs to third parties?
	The two possible third-party tie-back options (Pluto LNG and Gorgon LNG) have the same potential to impact on the same categories of matters of National Environmental Significance (NES), even though the species potentially impacted may differ. The matters of NES that would likely be impacted by these options include nationally threatened species and ecological communities, migratory species and Commonwealth marine areas. Although both sites are located outside of the National Heritage place boundary (Dampier Archipelago, including the Burrup Peninsula) they are in close proximity. Hence there is a possibility that the tie-back options for both sites would impact this National Heritage place.

3.2.2.3 Tie-back to New Onshore Facility

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.2.2.4 Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.2.2.5 Preferred Alternative

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.3 Site-screening Study

20.3	BHP Billiton's Pilbara LNG Project Site Selection Study (URS, 2004) also used a 5 step process to identify suitable LNG sites between Karratha and Exmouth. The 5 step process identified a number of exclusion criteria relating to engineering requirements including: • Sufficiently elevated site that is safe from flooding and likely storm surge (>5m AHD) (URS, 2004, p. 16) • Minimum distance from coast to navigable water depths to allow access for 12 m draft LNG tankers" (URS, 2004, p. 7) • Distance from 10m contour line >15km given rate of 10 (URS, 2004, p. 16). • Other environmental exclusion, or nearly exclusion (rated up to 10), criteria which BHP Billiton's selection site study included: • Mangroves were given a constraint factor of 10 (high to nearly exclusion) (URS, 2004, p. 14) • Very small islands gave complete exclusion and small islands (500-1000ha) rated 10 (URS, 2004, p. 14) • Water courses constraint factor of 9 - "in recognition of the ecological importance of natural drainage courses, particularly those significant enough to be recorded in the GIS database sets" (URS, 2004, p. 15). In the BHP Billiton site selection study Ashburton River site was deleted from the 10 selected sites upon a site inspection over concern for flooding and access to the coast" URS, 2004, p. 17). **Question 1**: Could an explanation be provided to why the Chevron Site Selection resulted in the choice of the Ashburton North site when it was contraindicated in the BHP Billiton site selection? **Question 2**: The BHP Billiton's site selection study rated the following sites as the most suitable: Onslow Industrial, Onslow North, Holden Point and Dampier West (URS, 2004, p. 34). Could there be an explanation why these sites were deemed unsuitable for the Wheatstone Project?

Response 1: In 2008, Chevron engaged WorleyParsons to conduct a site-selection study. The Wheatstone LNG Site Selection Study Report referenced BHP Billiton's Pilbara LNG Project Site Selection Study (URS, 2004) and did not contradict BHP Billiton's study or the preferred sites identified.

BHP Billiton's process identified Ashburton North as a potential site during the regional constraints assessment, as the site had relatively low levels of constraint based on a range of environmental, social and physiographic factors that were analysed. During the site feasibility assessment, a field inspection was undertaken by the BHP Billiton engineering team, which removed the site from further assessment due to engineering constraints associated with concern over flooding and access to coast.

Chevron's site-selection study concluded that the Ashburton North site is the preferred site as it had the highest suitability index and environmental and social issues were relatively low compared to other sites. Cyclone/flood surge height risks and access to the coast can be mitigated through site filling and coastal engineering.

Response 2: The purpose of a site-selection study is to identify a preferred site and potential alternative sites to progress further investigations. The BHP Billiton report represents the initial stage of the site-selection process and further investigations and activities are required to complete the final site selection. This includes environmental, cultural heritage, socio-economic impact and technical feasibility studies (including site investigation) as well as comprehensive stakeholder engagement.

Since BHP Billiton's site-selection study, the Premier and the Minister for State Development authorised the State to commence planning for the Ashburton North Strategic Industrial Area (ANSIA) to assist with the establishment of hydrocarbon-related industries to develop the West Carnarvon Basin. ANSIA's location has been endorsed by BHP Billiton, ExxonMobil and Chevron for LNG and hydrocarbon processing of gas extracted from the Scarborough Pilbara LNG Plant, Macedon Gas Development and Wheatstone Plant. The development of the ANSIA as an LNG hub will lessen the need for future LNG related port developments in the Pilbara.

This location also supports Chevron's strategic benefit strategy for the development of future West Carnarvon Basin reserves. While Chevron could pursue the development at Holden Point and Dampier West, other reserves located within the West Carnarvon Basin would be left relatively remote from suitable processing facilities and therefore require a greenfield development closer to these fields.

3.3.1 Outcomes of the Five-step Process

3.3.1.1 Specific Option Locations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.3.1.2 Site-screening Study Area

20.4	Please explain why a new site will have a lesser environmental impact than combining with another existing, or planned project?

Chevron is working in partnership with the State Government and other proponents such as BHP Billiton, ExxonMobil, and Apache to develop Ashburton North Strategic Industrial Area (ANSIA) to assist with the establishment of hydrocarbon-related industries (such as the Wheatstone LNG plant, Macedon Domestic Gas Plant and Scarborough LNG) to develop the West Carnarvon Basin. The development of the ANSIA as an LNG hub will lessen the need for future LNG related port developments in the Pilbara.

While Chevron could pursue the expansion at Pluto and the NWSJV LNG plants, other reserves located within the West Carnarvon Basin would be left relatively remote from suitable processing facilities and therefore require a greenfield development closer to these fields.

3.3.2 Final Results of Site-screening Study

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.4 Community and Stakeholder Engagement Process

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.5 Independent Peer Review

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.6 Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7 Project Design Considerations

20.10	"The placement of multiple industrial facilities within a concentrated development area reduces overall cumulative impacts and ensures localised environmental impact over a broad region by reducing the need for multiple infrastructure development." What investigations have been done for considering sharing of multiple industrial facilities along the Pilbara coast? Including, but not limited to, those in existence and those proposed?

Chevron shares the view that LNG hub developments reduce associated industrial impacts, and endorses the State Government's approach to combine infrastructure at the Ashburton North Strategic Industrial Area (ANSIA) to assist with the establishment of hydrocarbon-related industries to develop the West Carnarvon Basin. The development of the ANSIA as a hub will also lessen the need for future LNG related port developments in the Pilbara.

Investigations about combining other industrial facilities along the Pilbara coast is a matter for the State Government. But Chevron notes that the industries combined need to be compatible. For example, the nature of LNG and condensate exports make it impractical to combine an LNG/condensate port and a mining port.

3.7.1 Strategic Industrial Area (SIA) Concept – Common Use Coastal Access (CUCA)

20.12	"Multiple proponents can utilise a single multi-access infrastructure corridor (access roads, utilities, pipelines) … eliminating the need for multiple infrastructure corridors … 1. "What has been put into place to enable future proponents to share infrastructure corridors? 2. Will future pipelines require dredging and stabilisation or can future projects utilise the exiting Wheatstone pipelines? 3. Why can't the (unused) Griffin pipeline be used for the Wheatstone Project to access the coast? 4. Why does the Macedon Project have a separate pipeline and corridor coming into the nearby shallow waters to reach the same site?

1. Chevron, along with BHP, will develop a Shared Infrastructure Corridor from the existing Onslow Road to the proposed Wheatstone and Macedon development sites. This infrastructure corridor will be large enough to accommodate a road, pipeline(s), and telecommunication lines for multiple users. It is anticipated that the road will be managed by Main Roads.
2. The pipeline (trunkline) for the Project will transport the hydrocarbons from the Project offshore development. This will be approximately 9 MTPA. If the Project reaches its full capacity of 25 MTPA then a further 16 MTPA will be transported to the Onslow site. These pipelines may require dredging and stabilisation; however, the locations of the proposed fields to supply this gas and the associated pipeline routes are not yet known. These future developments would be subject to their own environmental approvals.
3. BHP Billiton are currently preparing an approval to decommission the Griffin Gas Plant and the associated infrastructure. It is anticipated that they will seek to leave the Griffin pipeline in-place. However, the pipeline is not suitable for transporting Wheatstone gas and condensate as its diameter (8 inches) is too small to meet Wheatstone requirements (44 inches) and the route of the Pipeline is not in the vicinity of the proposed Wheatstone Offshore Platform.
4. The Macedon and Wheatstone projects both undertook detailed pipeline route assessments. These assessments considered seabed conditions, the environment, and cost. The Wheatstone Project fields are located approximately 220 km to the north-east of Onslow. The Wheatstone trunkline is proposed to run south and west until it passes Thevenard Island, thereby avoiding sensitive nearshore reefs. The Macedon Project's gas field is located approximately 200 km south-west of Wheatstone Project fields. The Macedon pipeline will run in an easterly direction until it reaches the Griffin pipeline. It will then run adjacent to this pipeline to the Griffin pipeline shore crossing. The Macedon pipeline will then cross the Ashburton River at the existing causeway crossing. It did not make economic or environmental sense for the Wheatstone trunkline to pass the onshore plant to the Griffin pipeline and then have an additional crossing of the Ashburton River.

3.7.2 Offshore Field Development (Gas Wells)

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.3 Dredging and Dredge Material Management Considerations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.4 Material Offloading Facility

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.5 Pipeline Shore Crossings

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.6 Greenhouse Gas Considerations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.7 Domestic Gas Plant

20.9 "Third parties may also provide natural gas to supply the proposed Domestic Gas Plant"

If there is provision for third parties to supply the Chevron Domestic Gas Plant why couldn't the BHP Billiton Macedon Gas plant (to be built on the Ashburton North site shortly) be used for Wheatstone & Macedon and still provide provision for 'third parties'? This would comply with the objective to decrease the 'need for multiple infrastructure development' as stated on page 92. Similarly have combined domestic gas plants been considered with other projects? Does the domestic gas plant have the capacity to reduce the need for additional future gas plants from future proposed Domestic Gas Plant' projects?

While some synergies between the projects located within the Ashburton North Strategic Industrial Area (ANSIA) are possible and are being explored, there are several technical and commercial difficulties with combining domestic gas plants. To some degree the plants are designed to deal with the specific composition of each gas field. For example, gas from fields with higher nitrogen need additional treatment to fields with lower levels. Each of the domestic gas plants are designed to meet those specific feedstock needs.

There are also other constraints associated with aligning maintenance schedules for fields, platforms, pipelines, LNG plants and so on associated with the domestic gas plants.

Lastly, the WA Government is keen to diversify the supply of domestic gas to provide greater security of supply. If a large domestic gas plant at Ashburton North were to suffer major problems it could have a serious economic and social impact on WA, as has happened in the past.

3.7.8 Produced Water Handling

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

3.7.9 Future Considerations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.0 Emissions, Discharges and Wastes

4.0 Emissions, Discharges and Wastes	
4.0	**General Comments**
24.3	Be pro-active and own your roadside litter. The 'Industrial Communities Against Rubbishing the Environment' (ICARE) group was formed in late 2009 to tackle the issue of roadside litter along Burrup and Karratha-Dampier Roads - the principle access corridors to major industry in the region. The group brings together the key government and port industry stakeholders within the Port of Dampier, including: Dampier Port Authority, Woodside and Rio Tinto. The ICARE group has committed to conducting four clean-ups throughout the year along over 30 kilometres of roadside each year, in addition to implementing pro-active and co-ordinated litter management strategies. A similar holistic approach to managing the litter issue could be adopted by the Chevron Wheatstone Project.
	Chevron supports the local community and, through responsible environmental management, acts to reduce impacts to public safety, the environment, road infrastructure and public amenity.
24.4	Encourage Litter Reporting by the Workforce. Currently members of the public can report acts of littering or dumping to Ranger Services (Shire of Roebourne) or the Keep Australia Beautiful Council of Western Australia. As part of the Shire/ DEC's powers, an infringement notice can be issued for littering or illegal dumping.
	Chevron applies the following measures to litter control: • Provides training to employees and contractors during induction and as an on-going commitment to quality assurance. Training is provided in waste management and impacts of improper waste management to public health and the environment. • Encourages employees and contractors to report all non-compliance with procedures. • Provide suitable litter and waste facilities throughout the LNG site and accommodation areas.
4.1	**Introduction**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
4.2	**Greenhouse Gases Emissions and Management**
3.1	I have heard that the Chevron Wheatstone Project will emit over 10 million tonnes of carbon pollution per year. I think that this is an unacceptable amount and ask that you consider not approving the Project.
11.1	Please take action to ensure that the carbon pollution from this project is not allowed.
	Chevron shares the concerns of governments and the public about climate change and acknowledges the use of fossil fuels to meet the world's energy needs contributes to greenhouse gases in the Earth's atmosphere. In response to this concern, Chevron has sought ways to reduce greenhouse gas emissions from the design of the Project. Concern about the level of greenhouse gas emissions in Western Australia must be informed by the fact that climate change is a global issue and that the life cycle emissions related to the use of various fuels must be considered. Policy makers increasingly accept that the global supply of natural gas has an important role to play in slowing the rate of growth and potentially reducing global greenhouse gas emissions by displacing other more emissions-intensive fuels such as coal. While the Project (as per the Project scope described in the EIS/ERMP) will emit 10.4 million tonnes per year, natural gas from the Project can result in between 40 and 100 million tonnes per year less global greenhouse gas emissions than would otherwise have been the case if that energy has been supplied by competing fuels such as coal. Extrapolated over the Project's economic life, the use of natural gas from the Project has the potential to result in several billion fewer tonnes of greenhouse gases in the atmosphere compared to the same amount of energy derived from competing fuels such as coal.

23.15	There can be no doubt that carbon pollution from this project will have a direct effect on the WA environment, and therefore should be regulated by the WA EPA under the Environmental Protection Act. Scientific and legal precedents are now common in other jurisdictions for this approach, including the US EPA determination of carbon dioxide as a dangerous pollutant.
23.16	The vulnerability of key WA terrestrial ecosystems to climate change, particularly those in the biodiverse South West continue to be highlighted in major reports such as IPCC. The impacts of carbon as a pollutant are not limited to climate change. There is now a clear and direct link between CO_2 concentrations and ocean acidification. A review by the August Royal Society reviewed the science in 2005 provided clear evidence to suggest that changes in ocean chemistry resulting from elevated atmospheric CO_2 may produce significant and profound changes to ocean ecosystems. In particular, eco-systems such as Ningaloo reef, in common with other marine coral ecosystems may be as adversely affected by ocean acidification as other aspects of climate change.

Chevron does not dispute that groups such as the Intergovernmental Panel on Climate Change and the CSIRO have predicted that anthropogenic climate change may impact upon areas such as the south-west of Western Australia and that increased levels of carbon dioxide in the atmosphere may lead to impacts on ocean ecosystems such as coral reefs. However, Chevron is unable to identify any scientific literature that indicates greenhouse gas emissions from individual facilities such as those proposed for the Project will have any measurable environmental impact on the areas surrounding the Project site.

Greenhouse gas emissions from the Project will contribute to global atmospheric concentrations. It is therefore misleading to imply that facility-level emissions from the Project will have any measurable impact on the environment in proximity to the Project.

The US EPA Endangerment Finding was that "greenhouse gases may contribute to air pollution and may endanger public health and welfare". The US EPA did not contend, as suggested in this submission, that greenhouse gases contributed to localised environmental impacts.

What is important is that governments around the world develop workable, effective and economically efficient policies that seek to reverse the growth in global atmospheric concentrations of these gases. Chevron contends that increasing the supply of natural gas, such as from the Project, has an important role to play in this policy framework given the life-cycle emissions intensity of natural gas compared to other traditional and more emissions-intensive fuels and the relative low cost of emissions abatement provided by increased utilisation of natural gas both within Australia and overseas.

20.43	"CO_2 sequestration infeasible" Have alternatives for CO_2 reuse been investigated? What options are there and why cannot they be incorporated into the project design? A media release by WA government (30.09.2010) announced plans for Aurora Biofuels Pty Ltd to source CO_2 from a major industrial plant in the Karratha region for use as feedstock for algal production, with subsequent production of biodiesel and other algal products. Has Chevron committed to a similar project to recycle CO_2 produced by the Wheatstone Project?

Chevron acknowledges Cape Conservation Group's comment. As discussed in Section 3.7.6.4 of the Draft EIS/ERMP, opportunities to geologically dispose of reservoir carbon dioxide emissions associated with the Project were considered but it was concluded that the opportunity was not viable.

The Project team has not studied, in detail, opportunities to utilise carbon dioxide emissions from the Project as a feedstock for the production of algal based bio-fuels. Chevron currently views these technologies as immature.

	However, Chevron Corporation is actively conducting research on second and third-generation bio-fuels such as those made from algae and microbes, and it considers these could play an important role in diversifying the world's energy sources and curbing greenhouse gas emissions. Research into these bio-fuels includes: • Identifying the appropriate organisms to use as biomass feedstock • Identifying and testing technologies for converting the biomass into bio-fuels. This work is time consuming as we have found that technologies that work in the laboratory often don't transfer to commercial-scale production • Developing finished fuels that meet consumer expectations and are compatible with existing vehicles.
21.1	Just a quick email to urge you to enforce a requirement on Chevron's proposed Wheatstone LNG development that it massively reduce its planned emissions. Up to half a BILLION tonnes of carbon pollution is outrageous in this day and age. Do your job properly and mandate significant changes to this development or reject it outright.
	As discussed in the Draft EIS/ERMP, the Project is predicted to have an operating life of between 30 and 50 years. The reference to half a billion tonnes of greenhouse gas emissions assumes the Project will operate at full capacity for the entire 50 years. As discussed in the Draft EIS/ERMP, there is a considerable ramp up to full production and there is likely to be a similar ramp down of production at the end of the Project's operating life. Concern about the level of greenhouse gas emissions in Western Australia must be informed by the fact that climate change is a global issue and that the life cycle emissions related to the use of various fuels must be considered. Policy makers increasingly accept that the global supply of natural gas has an important role to play in slowing the rate of growth and potentially reducing global greenhouse gas emissions by displacing other more emissions intensive fuels such as coal. While the Project (as per the Project scope described in the EIS/ERMP) will emit 10.4 million tonnes per year, natural gas from the Project can result in between 40 and 100 million tonnes per year less global greenhouse gas emissions than would otherwise have been the case if that energy has been supplied by competing fuels such as coal. Extrapolated over the Project's economic life, the use of natural gas from the Project has the potential to result in several billion fewer tonnes of greenhouse gases in the atmosphere compared to the same amount of energy derived from competing fuels such as coal.
23.11	We are also extremely alarmed by the very large carbon pollution output projected for the Wheatstone Project with no proposed mitigation actions. In our view this approach is totally unacceptable for a pollution source of this magnitude and for a proponent such as Chevron. This project is projected to produce over half a billion tonnes of carbon pollution over its lifetime, and over 10 million tonnes per annum. This will increase Western Australia's carbon pollution by over 13% and Australia's total pollution by more than one per cent, placing international carbon pollution reduction commitments at serious risk unless carbon pollution mitigation actions are taken by Chevron.
23.12	The Draft EIS/ERMP is over 8000 pages long, yet discussion of carbon pollution abatement opportunities through geosequestration or biosequestration totals four paragraphs. This is an extremely cursory approach to perhaps the largest single environmental impact of this project. The documentation suggests that the only mitigation actions that Chevron will consider taking will be compliance with an Emissions Trading Scheme (ETS), however given that there is no certainty that an ETS ever come into effect this commitment can only be interpreted as a tactic to delay carbon pollution reduction actions by Chevron.

	Section 4.2.7 of the Draft EIS/ERMP summarises a number of actions that have been taken to reduce emissions from the Project and a range of additional studies that are planned to be undertaken during the ongoing design and engineering to further reduce emissions. Section 3.7.6 of the Draft EIS/ERMP describes several of the high-impact design decisions that will have the effect of reducing the Project's greenhouse gas emissions. Concern about the level of greenhouse gas emissions in Western Australia must be informed by the fact that climate change is a global issue and that the life cycle emissions related to the use of various fuels must be considered. Policy makers increasingly accept that the global supply of natural gas has an important role to play in slowing the rate of growth and potentially reducing global greenhouse gas emissions by displacing other more emissions intensive fuels such as coal. While the Project (as per the Project scope described in the EIS/ERMP) will emit 10.4 million tonnes per year, natural gas from the Project can result in between 40 and 100 million tonnes per year less global greenhouse gas emissions than would have been the case if that energy had been supplied by competing fuels such as coal. It is unlikely that emissions from any one project will have any material impact on international talks to reduce greenhouse gas emissions; however, confidence about increased supplies of natural gas may facilitate commitment under the Copenhagen Accord by nations such as China to "endeavour to lower (their) carbon dioxide emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level".
23.13	The documentation released by Chevron claims that the LNG produced by this project is a clean fuel source that 'could' have a net effect of reducing greenhouse emissions globally. While LNG is somewhat cleaner that coal, there is no evidence presented that the sale of LNG into the global energy market by Chevron will displace coal fired energy generation, or result in any less coal being used. The dynamics of the energy market would suggest that the overwhelming outcome of additional LNG supply will be additional energy demand, and in fact LNG may actually displace cleaner forms of energy such as wind or solar power. Chevron's claims that LNG will result in reduced carbon pollution lack any credibility without detailed modelling to demonstrate and guarantee that LNG sales will displace dirtier fuel sources. The more likely scenario given the dynamics of international energy markets is that this project will result in a very significant global increase in carbon pollution by adding an additional dirty pollution-intensive fuel into the market and by delaying the transition towards renewable energy sources.
	The use of natural gas compared to alternative fuels has the potential to significantly lower greenhouse gas emissions. As demonstrated in the Draft EIS/ERMP, natural gas from the Project – when used to generate electricity in East Asia, for example – results in life cycle emissions of between 440 and 600 kg of greenhouse gas per megawatt hour of electricity generated. This compares to between 720 and 1020 kg from the use of Australian export black coal. The emissions benefit is much higher if the comparison is made with fuels such as brown coal. The argument in this submission that global emissions will increase simply because of increased supply of natural gas from the Project is erroneous and misrepresents the dynamics of the global energy market. Energy markets in which gas from the Project will compete are governed by consumer demand. Demand growth is fundamentally driven by GDP growth and to a lesser degree by long-term energy prices. These energy markets have numerous choices regarding how this demand will be satisfied. This includes domestic coal, internationally traded coal, natural gas, oil and renewables. Overall demand is not influenced by the addition of one or two new energy supplies. This results in projects such as Wheatstone having to compete with alternative energy sources to supply a relatively fixed market demand. One only has to consider recent media announcements about gas supply contracts delays for the LNG projects in eastern Australia to recognise that these markets are highly competitive and underpinned by relatively low-cost coal. The challenge for all cleaner energy supplies is to make the argument that consumers should be willing to pay a premium for cleaner fuels. It is widely recognised that consumers are resistant to significant increases in energy costs and in many markets will elect for lower cost energy rather than cleaner energy.

	Natural gas also offers a low-cost path to reducing emissions. ClimateWorks Australia published its Low Carbon Growth Plan for Australia in March 2010. This report concluded the increased use of natural gas could result in emissions abatement at a cost of \$59 to \$60 per tonne, whereas wind power cost between \$75 and \$134 per tonne, solar thermal \$136 per tonne, wave and tidal power \$320 per tonne and solar photovoltaic at \$460 per tonne. The reality is that without government sponsored mandates or subsidies, most renewable energy sources are currently cost prohibitive.
23.14	In the absence of a broad-based policy measure to deal with carbon pollution in Australia (such as an ETS), it will be necessary to continue dealing with carbon pollution on an ad-hoc basis by State Government regulators. As such, carbon pollution from this project should be subject to at least the same abatement conditions that have been imposed on other LNG projects in Australia such as the Gorgon JV Project or Woodside's Pluto project. As a part of the Ministerial consent to develop Pluto, Woodside was required to biologically offset its reservoir emissions. Similarly the Gorgon Project was required to enter into undertakings with the WA government to address its reservoir emissions of CO_2 by geosequestration. At an absolute minimum there must be a requirement for geosequestration or other permanent abetment of reservoir emissions from the Project.
	In undertaking to manage emissions from the Project, Chevron has fully complied with all Federal and State Government policy and guidelines on the management of greenhouse gas emissions. In particular, the actions committed to by Chevron are consistent with the Western Australian EPA Guidance Statement 12 on the minimisation of greenhouse gas emissions, which requires proponents to consider opportunities such as bio and geological sequestration and appropriate offsets. Sections 3.7.6 and 4.2.7 of the Draft EIS/ERMP discuss these considerations and Chevron's reasoning for adoption or rejection of various mitigation and offset opportunities. The issue of what actions individual projects should undertake to minimise their greenhouse emissions is complex and subject to significant debate as the Australian government considers how best to decarbonise the Australian economy. For the past ten-to-15 years governments have adopted the approach of dictating the emissions reduction actions that must be taken by large projects. Australia's growth in emissions over this period is evidence that this approach has not been successful in reducing the rate of growth in emissions. It is also widely accepted that these prescriptive policy responses can only deliver lowest cost emissions abatement where government has perfect information about the current and future cost of all emissions reduction opportunities. Economist Ross Garnaut's Climate Change Review report made the case that governments do not have such perfect information. It is for this reason that many favour the introduction of a price on emissions across the economy as the most efficient mechanism to drive down emissions across the economy. As identified in the Draft EIS/ERMP, Project design is consistent with the introduction of a price on emissions.
23.17	It is totally unacceptable that Chevron are proposing no action to reduce the massive carbon pollution output predicted from this project. Not only will this result in a failure to achieve a social licence to operate, but this is likely to expose the project to legal challenges and other action taken in the public interest to avoid dangerous carbon pollution.
	Beyond reducing emissions through changes in plant design, opportunities to further reduce emissions – by geological sequestration of reservoir carbon dioxide, for example – were considered and found to be unviable. This is discussed in Section 3.7.6.4 of the Draft EIS/ERMP. Opportunities to reduce Project greenhouse gas emissions by investment in offsets was considered (see Section 4.2.7.3) and found to be a credible alternative for managing liabilities under schemes such as the proposed Carbon Pollution Reduction Scheme. Should such a scheme be introduced then it is possible that Chevron will invest in such opportunities to assist in managing any scheme obligation. One of the significant issues facing proponents of major energy projects at this time is the continuing uncertainty regarding national policies to regulate greenhouse gas emissions. Without a clear national policy regulating greenhouse gas emissions, consideration of emissions reduction opportunities beyond the plant boundary (such as biosequestration offsets) is premature.

23.19	Of concern, there a number of statements throughout the Draft EIS/ERMP that appear to be contradicting, misleading, unsubstantiated or false. A few simple examples to highlight this include: 1. Section 1.5 Consequences of Not Proceeding states (pg. 9) "If future growth in energy demand could be satisfied through the increased consumption of coal, this would result in markedly higher greenhouse gas emissions. This section fails to quantify emissions of LNG or domestic gas versus coal nor mention the other sustainable perspective of not proceeding which may result in adoption of already existing renewable energy technologies (and enhancement of efforts towards further improving the efficiencies of those energy sources), reductions in use of non-renewable resources and greatly reduced GHG emissions. In addition, there is no quantification of risk versus reward.
	Evidence to support the summary statement in Section 1.5 that LNG has lower life cycle greenhouse gas emissions compared to competing fuels such as coal was provided in Section 4.2.5 and Figure 4.4 of the Draft EIS/ERMP. Natural gas and renewable energy do not directly compete for energy markets given most renewable energy supplies are only taken up given government mandated subsidies in the form of renewable energy targets or feed in tariffs. Chevron contends that lower cost of emissions abatement can be achieved (without government mandated subsides) by increasing the supply of natural gas. ClimateWorks Australia published its Low Carbon Growth Plan for Australia in March 2010. This report concluded the increased use of natural gas could result in emissions abatement at a cost of $59-60 per tonne, whereas wind power cost between $75 and $134 per tonne, solar thermal $136 per tonne, wave and tidal power $320 per tonne and solar photovoltaic at $460 per tonne.
30.50	Considering that Pluto LNG has a GHG efficiency of 0.32 tonnes of CO_{2e}/tonne of LNG and Tangguh LNG (Indonesia) has a GHG efficiency of less than 0.3, is there a reason why Wheatstone could not achieve 0.3?
	Chevron is unclear as to the source data suggesting the Tangguh Project only has an emissions intensity of 0.3. While not included in the benchmarking data contained in the Draft EIS/ERMP (Figure 4.5), the environmental impact assessment for the Tangguh Project (Summary Environmental Impact Assessment - Tangguh LNG Project in Indonesia, BP, June 2005) indicates an expected emissions intensity of the LNG plant to be 0.61 tonnes CO_{2e} per tonne LNG. There are many factors that influence the emissions intensity of an LNG plant. These range from the composition of the gas in the gas field, pressure of the gas in the gas field, the distance that the natural gas has to be transported between the gas field and the processing plan, ambient operating temperatures, the ability to use water cooling, the availability of grid connected power etc. Within these factors project proponents generally select the most efficient plant design that suits the attributes of their project. Proponents have a very real incentive to design plants that use as little fuel as possible; any gas not burned as fuel can ultimately be sold as LNG (or domestic gas). In designing the facilities to be used at the Wheatstone Project, Chevron has selected the use of currently applied best practice technology in emissions reduction and plant efficiency suited to the attributes of the Project. A discussion of the critical technology selection and design decisions that influence the Project's greenhouse gas emissions was included in Section 3.7.6 of the Draft EIS/ERMP. Section 4.2.6.1 of the Draft EIS/ERMP contained a discussion comparing the anticipated greenhouse gas emission intensity of the Project with a range of other LNG projects, including a number that are progressing through environmental impact assessment in Australia.

30.51	CO_2 content of gas at "yet to be determined gas-fields". How will this affect GHG emission levels? Is it built in to the 10Mta "average"? What is CO_2 content of the newly discovered field (announced recently)?
	Section 2.1 of the Draft EIS/ERMP identifies the development of gas fields in Petroleum Titles WA-253-P, WA-17-R, WA-356-P and WA-16-R as providing natural gas to supply the first two LNG processing trains (the Foundation Project). Gas sources for the subsequent LNG trans and the related design of those LNG processing trains are yet to be determined. In estimating the greenhouse gas emissions for the subsequent LNG processing trains it has been assumed that the fields used to supply these trains has a similar gas composition to that contained in Petroleum Titles WA-253-P, WA-17-R, WA-356-P and WA-16-R and the design of the LNG processing trains was similar to that of the Foundation Project. No economies of scale have been factored into this assessment so the 10 MTPA figure should be considered to be on the high end of the anticipate emissions. While Chevron has been involved in a number of recent discoveries over the past 12 months it is premature to speculate on the size and composition of these discoveries and the potential for these discoveries to be integrated into the Project. The various exploration joint ventures that control these discoveries will need to undertake further detailed appraisal activities before the size and composition of these fields can be determined.
30.58	Please provide a discussion of how best practice has been incorporated into the proposal. Note that Wheatstone is only one of the industries in the SIA and minimisation of impacts should be demonstrated to allow for other industry impacts. In particular, how is best practice to be applied to air emissions, noise and spill prevention? Note the PLF, MOF and presumably diesel and condensate storage will be close to the mangroves and even small spills could impact on this critical asset, so best practice design and management will be critical.
	Chevron would like to thank the OEPA for their submission. Chevron considers that there are two elements to this submission; best practice (including spill management), cumulative impacts and the Ashburton North SIA. **Best practice** Best practice for air emissions includes the use of DLE burners for the gas turbines, the use of Thermal Oxidizers to incinerate the acid gas from the AGRU, and the use of WHR units to supply heat to the plant's heating medium. Best practise for noise will be met by compliance with industry standards and with Regulations to minimise noise impacts. Best Practice for spills – Chevron are developing Environmental Response Plans (including an Oil Spill Response Plan), a CEMP, and DSDMP that will detail the key risk and mitigation issues around spills and the mangroves. Importantly Chevron intends to minimise leaks and spill through engineering controls. Any potential spills will be intercepted by bunding and/or drainage collection systems before they would flow off-site toward the mangroves. This is discussed in detail in Chapters 4.8 and Chapter 8 of the EIS /ERMP. **Cumulative Impacts** Chapter 11 of the Wheatstone Draft EIS/ERMP provides a cumulative impact assessment that considers additional potential developments located within the Ashburton North SIA: the proposed Macedon Project, which is currently undergoing design; and the Scarborough development, which has not publically announced any final concept decisions for the development, its location, or when the development is likely to begin. No further developments have been proposed, nor are details available, for any further developments in the Ashburton North SIA. The assessment of cumulative impacts for each factor concludes that potential impacts to the environment can be managed.

4.3	**Atmospheric Emissions (excluding Greenhouse Gas)**
5.1	Not much detail on mitigation measures with regard to emissions and discharges from the construction, commissioning and operations of the facility was provided. Specific information on this will be required during the works approval phase. Both point source and ambient air quality monitoring will be required.
	Mitigation measures relating to emissions, discharges and wastes during the phases of the Project will be developed as the design of the Project matures. These measures will be provided as part of the Works Approval process as noted by the DEC. Chevron will liaise with DEC as required in the development of the Works Approval documentation.
10.5	In DIA comments on the Draft EIS/ERMP, it was recommended that the air quality assessments include concentrations from bushfires and open air erosion, which have meant that the summer maxima for particulate matter in the Pilbara have exceeded the NEPM standards (from 6.2.3 p14, 4.3.4.2, p40, p43, 4.3.5). However, in the current version of the ERMP, emissions from bushfires have been excluded from the SKM air quality study, which is suggested is due to "the complexity of determining emissions and the difficulty in modelling the variable short term impact of fires on an annual basis" (p93, Appendix C1). This is despite the largest impact in terms of percentage of NEPM under normal operating conditions being from particulates (p195, Appendix C1). The nearest particulate monitoring point to Onslow with publicly available data was apparently in the Dampier/Karratha region at the Dampier Primary School where they recorded an annual average of 21.4 micrograms per cubic metre, which is below the NEPM standard of 50 micrograms per cubic metre. However, a high particulate annual average in 2003 was excluded from the data.
	It is noted that bushfires and open area wind erosion do result in exceedances of the NEPM criteria for PM_{10} in the Pilbara region. However, these events can be considered to be natural or background events. To account for the background particulates SKM examined the results of the Pilbara Iron monitoring network at Dampier and Karratha and using this data determined, in the absence of local monitoring data, that an average annual background concentration of 22 $\mu g/m^3$ can be considered to be representative of the region. The high annual average recorded during 2003 at the Karratha monitoring site is noted by Pilbara Iron as an aberration. The annual average for the years immediately preceding and following 2003 are significantly lower. The monitoring results for particulates in the report include the background concentration of 22 $\mu g/m^3$ and if this is subtracted from the results then it is apparent that the proposed Project development only contributes an insignificant amount to the maximum concentration (5 $\mu g/m^3$ for the maximum on the grid and 3 $\mu g/m^3$ at Onslow).
10.6	Chevron is currently undertaking ambient particulate concentration sampling but at the time of writing a full year of data was not available (p130, Appendix C1). Chevron has also installed a meteorological station at the proposed plant site to obtain site specific data (p125, Volume 1). It is recommended that monitoring continue through the life of the Project. The ERMP document states that the monitoring is planned to be ongoing (p277, Volume 1).
	Chevron intends to continue with ambient air-quality monitoring during the construction and commissioning of the Project. It proposes to continue with ambient air-quality monitoring for 12 months of continuous operations after construction and commissioning. After this time, it is proposed that Chevron undertake a review of ambient air-quality monitoring and reassess the program. This review would be undertaken in discussion with the Department of Environment and Conservation.

10.7	The results of the particulate monitoring that were given show that PM_{10} maximum levels were above the NEPM standard of 50 micrograms per cubic metre (p111, Appendix C1) at Site 1 from January - March 2010 and October 2009 - March 2010. (p288, Volume 1). This is assuming that the tables are representing micrograms rather than milligrams, in which case many more of the measurements would be above NEPM levels. It is of concern that the fact that these measurements exceed the NEPM is not mentioned elsewhere in the ERMP. If background levels of PM_{10} already exceed NEPM levels, then any further raising of these levels by industry could be highly detrimental to human health. Air quality has also been a concern regarding possible effects on rock art in the Dampier Archipelago, where there has been industry contribution to an air quality monitoring programme.
	Chevron acknowledges the submission on air quality. The table on p278 contains a summary of the air quality data collect from the site from the Project location. The submitter is correct the Table parameters are in micrograms and there are several occasions where the natural baseline exceeds the NEPM requirements for dust. This not unusual for a semi-arid area like Onslow. These occurrences are however, isolated and appear to associated with strong wind speeds. Chevron is still reviewing this baseline data with our independent consultants and will ensure that any findings from this data collection are reflected in the Dust Management Plan in the Construction Environmental Management Plan. Through these management measures Chevron seeks to reduce any contribution to PM_{10} levels from the development of the Project. The effect of air pollution on rock art has generally been associated with acid deposition. This is normally associated with high levels of sulphur dioxide and oxides of nitrogen (NO_X) from industrial sources. The sulphur dioxide and NO_X levels associated with the Project are anticipated to be low and therefore the corresponding acid deposition is anticipated to be low. Please see the SKM Technical Report in Appendix C of the Draft EIS/ ERMP for further discussion on this.
13.9	Air quality The proponent has committed to the development of a dust management plan. It is recommended that studies undertaken include analysis of dust constituents. Should examination yield fibrous or other particulates of concern to health, appropriate risk assessments should be undertaken. Further advice may be sought from WA Health.
	Chevron will undertake speciation of a dust sample taken from the dust monitors on site. This analysis will be undertaken by an independent accredited laboratory. If the results of this assessment identify any "fibrous or other particulates of concern to health" then Chevron will undertake an appropriate risk assessment and advice will be sought from the Department of Health.
27.5	Odour from Hydrogen Sulfide emissions has been identified as an air quality issue in the ERMP. Hydrogen Sulfide emissions during acid gas removal has not been addressed in the atmospheric emissions section (section 4.3) as a potential odour issue. This matter needs to be addressed.

Odour generation from deposited sediments is identified in Section 4.3.4 of the Draft EIS/ERMP as a potential issue, which would have to be assessed and managed should it arise. At this stage it is by no means certain that this will arise as an issue, however, the potential for such an emission has been identified.

Hydrogen sulphide emissions from the Acid Gas Recovery Unit is addressed in Section 4.3.4.2 of the Draft EIS/ERMP. Current identified feed gas is low in sulphur, however any sulphur compounds collected in the Acid Gas Recovery Unit will be sent to the thermal oxidiser for destruction.

In summary, the following are considered to ameliorate the odour potential from hydrogen sulphide:

- Feed gas stream to Wheatstone LNG Plant is expected to be low in H_2S content
- Wheatstone facilities are designed to avoid any continuous venting or flaring of feed gas or other hydrocarbon streams which may contain H_2S
- Fuel gas used in the Wheatstone LNG Plant is primarily obtained from process gas which has been treated in the Acid Gas Removal Unit. The AGRU will remove the majority of H_2S. The resulting fuel gas sulfur content will be similar to pipeline or domestic quality natural gas, which has minimal H_2S or SO_X emissions when combusted
- H_2S removed from the feed gas stream in the AGRU will be sent to the Acid Gas Incinerator Unit where it will be incinerated
- In the event of plant upset, gas streams containing H_2S would be routed to an enclosed relief system and sent to an elevated flare stack. Any gas containing H_2S would be burned in a high efficiency flare burner tip
- LNG plant facilities will be designed, operated and maintained to industry standards which minimise any fugitive emissions that could contain small levels of H_2S.

27.6 There are some other important air quality related guidelines that are worthy of mention in Table 9.26. We recommend that the proponent considers and refers to the following guidelines in the ERMP:

1. DEC Dust Guideline "a guideline for the development and implementation of a dust management program"
2. the DEC's air quality modelling guidelines
3. The NSW dust deposition guidelines for amenity impacts in coal mining areas
4. The National Environment Protection Measures (NEPM) Guideline.

Chevron acknowledges the reference and directs the AQMB to the following:

1. The DEC (2008) A guideline for the development and implementation of a dust management program (Draft) has not been considered at this stage, but will be considered during development of the dust management plan.
2. The air quality assessment (see Appendix C1) was undertaken in line with the Department of Environment and Conservation guidelines for Air Quality Modelling 2006, and has been referred to in the ERMP.
3. The NSW dust deposition guidelines for amenity impacts in coal mining areas have not been referred to in the ERMP. That guideline was unobtainable, however, the NSW "Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales – revised version – DEC NSW (2005) refers to a 1988 reference (NERDDC 1988, Air Pollution from Surface Coal Mining: Measurement, Modelling and Community Perception, Project No. 921, National Energy Research Development and Demonstration Council, Canberra). The standard, as it is reported in DEC NSW (2005), appears to indicate a maximum of 4 g/m2/month with no more than an increase of 2 g/m2/month. It is unclear how this standard would be applied as the original publication is out of print and two of the measured background concentrations exceed the 4 g/m2/month standard (Table 6.10). While the standard was originally intended for amenity impacts from coal dust, it is noted that NSW agencies appear to have applied the standard to all forms of settleable dust.
4. The National Environmental Protection Measures (NEPM) guidelines are listed in Chapter 9 (Table 9.26) for consideration.

30.53	What turbines will be used for which purposes is not clear. Chapter 3 says that for processing aero-derivative gas turbines will be used, Chapter 4 says consideration of aero derivative? Please clarify what turbines will be use where (on-shore) and which will have heat recovery systems.
	Aero-derivative gas turbines will be used in the onshore facilities for both gas turbine drivers for the refrigerant compressors and power generation. The aero-derivatives turbines driving the refrigerant compressors will be equipped with Waste Heat Recovery (WHR) systems. The aero-derivatives used in the power generation plant will not include a WHR system. (However, the design specifies that sufficient space be left to install WHRUs in the future, if justified on a technical and economic basis).
30.54	There is no mention of what NO_X emission levels will be from turbines. Please provide this information. Please note that EPA Guidance 15 is being withdrawn as it is out of date. Best practical technology and emission limits are expected.
	NO_X emissions for the gas turbines are included in Section 4.3.4.2 (Table 4.10) of the Draft EIS/ERMP. These are based on gas turbines with 25ppm NO_X emission Dry Low Emission burners.

4.3.1 Overview

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.3.1.1 Air Quality Criteria

27.1	The outline provided for air quality aspects in the ERMP and Air Quality Impact Assessment is, in general, well-structured and most of the potential emission criteria have been addressed. The ambient concentrations (Nitrogen Dioxide, Sulfur Dioxide, Benzene, Toluene and Xylenes) presented in these reports appear to be below the current ambient air quality standards. Also the provided modelling results comply with the depaliment's guidelines for air quality modelling
27.2	AQMB notes that the presented peak concentrations for the Proposed Wheatstone Project (by itself) are probably representative and the maximum predicted future ground-level concentrations are unlikely to exceed the NEPM standard under normal operations; however, ozone and PM_{10} concentrations are about 50% of NEPM criteria.
	Chevron acknowledges the Air Quality Monitoring Branch's submission.

4.3.2 Existing Environment

27.4	It is stated that Chevron is currently undertaking a monitoring study of baseline conditions for dust (TSP and PM_{10}), NO2, SO2 and VOCs. The results of these ambient air quality monitoring campaigns should be compared with current model assumptions and reported to DEC for future consideration.
	Chevron will pass on data collected from this baseline assessment to the AQMB on an annual basis. Chevron will compare the results obtained during the monitoring assessment with those estimated during the modelling assessment.

4.3.2.1 Dust

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.3.2.2 Atmospheric Pollutants and Air Toxics

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.3.3 Offshore Emissions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.3.4 Onshore Emissions

4.3.4.1 Construction and Commissioning

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.3.4.2 Operations

27.3	The peak concentrations during cumulative impacts and non-routine upset conditions (cold start or emergency shutdown) are generally expected to be significantly higher than normal conditions, while most of presented criteria pollutants under upset conditions (ERMP and SKM Air Quality Impact Assessment) are lower or equal to concentrations under normal conditions. Reasons given to justify these matters are: the duration of non-routine emergency shutdown is short (resulting in peak flaring for 15 min) and low flow rate will be directed to LNG train during cold start (30% of normal flow rate directs during a six-hour cold start).
	Chevron acknowledges the Air Quality Monitoring Branch submission.

4.3.5 Comparison of Predicted Air Emissions with Standards and Guidelines

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.4 Light

30.27	Operational flaring is expected 10 x per year. What is the likely duration of flaring events? Where these are planned events, can they be scheduled during the day? Wet/dry flares lux given as 1053 (AppD1) but 100 in Ch 4?
	Operational flaring represents flaring events to maintain a product rundown (does not include emergency, start-up or shutdown flaring events) and the assumption for these events is that they would last <8hrs. These events are usually not planned events; planned events are usually scheduled for a restart or to address upset conditions and do not fall within operational flaring. Whether these planned events could be scheduled during the day has not been assessed at this point. The lux levels are determined by the distance from the source (the flares). There is no difference between the two lux levels; just the distance from which they were referenced. Table 4.16 shows estimated levels approximately 100 metres from source. Table 3.2 in Appendix D1 is correct at 12.5 metres from the base of the flare.

4.4.1 Overview

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.4.2 Existing Environment

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.4.3 Offshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.4.4 Onshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.5 Noise

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6	**Marine Discharges**
5.2	Effluent toxicity testing of discharges should occur and a level of species protection at a defined mixing zone will need to be determined to ensure ANZECC guidelines are being met.
	Consideration will be given to the need for effluent toxicity testing. Appropriate levels of protection will be established that are consistent with the ANZECC guideline and consistent with the level of protection required for the receiving waters.
4.6.1	**Overview**

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6.2	**Offshore**

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6.3	**Nearshore**
4.6.3.1	Anti-fouling Compounds

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6.3.2	Construction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6.3.3	Pre-commissioning and Commissioning

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.6.3.4	Operations Discharges
13.1	The Department of Health (DOH) has reviewed the documents and commends the proponent for its extensive and comprehensive assessments.
	Chevron thanks the DoH for its submission.
4.7	**Waste Management**
13.10	Waste The proponent has indicated that it will transport wastes to Perth for recycling, treatment and/or disposal. As some of these may be classified as controlled wastes, it is important that appropriate regulatory requirements are met for these substances and that the safety of the public on roads and in transit towns during transport is appropriately addressed.
	Although final waste management plans have not yet been prepared, Chevron envisages that: 1. Generated wastes will be categorised on-site and segregated into recyclables, controlled waste, and non-controlled wastes. 2. Controlled wastes, which cannot be recycled (such as spent solvents), will be appropriately packaged and labelled and transported by licensed controlled waste and/or dangerous goods contractors for treatment and disposal. 3. Controlled wastes, which can be recycled (such as batteries), will be appropriately packaged and labelled and transported by licensed controlled waste and/or dangerous goods contractors for pre-treatment and recycling. 4. Non-controlled wastes (such as putrescibles wastes) may be either incinerated onsite in appropriately approved and licensed facilities, or transported offsite to licensed facilities for disposal.

14.2	The proponent has discussed the potential for naturally occurring radioactive material (NORM) to be encountered. Chevron should be made aware that the Radiological Council of Western Australia must be consulted in regard to any radiation matters arising out of this project, including the removal and disposal of any scale or waste containing NORM. A Radiation Management Plan would be required in this situation.
	Chevron notes that it is not currently anticipated that NORMs will become a waste source during the operational phase of the Project. However, should feed gas sources change over the course of the Project, resulting in the generation of residues contaminated with NORMS, then an appropriate Radiation Management and Waste Disposal Plan will be prepared after consultation with the Radiological Council of Western Australia, and in compliance with the NHMRC Code of Practice for the near-surface disposal of radioactive waste in Australia (1992), or other relevant documentation required at the time.
22.34 22.35	Waste Management a) Australia is a signatory to the MARPOL 73/78 convention. The current design of the Gas Wharf does not appear to have any capacity to offload ship's waste. How will Chevron ensure compliance with this international convention and facilitate the disposal of ships waste, especially oily waste and garbage? b) How will Chevron facilitate the correct disposal of AQIS-controlled waste from ships? c) The document indicates that the site will be grubbed and cleared. This will generate a large volume of unsuitable material. The document does not indicate where this material will be taken, or if this will be stockpiled on-site.
	a) Chevron has considered the implications of the MARPOL 73/78 convention and advises that: MARPOL 73/78 Annexes I and II are mandatory, while annexes III to VI are voluntary. The Protection of the Sea (Prevention from Pollution from Ships) Act1983, administered by the Australian Maritime Safety Authority, gives effect to Annexes I to VI. Sections 14A, 26AA, 26DAA and 26FE note that a "...specified facility that is suitable to receive..." waste may be required to take waste specified by an authorised officer. The Project is not providing facilities that are suitable to receive waste from vessels using Project infrastructure, such as moorings, docks and harbours. b) Chevron will not be facilitating the disposal of AQIS-controlled waste from ships/vessels as the facilities are not suitable for this activity. c) The material generated by grubbing and clearing of the site will generally be stockpiled and then utilised for progressive site rehabilitation. In situations where this material is not required (e.g. high density of weed species), this material will be removed through actions that may include removal to licenced waste facilities, controlled burning or burial. If the material is burnt, or transported off site, Chevron will obtain any required Shire or State licenses.
24.1	Commit to 'naked' cargo. Plastic wrapping degrades extremely rapidly on exposure to UV light and the temperatures experienced in the Pilbara region. Quite often, cargo will take weeks or months to transport from its place of manufacture (e.g. China) to the work site. The exposure to sunlight over this extended period is sufficient to cause the plastic wrapping to degrade and break apart. When the cargo is transported by road, the degraded wrapping is ripped off by wind turbulence and ends up as roadside litter. The Citic Pacific Mining Sino Iron Ore project recently (September 2010) committed to naked cargo for the remainder of its shipments through the Port of Dampier and Hedland. This commitment came after experiencing a high volume of litter reports and community complaints about unsecure plastic wrapping and cargo signage from the road transport of its cargo from the Burrup Peninsula to Cape Preston. The transport contractors found out that the Chinese manufacturers had been wrapping the cargo to keep the dust out!

	Chevron assures the CARE Group that: • The transport of goods and equipment to site by third-party contractors will be required to be undertaken in compliance with both the Litter Act 1979 and specifically, Sections 56 to 60 of the proposed Road Traffic (Vehicles) Bill 2009 – Draft 3. • The use of packaging materials is required to reduce shipping damage to goods and to assist in reducing contamination of goods with dust and dirt accumulated during transport. Packaging also helps to reduce corrosion and damage from UV light. • Packaging materials used during the Project will be chosen to optimise load stabilisation, and to reduce vibration/rattling and breakage.
24.2	Ban plastic shrink wrapping. Plastic shrink wrapping accounts for a significant proportion of the roadside litter within the Burrup Peninsula. This material is used to secure smaller freight cargo. However, when it is exposed to sunlight and heat, it rapidly degrades. Again, when shrink wrapped cargo is transported, the loose degraded shrink wrapping is ripped off and falls to the roadside. There are many other simple alternatives to using this product (including many recyclable options), which should be considered by the Chevron Wheatstone Project. The impact of the use of this material should not be underestimated.
	Third-party transport contractors will be required to maintain secure loads at all times. Compliance with this requirement will be managed through the Construction Environmental Management Plan (CEMP).
4.7.1	**Overview**
23.21	Of concern, there are a number of statements throughout the Draft EIS/ERMP that appear to be contradicting, misleading, unsubstantiated or false. A few simple examples to highlight this include: 3. The Business Unit Policy 530 (pg. 15) states "Environmental Stewardship – Working to prevent pollution and waste" then Table 1.3 Objects of the EP Act and EPBC Act (pg. 18) states "Principle: Waste Minimisation; Aim: Take all reasonable and practicable measures to minimise waste generation and discharges to the environment'. Contrary to these statements, Section 4.7.1 (pg. 164) states that compostable materials such as paper, greenwaste and biosolids are "uneconomically recyclable". This statement is not substantiated and is concerning in light of the numerous reasonable, practical and economically feasible options for processing of these types of materials.
	Chevron wishes to emphasise that its endeavour is always to reduce waste generation wherever it is possible. To the specifics of this comment, Chevron notes that: • Green waste and bio-solids will be managed to provide net positive environmental outcomes, through third-party waste service providers, where practicable. • Paper is a commodity that goes through regular fluctuations in value. The cost to recycle paper, including collection, compaction and transport, in terms of both monetary value and greenhouse gas generation, will be assessed against net positive environmental value prior to determination of waste management options. • Waste management options will be regularly reviewed to allow informed decisions to be implemented.

4.7.2 Existing Waste Disposal Options

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.7.3 Offshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.7.4 Onshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.7.5	**Waste Disposal Options**
16.1 16.2	There is no specific State Government policy which prevents the use of incineration for the disposal of waste. In fact, there are two large-scale incinerators currently operating in the State. Incinerators may be licensed by the Department of Environmental Protection (DEC) as Category 59 (bio-medical incinerator) or Category 60 (industrial waste incinerator) premises under the Environmental Protection Regulation 1987. DEC will consider any proposals to establish incinerators on the basis of their merits. It is also noted that the proposal is to install incineration equipment which meets emissions standards endorsed by New South Wales. Western Australia does not have an endorsed set of emissions standards for incinerators. While the NSW emissions standards may be a good starting point in presenting any proposal for licensing to DEC, as mentioned above, any proposal to establish an incinerator will be considered on its merits by DEC within the licensing process and a range of environmental factors will be taken into account.
	Chevron has not yet finalised waste management plans and advises that: 1. Should it be determined that incineration is one of the appropriate waste management technologies for the Project, then an assessment of the human health and environmental risks associated with such a facility will be implemented. 2. Based upon the findings of the risk assessment and the required mitigation measures, an application will be made to the DEC for works approval for a Category 60 industrial waste incinerator.
30.47	Incinerator: It is noted that due to the isolated location of the Project site, an incinerator has been considered as a potential waste management option. This is due to the lack of suitable nearby waste management alternatives. Please explain how this conforms to EPA's/WA's waste strategy of waste prevention, recycling and reuse, before disposal. Will the proposed incinerator comply with EU Directive 2000/76/EC and Directive 2008/1/EC?
	The purpose of the EPA's waste strategy of waste prevention, recycling and reuse before disposal is to conserve energy and resources. The use of incineration as a possible waste management technology does not provide waste prevention. However, it provides conservation of energy and resources. In large part, the materials for incineration are materials with medium to high calorific values that may end up in landfill. Landfills capture less than 50 per cent of the materials energy, if run as a bioreactor. For a standard landfill, the resources and energy are largely entombed and unrecovered. An incinerator can capture up to 80 per cent of a materials energy value if operated to allow energy recovery and reuse. In addition, recyclables within the waste stream (such as metal cans) can be recycled after incineration, if commercially viable. If considered to be the best option, the proposed incinerator would be designed and operated to comply with Western Australian Department of Environment and Conservation (DEC) license conditions, or better. It is considered that the DEC Works Approval process and Licence conditions provide adequate conformance to the objectives of both the EU Directive 2000/76/EC (requiring prior authorisation of activities and compliance with emissions/discharge criteria), and the EU Directive 2008/1/EC (requiring integrated pollution prevention).
4.8	**Accidental Releases (Spills and Leaks)**
29.146	Rupture of onshore processing facility and associated uncontrolled release. The revised text (provided by Chevron in an email dated 13/07/10, and agreed, with minor changes, by DSEWPaC on the same date) meets DSEWPaC requirements for the Draft EIS/ERMP. DSEWPaC notes Chevron agreement to include in the Supplementary EIS/ERMP, the proposed controls that will be incorporated into the LNG storage tanks to mitigate against a release. In agreeing the revised text on 13 July 2010, DSEWPaC also advised Chevron as follows: "While we note that the Facility Safety Case is unlikely to be completed prior to the preparation of the Supplementary EIS, we anticipate that hazard modelling of some form will be required to satisfy the Minister in his consideration of social and economic matters."

Chevron acknowledges the agreement to provide in this Supplementary EIS/ERMP further information on the proposed controls that will be incorporated into the LNG storage tanks to mitigate against a release, and provides the following information.

The potential safety risks associated with the release of flammable gas from the onshore LNG facilities, including the storage tanks, are fully understood and comprehensive controls will be put in place to reduce these risks. To identify appropriate control measures and support the safe design of the LNG Facilities a number of risk assessment studies are being progressed. The intent of these studies is to identify the hazards associated with operating the LNG Facilities, analyse the potential consequences of an accident event occurring and then to ensure that sufficient safeguards are put in place to reduce the risk to As Low As Reasonably Practicable (ALARP).

These studies include both qualitative and quantitative risk assessments and include amongst others; gas dispersion modelling, fire and explosion modelling, plant and building layout reviews, Quantitative Risk Assessments, Hazard and Operability (HAZOP) studies.

Although the primary focus is on designing the facilities to prevent a release occurring, a number of safeguards will also be provided to mitigate against such a release.

Some of the main prevention measures that will be included in the design process for the Wheatstone LNG Facilities include:

- Design of the facilities in accordance with industry accepted codes and standards.
- Selection of appropriate equipment and materials.
- Adoption of leak minimisation and inventory minimisation strategies.
- Design of a process control system to ensure the facilities operate within the design conditions.
- Primary and secondary containment systems on the LNG Storage Tanks.
- Design assurances activities.
- Quality control processes during construction.

Mitigation measures that will be included in the design of the Wheatstone LNG Facilities include:

- Flammable gas and fire detection systems to quickly alert the operators in the event of a release.
- Layout of the facilities to maximise natural ventilation to reduce the potential for the build up of flammable gas clouds.
- Design and location of equipment and buildings to reduce congestion and the effects of an explosion.
- Emergency shutdown and blowdown systems to reduce the amount of gas that could be released.
- Spill containment systems.
- Control of potential ignition sources to reduce the likelihood of a fire or explosion.
- Passive and active fire protection systems.
- Emergency Response Procedures to ensure the safety of workers at the site, workers at adjacent facilities and also members of the public.

The above lists are not exhaustive but highlight some of the main aspects being considered in the design. A full description of the safety measures to be implemented to reduce the risks during operation of the LNG Facilities, along with specific details of the hazard modelling will be provided in the Safety Report being developed under the requirements of the Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007.

32.2	The DoW considers the proposed measures for hydrocarbon and dangerous goods management sufficient as in the Draft Construction Environmental Management Plan. The DoW considers the Department's Water Quality Protection Note 10 "Contaminant Spills - Emergency Response" should be added to the list of key guidelines for spill contingency and response. This note applies to the management of any chemical spill or contaminated water that may pose a threat to water resources (including aquatic ecosystems) that may harm human health, amenity, environmental or economic values.

Chevron will add the Department's Water Quality Protection Note 10 "Contaminant Spills - Emergency Response" to the list of key guidelines in the CEMP.

4.8.1 Overview

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.8.2 Offshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.8.3 Onshore

4.8.3.1 Construction Phase

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

4.8.3.2 Operations Phase

29.149 DSEWPaC notes Chevron's commitment to provide further information in the Supplementary EIS/ERMP regarding specific discharge standards and treatment protocols for PFW discharges from the onshore LNG facility. DSEWPaC has indicated to Chevron in discussions that PFW management and treatment standards will be a matter examined closely in potential approval condition setting.

The PFW present in the foundation project will be minimal in volume and will be handled by the existing separation and treatment system. The bulk of the PFW brought onshore will be in subsequent trains and no detailed design work has been done around the separation, treatment and discharge for anything beyond the foundation project at this time. We do know that it will be handled as a separate system and that is one of the reasons that it will have its own discharge. One of the challenges of trying to make any determinations around the PFW is that the exact composition of that stream is not definitive at this time, it will depend on what flows are coming from what fields. At a minimum we will meet the ANZECC guidelines for PFW.

In addition to meeting ANZECC guidelines the mitigation measures will be adopted:

- Develop an Outcome Based Condition (OBC) for Marine Water and Sediment Quality in communication with the relevant authorities.
- Establish procedures for the monitoring of water quality including a pre-disturbance assessment of the receiving environment against which the proposed OBC can be assessed.
- Provide a monitoring and management framework relating to Project-attributable impacts on water quality with the aim of achieving the OBC:
  - Report at an agreed frequency to the relevant authorities on the results of monitoring activities
  - Develop contingency and management actions.

To manage water and sediment quality the Proponent will:

- Establish procedures for the monitoring of water quality including a pre-disturbance assessment of the receiving environment against which the proposed Marine Water and Sediment Quality Outcome Based Condition can be assessed.
- Provide a monitoring and management framework relating to Project-attributable impacts on water quality with the aim of achieving the OBC.

5.0 Stakeholder Consultation

5.0 Stakeholder Consultation	
5.0	**General Comment**
15.2	Apart from an invitation to attend a public meeting at Hillarys, there have been no consultations between Chevron and Mackerel Islands Pty Ltd on this issue, despite the obvious impact the program is likely to have on our past investment and future planning. We have had a close and constructive association with Chevron over many years due to our co-habitation of Thevenard Island, and would welcome the opportunity to discuss formally our concerns and suggestions with both the EPA and Chevron.
	Chevron acknowledges the comment from Mackerel Islands Pty Ltd, however Chevron notes that it has provided opportunities to the to engage in consultation, including the Hillary's meeting and invitations to three community open days in Onslow where subject matter experts were available to answer questions on the Project. Chevron acknowledges the benefit of additional engagement and welcomes the opportunity to discuss the Project with Mackerel Islands Pty Ltd further. Mackerel Islands Pty Ltd has expressed a concern that the Project may have an impact on its past investment and future planning. Chevron considers that it has provided sufficient information within the Draft EIS/ERMP for commercial businesses to conduct an assessment of how the Project may impact them.
23.18	Additional concerns: Section 5 Stakeholder Consultation suggests that Best Practice consultation has been undertaken for the Project, and that opportunities have been provided for stakeholder input and feedback throughout the assessment process to inform Project decision-making. This position is questionable as resources were provided by the Proponents of other oil and gas projects within the Region to contract the services of an independent Conservation Liaison Officer to assist Conservation Groups to respond to environmental approval documentation. In this instance, in the absence of such a resource, and in light of the size of the document, we have not been in a position to document our many concerns on statements made in the document, on the detail provided therein or specific Environmental Conditions required for the Project.
	Chevron acknowledges the Conservation Council's and the Wilderness Society WA's concerns associated with providing a resource to assist with a response to the Draft EIS/ERMP. Chevron has assessed the range of environmental and social impacts of the Project in this EIS/ERMP, as approved in the Project's Scoping Document. Chevron's internal process requires a peer review which provides Chevron with a level of assurance as to its assessment. In additional, as a result of extensive consultation, Chevron has received 32 submissions with approximately 550 individual comments in relation to the EIS/ERMP. Chevron has not accepted requests from individual reviewers to provide resources as Chevron considers that the EIS/ERMP has been the subject of extensive independent review.
5.1	**Stakeholder Consultation Strategy**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document	
5.2	**Aims of Stakeholder Consultation**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
5.3	**EIS/ERMP Stakeholder Consultation**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
5.4	**Assessment, Consultation and Communication Methods**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	

5.5 Proposed Consultation

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

5.6 Project Issues and Impacts

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

5.7 EIS/ERMP Consultation with Native Title Claimants

10.4	Consultation It appears that there has been adequate consultation with the local Onslow Aboriginal community. The ERMP notes that there were monthly meetings with the BTAI, heritage surveys, and involvement in the Aboriginal Social Impact Assessment surveys. Five local people were trained to assist in conducting the research, which surveyed about half of Onslow's Aboriginal households, and developed community feedback specifically for the Aboriginal community (p177, 180, Volume II). A total of 24 Aboriginal households were sampled, totalling 87 Aboriginal people resident within the Onslow and Bindi Bindi communities, and as well as socio demographic questions, additional information was collected on community needs and aspirations regarding education, training and employment (pi79, Volume II). The Social Impact Assessment data has not been provided to DIA, so we are unable to comment further on it. In the Stakeholder Consultation list, there is a heading that refers to "Other Aboriginal language groups".(p3, Appendix S1). It would be helpful if the particular language groups consulted with were specified.
	Community stakeholders from the following language groups were consulted (please note that people self-identified their language group): • Banyjima • Ingada • Injibandi/Yindjibarndi • Innawanga/Inyawonga/Yinhawangka • Ngalawongga/Ngalawangka • Nyiyaparli/Nyiyabali • PKKP – Kurrama/Binnigra • Thalanyji • Wadagarri • Yamatji.

5.8 Native Title Claimants' Project Issues and Impacts

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.0 Overview of Existing Environment

6.0 Overview of Existing Environment

6.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.2 Regional Overview

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3 Local Marine Environment

6.3.1 Location

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.2 Oceanography and Hydrodynamics

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.3 Water Quality

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.4 Marine Sediments

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.5 Ambient Underwater Noise

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.6 Marine Biogeographical Setting and Biodiversity

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.7 Deepwater (Offshore) Benthic Habitats

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.8 Nearshore Benthic Habitats (Intertidal and Subtidal)

15.3	In describing the existing environment (Chapter 6) The Chevron document notes that, while there are 110 extensive coral reefs in the area, there are fringing reefs on essentially all of the islands, and a number of reefs and shoals along the 10m isobath (actually from 10 to 16m) supporting coral communities. It also notes scleractinian coral diversity is high Hence, while coral cover is not high overall, the coral sites that do exist are very healthy with a concentration of marine life of high species abundance. It is these characteristics which have led to the Mackerel Islands being identified as one of the best dive localities in the world. From an environmental aspect it is important that these sites are preserved.
	Chevron is committed to conducting dredging, material placement and marine construction activities, associated with the Project, in an environmentally responsible manner. Water, sediment and coral health baseline studies have been undertaken and those not complete will be completed prior to the commencement of the dredging. A comprehensive monitoring programme will be undertaken during dredging to monitor impact predictions and manage the dredge programme.

6.3.8.1 Studies Undertaken

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.8.2 Subtidal Mapping Methodology

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.8.3 Habitat Types and Distribution

15.4	The filter feeders that are common to sandy ocean floors in the inner shelf are extremely important components of the ecological system, and loss of these filter feeders will impact detrimentally on the food chain.
	The issue of impact to filter feeder communities is discussed in Chapter 8 Section 8.3.5.1, 8.3.5.2, 8.3.5.3, 8.3.5.6 of the Draft EIS/ERMP. Conservative modelling on the impacts to corals has been completed as corals tend to be more sensitive to water quality impacts than filter feeders. Chevron anticipates that by managing impacts to corals, impacts to filter feeders will indirectly be managed.

6.3.8.4 Detailed Description of the Key Benthic Habitats

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9 Marine Fauna

6.3.9.1 Threatened Marine Species

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.2 Marine Birds

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.3 Baleen Whales

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.4 Dolphins and Toothed Whales

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.5 Dugongs

20.15	The dugong population appears to have been estimated from an aerial surveying whose primary purpose was to look at whale distributions (Jenner & Jenner, 2009). The report itself states "As such sightings of other mega fauna reported here are of limited use in determining actual densities of these species and should rather be used to infer presence (not absence, nor density) during a particular temporal period." (Jenner & Jenner, 2009, p. 49). Were any other local surveys used to estimate the distribution of dugongs in the project location? Concerns regarding the use of data gained from a whale survey include: • The survey results are from flights only conducted during May to December which does not show any seasonal variation in the population nor trends over longer periods of time • The survey does not specify if the 'trained staff' were trained in only cetaceans or their training also included dugong-specific training • The survey does not mention any other dugong monitoring they have been involved in as evidence of experience

- The survey flight height was determined by that required for whales and was not altered for near shore dugong sightings although the height recommended for humpback sightings is twice the height recommended for dugong surveys (Penrose, 2005, p. 3)
- Dugongs are known to undertake large scale movements (hundreds of kilometres in days) (Marsh et al, 2002, p. 3) and there is evidence to suggest this may be the case with the Exmouth Gulf population (Gales, McCauley, Lanyon & Holley, 2004)
- Recommended population survey sampling should span 'at least 15 years' (Marsh et al, 2002, p. 21)
- Aerial surveys are not a reliable indicator of habitat use
- There was no satellite tagging used to determine habitat use and migration patterns
- There was no direct behavioural observational studies incorporated to identify feeding locations, resting and birthing areas, social behaviour (including mating rituals) and migration paths
- The time-frame of the survey was within 3 years of major cyclonic activity (e.g. Cyclone Glenda in 2006 and Cyclone Dominic in 2009) which could have impacted seagrass habitat and caused a episodic migration away from the site and resulted in an abnormal result

It would be highly recommended that extensive, long-term research is undertaken to look at the current residential and migratory dugong population use which required both localised studies (including satellite tagging and direct behavioural studies) and regional studies to understand migration patterns and population pressures.

6.3.9.5 ""Data also show that calves are present, albeit in small numbers""

For potential impacts on inaccuracy of data collection see previous point regarding ""6.3.9.5. Estimated Dugong distribution"". Dugongs have a very low reproduction rate, a high investment in each offspring and are unlikely to increase, in the optimal conditions, at more than five per cent per annum (Marsh et al, 2002, p. 1). These factors, and those making the data inaccurate, make observations regarding calve numbers inappropriate.

Chevron did not provide a dugong population estimate within the Draft EIS/ERMP and agrees that the 12-month megafauna aerial survey was not designed to do so.

The Centre for Whale Research (CWR) undertook fortnightly aerial surveys over 12 months from May 2009 to record marine megafauna distribution and abundance, specifically targeting larger species such as humpback whales, but also recording observations of dugongs. The majority of this data was provided in the Draft EIS/ERMP (Appendix O4), with the final report available in Appendix FD of the document. While the survey obtained useful spatial and temporal distribution data, the design did not enable quantification of absolute dugong abundance or density.

An aerial dugong survey has been completed in the Project area, and in Exmouth Gulf to provide a regional comparison. The aim of the survey was to obtain data that would increase the certainty of the Draft EIS/ERMP risk assessment and to inform the development of management measures in relation to dugongs. A key objective of this survey was to quantify the absolute abundance and distribution of dugongs (including calves) within both the Project area and Exmouth Gulf. This data can be found in Appendix FE of the document however a summary is included below:

- The absolute abundance of dugongs within the Project area was 287 (95%CI: 176-340), as versus 1760 (95%CI: 1369-2088) in Exmouth Gulf.
- The density of dugongs in the Project area was 0.11 (95%CI: 0.07 -0.13), as versus 0.59 (95%CI: 0.46 -0.70) in Exmouth Gulf.
- Within the Project area, dugongs were primarily found in the north-west and were often close to the coast or in the lee of reef-fringed islands.
- No calves or aggregations were recorded in the Project area.
- The density of dugong in the Project area was found to be the lowest recorded on the Western Australian coastline.

	In response to the reviewer's comments, key design elements of the recent dugong survey (Appendix FE of the document) included: • A standardised dugong aerial survey method, following Marsh and Sinclair (1989) as refined by Pollock et al. (2006). • The survey was completed during winter (August) as the CWR results indicated a peak in abundance at this time of year. This is also an appropriate time of year to survey marine megafauna in north-west of Western Australia as seas are usually calmer, producing a low Beaufort Sea State rating and therefore providing a higher likelihood for animal detection. • Survey staff completed office-based training in dugong identification and completed a trial flight over Shark Bay prior to survey mobilisation. • The survey team members had extensive experience in completing aerial surveys for a range of marine megafauna, including dugongs. As outlined in the Environmental Scoping Document, only dugong distribution and abundance was required to be surveyed as part of baseline data collection surveys. Information such as dugong migration, behaviour and general ecology has been documented in a detailed literature review (Draft EIS/ERMP, Appendix O12; Appendix FE of the document). The Project area is unlikely to support important dugong habitat and does not support a regionally important dugong population. It is unlikely that dugongs in high densities or at sensitive life stages (i.e. calving) would be present within the Project area. Chevron will not undertake further baseline work, in addition to that already completed. Chevron will focus on working towards the development of appropriate management measures and ongoing assessment of management effectiveness.
20.16	6.3.9.5 "It remains unclear whether all key life processes of feeding, mating, calving and weaning occur in this area." Limited research to date indicates that dugongs can use a variety of habitats for a number of different key life processes. Shallow waters like tidal sandbanks and estuaries have been calving sites at other locations (Gales et al, 2004, p. 7). As these types of environments exist in the project area (notably the Ashburton River mouth complex and Hooley Creek) have there been any behavioural studies to exclusively rule out these as calving sites? If this information is not known then the precautionary principle should be in place until the information has been obtained. The Shark Bay population has shown males to have leks they defend (Gales et al, 2004, p. 5). Disturbing such strong site fidelity may affect fecundity of a population (Gales et al. 2004, p. 5). Has there been seasonal behavioural studies in the project area to rule out the presence of leks? If there is not then the precautionary principle should be implemented until such leks are been proven not to be present.
	As outlined in the Environmental Scoping Document, only dugong distribution and abundance was required to be surveyed as part of baseline data collection surveys. Information such as dugong migration, behaviour and general ecology has been documented in a detailed literature review (Draft EIS/ERMP, Appendix O12; Appendix FE of the document). An aerial dugong survey has been completed in the Project area, and in Exmouth Gulf to provide a regional comparison. The aim of the survey was to obtain data that would increase the certainty of the Draft EIS/ERMP risk assessment and to inform the development of management measures in relation to dugongs. A key objective of this survey was to quantify the absolute abundance and distribution of dugongs (including calves) within both the Project area and Exmouth Gulf. This data can be found in Appendix FE of the document however a summary is included below: • The absolute abundance of dugongs within the Project area was 287 (95%CI: 176-340), as versus 1760 (95%CI: 1369-2088) in Exmouth Gulf. • The density of dugongs in the Project area was 0.11 (95%CI: 0.07 -0.13), as versus 0.59 (95%CI: 0.46 -0.70) in Exmouth Gulf.

- Within the Project area, dugongs were primarily found in the north-west and were often close to the coast or in the lee of reef-fringed islands.
- No calves or aggregations were recorded in the Project area.
- The density of dugong in the Project area was found to be the lowest recorded on the Western Australian coastline.

The Project area is unlikely to support important dugong habitat and does not support a regionally important dugong population. It is unlikely that dugongs in high densities or at sensitive life stages (i.e. calving) would be present within the Project area.

The definition of a lek is based on a specific territory, smaller than a normal home range, and is used traditionally (or repeatedly) (Anderson, 2002). Anderson (2002) indicates that a specialised habitat is required for a lek to occur. Within Shark Bay, lekking has only been observed within South Cove, and the habitat was characterised as follows:

- Clear and shallow water.
- A sheltered, protected cove.
- High salinity (inner waters of Shark Bay are hypersaline).
- A smooth unvegetated substratum.

No seasonal studies have been conducted to determine if a lek site exists in the Project area for the following reasons:

- Appropriate habitat, as described by Anderson (2002), is not represented within the Project area.
- Shark Bay is the only recorded location, to date, at which dugong lekking has been observed (Anderson 2002; Anderson 1997; Holley 2006; Marsh et al. 1999). It should be noted that these observations were obtained through aerial surveys, similar to those undertaken in the Project area.
- There have not been any high density dugong observations recorded by any of the aerial surveys undertaken.
- No aggregation areas were identified during the dugong aerial survey.
- No historical or anecdotal evidence exists supporting the existence of aggregations in the Project area.

Chevron will not undertake further baseline work, in addition to that already completed. Chevron will focus on working towards the development of appropriate management measures and ongoing assessment of management effectiveness.

6.3.9.6 Turtles

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.7 Other Marine Reptiles

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.8 Fish

20.27	"Satellite tagging has shown that Whale Sharks departing Ningaloo migrate generally towards the north-east, often into Indonesian waters. This migration takes the Whale Sharks past the Project area along the continental slope." Please clarify if the volume and duration of this data is sufficient to make assumptions regarding Whale Shark migration routes.

Sufficient pre-existing knowledge of whale shark movement in the Project area is available to support the risk assessment for this species, classified as being 'Low'. Aerial surveys, completed over 12 months from May 2009 to April 2010, recorded only four whale shark observations, within and adjacent to the Project area (Appendix FD of the document). A majority of survey time was spent surveying transects over shallow (>15 m), clear water, thus improving the opportunity to spot whale sharks just below the surface.

	The data obtained from the aerial surveys is supported by previous whale shark satellite tracking studies by Wilson *et al*. (2006). This tagging survey indicated that, of those individuals tagged, most whale sharks travelled north-east along the Continental Shelf before moving into the deeper waters of the north-eastern Indian Ocean, and away from mainland coast of Australia. (See Figure 3.5). Based on the above information, Chevron will not complete further baseline surveys, and will instead focus on developing management and mitigation measures and assessing their effectiveness.
28.2	No reference is made to the commercial finfish fisheries and target species. Prawns and pearl oyster fisheries are described but not the Pilbara Demersal Scale Fishery (PDSF), (which includes trawl, trap and line sectors). This fishery is the highest value finfish fishery in the State. The Mackerel fishery has also been overlooked. The PDSF and Mackerel fishery need to be described in this "Natural Capital" section in the same way as prawns and pearling. The offshore facility is located in 70-300m water and will potentially affect the PDSF and the Mackerel fishery, which operates in the 30-200m depth range. This sector will also be affected by the pipeline construction and installation of sub-sea production wells, flow lines etc. These structures will be in place for decades and will effectively exclude fisheries with benthic gear for areas around the well. This will impact the operations of both the PDSF trawl sector and the Commonwealth trawl sector. Therefore the target species of these fisheries need to be given prominence in this background section to fish species in the area. There is also a need to mention that for some snapper species targeted by the PDSF, the juvenile stage and nursery areas are inshore. Examples of this are *Lutjanus malabaricus*, *L. sebae* and *L. erythropterus*.
	Chevron acknowledges the DoF's concerns associated with the level of information provided on the PDSF and Mackerel Managed Fishery within the natural capitals section. Please refer to the response provided for Submission 28.3 located in Section 6.5.3.1, where the PDSF and the Mackerel Managed Fishery have been described and supplemented with maps of these two fisheries.
28.4	Table 6.7 (page 261) lists 'studies of marine fauna'. No fish studies have been listed. The proponent should review this table and amend the caption (e.g. literature relevant to protected species) or add all relevant literature. Note that in section 6.3.9.8, multiple fish references are used and cited.
	Chevron acknowledges the DoF concerns associated with the information presented in Table 6.7 of the Draft EIS/ERMP, however this document will not be amended.
28.5	A statement is made that a summer survey is planned to document seasonal variation in fish composition (P270). Given the limited sampling, seasonality is likely only to be demonstrated not defined. In addition, there are no dates or details of the proposed survey. More details need to be provided. In addition, will the proponent make these data available to the Department? Longer term studies are needed to define seasonal variability in fish communities. Kangas et al. 2007 provides additional information on fish and invertebrate species composition of prawn trawls within Area 1. (Reference: Kangas, M.I., Morrison, S., Unsworth, P., Lai, E., Wright I. and Thomson A., (2007) Development of biodiversity and habitat monitoring systems for key trawl fisheries in Western Australia. Final FRDC Report 2002/038. Fisheries Research Report 160: 333pp).
	Indeed seasonality is likely to be identified but not defined. However, by sampling during different seasons it is likely that a greater proportion of the finfish assemblage within the estuarine habitat will be identified. The findings of future surveys will be made available.
28.15	The potential impact on fish is only considered in relation to the inshore component of the Project. The offshore facility will potentially affect the trap and line sectors as indicated previously in comments section 6.3.9.8. Effects on offshore fish populations is not considered.

Chevron has identified the Onslow-based trap fishery and wetline line fisheries operated by charter boats in Chapter 10 (Section 10.4.2, 10.4.7.1) of the Draft EIS/ERMP as economic components of Onslow's economy.

These pelagic/demersal fisheries operate in the offshore environment beyond the 20 m isobath and west of Thevenard Island. However, it is also recognised that other stages of the life cycle of species in these pelagic/demersal fisheries may include habitat for spawning around reefs and shoals and larval and juvenile stages in nearshore waters including creeks and mangrove areas. Project effects on offshore fish populations therefore require a system view and this underpins the approach taken in the marine environmental impact assessment for the Project.

Detailed field investigation, followed by impact assessment and development of mitigation measures to protect these key nearshore habitats that support offshore fish populations, have been addressed in the Draft EIS/ERMP. In addition, impacts to water quality as a result of the operations of the offshore platform have also been addressed (Draft EIS/ERMP, Section 8.2.5.8, 8.2.5.9).

While much of the environmental focus presented in the marine component of the Draft EIS/ERMP has been focussed on benthic primary producer habitats (Appendix N1), it was identified early in the assessment phase, by independent reviewer Professor Charles Sheppard (acknowledged expert from Warwick University) that sole focus on primary producer habitats may not be warranted: "*Secondary productivity on soft substrates is key to many fisheries. High diversity deep habitats, which apparently certainly exist in some abundance in Western Australia, should be considered to be as important as BPPH in mitigation measures (because they are as important biologically)*." (Draft EIS/ERMP, Appendix N5, Appendix A). Accordingly, three key marine surveys were conducted in order to gain a better understanding of the distribution of benthic habitat beyond the 20 m isobath of the Project area and assist in identifying and further mitigating potential impacts arising from the Project. These surveys included a subtidal habitat Survey (Draft EIS/ERMP, Appendix N12), a benthic habitat survey (Draft EIS/ERMP, Appendix N8), and a deepwater habitat survey (Draft EIS/ERMP, Appendix N9).

These surveys did identify key benthic habitat producers, both primary and secondary, located in the "shelf-break" primarily in the zone between 20-40 m CD. University of Western Australia results reported the region between 40-70 m CD appears to be largely bare sand. Accordingly, the Draft EIS/ERMP acknowledges that avoidance of potential impact in this region is important. Potential dredge impacts are not anticipated in this region, apart from potential burial of benthic habitat at dredge placement Site D. Further survey of this proposed site option, reported in Draft EIS/ERMP (Appendix N9) indicates this area to have low benthic cover. Dredge plume modelling of simulated material placement activities at Site D, reported in the Draft EIS/ERMP (Appendix P1), has also been followed up in Appendix FP of the document, to address concerns raised by the independent dredge plume modelling reviewer (Dr Des Mills). The concerns centred on technical issues regarding 3D effects on currents at these deeper sites. The modelling predicts that a more intense plume arising from placement at this site under all climatic scenarios (above 20 mg/L SSC) is confined well within the boundaries of the proposed site.

In summary, Chevron considers that potential effects to offshore fishery habitat has been addressed sufficiently in the Draft EIS/ERMP, using the holistic approach of primary receptors described for impact assessment, potentially arising from the proposed development. The potential impacts to offshore trap and line fisheries is considered to be low.

6.3.9.9	Prawns
28.6	Need to emphasise the importance of structured habitats for tiger (and endeavour) prawns. See comments in Appendix O10 for references.

Chevron acknowledges the DoF's concerns associated with the information presented in relation to habitats of tiger and endeavour prawns. Please refer to Appendix FH of the document where further details on structured habitats are presented.

28.7	The Onslow prawn fishery is a multi-species prawn fishery and Area 1 in particular is significant for tiger prawn catches, not just banana prawns which tend to be highly variable depending on rainfall events.
	Chevron acknowledges the DoF's statement in relation to the multi-species nature of the Onslow Prawn Managed Fishery. Please refer to Appendix O10 of the Draft EIS/ERMP for an overview of the Onslow Managed Prawn Fishery. Additional information on predicted impacts to these fisheries has been provided in Appendix FH of the document.

6.3.9.10 Pearl Oysters

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.11 Other Benthic Invertebrates

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.9.12 Introduced Marine Species

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.3.10 Conservation Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4 Local Terrestrial Environment

6.4.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.2 Air Quality

6.4.2.1 Dust

30.56	Dust – PM_{10} and $PM_{2.5}$ results are given from Site 1 and 2, was there monitoring at the other 3 sites? Is the dust deposition per month or over the entire monitoring period? Maximum results of the background dust monitoring show exceedances of NEPM for PM_{10} and reportable $PM_{2.5}$ guidelines during several months (as daily results are not given it cannot be determined on how many days this occurred). This emphasises the need for dust management during construction and long-term management of dust from traffic areas and the necessity for a dust management plan.

Chevron thanks the OEPA for its submission.

The current monitoring program includes five monitoring sites. Of these sites three use the traditional dust deposition gauges (DEC approved) and two use directional dust monitors (OSIRIS). This is why Table 6.9 in the Draft EIS / ERMP only shows TSP, PM_{10} and $PM_{2.5}$ for two locations – the two OSIRIS sites. Table 6.10 shows the data collected from the dust depositional gauges. Please see Section 6.4.2.1 for further information.

The monitored data from the site does show naturally occurring exceedences of NEPM guidelines for PM_{10} and $PM_{2.5}$. An investigation to determine the cause of these exceedences by URS determined that these exceedences were likely to be caused by high wind speeds and were not associated with equipment error. The exceedences occurred over a period of few days and on more than one occasion. Chevron intends to provide the data to the Air Quality Management Branch of the DEC for its information.

Chevron intends to incorporate a Dust Management Plan within in the CEMP. Chevron also intends to develop a Traffic Management Plan. Both plans will utilise the information obtained from the onsite monitoring program.

6.4.2.2 Gaseous Emissions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.3 Land Systems and Landforms

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.4 Soils

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.5 Groundwater

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.6 Surface Water

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.7 Hydrology and Drainage

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.8 Vegetation and Flora

30.1	Vegetation and Flora The survey of some parts of the study area (OEC 2008) was conducted during dry periods, which is not consistent with Guidance 51. The dry season survey by OEC (Nov 2008) appears to include the majority of the plant area, which will be significantly impacted (Figure 6.64, page 309).
	Chevron acknowledges the concern regarding the appropriateness of the timing of the preliminary OEC survey conducted over the Wheatstone plant area. However, the survey conducted by Biota in April 2009 also included the plant area and as Biota (2009) states: "The January-February 2009 rainfall was well above the long-term average for Onslow…and conditions at the time of the current field surveys were favourable for the collection of annual and cryptic perennial species." Figure 6.64 of the Draft EIS/ERMP may not obviously illustrate that the plant area was also surveyed by Biota (2009). Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner and conducting studies in accordance with the EPA Guidance Statements.

6.4.8.1 Survey Effort

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.8.2 Vegetation

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.8.3 Threatened Ecological Communities

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.8.4 Groundwater Dependant Vegetation

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.8.5	Flora
30.2	Vegetation and Flora Not all of the study area was systematically searched for rare flora; however main habitats and those known to frequently support rare or habitat restricted species were searched.
	Chevron notes this statement. Two additional surveys have been completed since the publication of the Draft EIS/ERMP. See Section 2.1.3.1 for further details.
30.34	"Undescribed taxa recorded during the vegetation and flora studies, other than those listed in Table 6.21, have been recorded more widely in the Pilbara region". What are they, where are they and what proportion of the know population will be impacted?
	As stated in Technical Appendix I1 there were no additional undescribed taxa located within the study area other than those listed in Table 6.21. The Draft EIS/ERMP will be updated to reflect this change.
30.36	Other undescribed species except Aenictophyton are illustrated as in the Project area only. For all undescribed species the location of additional populations and proportion of the known population to be impacted should be given. Table 9.17 attempts to do this but all other populations are shown in Project area or Industrial area (under threat).
	Chevron recognises the EPA's comments. The Draft EIS/ERMP is designed to assess the impacts on the Wheatstone Project only. However, a Targeted flora survey was conducted in August 2010 to locate populations of the threatened species outside of the TAA and Ecological Survey Area. The survey was able to locate a number of populations of undescribed species, including *Abutilon sp* and *Stemodia sp Onslow*. An additional survey will be conducted post rainfall to located species which may not have been visible during the August survey due to the adverse environmental conditions. The information acquired from this survey is described in Section 2.1.3.1.
30.37	The location of all priority species are shown as either in the project site or within the industrial estate and therefore under threat. The location of additional populations and proportion of the known population to be impacted should be given. Table 9.17 makes some attempt to give impacts.
	Chevron recognises the EPA's comments; however, Figure 6.69 in the Draft EIS/ERMP shows populations of Priority species occurring outside the Project site and Industrial Estate. Regardless, two flora surveys have been conducted since the publication of the Draft EIS/ERMP to locate additional populations of Priority species outside of the TAA and Ecological Survey Area. Additional populations of the Priority species *Triumfetta echinata* and *Abutilon uncinatum* were located outside of the Ecological Survey Area. The information acquired from these surveys is included in 2.1.3.1

6.4.8.6 Introduced Flora

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.9 Fauna

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.4.10 Conservation Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.5	**Socio-economic and Cultural Environment**
28.8	Commercial finfish fishing activities are only briefly mentioned, as compared to prawn and pearl fisheries (p 348). In addition, the value of fishery production is not stated in figure 6.77 (p 340).
	Chevron acknowledges the DoF's concerns associated with the level of information provided on commercial finfish fishing activities within the natural capitals section, however this document will not be amended.
6.5.1	**The Pilbara Region**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
6.5.2	**The Shire of Ashburton**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
6.5.3	**Onslow's Community Capitals – Baseline Demographic Analysis**
6.5.3.1	Natural Capital
28.3	Same comment as above [*Refer to Section 6.3.9.8*]. PDSF and Mackerel need to be described in this "Natural Capital" section in the same detail as prawns and pearling. The spatial trawl management (i.e. the five Areas identified in State of the Fisheries Reports)) are not identified by the proponent or mapped against the proposed sub-sea development. This should be included.
	Chevron acknowledges the DoF's concerns associated with the level of information provided on the PDSF and Mackerel Managed Fishery within the natural capitals section and has provided a summary, including maps, of these two fisheries. **Pilbara Demersal Scalefish Fishery** The Pilbara Demersal Scalefish Fishery (PDSF) consists of three fisheries; the Pilbara Fish Trawl (Interim) Managed Fishery, the Pilbara Trap Managed Fishery and the Pilbara Line Fishery. The boundaries of the fisheries within the PDSF are presented in Figure 3.1.

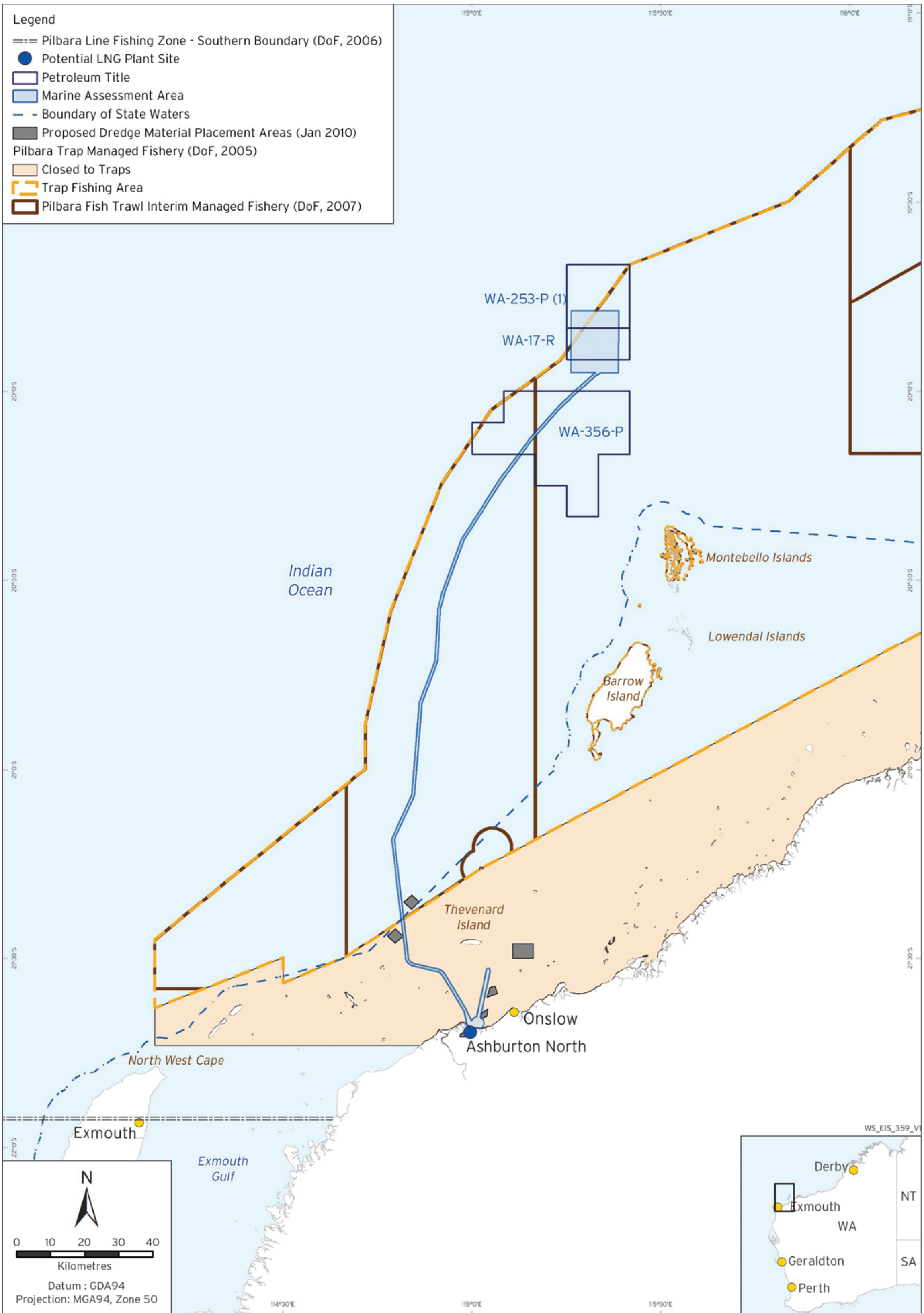


Figure 3.1: Pilbara Demersal Scalefish Fishery

The species targeted by these fisheries include Bluespotted emperor (Lethrinus punctulatus), Rosy threadfin bream (Nemipterus furcosus), Brownstripe emperor (Lutjanus vita), Crimson snapper (L. erythropterus), Goldband snapper (Pristipomoides multidens), Red emperor (L. sebae), Saddletail snapper (L. malabaricus), Spangled emperor (Lethrinus nebulosus), Frypan snapper (Argyrops spinifer), Rankin cod (Epinephelus multinotatus) and other demersal scalefish (Newman et al. 2010). For some of these species (Saddletail snapper, Red emperor and Crimson snapper) the juvenile stage and nursery areas are located in nearshore areas.

During the 2009 season more than 30 people were directly employed by the PDSF, which consisted of 18 fishers on four vessels in the Pilbara Fish Trawl Fishery and six fishers on two vessels in the Pilbara Trap Fishery. It is not known how many fishers were employed through the Pilbara Line Fishery (Newman et al. 2010).

Figure 3.2 indicates the catch levels of the Northern Demersal Scalefish Fishery (includes both Pilbara and Kimberly demersal fisheries) from 1989 to 2009.

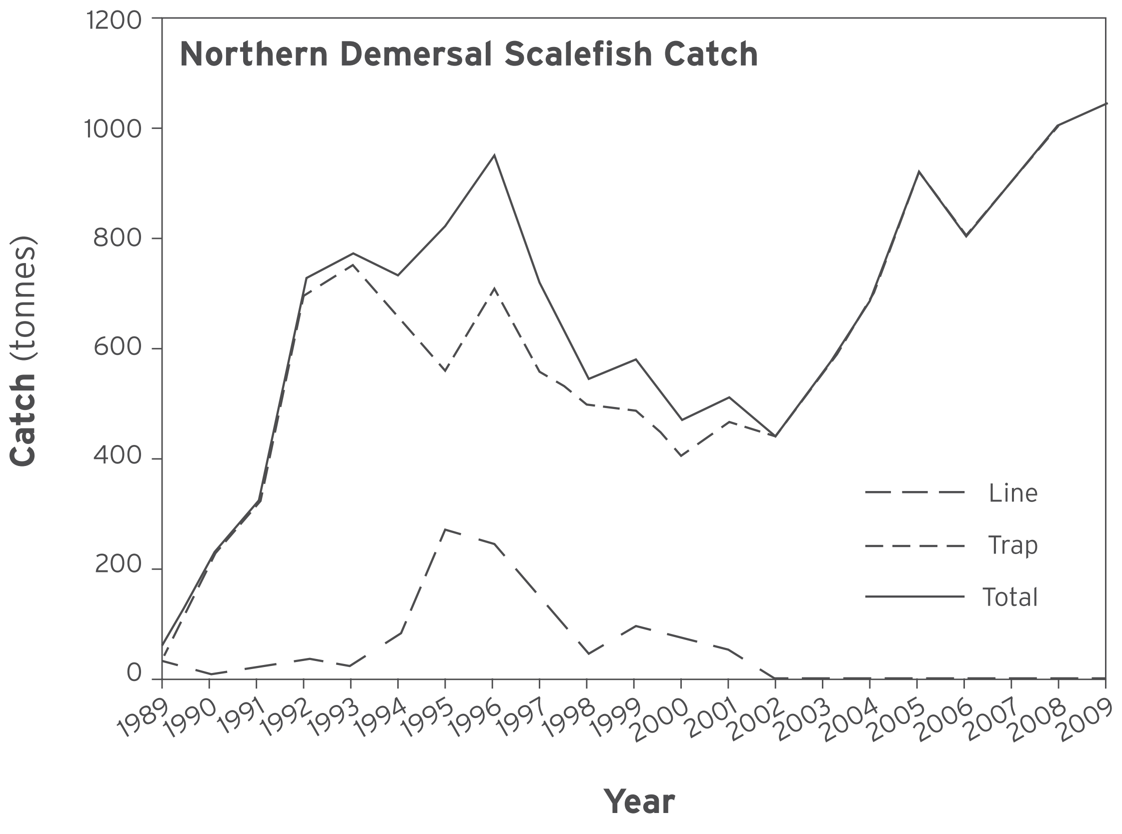


Figure 3.2: Catch Levels of Demersal Finfish in the Northern Demersal by Line and Trap (1989-2009).

Source: Newman et al. 2010

An economic profile of the 2005 to 2009 season of the Pilbara Trawl, Trap and Line Fisheries is presented in Table 3.1.

Table 3.1: PDSF Economic Profile (2005 - 2009)

Year	Effort days	Change in effort days from previous year	Total catch (tonne)	Change in total catch from previous year	Economic value	Change in economic value from previous year
Pilbara Fish Trawl (Interim) Managed Fishery						
2005	886	(-) 67	2371	(-) 466	$8.0 million	(-) $1.0 million
2006	914	(+) 28	2222	(-) 149	$7.5 million	(-) $0.5 million
2007	841	(-) 73	1704	(-) 518	$5.8 million	(-) $1.7 million
2008	831	(-) 10	1210	(-) 494	$4.4 million	(-) $1.4 million
2009	711	(-) 120	1044	(-) 166	$3.7 million	(-) $ 0.7 million
Pilbara Trap Managed Fishery						
2005	431	(+)13	408	(+) 13	$2.1 million	(+) $0.2 million
2006	464	(+) 33	473	(+) 65	$2.5 million	(+) $0.4 million
2007	425	(-) 39	460	(-) 13	$2.4 million	(-) $0.1 million
2008	461	(+) 36	508	(+) 48	$2.7 million	(+) $0.3 million
2009	456	(-) 5	455	(-) 53	$3.1 million	(+) $0.4 million
Pilbara Line Fishery						
2005	985	(+) 216	260	(+) 20	$1.2 million	(-) $0.2 million
2006	397	(-) 588	105	(-) 155	$0.5 million	(-) $0.7 million
2007	385	(-) 12	102	(-) 3	$0.5 million	No change
2008	326	(-) 59	86	(-) 16	$0.25 million	(-) $0.25 million
2009	294	(-) 32	123	(+) 37	$0.52 million	(+)$0.27 million

Source: Newman et al. 2010, Newman et al. 2009, Stephenson 2008, Stephenson & Newman 2007, Stephenson & King 2006, and Stephenson 2005.

The 2009 season catch for the Pilbara Trawl Fishery was significantly below the target catch. It is expected that the target catch will be reassessed for the 2010 season. The catch for the Pilbara Trap Fishery was within the target; and the catch for the Pilbara Line Fishery was above the target (Newman et al. 2010).

The Pilbara Trawl Fishery experienced an annual decline in the economic value and size of the catch between the 2005/6 and the 2009/10 fishing season; however, during this same period the effort days fluctuated. The Pilbara Trap Fishery experienced no linear patterns in effort days, catch size or economic value; however, in the past two seasons (2008/9 & 2009/10) the fishery saw a steady increase in the catch size and economic value. The Pilbara Line Fishery exhibited no patterns between 2005 and 2009.

Mackerel Managed Fishery

The Mackerel Managed Fishery targets species such as Spanish mackerel (Scomberomorus commerson), Grey mackerel (S. semifasciatus) and other species of Scomberomorus, Grammatorcynus and Acanthocybium. The Mackerel Managed Fishery uses small vessels for jig fishing and near-surface trolling in depths of 10 to 100 m around reefs, shoals and headlands (Molony & Lai 2010).

The fishery consists of three parts; Area 1 (Kimberly region), Area 2 (Pilbara region) and Area 3 (Gascoyne and west coast). There are currently 78 permit holders in the Fishery operating across the three areas; however, only 38 permits are active. There are 22 permits operating on seven boats in the Pilbara; however, it is not disclosed how many of these permits are active (Molony & Lai 2010). The boundaries of the fishery extend from the Western Australian/Northern Territory border down to the West Coast Bioregion, with the majority of the catch taken from the Pilbara and Kimberly coasts. Figure 3.3 presents the location of the Mackerel Managed Fishery.

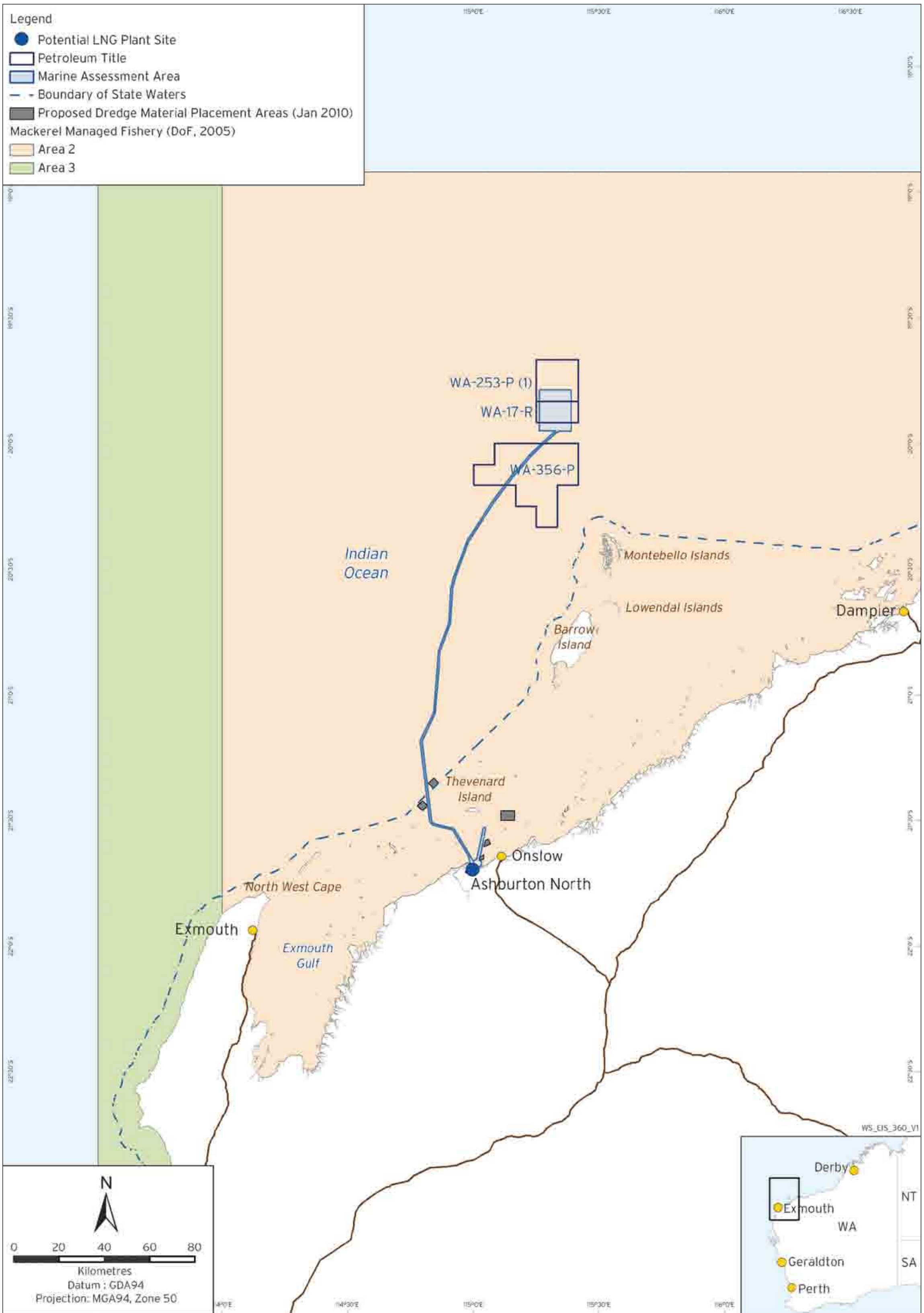
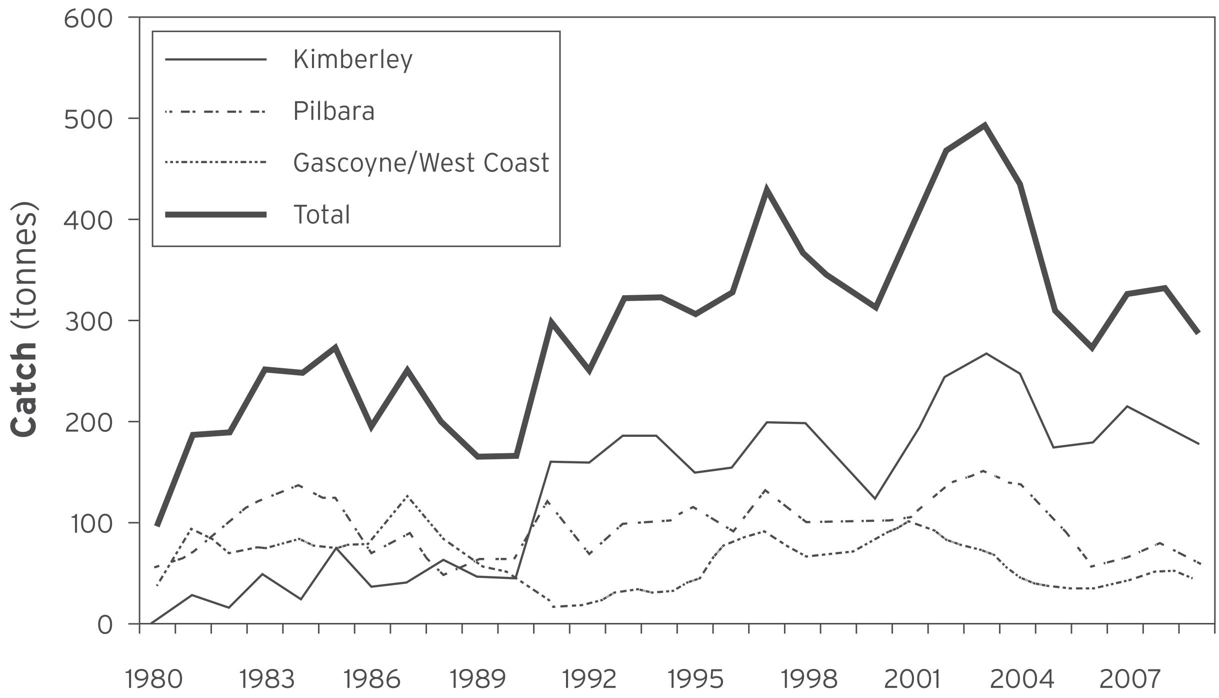


Figure 3.3: Mackerel Managed Fishery

Each Area of the fishery is managed by a Total Allowable Commercial Catch (TACC), which marks the maximum allowable mackerel catch as determined by fishery officials. The current TACCs for the fishery are 60 tonne of Grey mackerel for Areas 1, 2 and 3. For Spanish mackerel/other mackerel the TACC for Area 1 is 205 tonne, Area 2 is 126 tonne and Area 3 is 79 tonne (Molony & Lai 2010). During the 2009/10 season a total of 284.2 tonnes of Spanish mackerel, 11.1 tonnes of Grey mackerel and 0.4 tonnes of other mackerel was landed. Of this catch 61.6 tonnes of Spanish mackerel was caught in Area 2 (Pilbara region) which was significantly lower than the TACC of 126 tonne.

Figure 3.4 presents the annual catch of Spanish mackerel in each Area of the Mackerel Managed Fishery from 1979 to 2009.



Source: Molony & Lai 2010

Figure 3.4: Annual Catch of Spanish Mackerel in Western Australia, 1979 - 2009

6.5.3.2 Economic Capital

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.5.3.3 Human Capital

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.5.3.4 Physical Capital

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.5.3.5 Social Capital

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

6.5.3.6 Vulnerability of Onslow's Community Capitals

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.0 Impact Assessment Methodology

7.0 Impact Assessment Methodology

7.0 General Comments

22.2	Due to the fact that the risk assessment technique is in its infancy, DPA recommends an independent review of the risk ratings applied to the Project.
	Chevron has worked in close consultation with appropriate departments (including the Environmental Protection Authority), and technical experts throughout the development and application of the risk-based assessment approach and do not consider it necessary for an independent review of the risk rankings.

7.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.2 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.3 Methodology

7.3.1 Scoping

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.3.2 Establishing the Context

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.3.3 Identifying Aspects

28.13	Table 7.2 lists 'aspects' identified for the project. None of these appear to cover the issues around the long-term operations of the pipe-line or the facilities; that is, permanent exclusion of commercial fishers, recreational fishers and the general public from marine areas.
	Chevron notes the concerns of DoF regarding the exclusion of fishers and the general public from marine areas associated with the Project. Chevron is committed to a best-practice approach with regard to the Wheatstone environmental assessment, which includes the identification of issues relating to social impacts. The process of developing aspects for the Draft EIS/ERMP is discussed in Section 7.3.3 of the Draft EIS/ERMP: "Aspects were initially developed through a series of internal workshops and brainstorming sessions. These were vetted through consultation with individual stakeholders, and discussions at stakeholder workshops in February, March and September 2009. Key Project activities were assessed for their potential to occur during the construction, commissioning, operation, maintenance or decommissioning stages." The process for identifying key issues to be assessed included consultation with DoF and industry stakeholders. Key concerns raised during this process focussed on temporary closures and impacts associated with construction activities such as dredging. Consultation with Onslow residents, tourist operators and recreational fishers also identify concerns regarding access to coastal locations such as Hooley Creek. The final assessment provided in the Draft EIS/ERMP addresses impacts to commercial and recreational fishers and marine recreation users as a result of long-term activities as well as short-term impacts associated with the construction phase. Section 10.4 of the Draft EIS/ERMP addresses the potential impacts of the Wheatstone Project on fishing and pearling (including recreational fishing), while Section 10.5 addresses impacts to other recreational users.

In addition to the consultation activities conducted to date, and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role will include liaising with holders of commercial fishing licenses. The liaison will provide information on long-term activities such as dredging, pipelaying associated with expansion phases and vessel traffic associated with product export.

Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing throughout the development of the Project.

7.3.4 Identifying Factors

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.3.5 Analysis and Evaluation of Risk

7.3.5.1 Consequence Definitions

28.28 For both Major and Moderate Consequences a percentage area impacted is used as a measure. This may not necessarily result in a similar percentage of risk as there are spatial differences in productivity over fishing grounds – so quoting a one to two per cent impact on trawl grounds does not represent a one to two per cent impact on production, as it can be higher. For example, one to two per cent of an area may represent a significant percentage of catch on average for the fishery.

This issue is discussed in Section 7.3.5.1 of the Draft EIS/ERMP. In particular, this section describes the thorough process by which consequence definitions were developed, including drafting by various experts, being presented and recommended by the Environmental Protection Authority (EPA) Board and then tested and revised through stakeholder workshops.

Chevron is committed to a best-practice approach with regard to the assessment of the Wheatstone Project and will continue to liaise with the DoF throughout its future development.

28.9 Fisheries are spatially defined with species abundance restricted to specific areas. Avoiding localised spatial depletion of species is an important goal in fisheries management. While many fish populations are wide-spread across a zone, the spatial abundance of these species is not. Therefore a localised impact due to a certain activity may have a major impact on the fishery if it occurs in a nursery area or an area of high abundance targeted by commercial fishers. Thus, the marine impacts consequence definitions in Table 7.5 do not adequately capture the consequences in relation to fish. There is also a need within the consequence definitions for the different life stages of fish to be considered, i.e. a certain activity may have a minor effect on adult species (who have good swimming ability), but a major effect on the larval stage of the same species.

In summary while the marine impacts consequence definitions may be appropriate for marine fauna (other), DoF believes that it is not appropriate to put fish into this category and that fish should be placed in a new category with appropriate definitions.

This issue is discussed in Chapter 7: Impact Assessment Methodology (Section 7.3.5.1) of the Draft EIS/ERMP. In particular, this section describes the thorough process by which consequence definitions were developed, including being drafted by various experts, their presentation to and recommendation by the Environmental Protection Authority Board and then testing and revision through stakeholder workshops.

The practical application of this process resulted in the Consequence Definitions in the Draft EIS/ERMP (Section 8.4.4, Table 8.40) that were applied for marine fauna.

Chevron recognises that a holistic approach is required for impact assessment in relation to fisheries. For example, life cycle stages of species in pelagic/demersal "offshore fisheries" may include habitat for spawning around reefs and shoals and larval and juvenile stages in nearshore waters including creeks and mangrove areas. Similarly prawn fisheries operating within the Onslow Prawn Managed Fishery include early life stage components that occupy and depend on coastal habitats including creeks, mangrove deltas and seagrass habitat in the nearshore. In addition, effects on key habitats, assemblages and food webs that determine spatial abundance of fish populations are also important considerations. Project effects on fish populations therefore require a system view and this underpins the factor-based approach taken in the risk assessment.

	Three principal marine factors are dominant controlling drivers for determining the potential effects on fish populations, namely: • Water and sediment quality • Benthic habitat • Coastal processes. While the consequence definitions derived for the Project were developed in consultation with government agencies for the trial of the risk-based approach, this submission, involving definitions for different life stages of fish species in the Consequence definitions, is acknowledged. This was considered previously, and it was decided that it would bring additional complexity to the risk analysis process (several secondary receptors were suggested) and unlikely to affect the overall risk analysis outcome. Primary receptors were therefore generally preferred for assessment. The Onslow Prawn Managed Fishery Ashburton nursery ground was considered the highest risk primary receptor in the overall fisheries assessment and was therefore included in the risk analysis. Chevron considers that assessment of the aforementioned environmental factors and their incipient primary receptors (e.g. mangroves, seagrass, corals, littoral transport, marine water quality etc.) encompasses likely secondary effects to fish populations. By proxy, the factors and primary receptors used in the risk analysis are therefore considered to be adequate in assessing overall risk from specific aspects of the proposed development. Similarly, development of mitigation measures to protect these receptors is therefore also considered to protect the key habitats that support fish populations in the Project area. Moreover, the resultant residual risk rankings for each receptor presented in the Draft EIS/ERMP were not developed in isolation, but included consideration of the secondary effects to secondary receptors including life stages of a range of fisheries found in the region. Therefore, Chevron does not believe that a new category for fish alone is warranted.
28.14	Table 7.5 (p 396) lists the consequence definitions used to assess the risks to marine fauna. Some of these (e.g. declining conservation status/ conservation listing) appear very conservative. These are reiterated in table 8.40 (p 560). It is unclear how or if the cause for these consequences will be identified as arising from the Project or other sources? For example, if a species is conservation listed in the region after the Project has commenced, will it be assessed as to the role the Project has in the declining status of the species?
	This issue is discussed in Chapter 7: Impact Assessment Methodology (Section 7.3.5.1) of the Draft EIS/ERMP. In particular, this section describes the thorough process by which consequence definitions were developed, including being drafted by various experts, their presentation to and recommendation by the Environmental Protection Authority Board and then testing and revision through stakeholder workshops. The practical application of this process resulted in the Consequence Definitions in the Draft EIS/ERMP (Section 8.4.4, Table 8.40) that was applied for marine fauna. Chevron acknowledges that adopting a trigger of declining conservation status for a marine fauna species is a conservative position. However it is also understood that the assessment process for declaration of declining conservation status requires reasonable understanding of baseline populations of the species in the region and subsequent monitoring to justify this declaration. The impact assessment presented in the Draft EIS/ERMP has assessed the known and likely impacts arising from the development and does not consider these likely to result in declining status of these species. Identification of key threatening processes is an important component of the assessment in understanding the decline in conservation status of a species in a region. For many of the existing marine fauna species that are currently conservation listed in the Project area, these key threatening processes are generally well understood. Most relate to direct impact on the species (e.g. vessel strike or by-catch) or indirect impacts by impingement on critical habitat (e.g. loss of foraging areas). Management and mitigation of these threatening processes form part of the overall residual risk assessment for the Project.

7.3.5.2 Defining Likelihood

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

7.3.6	**Detailed Analysis of Risks**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
7.3.7	**Detailed Evaluation of Risks**
28.12	There is no discussion of Indigenous fishing for either town-based or community-based groups. Indigenous fishers usually target different fish species and shell fish to non-indigenous fishers. This issue should be addressed or an explanation given within the document as to why it was not addressed.
	Chevron completed a comprehensive Aboriginal Social Impact Assessment as part of a suite of social and health impact assessment studies undertaken for the Project. Within this assessment, members of the local Aboriginal community were asked to identify areas they value and use for fishing and hunting. The patterns of fishing, and areas of value and use for fishing, were remarkably similar to those of the non-Aboriginal community. As the Project impacts on fishing are expected to be the same for both communities, the Project did not undertake a separate risk assessment for the Aboriginal community.
7.3.8	**Mitigate and Manage Risks**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
7.3.9	**Cumulative and Additive Effects**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
7.3.10	**Consultation with Government, Specialists and Stakeholders**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	

8.0 Marine Risk Assessment and Management

8.0 Marine Risk Assessment and Management

8.0 General Comments

6.1	The Draft Environmental Impact Statement/ Environmental Review and Management Programme for the Proposed Wheatstone Project (EIS/ERMP) is vague, incomplete and lacks the detail necessary to be fully analysed. (If a similar document were produced for a proposed commercial fishing operation, it would be rejected and either the entire proposal rejected or a new EIS/ERMP required).
	Chevron has been working with appropriate State and Commonwealth departments to ensure that the Draft EIS/ERMP adequately addresses all areas of environmental concern to an appropriate level of detail required under both State and Commonwealth legislation.
8.14	Concerns with Wheatstone LNG Site at Onslow. Issue: Dredging will be disruptive. Impact: Dredging will not be limited to the immediate pipeline and port areas. Phase: Construction. Risk: Critical.
	The capital dredging will be limited to the proposed trunkline corridor, the proposed navigation channel, the temporary access channel, the turning basin inside the Materials Offloading Facility and potentially the export pipeline. A small volume of maintenance dredging will also be required for the MOF, turning basin and navigation channel. Potential impacts and management measures relating to both the capital and maintenance dredging programmes are provided in Chapter 8 of the Draft EIS/ERMP. Indirect impacts from the dredging programme will extend beyond the areas to be dredged. The spatial extent of these indirect impacts is presented in detail in Chapter 8 of the Draft EIS/ERMP.
30.11	The OEPA requests that the proponent provide the following data provided in the ERMP, in a suitable GIS format (see Appendix 4 of ERG 3, Dec 2009 for guidance on format): a. The Marine Habitat Mapping b. The Marine infrastructure elements and their footprint outlines c. Boundaries of the predicted zones of high impact, moderate impact and influence associated with dredging for the optimised dredging scenario d. The Local Assessment Unit boundaries.
30.59	The OEPA requests that the proponent provide the all environmental survey data provided in the ERMP and site layout data, in a suitable GIS format.
	The GIS data used in the creation of maps for the Final EIS/ERMP will be provided to the OEPA in accordance with Appendix 4 of Environmental Assessment Guideline 3 (EAG 3), Dec 2009 subject to confidentiality of third-party commercial/technical information and the finalisation of the detailed project design, baseline monitoring program, modelling revision and local assessment unit boundary revisions. The GIS data will be delivered in ESRI 9.3 File Geodatabase Format.

8.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2 Marine Water and Sediment Quality

8.2.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5 Impact Assessment and Management

6.7 Dredging and dredge spoil.

It is noted that much of the analysis that has been done (by DHI Water and Environment) on the dredging, the placing of dredge spoil and the resultant plumes are unpublished. Consequently we can have no confidence that these processes will not cause mass mortality for the Area 1 Onslow Prawn Managed Fishery prawn stocks. The proposed dredging of the port and channel (variously described to us as 40,000,000 or 44,000,000 cubic metres in meetings with Chevron representatives and 45,000,000cubic metres in the EIS/ERMP) will, over four years:

- Remove part of the prawn habitat
- Remove areas of prawn breeding habitat
- Deposit spoil on prawn habitat and trawl grounds
- Create turbidity that will diffuse sunlight and reduce seagrass growth and could potentially smother the seagrasses outside the proposed spoil dumping grounds. Sea grasses are critical prawn (particularly tiger prawn) habitat
- Disturb tidal water flows that are crucial for transporting eggs, nauplii, post larvae and prawns during their lifecycle.

The lifespan of prawns is two to three years. It is possible that little or no egg production will occur in the impacted areas from the commencement of dredging. Breeding stock alive at the commencement of dredging will be dead by two to three years into the dredging phase and then there may be little or no egg production for the final years of the dredging program. There is insufficient information or research on the spatial distribution of spawning stock and source sink relationships to provide this Association with any confidence that there will be a viable prawn population in the Onslow Prawn Managed Fishery after the dredging phase. The EIS/ERMP must provide that information and analysis.

In addition to the EIS/ERMP being deficient in providing information on 'the turbidity, suspended solids and smothering effects of the proposed dredging program it seems that what little analysis there is in the EIS/ERMP about the effects on prawns is directed to the life-cycle and habitat requirements of banana prawns (*Penaeus merguiensis*) whereas the mainstay of the Onslow Prawn Managed Fishery are tiger prawns (*Penaeus esculentus*) and western king prawns (*Penaeus latisulcatus*). Tiger prawns in particular, and western king prawns to a lesser extent, are strongly dependent upon healthy sea grass or algal habitat unlike banana prawns. How we should interpret this oversight is difficult to know. Either the EIS/ERMP is so deficient that it failed to focus on the commercial important prawn species in the Onslow Prawn Managed Fishery or its authors focused on an irrelevant species for some inexplicable reason. In either event it is gross deficiency of the Draft EIS/ERMP. The EIS/ERMP must include a complete, detailed and transparent re-assessment of the dredging effects on critical sea grass and algal habitat and the consequent impacts on the life-cycle of the commercially important species of the Onslow Prawn Managed Fishery.

	The work around the impacts from dredging has been undertaken by a combination of URS, SKM, DHI, and HR Wallingford, which are all internationally recognised companies in this area of expertise. All relevant information to support the environmental impact assessment and all results from the impact assessments are presented in the Draft EIS/ERMP (and technical appendices). These documents were made available to the public for review. Additional information outlining potential impacts to the Onslow Prawn Managed Fishery has been included in Appendix FH of the document.
8.16	Issue: Suspension of solids in water column, sedimentation and changes to water quality and flow. Impact: Reduces feeding efficiency of oysters and reduces pearl growth and lustre. Phase: Construction & Operation. Risk: Critical.
	The potential direct and indirect impacts to pearl species from Project construction and operation are discussed in Chapter 8 (Section 8.4.5.2) of the Draft EIS/ERMP. This section indicates that *Pinctada maxima* is able to cope with high suspended sediment loads and that they have a long breeding season. This information suggests that spawning and settling would still occur during and after dredging and placement activities.
29.152	Chevron to provide SEWPaC with further reasoning regarding the acceptability of the impact on seagrass habitat in the area. This reasoning will include the ecological significance of this removal (including the importance of this area for seeding other seagrass resources), the scale of impact in the context of habitat for dugong and marine turtles that are likely to use this area, as well as the likely recovery of impacted areas. The reasoning should also take account of Chevron's commitments during the 7/2/2011 meeting to review the dredge program in the early stages of the campaign (e.g. after 6 months) to determine the appropriateness of the modelling, and whether the Zones of Influence can, in fact, be reduced. The sources of this information should be cited and cross referenced to the relevant sections of the draft and proposed Supplementary EIS. If relevant information is not contained within the Supplementary EIS, further revisions may be required.
	An area of approximately 2963 ha of seagrass is predicted to be affected by the dredge plume. Within this area a temporary loss of up to 50% of the above ground biomass is anticipated. Up to 10 ha of permanent (100%) loss of seagrass is predicted within the proposed Trunkline footprint as a result of physical damage from burial under rock armour during the installation of the pipeline rock armour. However, if sand is used to cover the pipeline then the seagrass loss is predicted to be temporary, as seagrass is predicted to recolonise these areas from seed stock. A clarification of the predicted project impact on seagrasses including the percentage and spatial extent of anticipated seagrass losses; both permanent and temporary, and any impacts to marine megafauna resulting from these losses is provided in Appendix FM. The appendix also provides a short account of the site selection, optimisation and management measures employed by Chevron to minimise these impacts. During the early stage stages of the dredging programmes the accuracy of the impact predictions presented in the Draft EIS/ERMP and the Final EIS/RTS will be validated. This will include the validation of the dredge plume model predictions with regard to sediment plumes. Should the actual impacts occurring in the field vary considerably from the impact predictions presented in the Draft EIS/ERMP and the Final EIS/RTS, the mitigation measures and monitoring programs will be amended accordingly. This approach is consistent with, and, meets the needs of an adaptive management approach to both monitoring and mitigation measures.

8.2.5.1	Construction Dredging
7.4	Some of our concerns regarding the Wheatstone Project are: Water clarity while dredging.
	The issue of impacts to water quality during dredging is discussed in Chapter 8 Section 8.2.5.1 and 8.2.5.2 of the Draft EIS/ERMP, which outlines the anticipated dredge turbidity plume as well as listing potential impacts to water and sediment quality, BPPH and marine fauna. The results of the environmental impact assessment predict that there will be a temporary reduction in water quality due to the capital dredging programme. The impact assessment also recognised that the area to be dredged is characterised by high variability in turbidity and sedimentation due to natural process. Reducing the environmental impacts of the dredging programme is a key focus. A draft Dredge Spoil and Disposal Management Plan was submitted with the Draft EIS/ERMP. The final document will outline measures to be put in place to manage impacts from the dredging programme.
9.8	The DHI modelling assumes that 'potential movement of sand and coarse silt fractions originating from the dredging activities over the bottom as bed and suspended load is thus similar to existing conditions. The local habitats are adapted to these conditions, and no additional impacts are anticipated in this respect. These assumptions are not considered correct. Firstly the local habitats are adapted to the consolidated and coarse grain armoured existing seabed conditions rather than the large quantity of freshly deposit unconsolidated dredge material coated seabed. Secondly the placement of dredge material increases the availability of mobile sediment. Finally the environmental risk of ignoring the differences between the new and existing seabed properties is high.
	Chevron concurs that the placement of material at the proposed dredge material placement sites will lead to localised differences in sediment transport. This is described in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendix EE: Spoil Ground Stability). The modelling has demonstrated that changes in bottom shear stresses due to changes in bathymetry are localised. However, it is noted that the sediment composition and consolidation will differ from the original seabed at the spoil grounds. The greatest potential for impacts from the placement grounds is considered to be from the fines available for re-suspension. This risk is highest while dredging and placement is occurring. This component is included in the dredge material placement modelling for the impact assessment, in addition to the spill induced by the disposal process. The statement referred to in the submitter comments relates to the coarse fractions remaining at the placement grounds after the fines are progressively dispersed. The remaining material will gradually take on resemblance to the material in the surrounding area, exposed to similar wave and current conditions. There is a period where the material placed at the sites is likely to be composed of finer and less consolidated material than the original seabed, and some sediment in addition to the "undisturbed" transport that would have taken place with the original seabed will spread from the disposal sites during this period. Tropical storms and cyclones impact the area on a regular basis. Under these conditions, the overall mobilisation of the seabed and the sediment transport rates are a scale factor higher than the rates experienced under "normal" conditions. Whereas the more extreme conditions can cause some damage to local habitats, the habitats can be considered overall adapted to these conditions.

25.2	Recommendation 2: That an outcome-based condition or conditions be applied to the construction dredging program that requires the proponent to manage all turbidity generating activities including dredging, spoil disposal and trunkline installation, to ensure that there are no water quality changes or sediment deposition outside the predicted boundaries of the Zone of Influence presented in the ERMP. Discussion: The ERMP states that "plumes created during the winter are expected to travel up to 70 km to the west of the dredge area" (p. 437). Figure Y.13 on page 602 of Appendix Q1 indicates that dredging plumes during winter are likely to reach the northern areas of the Exmouth Gulf (an area with significant marine conservation values) and come within close proximity to the boundary of the Muiron Islands Marine Management Area. There is also the potential for dredging related plumes to reach the waters surrounding the Great Sandy Islands Nature Reserve to the east of the proposal area, which also has marine conservation values. Appropriate outcome-based conditions framed around the proponent's prediction that dredge plumes will not reach marine parks or reserves are required to provide confidence that impacts on these areas will be avoided.
	An outcome-based condition for corals will be applied to the Zone of Influence, some important reefs beyond the Zone of Influence, and reefs in the Zone of Moderate Impact. A coral monitoring program is currently being developed and will be presented in the final Draft EIS/ERMP Appendix S1: Dredging and Spoil Disposal Management Plan. This program will confirm the location of the monitoring sites in each of these zones. The need to monitor reefs at the Murion Islands, which are situated outside the Zone of Influence, will be discussed with the Department of Environment and Conservation.
30.24	Dredge area: there are unconsolidated sediments 0.4m or less with hard substrate beneath (clay, shelly reef, coral bed). What is the implication of the hard substrate for dredging, will blasting be required? Trunkline route has not been cored. How accurate is the dredge modelling for the trunkline?
	LWI have defined the dredging in the Dredge Disposal Plan based on the available geotechnical information. This includes use of CSDs, THSDs as well as a backhoe dredger for removal of rock that is too consolidated to be dredged by TSHDs. The dredge schedule operates with two production rates for loose and more consolidated material (weak rock). In terms of the dredge plume modelling, the potential requirement for blasting is not critical. Plumes released by blasting are limited and short lived. The dredge plume modelling for the trunkline included in the EIS is based on a CSD moving along the pipeline and overflowing into barges/hoppers. This creates the most concentrated and persistent plumes of the various installation methods under consideration, and is therefore considered conservative in terms of the potential impacts.
30.25	A combination of hopper and cutter suction dredge (CSD) will be used for all capital dredging in the MOF, main access channel and in the turning basin. Has the proportion of time the CSD will be needed been accurately estimate and included in the dredge modelling scenarios?
	The timing for each activity has been estimated in the dredge schedule provided in the Dredge and Disposal Plan (Appendix Q1, Figure 2.3). This is based on the geotech information and assumptions on dredger sizes and production rates. However, one of the key strengths of the scenario approach applied for the dredge plume modelling is the limited dependency on an accurate dredge schedule (and relative proportion of each activity). All dredge components are evaluated, including possible simultaneous activities, and the most critical components in terms of spills and possible impacts are captured in the dredge scenarios for each segment along the entire stretch from the coastline to the outer channel. These are combined with all climatic scenarios to make the assessment independent of the dredge schedule. Although the CSD dredging per the DDP is only taking place during summer, it has also been simulated during winter and transitional conditions to take any changes to the schedule into account in the definition of the envelopes for impact zones. This is obviously highly conservative, but considered the most appropriate method of accounting for the high uncertainty related to the dredge schedule at the EIA stage.

8.2.5.2	Maintenance Dredging
22.10	Marine Infrastructure Main shipping channel: i. Chevron should provide cross section highlighting the maximum design capacity of all channels and turning basins. These design characteristics should also be compared to PIANC guidelines as a minimum standard to ensure safe operations. This will demonstrate the design has minimised operational risks, and hence the potential for environmental impacts. ii. The cross-section should indicate the channel declared depth and over dredging for Insurance depth (maintain declared depth by allowing for interdredging siltation). Failure to allow insurance depth will see an urgent need for maintenance dredging following accretion within the channel by cyclones. This issue should be addressed at this EIS/ERMP stage via design.
	The cross-sections referred to are required from an engineering perspective and are not the subject of the environmental impact assessment provided in the Draft EIS/ERMP.
22.22	Dredging The document indicates that maintenance dredging of 50-100,000m3 is possible, and larger events may require 300,000m3. Furthermore, It is estimated that some 10 to 15Mm3 of maintenance dredging is required over a 25 year period, although the request for permit does not include maintenance dredging approval.
	Maintenance dredging requirements are addressed in Chapter 8 Section 8.2.5.2. A maintenance dredging permit would normally be sought separately to the construction dredging permit and, as a result, does not form part of the Sea Dumping Permit Application. It is anticipated that maintenance dredging will be performed once every five years, and more frequently in an active cyclone season. Although the annual channel infill rate could reach 300 000m^3, annual dredging is not anticipated. It is anticipated that the total maintenance dredging volume for the proposed 25 years of operation would not exceed 15 Mm^3 of material.
22.23	Dredging What provision is made for the disposal of maintenance dredge material? Can the spoil ground hold the estimated volume, or will new/extended spoil grounds be required in the short term?
	As outlined in the Draft EIS/ERMP, material removed during maintenance dredging will be placed at a combination of dredge material placement Site C and Site D. The dredge material placement grounds provide sufficient capacity to contain all dredge material volumes.
22.24	Dredging How will the maintenance dredging be done? Where would the dredging fleet be sourced from, would trailer suction hopper dredges be suitable to travel offshore sites, or does the maintenance dredging plan rely on other methods and spoil ground not yet defined?
	It is anticipated that maintenance dredging will be undertaken using a trailing suction hopper dredge, sourced from available plant working throughout Australia, or nearby countries. Trailing suction hopper dredges are suitable for placing material at offshore placement sites. This is the primary methodology planned for maintenance dredging with no foreseeable need to acquire additional offshore placement sites.
22.27	Dredging The documents indicate in several locations the dynamic nature of the Onslow coastline, especially under cyclone conditions. The current design of the MOF and near-shore channels would seem to be exposed to a significant risk of in-fill during these periods, and hence high maintenance dredging requirements. Insufficient information is provided in the draft documents as to: • The risk of significant in-fill, both under ambient and cyclonic conditions. • The expected maintenance dredging requirements. • The options for efficient disposal of maintenance dredging material, taking into consideration the plant most likely to undertake maintenance dredging tasks.

Maintenance dredging requirements are addressed in Chapter 8 Section 8.2.5.2. Periodic maintenance dredging will be carried out to ensure that the shipping navigation channels, turning circles and berth pockets remain at the required depth. Under average conditions, the annual infill is likely to be minimal. Annual sedimentation volumes and average sedimentation rates have been modelled along the navigation channel, product loading facility and materials offloading facility. The highest sedimentation rates are predicted to occur in the MOF approach channel. Total volumes are, however, small and manageable (Draft EIS/ERMP, Appendix Q1). A brief assessment of discharges from the Ashburton River following a cyclone showed that the plume did not impact the navigation channel with high sediment concentrations. However, simulations of a direct hit from Cyclone Vance (1999) gave rise to very high mobility of the seabed throughout the area and resulted in approximately 1 Mm^3 of infill into the dredged areas from an individual event. The channel may have to be surveyed following a severe cyclone with a potential requirement for maintenance dredging. Annual dredging of the MOF channel may therefore be required. This may result in the removal of approximately 50 000 to 100 000 m^3/year of sediment. Less frequent dredging may be required every three to five years for other dredged areas. It is anticipated that this will equate to 300 000 m^3/year. An estimate of total planned maintenance dredging for 25 years of operation is anticipated to be between 10 and 15 Mm^3.

As outlined in the Draft EIS/ERMP, material removed during maintenance dredging will be placed at a combination of dredge material placement Site C and Site D. The dredge material placement grounds provide sufficient capacity to contain all dredge material volumes.

8.2.5.3	Placement of Dredge Material Offshore
9.1	The disposal Site A is unlikely to be a suitable location for the disposal of material dredged by the CSD. The existing sediment at the proposed disposal Site A is generally coarser than its counterpart at the proposed CSD dredging site, which indicates a more energetic hydrodynamic environment at the Site A. It is likely that during disposal to Site A the wave and current generated bed shear stress and turbulence will hinder the deposition of the suspended dredged sediments which originate from a lower energy environment, and enhance resuspension of the unconsolidated dredge sediment from the bed will occur. Note that a CSD uses a rotating cutter head to create a slurry which is immediately recovered by a suction tube directly behind the cutter head. The slurry, consisting of approximately 10-20% solids, is proposed to be pumped directly to the disposal Site A(DDP, Appendix A, Appendix Q1).

The use of Site A is proposed to facilitate early inshore dredging with cutter suction dredge before barges may be able to reliably access a nearshore loading position. Site A represents a practical option for relocation of some of the initial material that must be dredged until a suitable location for inshore barge loading can be created for transport of materials to Site C. By using a diffuser to place material at Site A, the rates of dispersion of fines during placement will be minimised. Site A has not been selected as a non-dispersive disposal site but as a location that can, within the overall dredge plan, practically minimise adverse risk to sensitive BPPH receptors.

Material to be placed at Site A will be of variable grain size. The majority of the material placed is expected to remain *in situ* as the conditions are comparable to those experienced at the nearby Onslow Salt placement site. During the placement process, some of the fines (<75 μm) in the dredged material will be released to the wider environment. The effects of this have been assessed through sediment plume modeling with source terms representative of the release of fines during placement. This is expected to be a realistic worse case release rate under normal conditions at this site. Dispersion of fines from the volume of material proposed to be placed at Site A during or following placement has not been shown to represent a significant risk to nearby receptors. Much of the fines placed at Site A will become buried within the placed material and the risk of mobilisation will be reduced over time through processes including winnowing, armouring and consolidation.

Loss of sand from Site A will make little difference to transport rates in the nearshore area as there is an existing supply of mobile material in this area. Whilst some of the material placed at Site A will be mobile, the rates of transport will be low. Modeling of sand transport indicates that transport fluxes of 200 μm sand are weak in the Project area and are not expected to give rise to significant infill in future dredged areas of the Project. This prediction is consistent with the available information regarding present day infill in the Onslow Salt Channel.

9.2	The disposal sites B and C are unlikely to be stable as the material to be placed at these locations does not resemble the parent material. According to the latest dredge and disposal plan (DDP) the estimated particle size distribution indicates that only 16% of material is coarser than 0.2mm, which implies that more than 80% of the material on average will be mobile based oh Shields stability criterion. Although a fraction of the fines content will be lost during dredging and placement, the placed material is expected to be finer on average than the parent material at the spoil grounds. Consequently, there is high likelihood of the spoil material being re-suspended and spread to the channel, shore, MOF basin, and the Salt Channel.
	Site B will only be used if it is demonstrated that, within the overall placement plan, its use minimises risk of adverse impact to the BPPH receptors from dispersion of fines. Material placed at Site B will have similar low mobility to that at Site A. There are greater sensitivities to the use of Site B compared to Site A as it is located closer to sensitive BPPH receptors. Any use of this site will be carefully considered. This will be informed by the early monitoring of dredging and placement activities at Site A. Site C has been selected for placement of the bulk of the dredged material as placement and dispersion of material from this site is anticipated to be minimal and will have little impact on sensitive BPPH receptors. Processes of winnowing, armouring and consolidation will result in stabilisation of the placed material. Material dispersed from this site either during or following placement is not predicted to spread to the channel, shore, materials offloading facility basin or the Onslow Salt channel. Rates of transport from Site C are predicted to be low, consistent with evidence that the Onslow Salt channel is not subjected to high rates of infill. Material will be placed at Site C by bottom dumping from a trailing suction hopper dredge or barge. Bottom dumping will result in the burial of much of the placed material in a single placement. Given the water depths at the site, it will not be practical to simply place one load on top of another. Careful positioning will be required. This will reduce the risks of remobilising material during the placement activity. At Site C, a placement plan will be developed for the material and it will target placement to different areas of the site in different seasons. It will also place some of the less mobile material arising from the dredging at the edges of the site to reduce migration of more mobile material away from the central part of the site. The monitoring measures proposed at the site will inform the management of the placement operations.
9.3	The residual risk for placement of dredge material nearshore should be High instead of Medium (the current rating) as the placement sites A B and C are unstable and ongoing mobility of fine sand material will occur, For each disposal site a maximum percentage of clay and silt content (grainsize less than 0.062mm) should be set when allowing material to be placed on seabed.
	The justification of these risk rankings are provided in Chapter 8 (Sections 8.2.5.1, 8.2.5.2, 8.2.5.3, 8.3.5.1, 8.3.5.2, 8.3.5.3, 8.4.5.1, 8.4.5.2, Table 8.18, Table 8.37, Table 8.48) of the Draft EIS/ERMP. It is Chevron's view that setting a limit for maximum percentage of fines is not practical, as testing to confirm compliance cannot be carried out within a reasonable time frame. However, as a general principle, Chevron proposes to dispose of predominantly fine material, such as spoil from the clean-up dredge, at Site D. The three sites will be weakly dispersive for the majority of the material proposed to be placed at the sites. Rates of movement of material away from the sites will be greatest at the time of placement and during any cyclone events. Under normal conditions, the rates of transport of material from the site will be low and will not significantly affect background rates of sand transport. Dispersion of fines from the sites will reduce over time as the sites become resistant to erosion through processes of winnowing, armouring and consolidation. It is considered that a "Medium" residual risk for the assessment is appropriate. Evidence from the Onslow Salt placement area does not suggest that the inshore disposal site is unstable. The material placed at the sites will stabilise over time. There is no practical way in which the fines content of the cutter suction dredge (proposed for Site A), or within the hoppers of trailing suction hopper dredge and barges (for Site C), can reliably be determined in a short period. The characterisation monitoring and feedback monitoring will provide a more reliable evidence base to confirm that adverse levels of fines are not being dispersed from the placement sites towards sensitive BPPH receptors. It is the intention that any material in the trailing suction hopper dredge and barges that has a high fines content, such as that arising from clean-up dredging from areas of barge loading, will be placed offshore at Site D.

29.150	Chevron to include within the Supplementary EIS justification for why spoil disposal – particularly of larger material - does not increase the likelihood of marine pest colonisation. DSEWPaC notes that the offshore disposal of larger rock material may increase the likelihood of introduced marine pests colonising in these areas.
	Detailed monitoring programs are undertaken for all of the dredging campaigns in Western Australia. These have not detected any marine pest species. The iron ore mining industry began rapid development in the Pilbara in the late 1960s, and is increasing rapidly even today. There has been considerable dredging undertaken at many sites on the Pilbara coast during those 40 years, both for mining and other industries. Despite all the extensive dredging programs up north, no introduced marine pests are known to have been introduced on spoil grounds or elsewhere. In 2008, the Department of Fisheries coordinated an analysis of all the marine species introduced into WA. 60 species were identified, most of which are in temperate areas south of Kalbarri. Only three species are considered to be marine pests; all occur from Fremantle south. A fourth marine pest was later found in Albany.
29.151	Chevron to explain how the dredge campaign has been optimised to ensure best practice dredging methodology and minimisation of impacts.
	Chevron has minimised the scale of impacts to Benthic Primary Producers (BPP) and Benthic Primary Producer Habitats (BPPH) through the following actions: **Site selection to minimise impacts to BPP** • Selection of the Project footprint was based, in part, on minimisation of impacts to marine habitats (described in Section 3 of the Draft EIS/ERMP). • The dredge material placement sites were selected to minimise impacts to BPP and BPPH (described in Section 8.2.5.3 of the Draft EIS/ERMP). **Impact predictions to BPP** To determine the scale of sedimentation and turbidity impacts arising from the above activities, DHI was engaged to simulate the dispersal of sediments released by the proposed dredging program via their range of MIKE 21 mathematical models. DHI have developed an approach for impact assessment and management of dredging and reclamation projects in Europe and Singapore which is considered international best practice by both the World Association for Waterborne Transport Infrastructure (PIANC) and the World Dredging Congress (Doorn-Groen & Foster 2007). Their approach has been documented in a publication that is planned to be jointly released by PIANC and the United Nations Environment Program (UNEP) in 2010 (M Jury [DHI] 2010, pers. comm. May) (described in Section 8.2.5.1 in the Draft EIS/ERMP). **Determine the environmental significance of predicted BPP losses** Determination of the ecological significance of the predicted BPP loss was achieved using the Environmental Assessment Guidelines for Protection of BPPH in Western Australia's marine environment (EAG3). The EPA has developed this Environmental Assessment Guideline in recognition of the fundamental ecological importance of BPPH and the potential consequences of their loss for marine ecological integrity, based on the fact that almost all marine development proposals will result in some loss of these important habitats (described in Appendix FN). **Management of BPP** • Management is in accordance with the WA EPA Guidance Statement: DRAFT - Environmental Assessment Guideline for Marine Dredging Proposals (EAG7). Draft EAG 7 has been developed by the EPA to improve clarity, consistency and certainty with respect to environmental impact assessment and management of marine dredging proposals (described in Appendix FN). • Chevron is committed to use restrictive overflow zones to ensure impacts to corals do not exceed those predicted in Appendix FN and the draft EIS/ERMP (described in Sections 8.2.5.1 and 8.3.5.2 of the draft EIS/ERMP).

Monitoring to assess the effectiveness of management

- Chevron is committed to a responsive monitoring program that will be used to ensure impacts to corals from dredging do not exceed management threshold limits as agreed to with the Western Australia EPA (described in the Dredge and Spoil Disposal Management Plans: Appendices S1 and S2).

Responsive monitoring includes frequent surveys (e.g. fortnightly) of corals and water quality at 20 sites during dredging program to maintain the health of reefs and other BPP in the Project area (described in the Dredge and Spoil Disposal Management Plans: Appendices S1 and S2).

8.2.5.4 Placement of Dredge Material Onshore

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.5 Nearshore Construction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.6 Discharges from Onshore Construction

25.3 Recommendation 3: That the proponent develops a water quality and benthic habitat monitoring program associated with outfall 1 (Figure 8.17), to demonstrate there will be no decline in ecosystem health attributable to waste water discharge from onshore operations. This should be a key component of the proposed Marine Water and Sediment Quality Management outlined on p. 884 of the ERMP, or the proposed Construction Environmental Management Plan and include the following aspects:

- Design of discharge sites to avoid sensitive habitats and aggregations of marine fauna
- The spatial areas applicable to each level of ecological protection (LEP) be defined, and the environmental quality criteria to be applied to each LEP be specified prior to the completion of this assessment
- Monitoring procedures and triggers for corrective actions be specified. Corrective actions should include increasing the diffuser size or dilution rates in the event that water quality triggers for the mixing zone are not met.

Discussion: There is potential for waste water discharges to impact on nearshore sensitive habitats that support threatened and conservation significant species. The ERMP states that "measures to mitigate the impacts of discharges to the marine environment will be developed as part of the Construction Environmental Management Plan (CEMP, Appendix U1), which will be produced prior to commencement of construction activities" (p. 449). Although Table 8.18 outlines some mitigation measures, specific management, monitoring and corrective actions that would be required for inclusion in the CEMP are absent. Section 8.3.5.11 predicts that there will be no changes to sub-tidal benthic habitats or mangroves as a result of discharge from onshore wastewater (p. 520). This prediction should be used as the basis for an outcome-based condition to limit impacts on benthic habitats from discharges associated with onshore infrastructure.

Discharge of waste water will be monitored at Outfall 1. Although the monitoring program has not been finalised, it is likely to contain the following elements.

Monitoring should be conducted at the outfall site and include both edge of mixing zone and end of pipe monitoring. The location of the outfall site is shown in the Draft EIS/ERMP (Section 8.2, Figure 8.17). The location and design of the outfall site is highly constrained by the bathymetry and the need to discharge from the PLF.

Discharge modelling was summarised and reported on in the Draft EIS/ERMP (Chapter 8, Section 8.2.5.6, 8.2.5.7, 8.2.5.8, 8.2.5.9), with the full report presented in the Draft EIS/ERMP Appendix Q3.

Information on how the 200m mixing zone/low ecological protection zone was arrived at, its related impacts and what criteria determined this distance is contained within the Draft EIS/ERMP (Chapter 8, Section 8.2.5.6, 8.2.5.7, 8.2.8) and Appendix Q3.

The mixing zone boundary was defined as the distance where concentrations of indicator species in the effluent were expected to be indistinguishable for ambient water concentrations (ANZECC 2000). The size was considered as small as practical and unlikely to compromise overall integrity of the surrounding ecosystem. Modelling has been conducted to show that dilution is achieved in a 200m radius mixing zone for the most conservative criteria in this set-up which is salinity. These criteria and modelling results are reported in the Draft EIS/ERMP (Chapter 8, Section 8.2.5.6, 8.2.5.7, 8.2.5.8, 8.2.5.9) and detailed in Draft EIS/ERMP Appendix Q3.

The area surrounding the mixing zone has a Moderate LEP (berths, turning basin). Site selection of the outfall within this zone therefore reduced the potential impact on areas of High or Maximum LEP in the region.

Modelling indicated that, although different diffuser designs were tested, they had little influence on dilution in such a shallow site.

Outfall modelling was been based on limited information on discharge composition and treatment design.

Some of these criteria will not be able to be finalised until after the first discharge has occurred so testing can take place.

Monitoring is likely to be conducted quarterly and reviewed after 12 months (or whenever there are major changes in outfall volume or composition). After review, the program may be revised. More frequent end of pipe monitoring may be undertaken.

Duration of each monitoring visit would be two to three days to collect samples under different conditions within each season.

Parameters collected are likely to include:

- Edge of mixing zone – temperature, salinity, dissolved oxygen, pH, total nitrogen, total phosphorus, nitrate/nitrite and metals
- End of pipe – total nitrogen and phosphorus, Hg and Cd
- Treated water objectives at the point of discharge are:
  - Biological Oxygen Demand 5-day (BOD5): <30 mg/L E. coli < 10 per 100 mL
  - Total Suspended Solids (TSS): <30 mg/L
  - Total faecal thermal-tolerant coliform: 200 faecal coliforms per 100 mL
  - Maximum Residual Chlorine of treated effluent: 0.8 mg/L
  - Dissolved Oxygen: >3.0 mg/L. The process water will be treated to meet the standards at the edge of the plume mixing zone in accordance with ANZECC Guidelines for Fresh and Marine Water Quality, Volume 1 as applicable.

The final monitoring program will be described in the Construction Environmental Management Plan or in a stand-alone document.

25.4	Recommendation 4: That the discharge of produced water to the nearshore marine environment (outfall 2, Figure 8.17) is removed as a key Project characteristic, and other alternatives for the disposal of produced water be investigated. Specifically, it is recommended the proponent investigates alternatives to the direct discharge of produced water in the shallow coastal waters including, but not limited to (a) deep well injection at an appropriate site(s) or (b) discharge produced water at an appropriate offshore deepwater disposal site. Should the proposal proceed with outfall 2, the proponent characterises produced water from outfall 2, and undertakes eco-toxicological assessment consistent with the recommendations in the ANZECC Guidelines, and provides more specific information with regard to the proposed treatment of produced water from outfall 2. Discussion: At the time of commissioning trains 3-5, the proponent proposes to discharge produced water at outfall 2, which is within the 20 metre depth contour and supports filter-feeder habitats and foraging marine turtles (Figure 6.40, ERMP). Furthermore: • According to p. 455 of the ERMP, the detailed characteristics or volumes of produced water to be brought onshore and discharged at outfall 2 are currently unknown. • Produced water will contain polycyclic aromatic hydrocarbons (PAH) and volatile hydrocarbons such as benzene, toluene, ethyl-benzene and xylene (BTEX), as well as heavy metals used in any treatment processes. PAHs have a strong tendency to bio-accumulate in the tissues of marine organisms (with the exception of naphthalenes) (p. 454). • Produced water will be discharged for the operational life of the Project, which is between 40 to 50 years, potentially equating to significant bio-accumulation volumes of contaminants that may enter food chains in the long term. • The proponent has predicted that the produced water discharge will add an additional 100 tonnes per year of both phosphorus and nitrogen to the region, which is between a 25 per cent increase in nitrogen and a 75 per cent increase in phosphorus, compared to the annual average discharge from the Ashburton River. The effects of this nutrient increase are unknown. • The proponent has committed to managing waters outside the "mixing zone" using appropriate ANZECC/ ARMCANZ Guidelines. However, there are limited guidelines for PAHs and BTEXs, and it is questioned what criteria the proponent will use in the absence of a local eco-toxicological assessment. • The proponent has not undertaken an eco-toxicological assessment of produced water consistent with the recommendations in the ANZECC guidelines, which include using a minimum of five species from four different taxonomic groups. • Section 8.2.8, relating to predicted outcomes for marine water and sediment quality, does not discuss the predicted outcome for the produced water from outfall 2, in terms of the potential for toxicity impacts on organisms. • Produced water for other LNG projects in the region, such as the Gorgon Gas Project, is required to be disposed via deep well injection as opposed to coastal discharge. Based on the above, there is considerable uncertainty with regard to the long-term effects of the discharge of produced water. In addition, the nearshore discharge of produced water to the marine environment in large volumes would set a precedent for this activity in coastal waters of Western Australia. Alternatives for the discharge of produced water are therefore required, with one option being requiring similar standards as for the Gorgon Project.

Sources and, associated compositions, of produced water arriving onshore are known. The treated produced water will be disposed of via offshore outfall, running in line with the trunkline routing in approximately 20 m depth of water.

Chevron is committed to undertaking an ecotoxicological assessment of produced water, consistent with the recommendations in the ANZECC (2000) guidelines, and providing more specific information with regards to the proposed treatment of produced water from Outfall 2.

30.22	What impacts are expected from the elevated salinity of discharge?
	Under typical operation it is expected the outfall salinity concentration of co-mingled waste water will be approximately 60 g/L. With a dilution at 200 m of 1:10 and an assumed "normal" ambient salinity of 39.4 g/L (based on intensive field monitoring), the expected concentration at the edge of the 200 m mixing zone would be 41.5 g/L (five per cent above ambient). The ANZECC (2000) guidelines recommend that salinity changes should be less than five per cent for coastal waters. Given the modelled scenario represents "worst case dilution" then it is unlikely that elevated salinity will have an impact outside the mixing zone. A guideline value of five per cent was initially used as this is the only advice in ANZECC (2000) that specifically addresses salinity in estuarine and coastal waters (page 8.2-65). ANZECC (2000) also suggests trigger values can be defined by the 20th and 80th percentiles of the baseline or reference. Baseline data is being collected at this outfall site to derive trigger values. Given the inundation from Ashburton River flows, and high levels of evaporation in these shallow nearshore waters, site variation is likely to be high. Triggers will be derived from data collected during the baseline survey, and, if outfall modelling indicates these triggers are likely to be exceeded, site specific environmental effects will be assessed. Temperature of discharge is expected to be ambient.

8.2.5.7 Discharges from Onshore Operations

20.44	Will brine be combined with discharged treated waste water? Will the brine levels be tested regularly 50-75m from source to ensure it does not exceed the levels of normal sea-water (best practice levels used in Sydney)? Has Chevron made a commitment to maintaining normal sea salinity levels within 50-75m of brine outlet? What is the source of the water for flushing? Will brine be re-introduced into the ocean using a dispersion method.
	Discharges from onshore operations are discussed in the Draft EIS/ERMP (Chapter 8, Section 8.2.5.7). Under typical operation it is expected that the outfall salinity concentration of co-mingled wastewater to be approximately 60 g/L. With a dilution at 200 m of 1:10 and an assumed "normal" ambient salinity of 39.4 g/L (based on intensive field monitoring), the expected concentration at the edge of the 200 m mixing zone would be 41.5 g/L (five per cent above ambient). ANZECC (2000) guidelines recommends that salinity changes should be <5.0 per cent for coastal waters. Given the modelled scenario represents "worst case dilution", it is unlikely that elevated salinity will have an impact outside the mixing zone. Treated waste water composition will be confirmed and whole effluent toxicity testing will be undertaken, if considered necessary, as soon as the first water becomes available, and periodically thereafter. Outfall will be monitored in-line and assurance monitoring conducted at the edge of the mixing zone. The opportunity to increase rate of dilution through optimisation of diffuser configuration exists in the final stages of design and characterisation of effluent.

8.2.5.8 Discharges from Offshore Construction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.9 Discharges from Offshore Operations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.10 Release of NORM During Descaling

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.11 Shipping

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.5.12	Hydrocarbon Leaks and Spills
20.37	"The greatest risk of oil spill to Ningaloo Reef and Muiron Islands is from a shipping channel crossing condensate leak" What measures have been put into place to safeguard condensate shipping leaks? Are there minimum standards required of vessels allowed to collect condensate? If so, how is compliance ensured? Are there exclusion zones vessels collecting condensate must adhere to? Contract agreements within the Exmouth sub-basin require tankers are not to travel further south than required nor enter marine parks, marine management areas and substantial other areas. A similar precautionary approach would be recommended particularly for the condensate vessels and LNG tankers approaching the Wheatstone port, but also including all international traffic. Are there prescriptions regarding 'waiting vessels'? It is common place to see tankers lined up off shore in the Karratha region awaiting to approach the LNG hub there. A management plan in the first-place to reduce un-necessary presence of international ships in the region would be recommended. The plan should address both distance and time allowed. What commitments has Chevron made to the management of impacts for an oil spill?
	Risk assessment relating to the potential for hydrocarbon leaks or spills can be found in the Draft EIS/ERMP, Chapter 8 (Section 8.2.5.12, 8.3.5.14-17, 8.4.5.7). In addition to the implementation of the Marine Oil Pollution Plan (outlined below), strict vessel operating procedures and mitigation measures will be put in place to manage the risk of hydrocarbon spills from Project vessels (e.g. all condensate tankers will be double hulled, including spot cargoes). Chevron has a developed a detailed Marine Oil Pollution Plan for its Pilbara operations. This will be updated to include the Project. In addition, Oil Spill Contingency Plans will be developed for key marine operations. These documents will contain details relating to oil spill mitigation and management measures. The Plan will include aims, objectives, prevention and preparedness actions. The Plan will not focus exclusively on the Ningaloo Reef, but will be more generic and address spills relating to the whole Project area. An Oil Spill Sensitivity Map has been developed and is included in Appendix F1 of the document. This will be used to develop a management framework for protecting sensitive features from a condensate or diesel spill originating from Project facilities, and will support hydrocarbon spill contingency planning.
20.38	Has there been base-line sediment sampling, both during prawn trawling season and non-trawling season, done in Exmouth Gulf and waters to its north? Are there plans to monitor the Gulf (and waters to its north) for actual impact of dredging sediment? Have limits been set, which if exceeded, ensure that dredging must be suspended for key boundaries? Has there been a cumulative impact assessment done on the combination of prawn trawling and dredging occurring concurrently during winter on the waters of Exmouth Gulf and waters to its north?
	Chevron has not completed any baseline sediment sampling in Exmouth Gulf or waters to its north as Project activities are not predicted to impact Exmouth Gulf. Sampling has only be completed within the Project area. Water quality monitoring will be conducted adjacent to the Project's dredged areas, material placement sites, selected sensitive BPPH receptor locations and locations anticipated to be outside the Zone of Influence to provide control locations. The final Appendix S1: Dredging and Spoil Disposal Management Plan will contain details on the water quality monitoring program. Chevron does not propose to monitor water quality in Exmouth Gulf or waters to its immediate north as these areas are outside the Zone of Influence. The Draft EIS/ERMP does not include a cumulative impact assessment for waters of the Exmouth Gulf or waters immediately to its north as these waters are outside of the Zone of Influence.

20.39	"Estimate of total planned maintenance for 25 years of operation could be in the region of about 10 to 15 Mm3." Is this period being assessed for its full development capacity (operating life of at least 40 - 50 years p. 69) or require separate application for further expansion? If the Project is being assessed for its possible life-span of 40-50 years then all Project life assessments should address the full time-frame not just the first 25 years alone.
	Yearly sedimentation, without cyclones, will be in the order of 100 000 to 300 000 m^3. Over a 30 year life, this equates to between 3 000 000 and 9 000 000 m^3. Cyclone Vance (Category 5) has been modelled to estimate sedimentation from a similar intensity storm. The model predicted that approximately 570 000 m^3 of sediment could be expected to settle into the dredged areas. Total maintenance dredging over the life of the Project would be based on normal infill as well as sedimentation caused by cyclones. The scope of the assessment presented in the Draft EIS/ERMP is based on the full operating life of the Project. Management and monitoring procedures developed for the Project will reflect the operating lifespan of the Project.
20.40	"Estimate total Capital Dredge Volume 45 000 000 m3" Please provide a comparison of the original volumes dredged by the Dampier Salt Channel including evidence of incorporating the larger volume in making assumptions on the environmental impact of sea-dumping dredged material.
	Consultation with Onslow Salt to establish accurate estimate of volumes dredged is ongoing. However, dredge volume and duration for the Onslow Salt channel was significantly less than that proposed for the Project.
29.127	Further review of mechanisms in place to prevent and respond to spills will be required, including the availability of baseline data should a spill occur and environmental monitoring be required.
	The mechanisms to combat a spill will be contained in the Oil Spill Contingency Plans (OSCPs) and MOPP. Extensive baseline data is available on marine and coastal habitats in and adjacent to the Project area. These habitats are considered most at risk from a spill given their proximity to the MOF, PLF, trunkline and Wheatstone Platform. Nevertheless, Chevron recognises that habitats in more distant areas, such as the Ningaloo Marine Park, might be impacted in the unlikely event of a blow-out from the Wheatstone Platform. To assist oil spill responders plan and respond to a major loss of oil, an oil-spill sensitivity classification scheme has been developed to identify those natural resources at most risk from a spill and to prioritise response action to safe guard the most sensitivity or most valuable habitats. This classification scheme is described in Appendix FI. Although the maps in this report pertain only to the Project nearshore environment, the classification scheme is applicable to the southern Pilbara and Exmouth area, including the Ningaloo Marine Park. Chevron has not undertaken detailed surveys in the Exmouth Gulf or to the north of the Project area. It is possible that other proponents have collected baseline data in these areas which could be used by Wheatstone. In the first instance a review of available data will be undertaken to identify potential data gaps. Where data gaps exist surveys will be under taken to fill the relevant gaps. The types of data to be collected and the spatial extent and duration of the surveys will need to reflect the extremely low probability of the worst case scenario spill occurring.

8.2.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.2.8	**Predicted Environmental Outcome**
30.17	Marine Water Quality & LEPAs The Draft EIS/ERMP notes (on page 452) that several streams of waste water will be generated from onshore infrastructure, co-mingled and discharged at -5m CD at an outlet in the port. The wastewater streams will include treated sewage, grey-water and storm water but under typical operation the largest volume will be made up of RO brine and the discharge will be saline at about 60 ppt. The Draft EIS/ERMP discusses dilution of nutrients (Chapter 8 page 453), but the main issue under typical operation will be the dilution of the RO brine which is the dominant effluent under normal operating conditions. Rather than nutrients, whole of effluent toxicity testing has been used in assessing the environmental impact of RO effluent from other projects in WA and this approach is also appropriate for this project. The Draft EIS/ERMP has not addressed the question of how consistent the make-up of the co-mingled effluent will be (the changes in the effluent streams and effluent constituents of each stream over time), how toxic the effluent mixtures will be, and how it will be managed to ensure that the water quality objectives are met, including within the area designated as Maximum LEP. Figure 8.19 (page 454) shows modelling of "Worst case dilution" of maximum and typical operation discharges. The figure shows that "typical operation" dilution is much less than for the low salinity "maximum discharge" scenario (which may be expected to be a rare event associated with high rainfall). This suggests that the diffuser design that was modelled has not been optimised for a negatively buoyant plume. The diffuser used for this outlet should be designed to maximise near field dilution (within 5 – 10 m) for the typical operational discharge. The water depth at which the diffuser is placed will also be important in achieving maximum near field dilution and this should be modelled. The Draft EIS/ERMP concluded that nutrients will be diluted below the "threshold limits of the ANZEC 2000 guidelines within a 200 m mixing zone." In addition proposed LEP boundaries have been presented in Figure 8.25 (page 477). It should be noted that the relevant criteria is for 99% species protection within the area designated as High Ecological protection. It is not clear in the ERMP that this approach has been taken. Further it is not clear that: (a) the LEPA area has been calculated on the basis of the saline dilution (rather than nutrient), given that Figure 8.19 (page 454) shows a dilution of typical operation discharge to be about 10 units at 200 meters from the outfall, and (b) That the LEP boundaries have been calculated in accordance with the Pilbara Coastal Water Quality Consultation Outcomes (PCWQCO). In any event it is noted that the Project will require change to the LEPA boundaries in accord with the policy established in PCWQCO. With respect to the Maximum LEPA area to the west of the proposed port, the PCWQCO has provided a precedent in that in Map 3, Maximum LEP has not been applied (and has been replaced with High LEP) within 5km of a development node (page 49 of MR1 2006). With respect to shipping, Moderate LEP has been applied to inner port facilities and extending radially 250m around ship turning basins. Figure 8.25 on page 477 and text on page 478, indicates that the proponent proposes that a Moderate LEP be assigned to the waters within a 1km radius of the nearshore infrastructure and to waters within a 200m radius of the discharge outfall locations. These proposed areas are not in keeping with PCWQCO policy and should be either aligned with policy or modelling and assessment should be present to justify why the areas proposed are needed.

Under typical operation it is expected the outfall salinity concentration of co-mingled wastewater to be approximately 60 g/L. With a dilution at 200 m of 1:10 and an assumed "normal" ambient salinity of 39.4 g/L (based on intensive field monitoring), the expected concentration at the edge of the 200 m mixing zone would be 41.5 g/L (five per cent above ambient). ANZECC (2000) guidelines recommends that salinity changes should be less than five per cent for coastal waters. Given the modelled scenario represents "worst case dilution" then it is unlikely that elevated salinity will have any impact outside the mixing zone.

Whole effluent toxicity testing can only be addressed following production of waste water. Treated waste water composition will be confirmed and whole effluent toxicity testing will be undertaken, if considered necessary, as soon as the first water becomes available. Outfall will be monitored in-line and assurance monitoring conducted at the edge of the mixing zone.

	Variation in the composition of the co-mingled effluent has been addressed through modelling both typical and maximum discharge scenarios under worst case conditions to provide a conservative impact assessment. Impacts of other co-mingled effluent scenarios, with lesser potential impact, are expected to have a lower risk and have not been addressed for this reason. The modelling shows adequate dilution is achieved within the proposed mixing zone to meet water quality objectives for a High Level of Environmental Protection. This Level of Environmental Protection has been changed from Maximum to High taking into account the precedent of being within 5km of a major development node(Ashburton North Strategic Industrial Area) as outlined in the Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (PCWQCO) (DoE 2006a). The revised proposed Level of Environmental Protection map for the Project area has been provided in Appendix FN of the document. While the proposed Level of Environmental Protection amendments to those currently in place in the PCWQCO for the Project area initially apply to the construction phase, the long term Levels of Environmental Protection will need to be agreed with third party operators of the Project facilities. The diffuser design described in EIS Chapter 4 will be used. Opportunity to increase rate of dilution through optimisation of diffuser configuration exists in the final stages of design and characterisation of effluent. The threshold limits referred to in the Draft EIS/ERMP for nutrients are the default trigger values for physical and chemical stressors for tropical Australia for slightly disturbed ecosystems (ANZECC, 2000, Table 3.3.4). Threshold limits for toxicants were sourced from Maximum/High trigger values provided for slightly to moderately disturbed waters (ANZECC 2000, Table 3.4.1) as recommended for protecting the North West Shelf marine ecosystems, by Wenziker *et al.* (2006). Chevron agrees that the proposed Levels of Environmental Protection must be set in accordance with the PCWQCO. Consequently it is agreed that the proposed amendments to the existing Level of Environmental Protection described in the PCWQCO in the vicinity of the Project area be modified in accordance with the policy established in the PCWQCO to the following: 1. Maximum Level of Environmental Protection for areas more than 5 km away from the Ashburton North SIA. 2. High Level of Environmental Protection within 5km of the Ashburton North SIA (PCWQCO, 2006). 3. Moderate Level of Environmental Protection extending 250 m radially around the vessel turning basin. Low Level of Environmental Protection extending 200 m radially from the location of the proposed nearshore outfall.
8.3	**Benthic Habitats**
8.8	Tidal Regimes, Currents and Hydrodynamics - extend to include the 80 Mile Beach *P.maxima* pearl oyster fishery.
	The construction and operation of the Project will have no influence on the tidal regime, currents and hydrodynamics of the 80 Mile Beach area. Project-related impacts to tide, currents and hydrodynamics are likely to be localised to areas within, or adjacent to, the Materials Offloading Facility, Product Loading Facility and the proposed navigation channel.
20.13	The distribution of seagrasses in the near-shore project area appears to have been obtained from 3 surveys conducted in a 9 month timeframe during December 2008, May 2009 and August 2009 (URS, 2010, p, 136). It would appear the survey time-frame is insufficient to properly ascertain the variation in seagrass cover and also does not factor in significant local events. Cyclonic conditions can destroy seagrass meadows and it can take many years for recovery (such as the 12 year study done in the Gulf of Carpentaria, Australia - which showed only 20% recovery after 3 years) (Lord, Paling & Gordon, 1999). Cyclone Glenda crossed the coastline in 2006 2 years prior to the first survey (Chevron, 2010, p. 204) and Cyclone Dominic crossed the coast in January 2009 between the first and second surveys.

	Long-term studies on sea-grass distribution need to be conducted to provide an accurate reflection of the seagrass coverage and ensure that the timing of these surveys were not impacted by the events of Cyclones Glenda and Dominic - resulting in a under-estimation of sea-grass habitat distribution and density. The importance of these long-term studies is vital in view of the following: • Dugong fecundity is very sensitive to availability of its seagrass food, breeding is delayed making habitat conservation 'critical' (Marsh, Penrose, Eros, & Hugues, 2002, p.2) • Under optimistic conditions dugong population is unlikely to increase greater than five per cent per year (Marsh et al., 2002, p.1) • Chronic decline can be caused by loss of habitat (Marsh et al., 2002, 0.1). Could you explain how table 8.20 cites NO irreversible loss of seagrass habitat from dredging occurring despite the quote ""No permanent long-term reduction is anticipated, excluding the dredge area of the proposed navigation channel (approximately 250ha). [My italics] (Chevron, 2010, p. 485). Because dredging causes a huge amount of silting which would not be restricted to the actual dredging area, due to tidal and ocean currents, how can Chevron unequivocally say there will be no irreversible loss of seagrass habitat.

Chevron confirms that the distribution of seagrasses in the Project area has been obtained from three surveys conducted over a nine month period and described in the Draft EIS/ERMP (Appendix N12; Appendix N8). Appendix N8 focused on deeper water habitats (15-70 m CD). It is noted that seagrass habitat is important to the maintenance of dugong populations. However, Chevron does not consider that long-term studies on seagrass distribution in the Project area are warranted for the following reasons:

- The Project area is located in a cyclone-prone region, resulting in frequent disturbance to sediments, and therefore seagrasses (at least once every two years).
- Cyclones cause flooding of the Ashburton River which reduces light availability to the seafloor for periods of months. Hence the annual abundance of seagrass is likely to be highly variable depending on the number and intensity of cyclones per season.

The abundance of seagrass cover in the Project area is variable and generally low, given the exposed nature of the Project area to cyclones. Preferred seagrass habitat covers much of the seafloor in the Project area and this habitat will not be altered as a result of sediment released by the dredging program.

It should also be emphasised that while the dredging programme is expected to extend for four years, impacts to particular seagrass areas are not predicted for this entire four year period. As currents run perpendicular to the dredge channel (i.e. parallel to the shore) and the channel will be dredged area at a time, impacts will be confined to areas in the direct current flow path. This will be strongly seasonal (i.e. the entire area is not affected continually for the four year dredging programme). Impacts to the seagrass area to the west of the channel are anticipated to occur during winter, while impacts to the seagrass area east of the channel, including at Coolgra Point, are anticipated during summer. The duration of dredging per section of the trunkline is anticipated to last for less than two years.

It is anticipated that sediments will be recolonised by seagrasses, where suitable conditions occur, and once dredging ceases. The abovementioned habitat surveys inspected existing dredge material placement sites, established by Onslow Salt, and found seagrasses to be growing in low abundance and with a similar cover to the adjacent seabed, indicating potential for recovery. There were no seagrass areas found within the proposed navigation channel. Habitat mapping delineates areas of denser seagrass abundance, occurring a considerable distance from the channel. Based on the above justification, Chevron considers that there will be no irreversible loss of seagrass habitat as a result of the dredging program.

20.14	Please provide a cumulative impact assessment on the threats to seagrasses which includes, but is not limited to: • Light reduction from increased sedimentation from both construction and operations activities • Dredging (construction and maintenance) • Alteration of water flow • Changes in turbidity • Discharge of hypersaline water • Discharge of chemicals • Increased water levels of petroleum • Changes in local nutrient inputs Please also provide a risk assessment on the impact of seagrasses from: • Unexpected discharges • Potential toxic algae blooms (e.g. Lyngbya species) • Oil spill.

An "additive" impact assessment, as versus a "cumulative" impact assessment, has been provided in the Draft EIS/ERMP (Section 8.3.7, 8.3.8). However, further clarification is provided in the following text.

Seagrasses are not abundant in the immediate vicinity of the navigation channel. Habitat mapping indicates that seagrass occurs in relative abundance in only three locations in the Project area, the nearest of which is approximately six kilometres from the navigation channel. Seagrasses occurring in the Project area are ephemeral, short-lived, tropical species and their distribution and abundance varies depending on the nearshore light and wave climate, and cyclonic activity.

The major impact to seagrasses in the Project area will arise during the dredging program. Increased turbidity and light attenuation in nearshore waters is anticipated to result in a reduction in biomass of seagrass areas on a seasonal basis. The denser seagrass areas to the east of the channel will be affected during summer, and the denser areas to the west of the channel will be affected during winter. Chevron has acknowledged these impacts, and that they are likely to recur over a period of between three and four years. By comparison, turbidity impacts from maintenance dredging and shipping operations are anticipated to be much less in volume and duration, and are unlikely to adversely affect seagrass growth in excess of six kilometres away from the navigation channel.

The navigation channel is not anticipated to alter water flows (Draft EIS/ERMP, Appendix P2) and therefore no adverse impact to the dense area of seagrass to the east of the navigation channel is anticipated.

Risk assessment relating to impacts of discharges on water and sediment quality, BPPH and marine fauna is provided in the Draft EIS/ERMP (Section 8.2.5.6, 8.2.5.7, 8.2.5.8, 8.2.5.9, 8.3.5.11, 8.3.5.12, 8.3.5.13, 8.4.5.6). It is unfeasible to predict the risk or impact from unplanned discharges on tropical seagrasses. However, if adversely affected, seagrass is likely to recover quickly once the perturbation has ceased. Any adverse impact is anticipated to be short term.

It is outlined in the Draft EIS/ERMP (Chapter 8) that applicable water quality standards will be met at the boundary of the specified mixing zones for all waste water discharges. Applicable water quality criteria used to determine the appropriate size of the mixing zone for nearshore waster water discharges included the ANZECC/ARMCANZ (2000) guidelines for slightly disturbed tropical marine waters for total nitrogen and total phosphorus.

Mixing zone boundaries for the proposed nearshore waste water discharges during construction and operation of the Project are currently set at a radius of 200m. This zone was arrived at by hydrodynamic modelling of the dispersion of anticipated maximum discharge volumes and concentrations under worst case dispersion conditions using basic outfall design assumptions. There is scope for refining this mixing zone requirement once the wastewater characteristics are reliably determined and the outfall location and diffuser have been designed to optimise for rapid dilution of wastewaters, as indicated in the Draft EIS/ERMP.

Based on this information, nutrients are not anticipated to be present in concentrations above that of background concentrations, outside the mixing zone. There are no seagrasses within the mixing zone and the nearest area of abundant seagrass habitat is approximately 6 km away from the mixing zone.

Nutrients discharged into nearshore waters will be rapidly assimilated by marine plants and macroalgae and will subsequently be incorporated into the marine food web.

Seagrasses in these areas are unlikely to encounter nutrients at levels above background concentrations as a result of Project-attributable wastewater discharges.

Risk assessment relating to unplanned leaks and spills of hydrocarbon is provided in the Draft EIS/ERMP (Section 8.2.5.12, 8.3.5.15, 8.3.5.16, 8.3.5.17, 8.4.5.7). It is unfeasible to predict the exact impact of leaks and spills of hydrocarbon on tropical seagrasses. However, if adversely affected, seagrass is likely to recover quickly once the perturbation has ceased. Any adverse impacts are anticipated to be short term.

Algal blooms are not anticipated to occur as a result of Project construction and operation as discharges into the marine environment will conform to appropriate water quality guidelines.

8.3.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.3 Assessment Framework

8.3.3.1 Environmental Assessment Guideline No. 3

30.13 BPPH Loss Assessment

It is noted that the assignment of some of the Local Assessment Unit boundaries are inconsistent with the intent of Environmental Guidance Statement 3 [for example a single LAU spatially split over more than one location]. Further, some of the terminology used to describe impacts zones is not aligned with the EAG 3.

Chevron has obtained clarification on the intent of Environmental Assessment Guideline # 3 from the Office of the Environmental Protection Authority and as a result has revised some of the loss assessment unit boundaries. The figure, showing the revised loss assessment unit boundaries, is provided in Appendix FN of the document, as agreed with the Office of the Environmental Protection Authority.

30.23 EAG 3 – Development areas for inner port areas. Rest of area (outside of Ashburton mangrove guideline 1 area) would be non-designated areas, with an acceptable five per cent loss. Is this guideline met?

Chevron has obtained clarification of the intent of Environmental Assessment Guideline # 3 and has revised both the loss assessment unit boundaries and the applicable cumulative loss guidelines. The key changes are that ECU 1 has been divided into four new LAUs which incorporate a range of BPPH types, but are different cumulative loss guidelines. Loss assessment unit 1A and 1B have been reduced to occur within the administrative boundaries of the Onslow inner port limits. Cumulative loss guideline E (ten per cent) is considered applicable to these two loss assessment units which match the Guideline 4 zone (Guidance Statement # 1 (Environmental Protection Authority, 2001)). Loss assessment units 1C and 1D occur either side of the Project area but are outside the port limit and as such a cumulative loss guideline category of D (five per cent) is considered applicable. Cumulative loss guideline category D has also been applied to all loss assessment units in ECU 2.

New BPPH loss assessment calculations, based on the revised loss assessment unit boundaries and cumulative loss guideline classifications, are provided in Appendix FN of the document.

8.3.3.2 Guidance Statement No. 1

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.4	**Consequence Definitions**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
8.3.5	**Impact Assessment and Management**
8.7	Marine Water and Sediment Quality - appears to be limited to a 'nearshore' marine water quality study. PPA would ask that this be extended to include the nearby pearling leases at the Montebello Islands and Exmouth Gulf in the monitoring program.
	Impacts to water and sediment quality are described in Section 8.3.5 of the Draft EIS/ERMP. Conservative dredge plume modelling indicated that the zone of plume influence will not extend westward beyond Tent Point or eastward beyond the Mangrove Islands (Draft EIS/ERMP, Figures 8.31 to 8.33). Therefore, the dredging program will not influence water or sediment quality at the Montebello Islands or in Exmouth Gulf.
8.19	Issue: Pipelines may disturb local area. Impact: Possible shift in species mix near pipelines. Phase: Construction & Operation. Risk: Critical.
	The issue of change in local habitat and alteration of species composition around proposed near/offshore infrastructure is discussed in Chapter 8 (Section 8.3.5.1, 8.3.5.10, 8.4.5.1) of the Draft EIS/ERMP, which indicates the following: • Only the presence of the Materials Offloading Facility breakwaters, turning basin and navigation channel are predicted to result in permanent loss of local subtidal habitat. • It is possible that the presence of nearshore infrastructure will result in the aggregation of some fish species, potentially leading to adverse impacts on marine fauna community structure and abundance. However, this is unlikely to lead to negative impacts on species and habitats. With regard to your concern that this is a "Critical" issue, the Risk Assessment process evaluated this as being of "Low Risk" to local fauna populations.
9.3	The residual risk for placement of dredge material nearshore should be High instead of Medium (the current rating) as the placement sites A B and C are unstable and ongoing mobility of fine sand material will occur, For each disposal site a maximum percentage of clay and silt content (grainsize less than 0.062mm) should be set when allowing material to be placed on seabed.
	The justification of these risk rankings are provided in sections 8.2.5.1, 8.2.5.2, 8.2.5.3, 8.3.5.1, 8.3.5.2, 8.3.5.3, 8.4.5.1 and 8.4.5.2; and in tables 8.18, 8.37 and 8.48 of the Draft EIS/ERMP. It is Chevron's view that setting a limit for maximum percentage of fines is not practical as testing to confirm compliance cannot be carried out within a reasonable time frame. However, as a general principle, Chevron proposes to dispose of predominantly fine material, such as spoil from the clean-up dredge, at spoil Site D.
9.4	Dredge plume impacts have been rated as a key environmental risk for the Project. However, the dredge plume model has not been calibrated and validated against the field water quality data. Given the number of assumptions contained within the modelling, field data calibration is considered essential to understand the accuracy of the model. As the dredging will last about three years, it is suggested that the management plans include the collection of dredge plume field data as soon as possible after the dredging commences, and that this information be used to calibrate and review the model predictions and management plans.
	Chevron acknowledges that some uncertainty exists in terms of the dredge plume modelling, related to a lack of site specific, dredge induced water quality parameters. Further work on model validation will be undertaken to improve the accuracy of model predictions.

9.5	The Draft Dredge and Spoil Disposal Management Plan (Appendix S1) provides some suggestion on predictive management. However it is recommended that a preventative and impact minimisation 'adaptive management' approach be adopted. It is suggested that this could be undertaken by continually reforecasting the impacts of dredging throughout the works and adapting the dredging program to minimise the impacts. It is considered a reasonable forecast could be undertaken up to one week in advance and calibrated against field measurements taking the approach: • Forecast hydrodynamic conditions (utilising the Bureau of Meteorology's forecast) • Forecast dredging actives, considering different scenarios • Forecast spatial extent of turbidity sedimentation and assess potential environmental impact • Modify/adapt dredge activities to minimise impacts • Undertake field measurements for the purpose of model calibration (for example wind, wave, current, turbidity at cutter head, overflow propeller, plume, sedimentation rates, etc) • Compare model predictions to field observations and calibrate model • Repeat. It is considered that this could be relatively simply undertaken, by utilising the existing plume modelling work. Field measurements also provide the opportunity to review the accuracy of the original model predictions of overall impacts.
	A decision is yet to be made on the final monitoring programme to be adopted for the dredging programme. Draft programmes are currently being developed for discussion with the appropriate departments. Re-forecasting of dredge impacts will be considered for inclusion in the final dredge monitoring programme.
9.6	It is suggested that the proponent be required to contribute to scientific research, to improve our general understanding of key elements such as: the relationships between water quality and coral health including coral spawning; the rates of sediment re-suspension; and the natural background conditions. It is also recommended that all collected data and analysis be made publicly available so that our management and understanding continues to improve with subsequent projects.
	Chevron is committed to implementing coral monitoring programmes throughout dredging activity. These monitoring programmes will be developed in consultation with the Department of Environment and Conservation and the Environmental Protection Authority. The results of these programmes will be made available to the Department of Environment and Conservation and the Environmental Protection Authority.
8.3.5.1	Direct Losses to Subtidal BPPH arising from Nearshore Infrastructure
28.20	Three years of increased turbidity is likely to have impacts on inshore areas but not easily quantified. Seagrass/macroalgal loss in dredged areas is in reality for 25 years – not a short-term impact. Chevron quote Williams (1988?) that seagrass can recover in 8 months. Studies in Qld indicated a recovery time of ~10 years (Poiner et al. 1989; 1993) and the seagrass/macroalgal recovery in Exmouth Gulf took 2-3 years (Loneragan et al. in prep). So their projected recovery time is likely to be unrealistic. References: Loneragan, N. R., Kangas, M., Haywood, M.D.E., Kenyon, R.A., Caputi, N. and Sporer, E (in prep.) The influence of seagrass dynamics and cyclones on the recruitment of tiger prawns (shrimp) Penaeus esculentus in Exmouth Gulf, Western Australia. Poiner IR, Walker DI, Coles RG (1989) Regional studies – Seagrasses of tropical Australia. In: Larkum AWD, McComb AJ, Sheppard SA (eds) The biology of seagrasses: an Australian perspective. Elsevier, Amsterdam. Chapter 10. pp 279-303 Poiner I, Conacher C, Loneragan N, Kenyon R, Somers I (1993) Effects of Cyclones on seagrass communities and penaeid prawn stocks of the Gulf of Carpentaria. CSIRO report, FRDC Projects 87/16 and 91/45 Cleveland Dredging large volumes of sediment (pg 501) is not the same as a physical disturbance such as a cyclone so cannot extrapolate recovery between the two. The impacts may be reversible on some timescale but certainly not in the timescale of the commercial fishers currently operating in the fishery.

	Chevron notes the comments provided by DoF and considers the assessment presented in Chapter 8 of the Draft EIS/ERMP is robust.
29.140	Trunkline Trenching Impacts 1. DSEWPaC notes the information included within Section 8.3.5.1, which is predominantly a description of the activity, rather than a discussion of potential impacts arising from trenching activities. While DSEWPaC accepts the text as suitable for publication of the Draft EIS, further discussion of the impacts of the activity on BPPH must be included within the Supplementary EIS. Draft Construction Environment Management Plan (CEMP) 2. DSEWPaC notes Chevron's commitment in section XXXX to include a draft DSDMP within the Supplementary EIS. This meets DSEWPaC requirements for publication of the Draft EIS. DSEWPaC will review the Draft DSDMP included in the Supplementary EIS.
	With regard to trunkline impacts to BPPH, these are summarised in Section 8.3.5.1 of the Draft EIS/ERMP and more extensively in Appendix N1: Wheatstone Project Benthic Primary Producer Habitat Loss Assessment, which describes potential direct and indirect impacts to BPPH arising from both trenching and dredging. Qualitative and quantitative predictions of BPPH loss are presented. Dredge modelling results are given and potential mitigation discussed. Without mitigation, coral habitat fringing Ashburton Island are predicted to suffer some impact associated with dredging. Proposed mitigation includes restricted overflow zones. With regard to the Draft Construction Environment Management Plan, DSEWPaC comment is noted and no further action has been taken.
8.3.5.2	Potential Indirect Losses of BPPH Arising from Construction Dredging and Placement of Dredge Material at Marine Sites
9.9	The Dredge Spoil Modelling (Appendix Q1) states that the near-field sediment transport cannot be modelled accurately. On this ground, we would have a low confidence level on the boundaries of the 100% mortality zone.
	As discussed in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling), the near-field transport fields are complex, with overflow, vessel and propeller induced currents and turbulence, as well as density-driven currents and re-circulation. The modelling methodology adopted does not attempt to resolve these near-field flow phenomena. Instead, the sediment plume modelling has adopted an approach based on quantifying the potential impacts of sediment from spill sources that leave this near-field area. To account for the complex near-field concentration and sedimentation fields, and related model uncertainties, a minimum zone of 500m on each side of the dredged channel with assumed 100 per cent mortality has been included in the impact zones. It is noted that this is considered conservative, as extensive monitoring for other projects in Western Australia has demonstrated that corals can survive closer than 500m to dredging operations. Beyond the 500m width "default" 100 per cent mortality zone, the models are considered a reliable tool for quantifying potential impacts. Therefore, the adopted approach is considered conservative as it adopts the worst assumption (100 per cent mortality) within the zone where model is considered less reliable.

9.10	There is no proper consideration of the natural background turbidity and sedimentation, neither consideration of the compounding impacts of dredging on top of natural occurrences.
	Assessment of the incremental effects of additional suspended sediments and sedimentation, on top of "natural" or background levels, was one of the major challenges for the Draft EIS/ERMP. The consultant used to predict potential turbidity impacts are highly conscious of these difficulties; however, they have extensive experience in isolating these compounding effects, through years of detailed monitoring of dredging operations across the world, particularly in southeast Asia. A series of tolerance limits for impacts of suspended sediments on corals and seagrass were developed, based on an extensive review of available literature (Draft EIS/ERMP: Appendix N3). Some of the reviewed literature deals with experiments where additional (and quantified) suspended sediment or sedimentation loads are added to the ambient environment of particular receptor species, and the effects of these additional environmental loadings are determined. Other papers document the effect of natural turbidity and sedimentation gradients on receptor species composition, and the survival of different species following environmental loading pulse events (such as cyclones or large rainfall events). Chevron undertook baseline surveys in the Project area to document these baseline conditions, including a review of more than three years of MODIS satellite imagery for the area in order to establish the background concentrations and spatial and temporal variability in turbidity, and sediment trap surveys to establish the background sedimentation rates. The literature values, limits set for previous dredging projects in Western Australia, extensive experience of monitoring dredging operations around the world and the site-specific background conditions were taken into account, and used as a conservative approach in setting tolerance limits for corals and seagrass (in both cases using the most sensitive species recorded in the Project area) to both suspended sediments and sedimentation for the impact assessment. The tolerance limits were expressed in terms of "excess" or additional suspended sediment or sedimentation load, resulting from the dredging, because this is what is normally modelled for an EIS/ERMP. While it is possible to also incorporate some representation of background TSS or sedimentation into the modelling, it is much more complex, and introduces an unnecessary level of uncertainty to the modelling predictions and subsequent interpretation, due to the significant natural spatial and temporal variability of these parameters. While the tolerance limits were expressed as "excess" loads (i.e. without background), they have also taken into account the background turbidity conditions likely to occur in the Project area. The resulting tolerance limits were independently reviewed by Professor Charles Sheppard, an acknowledged expert from Warwick University, and were assessed to be suitably conservative (Draft EIS/ERMP: Appendix N3; Appendix A). Chevron therefore considers that natural background turbidity and sedimentation in the Project area have been adequately considered in the assessment for the Project.
15.1	Our concerns are in relation to the massive dredging program which is proposed to allow access to nearshore facilities by large tankers. We consider that a dredging program of this size and time-span is certain to have significant detrimental impacts on the marine environment around the Mackerel Islands.
	Chevron acknowledges that the proposed dredging program is large and that some of the Mackerel Islands (Tortoise, Ashburton, Direction and Twin) will be influenced by turbid waters on a seasonal basis. However, as indicated in Response 15.3, no damage to the fringing coral reefs around these islands is anticipated as a result of the channel dredging program. Revised predictions for impacts to benthic habitats as a result of the dredging programme, and management measures to reduce these impacts, are presented in the revised Appendix S1: Dredging and Spoil Disposal Management Plan and the revised BPPH loss assessment report (Appendix FN of the document).

15.6	It is recognised that any dredging program is likely to cause some damage, particularly one of the magnitude required for the Wheatstone Project. However, limits to the permissible damage need to be set to prevent loss of or damage to regional ecosystems; and greater consideration needs to be given to community and socio-economic interests. There is a concern that the proposed dredging program and the siting of the dredge spoil grounds will have major deleterious impacts on the coral communities and filter feeders, and hence on the marine biodiversity. Our specific concerns relate to the fact that there will be continuous levels of elevated turbidity over a very wide area both during and after dredging. These will have a direct influence on, for example, the fringing reefs of Direction and Thevenard islands.

Chevron recognises the socioeconomic importance of the reefs fringing Thevenard, Direction and Ashburton Island. Measures to manage potential impacts to these reefs are presented in the revised Appendix S1: Dredging and Spoil Disposal Management Plan and the revised BPPH loss assessment report (Appendix FN of the document).

Additionally, completed modelling also indicates that the reefs of Thevenard Island are not at risk of damage either from the construction dredging activities for the channel. In Appendix FN, Chevron acknowledged that if a CSD is used to cut the pipeline trench for the alternate route, the reefs on the north and south sides of Thevenard Island Reef would now likely occur within the potential Zone of Influence arising from trunkline installation works, and that both Brewis Reef and Ashburton Island Reef may occur within the Zone of Moderate Impact (Partial Mortality). Chevron understands that all of these reefs are important recreational diving assets for the Mackerel Islands Resort and is therefore committed to protecting these reefs from harm by implementing appropriate management actions to mitigate the risk of adverse impact.

Modelling undertaken to determine options available for management of cumulative impacts of synchronous trunkline installation and channel dredging works (Appendix FN, Appendix A) has indicated that a number of management options do exist and that it is possible to ensure that these reefs are protected.

The various options available are identified in Appendix FN and include:

- Reducing sediment release rates by using a construction method which releases only small amounts of sediment (such as a backhoe excavator) when the construction is upstream of either Ashburton Island or Brewis Reef
- If a CSD must be used, then reducing sediment release rates upstream of Ashburton Island and Brewis Reef by either pumping dredged material to a location approximately 1 km further along the trunkline route for later retrieval, or pumping into a barge that is located approximately 1 km from the CSD in a direction away from the reef in question.

Chevron commits to, at this stage, protecting Ashburton Island, Brewis and Thevenard Island reefs from damage, as defined in EAG 3, resulting from sediment released during both the trunkline installation works and the construction dredging works for the navigation channel.

The impacts of the dredging works for the navigation channel will be managed via the Dredge and Spoil Disposal Management Plan (DSDMP). The impacts of the trunkline excavation and burial works will be managed via a separate DSDMP for the trunkline. This separate DSDMP incorporates the same coral monitoring approach and the same management triggers as proposed in the DSDMP to protect coral reefs but may differ in range of management actions implemented in response to a management trigger being exceeded.

The trunkline excavation impacts modelling undertaken to date, and presented in both the Draft EIS/ERMP and Appendix FN, is based on a worst case scenario which assumes that a large CSD releasing sediment at the same rate as for the channel dredging works will be used to cut the pipeline trench. As indicated in the Draft EIS/ERMP, this scenario is a contingency in the event that the preferred method of trunkline installation cannot be implemented. The preferred method of trunkline installation is still being investigated and if implemented will release much less sediment to nearshore waters than the contingency approach. As a result the risk of damage to the reefs adjacent the trunkline route will be reduced.

15.7	Turbidity: It is accepted that the generation of turbidity is unavoidable during dredging operations, with the highest levels of turbidity being generated at the sites where dredging is occurring, and less during the disposal of dredge spoil. The Chevron document (Section 8.2) summarises the risks for both the dredging program and the placement of dredge material. It notes the risk to marine water quality from construction dredging is high. The dredging programme is estimated to take more than three years, and according to the interpretation of the computer modelling that has been undertaken, the plumes 'extend upwards of 50kms from the dredge area' to the east in the summer, and 70kms west during winter, and the fines content is as high as 40% during dredging. This will create an absolutely enormous plume of turbidity (easily observed from space) and one that will be largely continuous during the dredging programme. Clearly the risk to coral communities and filter feeders will also be high, if not critical, and every effort must be made to minimise its level and impact.
	Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. This commitment is demonstrated through the draft Appendix S1: Dredging and Spoil Disposal Management Plan which outlines the proposed environmental strategies for minimisation of impact to sensitive habitat. Furthermore Chevron would like to refer the Mackerel Island Pty Ltd to the extensive assessments and modelling predictions that are found in the Draft EIS/ERMP Appendices N and Q. Further measures to manage these impacts are presented in the revised Appendix S1: Dredging and Spoil Disposal Management Plan and the revised BPPH loss assessment report (Appendix FN of the document).
25.6	Recommendation 6: That the proponent's zones of "Partial Mortality" and "Total Mortality" be changed to the zones of "Moderate Impact" and "High Impact" respectively. These terms should be used to define limits of habitat loss in outcome-based conditions. Recommendation 7: That the proponent redefines and refines calculations for the extent of mortality within the Zone of Moderate Impact (ZoMI) with distance from the source of pressure, so that a more accurate and limited loss calculation can be provided for each habitat type and significant habitat feature within the ZoMI. Recommendation 8: That the extent of mortality within significant benthic features in close proximity to the dredge channel, such as End of Channel Shoal and Saladin Shoal (located within close proximity to the Zone of High Impact (referred to by the proponent as the Zone of Total Mortality)), be specified by the proponent. Discussion: The majority of nearshore habitats in the proposal area support populations of threatened marine fauna, including dugong and marine turtles. To be consistent with other approved dredging programs in the region (such as the Gorgon Project), the proposed zones of "Partial Mortality" and "Total Mortality" should be changed to the zones of "Moderate Impact" and "High Impact" respectively. Definitions for what must be protected within each zone should be provided in any outcome-based condition for benthic habitat protection. According to Table 8.24 Impact Classification Categories (p. 493), the proponent's definition of the zone of 'partial mortality' allows for between a one per cent and 50 per cent mortality of benthic habitats, with 50 per cent mortality close to the channel and one per cent mortality at the extremes of the zone. This could mean that the overall benthic habitat loss predictions could be over-estimated. To enable the assignment of appropriate outcome-based conditions that limit the loss of benthic habitats to as low as is practicably manageable, it is suggested that the proponent re-models predicted impacts and assigns specific levels of loss to each habitat type within each management unit within the zone of partial mortality. This may involve sub-dividing the zone of partial mortality to include zones ranging from 10 to 50 per cent mortality radiating out from the Zone of Total Mortality, and correlating with a pressure gradient.
	With regard to altering the names of the zones to "Moderate Impact" and "High Impact", Chevron will not be revising previously submitted technical appendices or the Draft EIS/ERMP. However, the suggested terminology will be used in all future technical appendices and within this document. With regard to the recalculation of the extent of mortality within the "Zone of Moderate Impact", Chevron agree that there is uncertainty in loss estimates and that those predicted in the Draft EIS/ERMP are likely to be an overestimate, given the conservative nature of the modelling. The option to recalculate loss will be discussed with the appropriate departments. With regard to the recommendation that the extent of mortality be specified in relation to the dredge channel, some uncertainty exists with regard to impacts on shoals close to the dredge area. However, loss estimates provided in the Draft EIS/ERMP are likely to be overestimated given the conservative nature of the modelling. The option to re-calculate loss will be discussed with the appropriate departments.

25.7	Recommendation 9: That an outcome-based condition be applied to the Zone of Influence requiring that net live cover of benthic habitats within the Zone of Influence does not fall below 100 per cent. A related condition should enable compliance with this condition to be demonstrated via a comprehensive benthic habitat and water quality monitoring program, to be developed in consultation with DEC and the OEPA prior to the completion of this assessment. Discussion: The zone of influence is typically an area where the dredge plume may result in water quality exceedences above background levels, but where there are no adverse biological effects resulting in mortality of biota. It is suggested that an appropriate outcome-based condition that protects habitat values within the Zone of Influence be included in any approval of this project, and a monitoring program developed in consultation with DEC and the OEPA to demonstrate that the 100 per cent habitat protection criteria for the zone of influence is met at all times during the marine construction period.
	An outcome-based condition will be applied to the Zone of Influence. A coral monitoring program will be developed to test the prediction that dredging will not have a measurable impact on corals in the Zone of Influence. The monitoring program will be designed to detect ecologically important change in corals and to allow the proponent to infer with confidence if dredging, not a natural agent of disturbance, is the cause of any measured change. The definition of 'ecologically important change' will be developed in consultation with the appropriate departments.
25.8	Recommendation 10: That the following outcome-based condition for the ZoMI (referred to by the proponent as the zone of partial mortality) be applied (based on the proponent's predictions on p. 496): • Zero net mortality of filter feeder communities associated with the dredging and spoil disposal activities • Zero net mortality of any of the regionally significant coral communities around the offshore islands including Serrurier, Direction, Mangrove, Thevenard, and Ashburton Islands. Recommendation 11: That the proponent demonstrates that the above benthic habitat health criteria will be met via a benthic habitat health monitoring program, to be developed in consultation with the OEPA and DEC prior to the completion of this assessment. This plan should include monitoring sites, frequencies, parameters and methods for data collection and analysis. Discussion: The proponent has predicted that there will be no mortality of regionally significant coral habitats around islands and island nature reserves, and no mortality of filter-feeder communities from dredging and spoil related stressors (p. 496, ERMP). As such, it is suggested that appropriate outcome-based conditions be established to ensure that the proposal is managed in a manner where predicted outcomes for habitat protection are achieved.
	Coral reefs in the Zone of Partial Mortality will be monitored and managed to ensure that there will be no greater than 50% loss of coral abundance as a result of dredging. The coral monitoring program will be described in detail in the final S1: Dredging and Spoil Disposal Management Plan. The program cannot be finalised until after the release of the Ministerial Statement. However, details concerning the coral monitoring program will be discussed with the regulators before being presented in S1: Dredging and Spoil Disposal Management Plan. Chevron agrees that coral reefs fringing islands beyond the Zone of Influence (i.e. the area not predicted to be influenced by the dredge plume) should be monitored to ensure that no net loss of corals occur as a result of dredging. The reefs that will be monitored as part of this program are yet to be confirmed. Chevron is not committed to monitoring filter feeders as part of a reactive monitoring program.

25.9	Recommendation 12: That the following outcomes be used as the basis for developing outcome-based conditions for the ZoMI (referred to by the proponent as the zone of partial mortality), based on the proponent's predictions on p. 496: • Impacted areas of seagrass and macroalgae outside of the Zone of High Impact (referred to in the ERMP as the Zone of Total Mortality) are monitored with the objective of demonstrating that habitat condition returns to pre-impact state within five years following the cessation of dredging • In the event that seagrass and macroalgae communities do not return to a pre-impact state within five years following the cessation of dredging, the proponent undertakes active rehabilitation, and where this is not possible, implements contingency offset measures to address long-term losses of seagrass and macroalgae. Discussion: Seagrass and macroalgae communities within the Project assessment area support dugong and marine turtles (Figures 6.38 and 6.40 of the ERMP). In relation to macroalgae and seagrass, the proponent has stated that "species have the ability to recolonise after disturbance. This information, in conjunction with the recruitment processes for the dominant seagrass and macroalgae species, suggests that any potential loss as a result of the Project is likely to be only temporary and will be reversible within five years" (p. 501, ERMP).
	Seagrasses will be monitored prior to the commencement of dredging and once dredging is complete. However, demonstrating dredging-related changes to seagrass will be complex. Seagrass abundance varies seasonally and variability between years may also be significant. Information on this issue is provided in the Draft EIS/ERMP (Chapter 6: Overview of Existing Environment and Chapter 8: Marine Risk Assessment & Management). Macroalgae will be monitored prior to the commencement of dredging and once dredging is complete, but only as part of the coral monitoring program. The coral monitoring program will be described in the final Dredging and Spoil Disposal Management Plan. With regard to the suggestion that rehabilitation of seagrass and macroalgae should be completed, natural recovery is likely to be more effective and rapid than rehabilitation, due to the influence of tropical cyclones on this area of the Pilbara coast. Chevron acknowledges the Environmental Protection Authority's Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the appropriate departments.
25.10	Recommendation 13: That the following objectives be used as the basis for developing outcome-based conditions for protection of benthic habitat (ensuring that conditions stipulate what is to be protected rather than what can be lost, i.e. the total area of habitat minus the total mortality habitat): • In LAU1B the area of coral habitat to remain above 128 hectares • In LAU1C the area of seagrass habitat to remain above 7,581 hectares • In LAU1C macroalgal habitat to remain above 10,695 hectares • In LAU1D seagrass habitat to remain above 3,328 hectares • In LAU1D Macroalgal habitat to remain above 9,755 hectares • In LAU2G seagrass habitat to remain above 1,160 hectares • In LAU2G macroalgal habitat to remain above 1,294 hectares Note: The above recommended limits are based on the proponent's predicted losses using the 'optimised dredge scenario'. Discussion: The optimised dredge scenario would reduce predicted partial mortality of benthic primary producer habitats, which support threatened fauna such as foraging marine turtles and dugong. Using the non-optimised dredging scenario, the EPA's CLG for all habitats affected by marine construction and dredging would be exceeded, except for seagrass in LAU1D and macroalgae in LAU1C (Table 8.29, ERMP). The proponent has also undertaken modelling of benthic habitat loss using an 'optimised dredging scenario', which includes the use of two 'restricted overflow zones' to be in place during specific periods when potential impacts are likely based on monitoring results and forecasts (p. 502, ERMP).
	Chevron has revised the BPPH mapping and management units as a result of further field surveys, trunkline dredge modelling, and as a result of discussion with the Office of the Environmental Protection Authority. The revised BPPH mapping and management units are presented in Appendix FN of the document.

30.12	BPPH Loss Assessment It is noted that the assessment of BPPH loss presented in the ERMP is a compilation of loss after a multiyear dredging campaign. In view of the seasonality of macro algae and seagrass growth and the potential use of this resource by marine life, including potentially dugong and turtles, the proponent should provide more information about the extent and duration of seagrass and algae loss over the entire dredging campaign and the implication for dependent fauna that have a strong association with these habitats during some parts of their life history. Of particular interest are species such as prawns and fish that have importance to ecosystem function (and commercial/social importance), as well as protected species such as dugongs and turtles. The modelling of dredge turbidity indicates a marked difference between the spatial distribution of the plume during summer and winter, and this may allow planning of the dredging campaign so as to minimize impact in selected locations. Although Halophila is ephemeral, and would be expected to re-establish with a post dredging return to ambient conditions, this dredging campaign will run over 3-4 years (Chapter 8 page 424). It is possible, therefore that losses will extend over as many as 5 years, which, in EAG 3 is considered "irreversible".

The assessment of BPPH loss presented in the Draft EIS/ERMP does not indicate the timing and duration of that loss for seagrasses and macroalgae. However, this is presented in the Draft EIS/ERMP (Appendix N1: Benthic Primary Producer Habitat Loss Assessment Report, Figure 5-18, Table 5-11). Figure 5-18 shows the location of the main seagrass receptors in the study area, whilst Table 5-11 shows which dredging scenario results in adverse impact to those receptors. The seagrass and macroalgae receptors most at risk are those identified in Figure 5-18 as receptor sites 25-34 (green). Reference to Table 5-11 shows that the large seagrass area to the east of the channel (represented by sites 29-34) will predominantly be affected by dredging during Scenario 2 and 6 under "representative" climatic conditions in summer. If these dredging works are undertaken during a different season, then the seagrass area to the east of Onslow is unlikely to be adversely affected and the seagrass losses estimated in Table 5-13 are unlikely to be reached.

However if the work is undertaken during summer, it would occur only during the first two years of dredging which is when nearshore dredging is likely to occur. These seagrass beds are unlikely to be affected during the later part of the dredging programme which focuses on the outer parts of the channel. Reference to Table 5-5 shows that Scenario 2 will occur when the cutter suction dredge is operating in the product loading facility berth and turning basin. The dredge plan (Appendix N1, Table 5-2) shows that this activity is likely to last for two to three months at the beginning of the dredging works, and as such any affected seagrasses are expected to recover from this work during the subsequent winter season.

Scenario 6 is predicted to produce larger scale impacts on seagrasses east of Onslow. Table 5-5 shows that this scenario involves two 10,000 m^3 trailer suction hopper dredge's operating simultaneously in sections 3 and 4 of the channel (Figure 5-2). Table 5-2 shows that these works may take 8 months to complete during the second year of dredging. No further adverse impacts to seagrasses east of Onslow are anticipated from the remainder of the dredging program.

The effect of dredging-induced turbidity and seasonal reductions in abundance of seagrasses on Protected marine fauna (namely turtles and dugongs) is addressed in Section 8.3.6 and in greater detail in Section 8.4.5.2 of the Draft EIS/ERMP. A reduced abundance of turtles and dugongs is anticipated seasonally in various parts of the Project area whilst the dredging works are in progress, but no adverse effects on the regional populations are anticipated.

Losses are anticipated to be short term and it is likely that seagrass will recover both seasonally and at the cessation of the dredging program. As such it is predicted that seagrass losses are reversible, for the purposes of BPPH loss assessment.

	The effect of dredging-induced turbidity and seasonal reductions in the abundance of prawns is also addressed in Section 8.4.5.2, and also in greater detail in a supplementary report titled Interactions of Onslow Prawn managed Fishery with Wheatstone Project (URS Nov 2010). Prawns are unlikely to be adversely affected by the increased turbidity in waters of the region because they are known to be able to tolerate high levels of turbidity which are substantially in excess of levels anticipated to result from dredging works. Local prawn populations are considered unlikely to markedly reduce as a result of the dredging program. Some habitat loss will occur as a result of construction of nearshore infrastructure and possibly in dredged material placement areas.
8.3.5.3	Indirect Impacts from Maintenance Dredging
8.15	Issue: Dredging may result in loss of habitat. Impact: Fishers are concerned about benthic disturbance associated with maintenance dredging for vessel access. Phase: Construction & Operation. Risk: Critical.
	The potential impacts on benthic habitats, as a result of maintenance dredging, are discussed in Chapter 8 (Section 8.3.5.3) of the Draft EIS/ERMP. This section indicates that it is possible that maintenance dredging will result in indirect impacts to subtidal BPPH as a result of plume drift and material placement. However, the proposed placement sites do not support significant amounts of BPPH and there is minimal risk to benthic habitats in the nearshore areas of the proposed navigation channel. Site D supports filter feeder habitat, but the small volumes of fine material to be placed at this location are considered unlikely to cause any irreversible loss of BPPH. Additionally, the benthic habitats which occur in the Project area normally experience elevated turbidity on a seasonal basis and are able to recover from this.
25.12	Recommendation 15: That the following outcome-based condition be applied to the maintenance dredging program based on the proponent's predictions: Maintenance dredging activities are to avoid mortality of benthic primary producer habitats (BPPH) outside the approved shipping channel and turning basin. The proponent is to undertake a confirmatory benthic habitat monitoring program in the first five years of maintenance dredging to demonstrate that there will be minimal mortality to benthic habitats immediately outside of the shipping channel dredge area, including Saladin Shoal and End-of-Channel Shoal. Discussion: The nearshore habitats where maintenance dredging will occur support dugong and marine turtles. Although modelling has not been undertaken to address maintenance dredging, which is proposed to occur annually at a rate of approximately 100,000 cubic metres for the 40-50 year life of the Project, p. 438 of the ERMP includes the prediction that there will only be short-term exceedences of background and applicable water quality criteria. The proponent has also predicted that "no adverse impacts to BPPH resources adjacent to the channel are anticipated from this activity" (p. 506, ERMP).
	Maintenance dredging will be managed to ensure predicted loss calculations for BPPH are not exceeded. The effects of maintenance dredging and vessel use of the channel (propeller disturbance of the channel floor, resulting re-suspension) on reefs near the channel are difficult to predict. For this reason, Chevron proposes to monitor the effects of maintenance dredging and vessel movement on coral assemblages on Saladin Shoal and End of Channel Shoal, but not manage these as part of the reactive monitoring/management program. Monitoring of these shoals will continue after dredging for a period up to, but not exceeding, five years.

8.3.5.4	**Direct and Indirect Impacts from Placement of Dredge Material Onshore**
25.13	Recommendation 16: That the proponent undertakes ongoing monitoring and management until defined criteria for minimal loss of mangroves and other BPPH are met. Discussion: On p. 507 the ERMP indicates that the key risks to benthic habitats include indirect impacts on mangroves adjacent to the onshore dredge material placement site, and indirect impacts on BPPH from the discharge of decanted tailings water. The proponent has made the following specific predictions: • Seepage of seawater will occur in areas immediately adjacent to the placement site, however, this is predicted to be localised to the dune and tidal flat and no permanent loss of mangrove habitat is predicted (p. 507) • That there will be no additional indirect loss of BPPH from the discharge of decant water into nearshore waters adjacent to plant site (p. 507). It is therefore suggested the proponent manages the Project to achieve defined criteria for protection (minimal loss) of benthic habitats and mangrove communities attributable to the onshore placement of dredge spoil.
	This issue is discussed in Chapter 12: Environmental Management Program (Section 12.2.2.1) of the Draft EIS/ERMP. This section also contains a series of proposed outcome-based conditions, indicating that mangroves will be monitored to ensure that no adverse Project-related impacts occur.
30.10	Marine Issue – Onshore Dredge Placement The proponent is requested to explain the suitability of the figure of 250mg/l TSS proposed in the Draft EIS/ERMP as the "turbidity limit" applied to seawater returned to the sea (Volume 2 page 471). In section 8.3.5.4 (page 507) a modelling scenario, not presented as part of this assessment, is discussed. It is stated that the modelling shows that disposal of seawater from the settling pond at a turbidity of 250 mg/l would not result in loss of BPPH. If this option is to be considered for Environmental Approval then the modelling and the detailed environmental assessment will need to be provided to the OEPA.
	Onshore placement is not longer a consideration and therefore setting tailwater discharge standards is not required.
8.3.5.5	**Indirect Impacts from Nearshore Construction Activities**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
8.3.5.6	**Indirect Impacts from Trunkline Construction Activities**
25.14	Recommendation 17: That fauna management protocols be applied for trunkline related shoreline crossing activities (consistent with those recommended in Recommendations 56 and 57 of this advice). Discussion: It is noted on page 442 of the ERMP that, whilst micro-tunnelling is the preferred option for the trunkline crossing, there is potential for trenching to be implemented. Should trenching for the shoreline crossing be required, appropriate fauna clearing protocols for the trenching activity will be required. Recommendation 18: That trunkline installation trenching be scheduled to occur outside of the calm transitional periods to minimise the loss of benthic habitats (primarily filter-feeders, coral and seagrass) from the impacts of suspended sediment concentrations (SSC) and sedimentation. Discussion: The proponent has predicted that the CLG filter-feeder habitats within LAU2D will be exceeded during trunkline installation (loss of 10.6 per cent). Given that there is evidence of marine turtle in-water activity that is likely to constitute foraging in LAU2D, and within filter-feeder habitats (Figures 6.35 and 6.40, ERMP), it is important that the proponent applies all practicable measures to minimise impacts on filter-feeder communities as far as possible using mitigation measures such as seasonal timing. It is therefore recommended that trunkline installation occurs outside of the calm transition period.
	Fauna management measures applicable to the installation of the shoreline crossing (including those suggested in Recommendations 56, 57) will be considered and discussed with the appropriate departments. Chevron cannot commit to scheduling the installation of the trunkline to occur only during calm transitional periods. It should be noted, however, that Chevron can confirm that the open cut trenching option has been dropped as an alternative for the shore crossing installation.

25.15	Recommendation 19: That the proponent undertakes coral health monitoring and management during trunkline construction in the immediate vicinity of Ashburton Island and Bessieres Island to ensure that impacts from SSC and sediment deposition do not result in significant mortality of coral. Recommendation 20: That the following outcome-based condition be established to limit the loss of filter-feeder habitat during trunkline installation: "Net filter-feeder habitat cover within two kilometres of the trunkline shall not fall below 50 per cent. Net cover of filter-feeder habitats outside of the two kilometre zone of partial mortality shall not fall below current levels." Recommendation 21: That the proponent includes the area of partial mortality predicted for seagrass in Table 8.31, and undertakes monitoring to confirm that seagrass habitat impacted by trunkline installation recovers within less than five years from the completion of installation. Discussion: Outcome-based conditions would limit the loss and degradation of habitat utilised by species of conservation significance such as dugong and marine turtles. The proponent has estimated that direct loss/smothering of benthic habitat will be limited to a 50 metre wide corridor. SCC zone of partial mortality for coral, filter-feeders and seagrass is expected to extend in the order of one to two kilometres east and west of the trunkline route, potentially impacting on coral reefs around Ashburton Island and seagrass areas to the north of Ashburton Island. The largest zones of partial mortality are predicted during the calm transitional periods. It is estimated that approximately 100 hectares of macroalgae/filter feeder communities will be disturbed and 10 hectares of seagrass will be disturbed as a result of trunkline installation. The proponent has also predicted that, despite coral communities around Ashburton Island falling within the modelled zone of partial mortality, no loss of coral habitat is anticipated as the proponent has committed to implementing a range of (as yet unspecified) mitigation measures that will avoid loss (p. 509). The proponent predicts that there will be no loss of benthic habitats outside of the four kilometre wide zone of partial mortality.
	Coral monitoring sites at Ashburton Island, Bessieres Island and around Thevenard Island and Brewis Reef are included in the monitoring programme proposed for the dredging campaign. Coral assemblages will be monitored during dredging for the trunkline installation. It is not proposed that filter feeders be monitored. It is proposed that corals will be monitored as a proxy for filter feeders. If corals remain unaffected it is predicted that filter feeders will be unaffected. This emphasis on coral is based on the following reasons: 1. Filter feeders are less sensitive to turbidity than corals, as not all filter feeders are autotrophs (requiring sunlight for their energy needs) 2. Filter feeders and their habitat are widespread throughout and beyond the Project area (see Chapter 6 and Chapter 8 of the Draft EIS/ERMP). In comparison, corals are restricted to reefs and shoals which represent only a small proportion of the Onslow marine environment. Further information on this justification, and associated assumptions, can be found in Appendix N3: Tolerance Limits Report. Seagrasses at a range of sites will only be monitored before dredging commences and after dredging ceases. The sampling program has not been finalised. Unlike corals, seagrasses will not be monitored and managed reactively throughout the dredging campaign. The seagrass monitoring program will be developed in consultation with the appropriate departments.
30.18	Impacts to Ashburton Is and Brewis Reef and other shoals and reefs from pipeline laying to corals and turtle nesting. How will these be managed?
	Impacts to corals at Ashburton Island will be managed through the implementation of restricted overflow zones (Draft EIS/ERMP, Section 8.3.5.2). Restricted overflow zones will limit the risk of corals being exposed to the turbidity plume and elevated sedimentation. Monitoring of water quality and corals will be undertaken to help adapt this programme according to the potential risk of the impacts occurring. Trunkline laying will not result in direct impacts to adult turtles. There is a low level of risk to hatchlings being influenced by vessel lighting if trunkline laying occurs near the island during the hatching period.

30.20	Depth of near shore outfall – 5m is shallow, normally 10m is needed to get reasonable dilution. Initial dilution currently predicted to be about 1:28. Will this be met? Would the initial dilution increase if the outfall was in deeper water given the negative buoyancy of the plume?
	Depth requirements are driven by a combination of factors including diffuser design, ambient conditions and effluent characteristics. Near-field modelling of the discharge at 5m depth predicts that dilution requirements will achieve ANZECC (2000) water quality criteria for a Moderate LEP at the edge of the mixing zone. A model validation field study will be undertaken once discharge commences to ensure that the model results are conservative and that required dilutions are achieved in practice.
8.3.5.7	Direct and Indirect Impacts from Trunkline Shore Crossing
22.11	Marine Infrastructure Trunklines: i. Pipeline stabilisation the Draft EIS/ERMP discusses possible trenching/stabilisation options for the trunkline, but lacks commitment to the proposed method or details of the potential environmental impact. More detail is required. ii. No commitment to either the open cut option or the micro-tunnel option for the shore crossing of the trunkline is given (however, Chevron appears to favour the open cut option). iii. The location of the beach crossing for the trunkline has not been determined and no real commitment is made to burying underground (Chevron only mentions its Intention to bury underground).
	Trunkline stabilisation techniques, shore crossing installation method, shore crossing location and the associated potential environmental impacts have been discussed in detail in the Draft EIS/ERMP Chapter 8 (Sections 8.2.5.1, 8.2.5.5, 8.2.7 (Table 8.18 – which provides the environmental risk assessment), 8.3.5.1, 8.3.5.6, 8.3.5.7, 8.3.5.9, 8.3.5.10, 8.4.5.1, 8.4.5.3, 8.4.5.8). Further geotechnical and trunkline alignment work is required before the exact stabilisation method can be selected. Chevron's base case method of installation for the shoreline crossing is microtunneling, as outlined in the Draft EIS/ERMP. The proposed location of the shore crossing is depicted in Chapter 8 Section 8.2.5.5 Figure 8.16.
8.3.5.8	Direct impact from Onshore Construction Activities
25.5	"Recommendation 5: That the proponent mitigates or offsets impacts on benthic habitats in LAU EC00 on the basis that the Cumulative Loss Guideline (CLG) is predicted to be significantly exceeded. Discussion: There is expected to be a 17-24 per cent direct loss of samphire/bio-turbated mud habitat and algal mats as a result of the onshore placement of infrastructure in LAU EC00. This exceeds the CLG of 10 per cent as recommended in EPA Environmental Assessment Guideline 3 (EAG3). There is also the potential for changes to the health of these benthic communities in the vicinity of the proposal as a result of changes to surface hydrology, potentially leading to an increase in this loss figure in the long term. The impact of these predicted losses at an ecosystem level is currently unknown.
	Predicted BPPH loss in EC00 is confined to the Hooley Creek – Four Mike Creek LAU. The exceedence of algal mat loss (24 per cent) within this LAU is primarily due to historical cumulative loss associated with the expansion of the Onslow Salt ponds. Loss of samphire community within this LAU will occur as a result of Project construction. Advice from Prof. Eric Paling indicates "*…it is unlikely that the ecological integrity of the Hooley Creek/Four Mile Creek system will be compromised by the removal of the algal mat from this development*." (Chapter 8, Section 8.3.5.8). Prof. Paling also concluded "*…it can be inferred that the loss of high tidal mud flat does not influence the ecological integrity of adjacent mangrove systems*." (Chapter 8, Section 8.3.5.8). Chevron acknowledges the Environmental Protection Authority's Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the appropriate departments.

30.44	What vegetation loss will occur from changes of flow at west Hooley Creek and at east Hooley Creek from additional flows? What impact to vegetation will the loss of storage areas and loss of west arm have?
	Tidal exchange and flow are the dominant and prevailing processes that maintain the Pilbara mangroves as they regulate many of the physical, chemical and biological functions (Draft EIS/ERMP, Appendix N4). Hence changes to tidal inundation regimes have the potential to result in indirect impacts to mangroves over the long-term. While Project construction works proposed to be undertaken in the upper reaches of Hooley Creek West will result in the direct loss of 4 ha (five per cent) of mangroves (Draft EIS/ERMP, Section 8.3.5.8), the resulting Project infrastructure will not modify tidal exchange to the remaining mangroves in the mid-lower reaches of Hooley Creek West or to the mangroves in Hooley Creek East (i.e. tidal exchange from the ocean, through the creek mouth to remaining mangroves areas will not be modified by Project infrastructure in the upper reaches of Hooley Creek West). Therefore, there is not expected to be any additional loss of mangroves, in addition to the 4 ha already proposed, due to Project-attributable impact. As indicated in Draft EIS/ERMP Section 8.3.5.8 and Appendix N1, an assessment of impacts to coastal processes from the Project indicates that the MOF breakwaters will disrupt the alongshore sediment supply and this may result in changes to morphology of the sand spit located at the mouth of Hooley Creek and hence the creek entrance itself. The historical photography of Hooley Creek shows that the sand spit at the entrance to Hooley Creek is highly dynamic and has been deflated and rebuilt a number of times during the past thirty years. This may potentially influence tidal exchange to the creek systems. However, intertidal habitat surveys of the area did not find any evidence of historical mangrove mortality in Hooley Creek that may be attributed to such changes in tidal inundation patterns resulting from the natural modification to the alignment of the sand spit or creek entrance. Chevron will implement Appendix T1: Coastal Processes Management Plan to ensure that shoreline morphology (e.g. beaches, cheniers and creek mouths) is maintained to provide for adequate tidal inundation to mangrove areas. Given consideration of this commitment, and the above historical evidence, it is not expected that indirect loss to mangroves will occur from changes to coastal shoreline morphology and tidal inundation patterns. Surface water modelling suggests that during episodic flood events there is likely to be additional freshwater flows through the upper reaches of Hooley Creek East due to surface water flows being diverted into that area by Project infrastructure constructed on tidal flats at the upper reaches of Hooley Creek West. The existing vegetation communities fringing the tidal creek systems are already dynamic and have responded to historic headward expansion of the tidal creek network. The additional flows may potentially increase the rate of headward (or landward) extension of the Hooley Creek East tidal creek system thereby providing additional habitat suitable for mangrove colonisation.

8.3.5.9 Indirect impacts to the Ashburton River Delta Mangrove System from Onshore Operations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.10 Offshore Construction Activities

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.11 Discharges from Onshore Construction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.12 Discharges from Onshore Operations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.13 Discharges from Offshore Construction and Operations

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.14	Hydrocarbon Leaks and Spills
29.128	Compression Platform Section 8.3.5.14 - meets DSEWPaC requirements for the Draft EIS/ERMP.
29.129	Vessel Grounding Section 8.3.5.14 - meets DSEWPaC requirements for the Draft EIS/ERMP.
	DSEWPaC comments noted and no further action taken.
30.30	As the spill of fuel and oils in the near shore environment may be catastrophic to Ashburton mangroves, a plan for spill management for near shore spills is needed for the assessment.
	Chevron has a developed a detailed Marine Oil Pollution Plan for its Pilbara operations. This will be updated to include the Project. In addition, Oil Spill Contingency Plans will be developed for key marine operations. These documents will contain details relating to oil spill mitigation and management measures. In addition to this, Chevron has developed an Oil Spill Sensitivity Map for the Project which can be used to support oil spill responses planning. The Oil Spill Sensitivity Map has been included in Appendix FI of the document. The Oil Spill Sensitivity Map was based on extensive ground-truthing surveys and baseline studies of intertidal habitats (e.g. mangroves and reefs) in the Project area.

8.3.5.15 Offshore Hydrocarbon Leaks and Spills

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.16 Nearshore Hydrocarbon Leaks and Spills

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.17 Onshore Hydrocarbon Leaks and Spills

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.5.18 Ship Movements

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.3.8	**Predicted Environmental Outcome**
25.16	Recommendation 22: That the proponent undertakes a monitoring program to demonstrate that the predicted areas of coastal benthic habitat loss are not exceeded. Recommendation 23: That the proponent develops and implements a mangrove, algal mat and samphire management plan in consultation with DEC, which addresses the direct and indirect impacts from onshore construction and operation. Recommendation 24: That the proponent offsets impacts on the Hooley Creek – Four Mile Creek in the event that monitoring indicates significant impacts. Recommendation 25: That the proponent commits to further surveys to clarify the presence and significance of the local population and habitat of Pristis zijsron (green sawfish). Discussion: Although the proponent has committed to undertaking mitigation and management measures (Table 8.37, pp 542-553), impacts on these BPPH types and the exceedance of the CLG for mangroves, algal mats and samphires are considered unavoidable within the Hooley Creek and Four Mile Creek LAU. Hooley and Four Mile Creek ecosystems are likely to play an important role in nearshore ecosystem processes, primarily acting as fish nurseries and foraging areas for marine turtles and waders. The extent and nature of potential flow-on impacts of significant coastal benthic habitat loss are unknown, largely due to the uncertainty with regard to the role algal mats and samphires play in the local ecosystem, which would require substantial studies focusing on isotope labelling. It is likely these creek systems support significant populations of juvenile/sub-adult and foraging marine turtles and other threatened fauna including Pristis zijsron (green sawfish), which has been identified as occurring in the Ashburton Delta and Hooley Creek (Appendix O5, p. 576), and therefore impacts on this type of ecosystem should be considered from a marine fauna conservation perspective.
	With regard to loss of coastal benthic habitat, this issue is discussed in Chapter 12: Environmental Management Program (Section 12.2.2.1) of the Draft EIS/ERMP. This section contains a series of proposed outcome-based conditions, indicating that mangrove and estuarine habitats will be monitored to assist with managing Project-related impacts. With regard to loss of mangrove, algal mat and samphire habitat, this issue is discussed in Chapter 12: Environmental Management Program (Section 12.2.2.1) of the Draft EIS/ERMP. This section contains a series of proposed outcome-based conditions, indicating that mangrove and estuarine habitats will be monitored to assist with managing Project-related impacts. Chevron acknowledges the Environmental Protection Authority's Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the appropriate departments. With regard to sawfish, a survey will be conducted within the Project area and the results will be made available before the commencement of dredging.
8.4	**Marine Fauna**
20.18	Dugong population displacement What evidence is there that the Project will not cause local Dugong displacement from all the impacts? In view of the likely migratory nature of the Dugong this needs to be looked at in terms of the region as a whole and take into account the cumulative impact of the numerous existing and planned projects for several hundred kilometres in either direction of the Project.
	Based on the combined datasets obtained from the 12 month megafauna aerial survey and the dugong aerial survey, Chevron are of the opinion that sufficient information has been obtained to support the assumptions underlying the risk assessment presented in the Draft EIS/ERMP. The risk assessment can be found in the Draft EIS/ERMP, Chapter 8 (Sections 8.4.5.4, 8.4.5.5, 8.4.7 (Table 8.4.8). Regional scale migration has not been included in the environmental impact assessment as the Project area supports only low numbers of dugongs and does not contain regionally important dugong habitat. Regional scale migration is likely to occur but only at a low level. The development of management measures will not be improved through obtaining data on regional scale dugong migration.

Importance of the Project Area for Dugongs

A dugong-specific aerial survey has been undertaken (Appendix FE of the document) using a standardised aerial survey method, following Marsh and Sinclair (1989), as refined by Pollock *et al*. (2006). The survey confirmed the risk assessment presented in the Draft EIS/ERMP, in that only low numbers of dugongs were recorded. A statistically significant difference was recorded between the dugong populations of the Project area in comparison to Exmouth Gulf (Appendix FE (Table 5, Table 6) of the document). The Project area dugong population estimate was less than one-sixth of the Exmouth Gulf population, and the dugong density estimate was approximately one-fifth of the Exmouth Gulf estimate. The Project area, in comparison to surveys of other locations on the Western Australian coastline, recorded the lowest dugong density (Appendix FE of the document).

Low-level Regional Scale Migration

Dugong movements are generally localised (Sheppard *et al*., 2006; Marsh and Rathbun, 1990, Preen, 1992, De Longh *et al.,* 1998 *cited in* Marsh *et al*., 1999). Sheppard *et al*. (2006) found that migration varies between dugong populations and individuals, with some dugongs migrating over long distances and others remaining resident. In a satellite tracking survey of 70 dugongs, only 23 per cent of the animals moved further than 100 km and migration was not related to gender, age or size (Sheppard *et al*. 2006). Breeding patterns follow an 'isolation by distance' model, meaning that breeding occurs locally rather than on a regional level (Tikel, 1998 *cited in* Marsh *et al*., 1999).

Infrequent Mass Migration

Both local and regional dugong movement can occur in response to changes in water temperature or seagrass availability (Marsh *et al*., 2002; Holley, 2006; Gales *et al*., 2004; Prince, 2001). Dugongs have been recorded moving from cool coastal waters (>18 °C) into warmer, deeper waters during winter months (Marsh *et al*., 2002; Holley, 2006).

Unlike the inner waters of Shark Bay, waters of the south-west Pilbara coast are exposed to mixing and do not experience a dramatic reduction in water temperature, remaining at about 21 °C during winter (Appendix FE (Figure 9) of the document). Therefore, dugongs are not encouraged to migrate into deeper waters during winter in the Project area.

Gales *et al*. (2004) suggested that dugongs migrated to Shark Bay from Exmouth Gulf following the removal of seagrass foraging habitat by Tropical Cyclone Vance in 1999. It is possible that dugongs from the southern Pilbara coastline also moved to Shark Bay, where there are expansive seagrass meadows of both tropical and temperate species, providing an abundant year round supply of dugong foraging habitat (Holley, 2006).

20.20	"…. in depths (<6m) characterised by the proposed piling location, and Dugongs and turtles occur only in very low densities at these depths." Please refer to comments made regarding 6.3.9.5 Estimated Dugong distribution and the following comment.

Observation of dugong made in the Project area were derived from two sources:

- A 12 month aerial survey design to count whales, but also to count other megafauna including whale sharks, dolphins, turtles, dolphins and dugongs (May 2009 to May 2010, Appendix FD of the document).
- A dugong-specific aerial survey (August 2010; Appendix FE of the document).

Both surveys indicate that dugongs are largely confined to water depths of less than 10 m, most likely due to a reduction of seagrasses with water depth increasing to great than 10 m. However, dugongs were uncommon in water depths less than six metres in area adjacent to the Project area (Draft EIS/ERMP, Section 8.4, Figure 8.64; Appendix FE of the document). The same result was recorded for turtle species. The aerial surveys, in addition to the vessel-based turtle foraging survey (Draft EIS/ERMP, Appendix O11), indicate that both dugongs and turtles are more common at offshore reefs.

20.22	Impacts on Exmouth Gulf There doesn't appear to have been any risk management done on the impacts to Exmouth Gulf. In particular the impacts to Humpback Whales, Marine turtles, and Dugongs which may result from vessels using/ crossing Exmouth Gulf. Risk management needs to include opportunity for public comment and cover: • Supplies sourced from the North West Cape (e.g. Limestone) • Supply loading facilities used for the Wheatstone Project (e.g. Exmouth Navy Pier, Exmouth Marina, Mowbowra Creek causeway or Jetty) • Personnel to be based in Exmouth (as per Premier Barnett's comments in the Northern Guardian 14.07.10 citing 100-200 families related to oil and gas) or any planned workers construction camp on the North West Cape.
	The risk assessment completed for the Project has not included Exmouth Gulf as Project-attributable activities are not anticipated to impact on marine fauna in this area. The current Project description does not involve: supplies being sourced from North West Cape, supplies being loaded at Exmouth, or personnel being based in Exmouth. The majority of Project vessels are not likely to use Exmouth Gulf waters. A limited number of small vessels may use Exmouth Port and will therefore travel through Exmouth Gulf waters. These vessels will most likely be used for environmental survey work and hydrographic survey work. It is also possible that vessels may use Exmouth Gulf waters for safety reasons during cyclonic activity.
20.26	Assumed use of the Project footprint by the Whale Shark appears to be based on incidental sightings within the cetacean-focused aerial surveys. While little is known about the habits and habitats of the whale shark they are not mammals and do not necessarily spend time at the surface - making aerial surveys of limited value. Being filter feeders whale sharks could be particularly susceptible to contamination or sediment in the water column. It would reasonable to request that the presence and effect on whale sharks is more fully researched in the literature and through liaison with Whale shark experts such as Brad Norman (Ecocean) and/or Mark Meekan (AIMS).
	Sufficient pre-existing knowledge of whale shark movement in the Project area is available to support the risk assessment for this species, classified as being 'Low'. Aerial surveys, completed over 12 months from May 2009 to April 2010, recorded only four whale shark observations, within and adjacent to the Project area (Appendix FD of the document). A majority of survey time was spent surveying transects over shallow (>15 m), clear water, thus improving the opportunity to spot whale sharks just below the surface. The data obtained from the aerial surveys is supported by previous whale shark satellite tracking studies by Wilson *et al*. (2006). This tagging survey indicated that, of those individuals tagged, most whale sharks travelled north-east along the Continental Shelf before moving into the deeper waters of the north-eastern Indian Ocean, and away from mainland coast of Australia. As the risk assessment process determined the risk to whale sharks to be 'Low'', no further research will be completed. Refer to Figure 3.5.

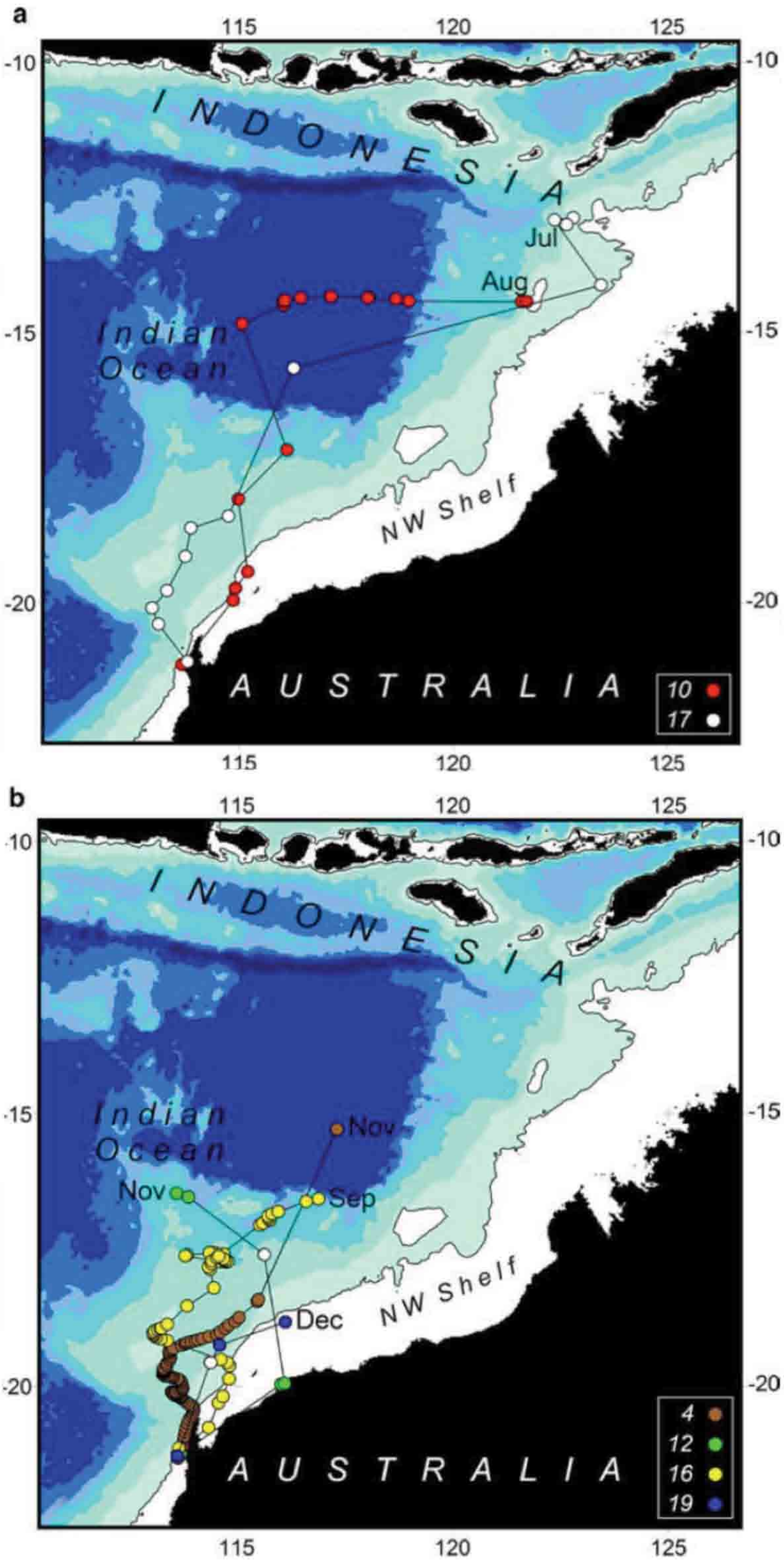


Figure 3.5: Movement of Tagged Whale Sharks

Wilson et al. 2006

20.29	Marine Fauna Observers Please expand on marine fauna observers. Are impartial external trained personnel going to be used? Will they carry recognised authority in direction of activities should it be required (in response to sightings)? Will night-time activities be directed and changed accordingly in response to day-time observations? For example when responses/changes in activity are required during the day are activities ceased based on the assumption night-time conditions are similar? Are the fauna observers trained in all of the following: marine turtles, whale sharks, dugongs, crocodiles and cetaceans? Will passive acoustic monitoring (PAM) be implemented for detection of marine mammals - being particularly relevant to aid night-time detection? Is there a commitment to use Marine Fauna Observers for pile-driving, dredging and all seismic activities?
	Selected crew members on board selected vessels will undertake marine megafauna identification training and inductions. Training, and roles and responsibilities, will vary dependant on the Project activity they will be involved with (i.e. vessel movement, dredging, pile-driving). It should be noted that seismic-based activities are not part of the Project assessment. Please refer to the final Marine Fauna Management Plan and the final Dredging and Spoil Disposal Management Plan for details on marine fauna observers. A key component of the approach to managing impacts to marine fauna will be adaptive management. This will provide the opportunity to review and amend the management measures being used in the event that these management measures prove to be ineffective, therefore night activities will be managed according to day time observations. A passive acoustic monitoring system will not be deployed to detect marine mammals as it is not likely that this system will reliably detect turtles or Dugongs. The detection of Humpback whale mothers and calves is also limited as it is only Humpback males "sing". Smaller dolphins, such as the Indo-Pacific Humpback, Bottlenose, Spotted and Spinner dolphins, can only be recorded at close distances as they vocalise at a higher frequency, therefore the equipment would need to be continually moved and would not pick up vocalisation outside of a certain area.
20.30	Migration times The proposal does not appear to address planning activities with migration patterns of different species to minimise impact. Nor does there appear to be any consideration of planned timing with cumulative impacts from surrounding activities being conducted at key times.
	The risk assessment process did not identify any Project activities that resulted in a High risk to migratory marine fauna, following implementation of mitigation measures (Draft EIS/ERMP, Chapter 8, Section 8.4.7 (Table 8.48)). This includes humpback whales, of which approximately five per cent of those migrating past the Project area come within 10.5 km of the coast (Appendix O4). As a result, the Project does not propose to schedule activities around migratory patterns. The construction schedules of other projects have not been considered during the scheduling of construction activities for the proposed Project. This is mainly due to the limited information available at the time of publication of the Draft EIS/ERMP. The proposed Macedon Project is currently undergoing design and the Scarborough Project assessment has been withdrawn.

8.4.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.4.2	Description of Factor
15.5	The Chevron document addresses the high fish diversity in the region, and turtle nesting areas on the islands, all of which are important ecologically. No mention is made of the Northern Wobbegong, nor of sea snake species such as the Aipysurus tenuis.

Chevron acknowledges the Mackerel Islands Pty Ltd's concerns associated with the potential impacts to marine fauna, not discussed in the Draft EIS/ERMP, namely the Brown-lined Sea Snake *Aipysurus tenuis* and the Northern Wobbegong *Orectolobus wardi*.

This issue is discussed in Chapter 8 (Section 8.4.2, 8.4.3, 8.4.5) of the Draft EIS/ERMP, which outlines how certain species were selected to be assessed via the risk-based assessment approach.

With regard to sea snakes (particularly the Brown-lined Sea Snake *Aipysurus tenuis*), while they are listed under the *Environment Protection and Biodiversity Conservation Act* (1999) they were not identified during the risk assessment processes as being a species or group that would be put at significant risk of impact due to Project construction and operation.

The brown-lined Seasnake (Aipysurus tenuis) is endemic to Western Australia, ranging from the southern Pilbara to the southern Kimberley (Source: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?showprofile=Y&taxon_id=1121).

Very little is known of the ecology of this species. Onslow is at the southern extremity of its known distribution. It is assumed that the Project will not have a significant impact on this species because only a small amount of habitat in its known distribution (the Pilbara marine environment) will be affected by the Project.

Additionally, most species of sea snake are generally widespread in the region and no critical habitats are known.

With regard to the Northern Wobbegong (*Orectolobus wardi*), the species is not listed under the *Environment Protection and Biodiversity Conservation Act* (1999) and was therefore not considered during the risk assessment of Project impacts.

28.16	Table 8.39 (p 557-8) lists the potential for impact of proposed project activities on demersal scalefish resources as overfishing, declines in abundance of target species and altered predator -prey relationships (an ecosystem impact/risk). Does this mean that increased fishing activities are likely to result from the Project, presumably by the increased population to support construction and operations (see table 8.41, page 563). If so, how will the proponent address this risk, given the current risk level to these resources?

It is likely that recreational fishing activities will increase as a result of the increase in workforce, associated with Project construction and operation. However, Chevron would like to confirm information included in Chapter 10 (Section 10.4.5.1) which explains:

"*The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:*

- Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road.
- Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct.
- A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken.
- Chevron will work with DoF to reduce potential risks to the existing recreational fishery.
- Chevron will work with the Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow.
- For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)."

	It should be noted that management of population growth and its impact on fish stocks is beyond Chevron's control and therefore is not within Chevron's scope of responsibility. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved. EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.
29.132	Marine Flora & Fauna Studies DSEWPaC is satisfied with the text put forward for the Draft EIS/ERMP. DSEWPaC supports the continuing collection of baseline information, however conclusions need to be formed within the Supplementary EIS regarding the likely impacts on species. DSEWPaC will review the conclusions put forward in the Supplementary EIS regarding likely impacts (which should include consideration of alternative habitat in the region) and expects to see commensurate management/mitigation measures presented in the Supplementary EIS.
	Chevron has completed additional marine fauna studies since publication of the Draft EIS/ERMP. The survey reports, listed below, are contained within Appendix FD, Appendix FG, Appendix FE and Appendix FA of the document. • A Description of Megafauna Distribution and Abundance in the SW Pilbara Using Aerial and Acoustic Surveys (2010). • Satellite Telemetry of Nesting Flatback Turtles from Ashburton Island (2010). • Dugong Aerial Survey Report (2010). • Underwater Environmental Noise Assessment: Wheatstone Piling (2010). The Dugong and humpback whale surveys confirm that these species are widespread in the Project area, but that densities of both species are low in nearshore waters where most Project construction and operations will occur. However, densities of both species are considerably greater in Exmouth Gulf, which is a large environment supporting similar habitat to the southwest of the Project area. Humpback whales are more abundant in Exmouth Gulf during the southern migration as the sheltered area provides a more suitable resting area than the more open marine environment of the Project area. It is hypothesised that Dugongs are more abundant in Exmouth Gulf given the greater availability of seagrass, the primary food source. Impact predictions relating to dugongs in the Draft EIS/ERMP are based on the: a) one-off survey that focused on a spatial comparison of dugong densities between the Project area and Exmouth Gulf (Appendix FE) b) 12 month megafauna survey that assessed relatively abundance of this species through time and spatially (Appendix FD).

To mitigate the risk of impact to Dugongs during the construction and operational phase Chevron has committed to the following:

- Implementation of designated vessel corridors that avoid highest densities of known Dugong use.
- Operators of specified vessels will have on duty selected, trained crew members to undertake observations for marine fauna.
- Should a vessel strike any Dugong, or should a vessel crew member sight any injured or deceased Dugong, the observing person will report the sighting to the vessel master immediately, or as soon as it is safe to do so.
- The vessel master will maintain a log documenting incidents of management procedures invoked, in-water incidents and observed injured/dead Dugongs.
- Any detected injury or mortality attributed to the Project of any Dugong listed as specially protected under the provisions of Section 14 (2)(ba) of the Wildlife Conservation Act 1950 (WA) or the EPBC Act (Cth) shall be reported by Chevron to the DEC, within 48 hours of observation.
- Use of selected, trained, crew members to undertake marine fauna observations to confirm that no Dugongs are within the vicinity of designated fauna exclusion zones for blasting and piling operations.

The following noise management measures will applied to piling activities:

- If a Dugong enters the observation zone (1500 m of an active pile hammer) the piling supervisor (or other individual) will be directed to monitor the movement of it in relation to the activity suspension zone.
- Pile driving activities shall cease if a Dugong is observed within the activity suspension zone (500 m of an active pile hammer).
- Piling operations will commence with a slow start/partial strike.
- The following noise management measures will applied to blasting activities, in the improbable event they will be required:
- Appropriate observation and suspension zones will be defined.
- Blasting operations will commence with a succession of small charges.

A recreational code of conduct, supported with specific training and inductions, will be implemented to manage impacts from recreational boating. This will entail:

- Inform Project staff/contractors of DEC rules relating to the Wildlife Conservation Act e.g. distance to keep from animals
- Recreational boats and recreational vehicles will not be permitted within the boundaries of the Project area or to travel on the access road from Onslow Road.
- Behaviour standards to be expected from all construction workers will be clearly articulated in a Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct.
- A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and, where necessary, action taken.

In regards to whale sharks, four individuals were observed in the Project area during the 12 month megafauna aerial survey program. This program involved repeated surveys every fortnight (see Appendix FD). In addition to supporting very low densities of whale sharks, there are no known whale shark aggregation areas in the Project area. Given the lack of aggregations sites and the very low densities of this species, the risk to this species from Project related activities is predicted to be low. This is consistent with the original risk rankings presented in the Draft EIS/ERMP. Although whale shark-specific management is not proposed, the following mitigation will reduce the risk to whale sharks that might enter the Project area:

- Fauna observers on construction vessels and during piling
- Implement vessel transit corridors during the dredging phase
- Report vessel strikes to Megafauna.

The turtle telemetry study indicated that adult female flatback turtles move throughout the Project area and into adjacent areas prior to, during and following nesting seasons. Overall, the tagged turtles spent little time in the Project area. The study also demonstrated that flatback turtles will nest on different islands during the same nesting period.

Chevron has also committed to undertake the following additional fauna and flora surveys, to be completed before mid 2011:

- Survey of sawfish in the Onslow area (proposed summer 2010/2011).

  The sawfish survey will be undertaken in summer 2011. Dr. David Morgan (Murdoch University) who will lead the sawfish survey has indicated that summer is a suitable period for the survey because pups and adults are likely to be present during this period. One reason why sawfish have not been observed at the Project site during December, January and February is that Chevron closes the site during the cyclone period and or following flooding.

  Although the sawfish survey has not been completed, Chevron has prepared a management framework to limit Project related impacts to sawfish. The framework is presented in the Marine Fauna Management Plan. The primary management action to protect sawfish in the Project is to ensure no permanent impacts to potential critical habitat, such as Hooley Creek and the Ashburton Delta.

- Seasonal baseline of seagrass in the Onslow area (proposed 2011).

  Predicted impacts to seagrasses were presented in Section 8.3.5.2 of the Draft EIS/ERMP. It was predicted that 2963 ha of seagrass meadows could potentially exhibit signs of partial mortality (i.e. reduction in cover) associated with the capital dredging program (Table 8.29 of the Draft EIS/ERMP). Construction of the trunkline was predicted to result in no permanent loss of seagrass if the pipe trench was backfilled with sand as opposed to rock armouring of the trunkline. If rock armouring is used, 10 ha of seagrass will be irreversibly lost. Chevron is committed to undertake a pre-dredging versus post-dredging seagrass survey to test the accuracy of these impact predictions. The baseline study will consist of a summer and winter survey prior to dredging.

8.4.3	**Assessment Framework**
8.11	Invasive Marine Pests - there is no suggested 'last port of call' management framework (e.g. all barges, rigs, dredges to be inspected at last overseas port before entering Australia).

The issue of introduction of marine pest species is discussed in Chapter 8 (Section 8.3.5.18, 8.4.5.1, 8.4.5.4, 8.4.5.6, 8.3.5.18, 8.4.5.1, 8.4.5.6) of the Draft EIS/ERMP.

Chevron intends to implement a "last port of call" strategy which will incorporate steps as follows:

- Desktop Risk Assessment – all vessels bound for the ANSIA will be risk-assessed prior to departure
- Pre-mobilisation inspection of "Medium" and "High" risk vessels – those vessels that are assessed as being of "Medium" or "High" risk will be subject to an inspection
- Cleaning of vessels as required by inspection – if the inspection identifies known marine pest then the vessel will undergo cleaning before departure from the overseas port to the ANSIA.

8.18	Issue: Possible introduction of marine pests; Possible introduction of oyster disease. Impact: Introduction of black striped mussel, Asian green lipped mussel and similar pests that could make it difficult or impossible to maintain oyster health and cleanliness. Phase: Construction & Operation. Risk: Critical.

The issue of introduction of marine pest species is discussed in Chapter 8 (Section 8.3.5.18, 8.4.5.1, 8.4.5.4, 8.4.5.6, 8.3.5.18, 8.4.5.1, 8.4.5.6) of the Draft EIS/ERMP. The risk assessment indicates that there is only a "Low" risk of marine pests being introduced because:

- The north coast of WA is part of the tropical Indo-West Pacific marine biogeographic region, and most of the species that could live in north-western Australia already occur there naturally (excluding the black-striped mussel)
- Mega-diverse tropical regions appear to have a natural resistance to introduced marine species becoming pests
- Shipping movements in the Pilbara have been substantial for the last 40 years, but no marine pests have been recorded as introduced to Pilbara ports
- All vessels under the control of the Proponent will comply with the International Convention on the Control of Harmful Anti-fouling Systems on Ships, as monitored by AQIS
- All vessels under the control of the Proponent will comply with AQIS ballast water discharge requirements (Australian Ballast Water Management Requirements V4 2008).

The introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. In the event of an identified 'medium' or 'high' level risk for a vessel a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. Contingency mitigation measures will be applied in the event that introduced marine pests are identified within the Project area.

8.4.3.1 Relevant Legislation/Guidance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.4.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.4.5 Impact Assessment and Management

8.3	Recommends that the 'regional area of interest' for EIS/ERMP may need to encapsulate the extremely important 80 Mile Beach *P.maxima* pearl oyster wildstock in the assessment boundaries. This is the last sustainable commercial wildstock pearl oyster fishery in the world and of significant importance to the WA *P.maxima* pearling industry supplying over 75% of the pearl oysters for production purposes annually contrary to comments in the document in relation to hatchery bred pearl oysters. Any impacts on this pearl oyster resource would have major implications for the industry in WA. The oceanography implications of the LNG precinct resulting from seasonal monsoonal conditions and the long-term El Nino Southern Oscillation (ENSO) may have implications for productivity in the 80 Mile Beach region especially in relation to carrying invasive marine pests.

Potential direct and indirect impacts to fisheries from invasive marine pests on the Project area are discussed in Chapter 8 (Section 8.4.5.1, 8.4.5.4, 8.4.5.6) of the Draft EIS/ERMP. In consideration of this, it is unlikely that introduction of pests in the Onslow area would result in the introduction of pests in the 80 Mile Beach area.

Fisheries key to the Onslow area are outlined in Chapter 10 (Section 10.4) of the Draft EIS/ERMP. The 80 Mile Beach area has not been considered as an area likely to experience impacts, either to water and sediment quality, BPPH or marine fauna as a result of Project construction and operation, and has consequently not been considered in this assessment.

8.20	Issue: Creation of new undersea structures. Impact: Possible change to local habitats; Possible shift in species mix near pipelines. Phase: Construction & Operation.
	The issue of change in local habitat and alteration of species composition around proposed near/offshore infrastructure is discussed in Chapter 8 (Section 8.3.5.1, 8.3.5.10, 8.4.5.1) of the Draft EIS/ERMP, which indicates the following: • Only the presence of the Materials Offloading Facility breakwaters, turning basin and navigation channel are predicted to result in permanent loss of local subtidal habitat. • It is possible that the presence of nearshore infrastructure will result in the disturbance of normal movements or migrations of marine fauna; however, as a majority of marine fauna will be able to navigate around the infrastructure it is unlikely that long-term consequences will result. Any placement of infrastructure in the marine environment will inevitably impact individual fishes and benthic communities, and associated habitats. This will happen with the construction of the MOF, trunkline and PLF. It is possible that the presence of nearshore infrastructure will result in the aggregation of some fish species, potentially leading to adverse impacts on marine fauna community structure and abundance. However, it is predicted that impacts will not have long-term effects at a population level for any species or impact habitat that is critical to the survival of any species. There are no known endemic marine species in the Project area, or in the southern nearshore Pilbara bioregion.

25.18	Marine turtles - Dredging and spoil disposal impacts
	Recommendation 27: That the following additional dredge management measures are incorporated into the approved dredging management program (as alternatives to the mitigation measures outlined in Table 8.48, p. 617) and apply to both construction dredging and maintenance dredging:
	• Pumps to be cut within one metre or less of the seabed (not four metres) to avoid marine turtle entrapment.
	• Overflow screens to be fitted to all trailer suction hopper dredges (TSHD) and monitored to detect turtle mortality or entrapment incidents.
	• The following additional measures be included in Table 8.48 and the DSDMP:
	  • Bed levellers to avoid the use of trailer suction hopper dredges during cleanup/sweeping activities
	  • Water injection on the trailing pipe of the draghead to disturb turtles ahead of the draghead suction
	  • Draghead chains or other turtle excluding technology to disturb turtles from the seabed ahead of the suction from the trailer hopper suction dredge
	  • Pumps cut whenever the draghead is not on the seabed to reduce the risk of entrapment when trailer hopper suction dredges are in use
	  • Vessel speeds restricted to as low as practicable for safe navigation (ideally less than eight kilometres per hour) to minimise the risk of marine turtle collision
	  • Development of dredge vessel and support vessel navigational pathways to avoid marine turtle habitats and aggregations
	  • Use of designated pathways by vessels at all times when travelling between dredge disposal areas and dredge sites (this is a period when marine turtles are at most risk of collision as dredges can transit at speeds up to 18 knots)
	  • Screens on dredge overflow to detect whether mitigation measures are effective in preventing entrapment.
	Recommendation 28: That a full season of in-water marine turtle surveys is undertaken to determine whether there are important seasons of in-water occurrence within the study area (particularly the construction area supporting vessel activity).

Discussion: Based on the level of uncertainty with regard to marine turtle entrapment for both construction dredging and annual maintenance dredging, best practice mitigation and monitoring measures on dredge vessels should be followed. The Marine Turtles Technical report (Appendix O11) indicates that there are higher densities of foraging turtles offshore in waters supporting reef systems. This report also indicates there is little in-water activity within the nearshore waters of the study area where dredging is proposed. However, it is important that the following limitations are considered when assessing the potential risk to marine turtles from in-water construction, dredging and vessel activities:

- Appendix O11 indicates that flatback turtles satellite tagged and tracked from Ashburton Island travelled into the Project footprint at least once during inter-nesting. This indicates that the marine turtles nesting on nearby islands use the waters within the dredging footprint during inter-nesting.
- The marine turtle surveys focusing on foraging documented in Appendix O11 were undertaken during a single 14 day survey period between 14 July and 7 August 2009. To understand the significance and seasonal occurrence of marine turtles, it is suggested in-water activity be surveyed over at least a complete year to determine whether densities vary between species and at certain times of the year.
- Smaller juvenile turtles are difficult to record from boat-based surveys due to size and water clarity in nearshore waters.
- It is unclear as to whether the mangal creek systems within the study area have been surveyed for juvenile marine turtles or foraging activity. Mangrove creek systems in the Gulf of Exmouth as well as Cape Preston are known to support juvenile marine turtles, and it is likely that the mangrove creek systems in the study area will also support marine turtles.
- The proponent is yet to undertake and complete time depth recorder surveys to determine the location, timing and water depth at which marine turtles are spending the majority of their time, therefore the risk of entrapment cannot be adequately predicted.

Chevron acknowledges the recommendations from the Department of Environment and Conservation (Environmental – Marine Branch). In addition to the management and mitigation measures proposed in the DSDMP, Chevron also commits to the following:

- Pumps to be cut within 0.5 m of the seabed when there is no risk to humans and equipment
- Overflow screens to be fitted on the TSHD, which will be monitored to detect turtle mortality or entrapment incidents
- Use of tickler chains on the draghead of the TSHD to reduce turtle entrainment
- Designation of vessel corridors for transit between dredging areas and Placement Site C to reduce disturbance to marine fauna
- Screens on dredge overflow to detect whether mitigation measures are effective in preventing entrapment.

Chevron does not commit to the following recommendations from the DEC – EMB:

- Bed levellers will not be used to avoid the use of TSHD during cleanup/sweeping activities, as there is no strong evidence of success in reducing entrainment
- Water injection on the trailing pipe of the draghead will not be used as this is unreliable and there is no strong evidence of success at reducing entrainment
- Vessel speeds will not be restricted to as low as practicable for safe navigation, as vessels will already be operating at low speeds and there is concern for the safety of operating vessels under reduced speed.

Chevron has reviewed the most effective management and mitigation measures and this has formed the basis of the selection. Additional mitigation will be considered during the dredging program, based on the success of the proposed mitigation measures. Chevron also proposes to implement a framework to manage the risk of turtle entrainment during dredging. This will be made available in the final Appendix S1: Dredging and Spoil Disposal Management Plan.

	With regard to marine turtles, further information has been included in Appendix FG of the document. This information describes the movement of female flatback turtles in the Project area during, and post, nesting. The study was undertaken between December 2009 and August 2010, thus including the nesting period when animals are most likely to remain in the vicinity of the Project area.
30.29	Please provide further information in relation to the possibility of a whale resting area off Onslow and if there is a degree of uncertainty how the issue could be managed.
	Only small numbers of individuals of the overall resting aggregation are likely to be present in coastal waters off Onslow during the southbound migration, peaking in the last two weeks of September and the first two weeks of October (Appendix FD of the document). Exmouth Gulf is known to be an important habitat for population IV humpback whales, supporting aggregations of resting cow-calf pairs and attendant males during the southern migration. The boundaries shown in the Humpback Whale Recovery Plan (Department of Environment and Heritage, 2005; Appendix FD of the document) are indicative. It is likely that resting whales 'spill over' this nominal boundary, and it is expected that this will occur more often with the increasing population size. However, it is not believed that the coastal waters off Onslow are as important as Exmouth Gulf as, being exposed to environmental factors such as open ocean swell and seasonal winds, they do not provide the preferred protected and sheltered resting habitat sought by humpback whale cows with calves (Department of Environment and Heritage, 2005). At this stage, no further baseline work is necessary, in addition to that already completed, and that the development of management measures should be the focus of further investigation. The development and implementation of an adaptive management approach is key and Chevron will work with the appropriate departments in developing this approach.
8.4.5.1	Physical Presence of Nearshore Infrastructure
6.5	Materials Offloading Facility. The EIS/ERMP is vague about the exact location of the proposed Materials Offloading Facility and there is no information about the changes that will occur to the water flows (speed and direction) as a result of its construction. Prawns, their larvae and the resultant nauplii are dependent upon natural water flow for movement onto and off nursery and breeding grounds. Dependent upon the quantum, when and where the new water movements occur, none, some or all of the prawn population of Area 1 of the Onslow Prawn Managed Fishery could be relocated to habitat that cannot support it. In addition, dependent upon the final location of the Materials Offloading Facility, the breakwaters, internal dredged waters and the channels may completely remove the critical nursery habitat of Area 1 of the Onslow Prawn Managed Fishery. If prawn production is reduced and recruitment declines due to habitat loss, it may result in the Onslow Prawn Managed Fishery becoming commercially unviable. The prawns may well become extinct or reduced to a population size that is no longer viable.
	The location of the proposed Materials Offloading Facility is presented in Chapter 2 (Section 2.3.2) of the Draft EIS/ERMP. Additional information outlining potential impacts of the Materials Offloading Facility on the Onslow Prawn Managed Fishery has been included in Appendix FH of the document.
8.4.5.2	Dredging
6.6	Product Loading Facility. The EIS/ERMP states that a trestle access will be built to the proposed Product Loading Facility and infers that the proposed Product Loading Facility will also be a trestle construction. Trestle construction should cause minor further disruption to the already disrupted water flows; disrupted by the Materials Offloading Facility, its dredged basin, the Product Loading Facility turning basin, and the proposed channels. In addition, the noise of pile driving, light attenuation and dredge spoil smothering during the construction phase will further disrupt natural prawn behaviour and potentially egg, larvae post larvae and nauplii settlement. The EIS/ERMP states that it will take about two years to complete berth 1 and that a further 18 months may be required to complete berths 2 and 3. This is a critically long period for prawns that typically have a maximum two to three year life span. More than two years of habitat disturbance will disrupt the life-cycle of the prawn population in what may be the most productive part of the prawns' habitat in Area 1.

With regard to the concern that the Product Loading Facility will cause minor changes in water speed and direction, as with the Materials Offloading Facility, turning basin and channel, the Product Loading Facility will be a permeable structure consisting mainly of pile bents spaced between 18 and 36 m apart. As a result it is unlikely that this structure would cause additional alteration of the speed and direction of water flow, and thus the movement of the prawn population away from Area 1 of the Onslow Prawn Managed Fishery.

The issues of pile driving, light attenuation and smothering due to dredge material placement impacting on marine fauna is discussed in Chapter 8 Section 8.4.5.8 and 8.2.5.3/8.4.5.2, respectively, of the Draft EIS/ERMP.

With regard to pile driving, such activities may impact upon prawns in the immediate vicinity of the acoustic emission source. However, the effects of the noise will be spatially limited and it is unlikely that prawns will be subject to mortality or to long-term impacts. Please refer to Appendix 09, pp 124 which shows noise modelling from piling at Cape Lambert (SVT 2009). Modelling suggested thresholds for physical damage to turtle hatchlings (used as the example species) would be within 25 m of piling site and behavioural modifications within 400 m of piling site.

A reference was included in Chapter 8 Section 8.4.5.8 pp 598. An extensive literature review of effects of acoustic emissions including underwater explosions found that commercially important benthic species such as crabs and prawns are highly resistant to shock (Lewis, 1996). Consequently, the domain for piling potential impacts on prawns would be highly localised.

It is possible that prawns may experience some mortality during piling activities only; however, they would need to be in relatively close range to the activity. This is unlikely to occur as the movement of vessels associated with piling would disturb prawns in the area and cause them to move elsewhere.

With regard to light attenuation, it is possible that a loss of habitat, critical for commercially and recreationally important marine fauna, may result as a consequence of dredging and material placement. Turbidity impacts on water quality during dredging operations will occur temporarily, but are considered unlikely to significantly affect fisheries in the area. The fisheries are based on mobile species which are periodically exposed to natural extreme turbidity events due to catchment run-off, especially from the Ashburton River, and resuspension due to wind and waves.

In addition, prawns are benthic dwellers and generally have a high tolerance to turbidity in excess of 100 mg/L (Preston *et al.* 2001). Banana prawns are known to prefer muddy habitats and are commonly found in the Ashburton River Delta, where turbidity ranges to levels above 50 mg/L (Draft EIS/ERMP, Appendix O10).

With regard to potential smothering impacts due to the placement of dredged material, and in terms of habitat critical to prawn production (recruitment), the anticipated potential permanent loss of the Onslow Prawn Managed Fishery nursery ground is less than four per cent of the total nursery ground area. Furthermore, the dredge material placement Site C is not located within the nursery area of the fishery. Therefore, it is considered unlikely that the presence of nearshore infrastructure (including material placement sites) will impact on long-term recruitment of the Onslow Prawn Managed Fishery.

Additional information outlining potential impacts to the Onslow Prawn Managed Fishery has been included in Appendix FH of the document.

8.9 Fish - needs to include *P.maxima* pearl oyster stocks.

The potential dredging-related impacts to *Pinctada maxima* have been included in Section 8.4.5.2 of the Draft EIS/ERMP, under the heading *Loss of Critical Habitat to Commercially Important Fauna due to Dredging and Dredge Material Placement*. Additionally, the status of *P. maxima* stocks in this area is described in:

Hart, A. M., Friedman, K. J. (Editors) 2004, Mother-of-pearl shell (*Pinctada maxima*): Stock evaluation for management and future harvesting in Western Australia, FRDC Project 1998/153, Fisheries Research Contract Report No. 10, Department of Fisheries, Western Australia, 84p. http://www.fish.wa.gov.au/docs/frr/frcr010/frcr010.pdf

31.2 Of most concern, is the expected impact to the Onslow Prawn Fishery. We refer you to the attached submission from Dr Peter Hick, T/A Petracology Consulting, and also to the submission from Graeme Stewart on behalf of the Nickol Bay Professional Fishers Association, emailed separately.

		Chevron acknowledges the Western Australian Fishing Industry Council's concern regarding potential impacts to the Onslow Prawn Managed Fishery. Potential impacts to the fishery are discussed in the Draft EIS/ERMP (Section 8.4.5.2, 8.4.5.7). Two key potential impacts are summarised below: • Reversible damage to a large area of seagrass east of Onslow is anticipated, however this should only last for the first two summers of dredging and will impact less than 15% of the area. • The presence of nearshore Project infrastructure is anticipated to cause the permanent loss of four percent of the total available nursery habitat of the Ashburton SMFG located in Area 1, however it is considered unlikely that this will have a significant impact on prawn production (recruitment). A more comprehensive assessment of potential impact is provided in Appendix FH of the document.
8.4.5.3	Nearshore Construction Activities
25.20	Seawater intake Recommendation 31: That the following management measures be applied to intake pipes for the reverse osmosis plant: • Double screen intake pipes to prevent entrapment of marine turtles including hatchlings • Velocity of intake pipes be considered in screen design, and do not exceed marine turtle swimming speeds (ideally no faster than 0.15 m/sec). Discussion: The proponent has not undertaken an assessment of seawater intake risks to marine fauna and therefore has not committed to mitigation measures.
	During the operations phase of the Project, it is anticipated that an open sea intake will be provided to supply seawater to the desalination plant. The design of the open sea intake currently includes a vertical caisson (pipe) located on the Product Loading Facility. Multiple screens will be attached to the caisson and will act as a filtration device. The screens are likely to have openings ranging from 0.5 mm to 10 mm and are usually oriented on a horizontal axis. The velocity of water at the face of the intake structure is not anticipated to exceed 0.15 m/sec, in order to minimise entrainment of marine fauna and debris on the intake screen structure.
30.28	Sea water intakes – what provision will be made to prevent marine fauna entrainment e.g. seahorses? What impacts to water quality is expected from the use of biocides, anti-scalants, etc?
	The temporary seawater intake pipe will be located to the east of the materials offloading facility. Once the materials offloading facility is completed the construction seawater intake will be relocated to inside the southeast corner of the materials offloading facility. It will be elevated off of the sea floor and protected from debris. This area of the seafloor is characterised by bare sand. Seahorses are unlikely to be found in such environments and thus the risk is considered negligible. No adverse impacts to water quality, outside of the mixing zone, are expected from the use and discharge of biocides and anti-scalants.
8.4.5.4	Vessel Movements
7.5	Some of our concerns regarding the Wheatstone Project are: Boat activity and these other issues changing the migration pattern of mackerel and other species in the short and long term.
	Existing vessel activity in the Onslow area is high, as discussed in Section 8.4.5.4 (Figure 8.61) of the Draft EIS/ERMP. During the construction period, the Project will contribute a modest increase in vessel activity in nearshore areas, adjacent to the proposed site (Section 8.4.5.4, Table 8.42). During Project operation, there will be a small increase above background vessel activity in the Onslow area. When in full production (25 MTPA) there will be approximately 2 LNG vessel movements per day between the Materials Offloading Facility and the open ocean (Section 8.4.5.4, Table 8.43). It is unlikely that the level of vessel activity generated by the Project will have a significant influence on the migration patterns of mackerel or other marine species in the Onslow area.

20.34	"Harbour master has powers to control marine pests" Given this is a private port what provisions have been put in place to emulate, or preferably exceed the system used by the state government to safeguard against introduced marine pests, bacteria, viruses and parasites?
	The materials offloading facility and Common Use Coastal Area will be operated by the Dampier Port Authority in the future so it will not be a private port. After the construction of agreed marine Project facilities, including the materials offloading facility and excluding the product loading facility, the Dampier Port Authority will operator these 'multi user facilities'. Chevron will provide the Dampier Port Authority with sufficient information to manage the risk of introducing and spreading introduced marine pests, prior to being granted approval to complete specific construction works. The introduced marine pest management steps for the infrastructure will include a baseline marine pest monitoring program which will be conducted at a yet-to-be-determined frequency. In the event of identification of any marine pest within the vicinity of the infrastructure, contingency management measures will be implemented.
20.35	"75% of introduced species arrive via biofouling" Given 75% biofouling is a greater risk than ballast water for the introduction of introduced marine pests, and the shallow nature of the coastal waters these international ships will be entering, what additional measures are being taken over and above the regulatory requirements?
	Introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. In the event of an identified 'medium' or 'high' level risk for a vessel, a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required.
20.36	"5-train operation will require 40 vessels per annum" What measures have been put into place to ensure these ships (and all international traffic) adhere to the Australian and Quarantine Inspection Service requirements?
	Introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. In the event of an identified 'medium' or 'high' level risk for a vessel, a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required.
22.39	Marine Biosecurity The DPA feels that the document would be improved by additional information on how Chevron proposes to manage the potential risks involved with introduced species at the Port of Onslow. The document appears to conclude that the risk of marine species being introduced to the Port of Onslow is low, based on the assumption that introduced species would not survive, and there are currently no documented invasive marine pests in ports in the Pilbara.
	The issue of potential risk from introduced marine pests is discussed in the Draft EIS/ERMP (Chapter 8, Sections 8.3.5.18, 8.3.7, 8.4.5.1, 8.4.5.4, 8.4.5.6, 8.4.7). The risk assessment to the environment is provided in Sections 8.3.7 and 8.4.7. Introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. At the event of an identified 'medium' or 'high' level risk for a vessel, a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. The introduced marine pest management steps for the port will include a baseline marine pest monitoring program which will be conducted at a to-be-determined frequency. If, despite risk mitigation measures put in place, marine pests are identified within the vicinity of the Project contingency measures will be put in place.

22.40	Marine Biosecurity The DPA understands that there are currently no baseline surveys of introduced species in the Onslow area. While the Port of Onslow has not been identified as a High Risk Port via the National Introduced Marine Pest Coordinating Group, it is considered that it would be a valuable exercise for a baseline survey to be undertaken before construction activities and Port operations commence.
	Chevron will not be completing any marine pest baseline studies prior to the commencement of construction. However, introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. At the event of an identified 'medium' or 'high' level risk for a vessel, a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. The introduced marine pest management steps for the port will include a baseline marine pest monitoring program which will be conducted at a to-be-determined frequency. If, despite risk mitigation measures put in place, marine pests are identified within the vicinity of the Project contingency measures will be put in place.
22.41	Marine Biosecurity The DPA, and the Western Australian Department of Fisheries (DoF) have developed and implemented a basic Marine Pest Monitoring Program. This body of work seeks to target high risk invasive species in a low cost, low technology program. The inclusion of the Onslow area in the Project through Chevron's involvement would provide important additional information, and provide a basic level of monitoring during both construction and operational phases of the Wheatstone Project. The DPA would encourage Chevron to discuss implementation of this monitoring with the DoF and DPA.
	Chevron will liaise with the Dampier Port Authority and DoF on all future matters regarding the potential introduction of marine pests.

25.21	Recommendation 32: That the conditions for this project include a requirement for a marine fauna management plan that includes the following vessel related mitigation measures:
	• Implementation of designated vessel corridors that avoid highest densities of known turtle and dugong use (seagrass beds) particularly in the zone of "highest level of construction vessel activity" depicted in Figure 8.62 of the ERMP
	• Mapping of designated navigation areas and coordinates of marine fauna habitats to be made available to vessel masters
	• Restriction of vessel speeds to limit potential impacts on marine fauna
	• Maintenance of a continuous watch for marine fauna during daylight hours by marine fauna observers
	• Standardised immediate informing of the vessel master should marine fauna of conservation significance be sighted within close proximity to or within the navigational path of an approaching vessel, with reasonable efforts made to avoid collision
	• Vessel logs be maintained to record marine fauna sightings and vessel strikes. These logs, wherever possible, to include the following information:
	  • Time and date of sighting(s)
	  • Location of sighting
	  • Number of fauna sighted
	  • Type of fauna (whale, dugong, turtle)
	  • Vessel type turtle sighted from
	  • Vessel speed at time of sighting
	  • Behaviour of fauna
	  • Changes to behaviour due to vessel proximity
	  • Vessel contact/strike
	  • Species (where possible to obtain a positive confirmation of species).
	• Reporting of any injuries/mortalities to DEC within 48 hours
	• Establishment of management contingency measures such that mitigation measures for vessel collision will be revised if management criteria are exceeded.
	Note: On a regular basis, vessel logs should be entered into the DEC Threatened Fauna Report form and submitted to DEC (can be downloaded at http://www.dec.wa.gov.au/content/view/5388/2237/).
	Discussion: The marine fauna management plan currently lacks specific information and descriptions with regard to the management targets, management actions, monitoring, management triggers and contingency measures.
	According to the proponent's assessment of vessel related impacts, manipulative experiments involving a six metre aluminium boat with an outboard motor have shown that turtles were unable to avoid being struck at speeds in excess of eight kilometres per hour (four knots). This supports the need for vessel speed restrictions, marine fauna observers and designated vessel pathways in habitats that support medium to high densities of marine fauna activity.

	This issue is discussed in Chapter 8 (Section 8.4.5) of the Draft EIS/ERMP. The section describes the risk of vessel–marine fauna interactions during construction and operation phases of the Project. Section 8.4.5 (Figure 8.62) shows areas of highest predicted vessel activity in relation to areas predicted to be important to megafauna. Areas of highest turtle densities are located on offshore reefs, which will be avoided by vessels for safety reasons. Seagrasses fringing the west side of Direction Island are predicted to be traversed by dredge related vessels transiting between the dredge area and dredge material placement Site C, but only during the period when the dredge is working in the lower sections of the channel. Vessel corridors for dredge vessel have been proposed; these are presented in the Draft Marine Fauna Management Plan. Vessel logs will be maintained to record marine fauna sightings and vessel strikes, and these incidents will be entered into Threatened Fauna Report forms and submitted to the Department of Environment and Conservation. Chevron is committed to recording and reporting vessel strikes to megafauna to the Department of Environment and Conservation within 48 hours of occurrence. Where they will be implemented, the above procedures will be outlined in the final Appendix O6: Marine Fauna Management Plan.
8.4.5.5	Increased Recreational Pressure Associated with the Project
20.17	Residual risk to protected marine fauna from vessel collision during operation is “”Low”” Residual risk to Marine fauna from boat strikes to Dugongs and turtles is “”Medium”” In addition to the previous comments relating to dugongs, in particular those regarding population estimates, this risk ranking appears to be under-rated. Anecdotal reports show dugongs ceasing to use areas of high boat traffic (Marsh et al., 2002, p. 11) and studies need to be undertaken to determine the actual impact. The consequence needs to take into account a slight reduction in adult survivorship can cause chronic decline (Marsh, 2002, p.1). The Likelihood needs to factor in the following: • Water depth used by boats • Dugongs are much slower than other marine mammals to respond to approaching boats (Penrose, 2005 p. 16) • Calves are vulnerable due their near surface proximity (Penrose, 2005, p. 16). • Background noise can interfere with the dugongs ability to sense an approaching boat (Penrose, 2005, p. 16). General impacts of boat traffic on Dugongs Boats can also cause acoustic disturbance impacting on Dugongs (Marsh et al., 2002, p. 9). This may account for reports of dugongs ceasing to use areas once boat traffic increases. What studies have been, or will be, done to ensure the background noise of increased boat traffic is not going to force the local population from their habitat? Dugongs react with a ‘flight’ behaviour to boating traffic - and spend a longer time reacting to slower moving boats (Hodgson & Marsh, 2007, p. 57). This high energy response is unlikely to be sustained for any length of time and could be using significant energy stores usually only spent in threatening situations (e.g. predators) (Gale et al., 2004, p. 4). While high-speed boats are more likely to strike a dugong, all boating marine presence is likely to have an impact. What has been done to monitor and mitigate these effects?
	Based on the combined datasets obtained from the 12 month megafauna aerial survey and the dugong aerial survey, Chevron are of the opinion that sufficient information has been obtained to support the assumptions underlying the risk assessment presented in the Draft EIS/ERMP. Although dugong occur in low densities within the Project area (Appendix FD and Appendix FE of the document), Chevron acknowledges that there is potential for Project-attributable vessel traffic to disturb dugongs. The risk assessment can be found in the Draft EIS/ERMP, Chapter 8 (Sections 8.4.5.4, 8.4.5.5, 8.4.7 (Table 8.4.8). Chevron acknowledges the concerns of the Cape Conservation Group in relation to the risk of increased recreational vessels potential disturbing dugongs. Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management (Section 10.4.5.1) which outlines management measures to be implemented to reduce the recreational impact of the Project: • Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road.

	• Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct. • A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken. • Chevron will work with the DoF to reduce potential risks to the existing recreational fishery. • Chevron will work with the Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow. A description of all marine fauna management measures will be provided within the final Appendix O6: Marine Fauna Management Plan and final Appendix S1: Dredging and Spoil Disposal Management Plan. An adaptive management approach will be implemented in consultation with appropriate departments. The assessment of management effectiveness is a key component of this.
25.22	Increased recreational pressure on conservation values Recommendation 33: That the conditions for this project include a requirement for the development of a recreation management program to minimise impacts of increased population and recreational activity on sensitive areas, such as island nature reserves, threatened marine fauna habitats and regionally significant coral communities. This program to include: • The development of a recreation management plan that focuses on visitor education, the establishment of management frameworks for island nature reserves and establishment of a monitoring program to measure the success of plan implementation • Provision of resources to develop and implement the recreation management plan possibly including resources for DEC to assist in the development and implementation of recreational management and impact monitoring on island nature reserves and surrounding marine habitat. Discussion: The ERMP acknowledges that recreational activity is likely to increase during construction and operational phases as a direct result of the increased workforce in the area (p. 577).
	Chevron has committed to reducing environmental impacts from recreational activities by developing and enforcing a Recreation Code of Conduct that articulates the code of behaviour for all employees and contractors during the Project's construction activities. This will set expectations about how the workforce engages in recreational activities within island nature reserves and marine parks and reserves in the locality and region. It will also contain workforce education about the local marine environment, no-take zones, DoF regulations, fishing restrictions in marine parks, adhering to rules governing island nature reserves and marine parks, and sustainable fishing practices. Compliance with government regulations designed to minimise human impacts will be mandatory. Boats and recreational vehicles will be excluded from accessing the workforce accommodation village or the Ashburton North Strategic Industrial Area access road from Onslow Road to discourage the construction workforce from bringing their own boats to Onslow. As an alternative to the workforce bringing their own boats, Chevron will develop a recreation program in consultation with Tourism WA, DEC, DoF and local tourism providers that allows workers to enjoy the marine environment in a more controlled manner, such as on charter boats where fishing limits are strictly enforced. Chevron will work with DEC to reduce potential risks from excessive recreational use of the islands generally, with a key focus being those islands within a 25km radius of Onslow. It will also work in partnership with DoF to reduce potential risks to the island nature reserves and marine parks and reserves in the locality and region.

28.17	Pages 576-77, works through this risk assessment due to recreational effort caused by the workforce for the Project. The residual risk is "Moderate" of (sic, I assume the word is 'or') "High", with a likelihood of "possible" The current risk to the finfish resources in the North Coast Bioregion is currently "Moderate-High". Thus, any increase in risk levels will result in a high risk to sustainability to fish stocks in the area. Therefore a management mechanism to deal with this risk should be developed in conjunction with the DoF.
	Chevron acknowledges DoF concerns in relation to increased fishing activities by increased workforce populations. Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management, Section 10.4.5.1 Recreational Fishing which explains: "*The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:* • Boats and recreational vehicles will not be permitted within the Construction Workforce Accommodation Village or the access road from the Onslow Road. • Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct. • A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken. • Chevron will work with DoF to reduce potential risks to the existing recreational fishery. • Chevron will work with DEC to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow. • For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF).
28.18	While some mitigation measures for recreational fishing can be enforced on staff while they are on-site, there is the potential that some staff may choose to spend the off-site leave fishing within this region. Studies are needed to determine the current fishing recreational fishing effort and potential fishing trends.
	Chevron acknowledges DoF concerns in relation to increased fishing activities by increased workforce populations. Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management, Section 10.4.5.1 Recreational Fishing which explains: "*The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:* • Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road. • Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct. • A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken. • Chevron will work with DoF to reduce potential risks to the existing recreational fishery. • Chevron will work with the Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow. • For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)." In instances where the workforce chooses to leave the vicinity of the Project site, they are still bound to comply with the Recreational Code of Conduct which governs recreational activities and behaviour. The need for further studies to determine recreational fishing effort and potential fishing trends is currently being discussed with the DoF.

28.24	This section [*Section 8.4.5.5*] focuses too much on protected species and not enough on fish resources. This may be one of the reasons for the limited range of risks identified and the limited risk assessment for finfish resources. For example, since 2004/5 the status of the PDSF resources have been declining to now be a moderate-high risk. These demersal finfish resources barely receive mention in the extensive document. The proponent should review the latest State of Fisheries data and reassess the risk to fishery resources imposed by the Project. Many of the identified potential 'aspects'' and impacts of this project are not assessed against finfish resources at all (e.g. increased recreational visitors to the Murion islands without assessing the impacts of increased fishing effort on local stocks), or not adequately enough (e.g. acoustic effects). The proponent should consider broadening the risk assessment and focus more on the risks to fishing. In addition, if a risk is identified (e.g. increased recreational effort) the management of this risk is not adequately discussed. This needs to be discussed with the proponent, given that a projected increase of 18,000 workers will be required during construction within a workforce of 6,000 during operations (c.f. current population in the area is 51,000, see pp 339-341). The likelihood of negative recreational fishing impacts on stocks, either via local depletion or stock sustainability seems highly probable.
	Impact to recreational and commercial fish stocks associated with Project activities are discussed in Section 8.4 of the Draft EIS/ERMP. Chevron acknowledges that there may be potential impacts to fish stocks associated with recreational fishing by the workforce. Accurate predictions relating to the workforce impacts to fish stocks cannot be made until it is known what proportion of the workforce will fish and where they will fish in the Onslow area. However, the level of impact will not be as significant as suggested in the comment given the workforce numbers quoted are incorrect. During the construction period the maximum number of workers at site will be 5,000 (not 18,000) during construction and 400 (not 6,000) during operations (Draft EIS/ERMP, Chapter 2, Table 2.1).
8.4.5.6	Discharges
30.21	Note that bio-accumulants will need to meet Anzecc guidelines on discharge. Is this criteria met?
	It is anticipated that the application of standard waste water treatment and RO plant discharge will not result in the excessive release of bioaccumulants (i.e. cadmium, mercury). Appropriate treatment of waste water will be applied and, as a result, it is anticipated that ANZECC (2000) guidelines will be achieved as proposed in the Draft EIS/ERMP. A model validation field study will be undertaken once discharge commences to ensure that an excess of bioaccumulants are not released in practice.
8.4.5.7	Hydrocarbon Leaks and Spills
25.17	Recommendation 26: That the proponent develops a hydrocarbon management plan to the requirements of the OEPA and DEC, detailing both preventative management and contingency response measures in the event that a hydrocarbon spill occurs, and including: • Specific precautionary measures for the protection of the Ningaloo Reef and critical habitats such as marine turtle nesting beaches • Specific contingency measures to reduce the risk of marine fauna exposure to hydrocarbons • Commitments to undertake cleanup and rehabilitation of affected marine fauna such as seabirds, marine turtles and mammals. Discussion: Hydrocarbon spill modelling was undertaken using five spill scenarios at offshore and nearshore locations. Spills from LNG or condensate ship were not modelled as, according to the proponent, there are enough measures in place to ensure that this would not occur (p. 524). According to the ERMP, model outputs are "worst case", have taken into account winter, summer and the transitional season, and have been designed to account for wind, tide and spill degradation.

	Reported key results of the modelling indicate: • A five to 10 per cent probability of Ningaloo Marine Park and Muiron Islands Marine Management Area being exposed to hydrocarbon leak from subsea wells during the transitional period • A five per cent probability of spills/leaks from the shipping channel and product loading facility (PLF) reaching Ningaloo Marine Park and Muiron Islands Marine Management Area in summer • A five to 10 per cent probability of spills/leaks from the shipping channel and PLF reaching Ningaloo Marine Park and Muiron Islands Marine Management Area in winter • significant risk of a subsea well leak reaching the Montebello Islands and Barrow Island marine conservation reserves • A 40 per cent probability of a condensate leak or spill in the shipping channel reaching the Montebello Islands and Barrow Island marine conservation reserves. The ERMP acknowledges (p. 583) that even with the application of mitigation and contingency plans (Table 8.48, pp 617-636), it is possible that a leak or spill of hydrocarbon into the nearshore environment may result in loss of critical habitat, in particular nesting beaches. In terms of larger offshore spills, a large spill during the transitional season would come in contact with the Ningaloo Reef and associated habitats, such as turtle nesting beaches on North West Cape and the Muiron Islands Nature Reserves. The information in Table 8.48 (p. 627, ERMP) is deficient in detail with regard to management and mitigation of hydrocarbon spills and leaks. Given the international importance of the marine environment in the areas potentially affected, it would be prudent to develop a detailed hydrocarbon management plan in consultation with DEC.
	A Marine Oil Pollution Plan will be developed for the Project. The Plan will include aims, objectives, prevention and preparedness actions. The Plan will not focus exclusively on the Ningaloo Reef, but will be more generic and address spills relating to the whole Project area. An Oil Spill Sensitivity Map has been developed and is included in Appendix FI of the document. This will be used to develop a management framework for protecting sensitive features from a condensate or diesel spill originating from Project facilities.
8.4.5.8	Noise and Vibration
8.17	Issue: Fear that seismic and other disturbance will damage fishery. Impact: Lack of clarity about actual effects of construction, especially dredging is fuelling concern about potential effects. Phase: Construction & Operation. Risk: Critical.
	This issue is outlined in Chapter 8 (Section 8.4.5.8) of the Draft EIS/ERMP, which indicates that vertical seismic profiling may be carried out during Project construction. Fisheries key to the Onslow area are outlined in Chapter 10 (Section 10.4) of the Draft EIS/ERMP and include the Onslow Prawn Managed Fishery, the Pilbara Trap Managed Fishery and the Pilbara Line Fishery. Section 8.4.5.8 indicates that construction acoustic emissions in the nearshore area have the potential to impact bony fish and prawns in the immediate vicinity of the source, but the effects will be spatially limited. In general terms, it is possible that fauna may exhibit avoidance behaviour and that potential injury and mortality may occur; however, it is not anticipated that vertical seismic profiling on its own will result in injury or mortality. Issues and potential impacts associated with construction and operation activities are provided in Chapter 8 (Sections 8.2, 8.3, 8.4 and 8.5) of the Draft EIS/ERMP. A description of the potential impacts of dredging on water and sediment quality, benthic habitats and marine fauna are provided in Sections 8.2.5.1, 8.2.5.2, 8.2.5.3, 8.2.5.4, 8.2.5.5, 8.3.5.2, 8.3.5.3, 8.3.5.4 and 8.4.5.2 of the Draft EIS/ERMP.

19.2	NRB has also reviewed the noise impacts on marine fauna, especially in the construction phase, and their managements. It should be noted that the available knowledge and understanding of noise impacts on marine animals are still very limited. From NRB's understanding, it seems that the major potential noise impacts on marine fauna have been properly identified and addressed. For instance, NBR would agree that the major potential noise impacts on marine fauna will be from piling activities and blasting (if required) during the construction phase. NRB would agree with the conclusions made in the ERMP document that the noise impacts on marine animals during the construction phase are low.
	Chevron acknowledges the Department of Environment and Conservation (Noise Regulation Branch) for its submission. Final details associated with the management of underwater acoustic emissions and marine fauna will be provided in the final Appendix O6: Marine Fauna Management Plan.
19.3	The proposed management and mitigation measures, for instance, delineating the observation zone and exclusion zone, also seem reasonable and practicable to NRB.
	Final details associated with the management of underwater acoustic emissions, particularly exclusion and observation zones, and marine fauna will be provided in the final Appendix O6: Marine Fauna Management Plan.
19.4	In summary, NRB would consider that the noise from the proposed Project, at both construction phase and operation phase, would be able to be managed to comply with noise regulations at all neighbouring noise sensitive premises. The potential noise impacts on marine animals during the construction phase do not seem significant to NRB, and the proposed management and mitigation measures seem appropriate and should be able to efficiently minimise the impacts on marine animals.
	Chevron thanks the Department of Environment and Conservation (Noise Regulation Branch) for its positive submission.
20.21	It is assumed that indo-Pacific Humpback dolphins, Bottlenose dolphins and Dugongs would spend most of their time in waters several kilometres off of the Project coastline."" Why would this assumption be made when Figure 8.64 clearly shows Dugong presence in the near coastal waters? Furthermore Dugong aerial surveys could have been inaccurate in the near-shore environment by the natural water turbidity of the area (the mean turbidity in the near shore area was described as 'generally elevated' in Appendices N3 p. 12). Please also refer to comments made regarding Dugong population estimation. "This may indicate that activities such as pipelaying, rock dumping, drilling and vessel movements (which are generally <1kHz) will not result in adverse noise impacts to Dugongs .... Impacts to Dugongs are therefore expected to be minor since it is unlikely that the population will be affected by noise generated during the construction and operations" While assessing the impact of noise on Dugongs from the nearby Straits Salt Project many potential threats to Dugongs from boat-generated noise were identified. These being: • Displacement from key habitat • Behaviour disruption/modification • Communication disruption/stress (particularly from persistent noise). (Penrose, 2005. p. 15) Information gained to date on noise impacts on Dugongs appears to be limited but from this report and its cited examples it appears to suggest that noise in fact will have a Significant impact on Dugongs both during construction and operations and this risk assessment should include a review of the available literature on the topic and revised accordingly.
	The Draft EIS/ERMP (Chapter 8, Section 8.4.5.4) stated that dugongs have been recorded predominantly within shallow coastal waters, while dolphins have been recorded predominantly within the 10 to 20 metre depth contour. Based on results from the 12-month megafauna aerial survey and the dugong-specific aerial survey, dolphins were typically observed in water depths of less than 20 m and dugongs in water depths less than 10 m. However, these animals were rarely observed in waters between the coast to the 5 m depth contour (Draft EIS/ERMP, Chapter 8, Figure 8.64; Appendix FE of the document). The 5 m depth contour can extend for several kilometers offshore of the Ashburton North SIA due to the wide shelf.

	The southern coastal region (to approximately 4 km offshore) of the Project area, from Bare Sand Point to Entrance Point, experiences turbidity of approximately 20 g/L (total suspended solids) during winter. This level of turbidity does impede the detectability of dugongs and may have affected the interpretation of dugong distribution during the dugong-specific aerial survey (completed in August 2010). It is also possible that dugongs avoid the area during turbid conditions. This may be attributable to a lack of suitable foraging ground due to light attenuation, or they may be more susceptible to predation by sharks in turbid water. However, given that the megafauna aerial survey was undertaken fortnightly, and during times when turbidity was lower, it is likely that at least a low number of dugongs would have been recorded during these surveys if they frequented the Project area. With regard to potential noise impacts to dugongs, the Project cannot be directly compared to the Straits Salt Project as the basis of the risk assessment for the Project assumed that the area offshore from the Ashburton North SIA was not a critical habitat for dugong. Recent survey of the Project area has confirmed this (Draft EIS/ERMP, Appendix FD; Appendix FE of the document). The dugong-specific survey indicated that a statistically significant difference between dugong population sizes in the Project area and Exmouth Gulf existed (Appendix FE of the document). A dugong-specific aerial survey has been undertaken (Appendix FE of the document) using a standardised aerial survey method, following Marsh and Sinclair (1989), as refined by Pollock *et al*. (2006). The survey confirmed the risk assessment presented in the Draft EIS/ERMP, in that only low numbers of dugongs were recorded. A statistically significant difference was recorded between the dugong populations of the Project area in comparison to Exmouth Gulf (Appendix FE (Table 5, Table 6) of the document). The Project area dugong population estimate was less than one-sixth of the Exmouth Gulf population, and the dugong density estimate was approximately one-fifth of the Exmouth Gulf estimate. The Project area, in comparison to surveys of other locations on the Western Australian coastline, recorded the lowest dugong density (Appendix FE of the document). The potential impact of vessel noise on dugongs of the Project area was risk assessed based on information obtained from a review of available literature. This information was provided in the Draft EIS/ERMP (Appendix O9: Possible Effects of Underwater Noise on Marine Fauna and Fish in the Wheatstone Project Area.
20.41	Increase in ocean noise Some areas the background noise of oceans from human activities (namely shipping) has doubled every decade for the last 6 decades (Wyatt, 2008, p. iii). What base-line ocean background noise work has been done? Are there commitments to continue to monitor ocean background noise from the cumulative impacts in the Region?
	Background underwater noise levels were obtained from loggers used to identify the presence of cetaceans in the Project area (Draft EIS/ERMP, Appendix O9). Chevron will not be monitoring marine background noise to assess cumulative impacts in the region as this is outside of the scope of the Project environmental impact assessment.
20.42	In the event of pile-driving will soft start procedures be done for every start-up? Wyatt (2008, p. 16) describes large variations in sound produced at significant distances from the pile-driving source. Will the proposed piece of equipment be tested for its actual noise generation to ensure compliance with reducing environmental impact and appropriateness of the distance boundaries used for shut-down of pile driving? Will ‘bubble curtains’ be used during pile-driving to reduce noise impacts?
	Soft start procedures will be considered as part of the adaptive management programme proposed in the Marine Fauna Management Plan. Bubble curtains will be considered as part of the adaptive management programme proposed in the Marine Fauna Management Plan. Please refer to the final Marine Fauna Management Plan and the final Dredging and Spoil Disposal Management Plan for a description of management and mitigation measures to be implemented as well as a description of the adaptive management process.

25.23	Noise and vibration Recommendation 34: That the proponent undertakes an underwater acoustic noise modelling exercise for pile driving to determine the zones of physical injury and avoidance based on the hearing frequency and predicted sound energy levels (SEL). This underwater acoustic model to take into account the following variables which affect noise levels and the spatial extent of the zones of physical disturbance and avoidance: • In terms of pile driving, the pile driving method and pile type (i.e. size, depth to be driven and type of material) • Frequency of the sound emitting source • Peak sound level • Duration of the sound emission source • Proximity of the sound emission source to significant marine fauna habitats • Species of marine fauna and known hearing thresholds • Absorption/refraction characteristics of the seabed • Depth of the water body • SEL for each species expected to result in physical injury or avoidance • Cumulative effects of the noise from a variety of sound energy sources. Recommendation 35: Once the proponent has undertaken the underwater acoustic modelling exercise and has assigned suitable zones of physical disturbance and avoidance (based on the most sensitive marine fauna receptor), management procedures for pile driving be developed and included in an outcome-based condition for this project. At a minimum, pile driving management procedures to include: • Avoidance of pile driving during critical periods (e.g. southern humpback whale migration; preliminary data indicates that dugong numbers in the area peak at the end of June) • Marine fauna observers • Soft start-up procedures • Shut down and restart triggers • Avoidance of pile driving during non-daylight hours • Field based model validation to confirm noise propagation and the effectiveness of the zones of physical disturbance and avoidance. Discussion: While it is acknowledged that a site-specific underwater noise modelling study will be presented in a supplementary report (p. 593), it is important that a pile driving/blasting acoustic assessment for each marine fauna species of conservation significance is undertaken prior to the completion of this assessment to determine the zone of physical injury (temporary threshold shift, permanent shift or mortality) and the zone of avoidance (behavioural disturbance). The lack of a site specific noise impact assessment is a critical omission from this impact assessment, as there are significant shortcomings in determining suitable management for pile driving based on extrapolation from assessments at other locations. This is due to differences in sound propagation, fauna populations and exposure levels due to site specific physical and faunal characteristics. It is suggested that an assessment of the local environment be undertaken, taking into account SELs known to affect the species occurring in the area and the likelihood of their exposure. Table 8.44 does not include the SELs for each sensitive receptor that is known or has potential to result in physical injury, mortality or behavioural changes/avoidance. This information is necessary to enable an assessment of the risks to marine fauna from major each noise related stressor.

	Additional information on underwater noise modelling has been provided in Appendix FA of the document. The information focuses on turtles and the results will be used to modify the management zones used to reduce the risk of noise impacts during piling. The noise modelling study suggested physical injuries to adult turtles could occur within 10 m of an active pile hammer. The suspension zone for piling will stay as originally proposed (i.e. piling will cease if a turtle is seen within 100 m of an active pile hammer). The study did not address issues relating to marine mammals because the humpback whale survey (Appendix O4) and the dedicated dugong survey (Appendix FE of the document) did not identify marine mammal aggregations in the Project area and confirmed low use of habitats in the piling area. However, the risk of noise impacts to marine mammals during piling will be managed based on those management zones described in Chapter 8 (Section 8.4.5.8). Chevron commits to conducting field-based underwater noise propagation model validation, marine fauna observers, soft start-up procedures and shut down and restart triggers. However, the avoidance of pile driving during critical marine fauna periods and the restriction of pile-driving activities to certain times of the day will not be committed to. With regard to specific piling management measures, these details are provided in the draft Appendix O6: Marine Fauna Management Plan.
25.24	Blasting Recommendation 36: That underwater blasting be excluded from this project. Discussion: P. 598 of the ERMP states "Underwater blasting is not currently considered to be part of construction activities for the Project. However, a lack of detailed geotechnical data in some areas of the Project indicates that blasting may be an option in the future". In the event that the proponent wishes to undertake blasting, it is suggested that this be subject to further assessment using a similar noise modelling exercise recommended in Recommendations 34 and 35 of this advice. Underwater blasting can result in the death of marine fauna including marine turtles, and therefore would warrant rigorous assessment.
	Underwater blasting may still occur as part of Project construction in the event that yet to be identified rock is encountered. If blasting is required, appropriate management and mitigation measures will be developed and reviewed by the appropriate departments, before blasting occurs. These details will be included in the final Appendix O6: Marine Fauna Management Plan. The blasting section of Appendix O6: Marine Fauna Management Plan now supersedes the proposed Blasting Environmental Management Plan (Draft EIS/ERMP, Section 8.4.5.8, Section 8.4.7).
28.19	Table 8.44 (p 589) identifies various sources of noise from the operations and identifies it as a risk to bony fish. Many of the sources of noise are on the North West Shelf, in the PDSF. There is clearly a risk to demersal scalefish which is not properly assessed. This is critical given these fish support the State's largest finfish fishery and is already at moderate-high risk to sustainability. See review comments on Appendix O9 for detailed comment.
	Bony fish fisheries in the Project area are identified as the Pilbara Trap Fishery, operating in 30-80 m isobath. Based on the information contained in Appendix O9 and the Draft EIS/ERMP, the only potential noise interactions arising from the Project in this region is the short-term (i.e. months) pipelay operation during construction and intermittent Project-related vessel operations along a specific and fixed navigation route. Neither of these activities is considered to pose a risk to the Pilbara Trap Fishery and this was indicated in the Draft EIS/ERMP where the impact of underwater noise was ranked as being between Very Low and Low.

29.136	Pile Driving - Proposed Management Measures & Modelling for Mitigation Measures. 1. Section 8.4.5.8 (p591) meets DSEWPaC requirements for the Draft EIS. DSEWPaC will review the information put forward in the Supplementary EIS. Gorgon Project Marine Fauna Exclusion Zones 22. Table 8.45 meets DSEWPaC requirements for the Draft EIS Marine Fauna Management Plan Pile Driving Management Measures 3. Chevron's commitment to include site specific pile driving management measures in the draft 'Marine Fauna Management Plan' attached to the Supplementary EIS/ERMP meets DSEWPaC requirements for publication of the Draft EIS.
	Chevron has not adopted Gorgon piling management zones because Barrow Island has a very different marine environment to the Wheatstone Project area. Barrow Island is located over 50 km from the Western Australian mainland, whereas the Wheatstone piling area is immediately adjacent to the mainland. Two site-specific underwater noise impact modelling studies were undertaken for the Project area, and the reports are included in Appendix FA (turtles) and Appendix FL (marine mammals) of the document. The results have been used to verify the draft management zones proposed for piling in Appendix O6: Marine Fauna Management Plan. In Appendix O6, a suspension zone of 500 m is proposed for managing piling in order to minimise risk to marine Megafauna from underwater noise. If any marine Megafauna are spotted in the suspension zone, piling will stop until the animal moves away. The modelling results indicated that physical injury and/or permanent hearing loss is unlikely to occur within a 10 m radius of an active pile hammer for adult turtles, and within a 50 m radius for marine mammals. A 1500 m observation zone is also proposed, to be aware of the marine Megafauna in the area so that action can be taken immediately, should the animal move into the suspension zone. Furthermore, within the observation zone, it is a condition that if a whale is within the observation zone for 30 minutes, then piling activity will be suspended until the whale has left the zone, or it has not been sighted for 30 minutes. In addition to this, Chevron will undertake periodic underwater noise surveys during piling to confirm the modelling predictions that the management zones were based on.
29.138	Vertical Seismic Profiling Impacts 1. Section 8.4.5.8 (p592) and Appendix O9 meets DSEWPaC requirements for publication of the Draft EIS. Marine Fauna Management Plan VSP Management Measures Reference 2. Appendix O6 (p617) meets DSEWPaC requirements for publication of the Draft EIS. DSEWPaC will provide to Chevron a copy of management measures previously required for VSP activities (attached).
	The proponent proposes the following management measures for VSP activities associated with the Project: 1. Pre-start-up Visual Observations: Visual observations would be undertaken within the observation zone by a suitably trained crew member for at least 30 minutes before the commencement of the soft start procedure. Observation zone to include a 3km horizontal radius from the VSP acoustic source. 2. Soft Start-Up Procedures: The VSP acoustic source would be initiated at the lowest setting, with a gradual ramp-up of the acoustic source over a 20 minute period until the full operating power level is reached. 3. Operating Procedures: While the VSP acoustic source is operating the following procedures would be implemented: a) Visual observations of the observation zone would be maintained continuously to identify if any whales are present b) At the event of sighting a whale within the observation zone the operator of the acoustic source would be placed on stand-by to power down the acoustic source c) At the event of sighting a whale entering the shut-down zone (a 500m horizontal radius from the VSP acoustic source) the acoustic source would be shut down completely.

4. Low Visibility Operating Procedures: During periods of low visibility, where the observation zone cannot be clearly viewed out to 3 km (including night time), the VSP source would be utilised as described in 2 and 3, provided that during the preceding 24 hour period:
   a) There have not been 3 or more whale instigated shut down situations
   b) A two-hour period of continual observations was undertaken in good visibility (to the extent of the observation zone) and no whales were sighted.

8.4.5.9	Light Emissions
20.28	Marine turtles There is a large presence of marine turtles in the Project vicinity. It appears likely the waters near the mouth of the Ashburton River are a significant habitat to flatback turtles. Are further studies on Marine Turtles include behaviour studies on the use of this habitat planned. If not, why not? In addition what has been done to assess the risk of this particular project, and also the regional development, impact on flatback hatchling use of near shore waters? The risk to hatchlings appears to be large when considering the number of significant rookeries within the 50km range. How can the sky glow be reduced to decrease this distance and potential impact? What on-going monitoring processes will be in place to confirm or deny impact on hatchlings.

The Draft EIS/ERMP (Section 8.4.5.1-8.4.5.9, 8.4.6, 8.4.7, 8.4.8) presents a summary of results obtained from the completion of numerous turtle surveys and desktop reviews. Sources of information resulted from literature reviews, nesting surveys, telemetry tracking and vessel-based surveys. The key findings of the surveys are summarised below:

- A majority of the beaches surveyed within and adjacent to the Ashburton North SIA was determined to be unsuitable for turtle nesting.
- Low-density flatback turtle nesting occurs at the Ashburton River Delta.
- Green and flatback turtles nest on islands adjacent to the Project area.
- No specific areas of turtle utilisation were identified.
- Turtles consistently moved through the Project area; however, they did not use the area for long periods of time.
- Hatching success is low on the mainland and high on the islands.
- Within the Project area, densities of foraging turtles are greatest near reef habitats and island.

Studies on the use of Ashburton River Delta beaches have been completed and the results are available in the Draft EIS/ERMP (Appendix O8). No further nesting surveys are planned at this stage.

The risk assessment addressing the impacts of light spill and sky glow on flatback turtle hatchlings has been provided in the Draft EIS/ERMP (Section 8.4.5.9; Appendix O1). Light spill domains were overlain on a location map of known flatback turtle nesting beaches. This indicated which areas, if any, would be more likely to be impacted by light. It was determined the highest potential risk to turtles will be to hatchlings emerging at the Ashburton River delta and the south-eastern side of Ashburton Island during flaring events. A hatchling monitoring program will verify the assessment and, in the unlikely event that turtle hatchlings are significantly affected, trigger an adaptive management process.

With regard to cumulative impacts, the evaluation of potential cumulative impacts to these factors is assessed largely via a qualitative approach. Light spill modelling has determined that light emissions from the proposed Project facilities and flaring present a low risk of potential impact to nesting turtles and hatchlings (Chapter 8, Section 8.4.5). The proposed Scarborough and Macedon facilities at the Ashburton North SIA will create light emissions that may cumulatively increase the risk of potential impact. However, the distance from the shoreline of these actions will greatly reduce this increase. Additionally, the dune system on the Ashburton River Delta beach reaches up to 10 m which will shield a large section of the nesting beach from illumination.

25.25	Light emissions Recommendation 37: That the conditions for this project include a requirement for a light management plan (LMP), which requires the following outcomes: • Collection of baseline light and hatchling orientation data prior to the commencement of construction • A "zero light horizon" objective for the nesting beaches of Ashburton, Locker, Serrurier and Thevenard Islands and the medium nesting beach west of Ashburton River during both construction and operational phases. • Hatchling orientation studies during construction and operation to confirm that hatchlings are not adversely affected by light emissions from the Project. • Contingency management measures in the event that hatchling orientation studies indicate that light emissions from the Project are adversely affecting hatchling orientation. • Vessel lighting during trunkline installation, to achieve a no light spill criterion on nesting beaches during nesting season for any species. This light management plan could form a component of the proponent's proposed marine fauna management plan. Discussion: The proponent has predicted that artificial light emissions are unlikely to result in significant impacts on hatchlings or nesting turtles. However, the ERMP states that "Sky glow from the Ashburton North SIA may be visible up to 50km offshore, which includes all islands and mainland beaches between the mainland and Flat, Thevenard and Twin Islands" (p. 600). This includes Serrurier Nature Reserve. The following limitations with regard to light emissions impact prediction studies presented in the ERMP should be noted: • It is unclear as to whether the proponent has taken into account light directivity, which plays an important role in determining whether light glow emissions are likely to affect hatchlings and nesting turtles • Analysis of the brightness (combination of light intensity, directivity and wavelength) and extent of light spill and light glow spatially and temporally (in the context of individual species' sensitivities and responses to light) have not been undertaken, as light impacts have apparently been based on emission estimations relevant to human vision • Presentation of the worst case artificial glow and light spill scenarios, which include the cumulative impacts of other light sources and predictions of light glow effects on nesting beaches remote from the proposed development site (not just Ashburton Island) have not been stated as having been undertaken • Discussion on the extent and manageability of light impacts and whether a 'zero' light horizon on nesting beaches is achievable has not been provided. It is questioned whether the worst-case scenario light spill and glow effects have been modelled • Only operational lighting has been modelled. On the basis that construction is predicted to occur for up to five nesting seasons, construction light spill and light glow modelling need to be undertaken.

A Light Management Plan will not be prepared. Instead, management of light impacts to turtles will be addressed in the draft Appendix O6: Marine Fauna Management Plan (Section 4.1).

The Draft EIS/ERMP contains a summary of light modelling in relation to the location of turtle nesting beaches (Appendix O1). Light modelling completed for the Project did not include directionality (i.e. angle). Modelling was completed for flaring events which represent the "worst-case" individual lighting scenario. Modelling was undertaken for the operation phase as the completed infrastructure, and associated lighting, plus operating flares would constitute an overall "worst-case" scenario.

In relation to the comment "*Analysis of the brightness (combination of light intensity, directivity and wavelength) and extent of light spill and light glow spatially and temporally (in the context of individual species' sensitivities and responses to light) have not been undertaken, as light impacts have apparently been based on emission estimations relevant to human vision*", Appendix O1 provides plots showing the flare spectra (intensity) versus wavelength.

	The Draft EIS/ERMP (Section 11.5.1.3) indicates that Project-related light emissions are unlikely to affect marine turtles. Following predictive light modelling studies, it was determined the highest potential risk to turtles will be to hatchlings emerging at the Ashburton River delta and the south-eastern side of Ashburton Island during flaring events. A hatchling monitoring program will verify the assessment and, in the unlikely event that turtle hatchlings are significantly affected, trigger an adaptive management process. The evaluation of potential cumulative impacts to these factors is assessed largely via a qualitative approach due to a lack of publicly available information. Light spill modelling has determined that light emissions from the proposed Project facilities and flaring present a low risk of potential impact to nesting turtles and hatchlings (Chapter 8, Section 8.4.5). The proposed Scarborough and Macedon facilities at the Ashburton North SIA will create light emissions that may cumulatively increase the risk of potential impact. However, the distance from the shoreline of these actions will greatly reduce this increase. Additionally, the dune system on the Ashburton River Delta beach reaches up to 10 m which will shield a large section of the nesting beach from illumination.
30.26	The main sources of light during installation and dredging will be various vessels, drilling mobile offshore drilling units (MODUs) and installation platforms. Typically, white light such as fluorescent, metal halide and halogen is used on a 24-hour basis. White light = most impact to turtles. Main document does not specify lighting type for on-shore plant? The impact to turtles from lights and flares must be considered in relation to EPA Assessment Guideline 5 for protecting marine turtles from light impacts.
	The Draft EIS/ERMP (O1: An Assessment of Light Emissions in Relation to Sea Turtle Nesting Beaches in the Wheatstone Project Area, Section 8.4.5.9) provides predictions on the amount of light turtles in the Project area will be subjected to, and Environmental Assessment Guideline # 5 (Environmental Protection Agency, 2010) was considered in this report. The report indicated that Project-related light emissions are unlikely to affect marine turtles. Following predictive light modelling studies, it was determined the highest potential risk to turtles will be to hatchlings emerging at the Ashburton River delta and the south-eastern side of Ashburton Island during flaring events. However, a 10m high dune shields the most part of the Ashburton River delta beach and Ashburton Island is considered to be a sufficient distance away from the light sources.
8.4.6	**Implications for Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
8.4.7	**Residual Risk Summary**
28.21	Currently, the 'consequence' seems to have been assigned '5' (minor) with likelihood being '3' (possible), resulting in a residual risk of 'low'. DOF continues to consider the consequences to be 'massive' (2) (for all the reasons described originally) – which combined with the already assigned 'possible' (3) likelihood results in a 'high' risk.
	Chevron acknowledges DoF's comments about the risk rankings; however, the risk rankings were derived from a solid analysis of data and predicted impacts and will not be amended. Introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. At the event of an identified 'medium' or 'high' level risk for a vessel a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. The introduced marine pest management steps for the port will include a baseline marine pest monitoring program which will be conducted at a to-be-determined frequency. If, despite risk mitigation measures put in place, marine pests are identified within the vicinity of the Project contingency measures will be put in place.
28.22	DOF would like the following clarifications to be included – as requested in its initial comments: (i) all vessels mobilising to the Project to undergo risk assessment (not just 'construction vessels entering the nearshore area.') (ii) DoF determines the level of risk based on information provided by the proponent (iii) DOF determines appropriate mitigation.

	The Draft EIS/ERMP is not being revised, however introduced marine pest management steps for vessels will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. At the event of an identified 'medium' or 'high' level risk for a vessel a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. The introduced marine pest management steps for the port will include a baseline marine pest monitoring program which will be conducted at a to-be-determined frequency. If, despite risk mitigation measures put in place, marine pests are identified within the vicinity of the Project contingency measures will be put in place.
28.23	Mitigate: (i) all vessels mobilising to the Project to undergo risk assessment (not just 'construction vessels entering the nearshore area.') Monitor: Thank you for including marine pest monitoring – as requested in DOF's first set of comments, can we please just change the word 'considers' to 'consistent with' (..DOF protocols....)
	Introduced marine pest management steps will be consistent with DoF protocols and will include an initial desktop risk assessment that will determine the level of risk associated with the respective vessels. At the event of an identified 'medium' or 'high' level risk for a vessel a pre-mobilisation inspection will be undertaken. Following the inspection the vessels will be cleaned as required. The introduced marine pest management steps for the port will include a baseline marine pest monitoring program which will be conducted at a to-be-determined frequency. If, despite risk mitigation measures put in place, marine pests are identified within the vicinity of the Project contingency measures will be put in place.
28.30	"Dredging 1. Leave as is 2. Consequence change from 5 to 4 Likelihood leave as 2 – Results in overall risk as MEDIUM 3. Leave as is Physical Presence 1 Consequence – Leave as 4 2. Consequence – Leave as 4 Likelihood - change from 4 to 3 – Results in overall risk as MEDIUM. The Management strategy is noted as the appointment of liaison person – unlikely that liaison/consultation would be sufficient mitigation with respect to impacts. Is there a Monitoring impacts plan? Construction Activities 1. Consequence – Leave as 4 Likelihood - change from 4 to 3 – Results in overall risk as MEDIUM. 2. Leave as is Operational Activities 1. Consequence – Change from 3 to 5 Likelihood – leave as is – Making Risk rating V.LOW 2. Leave as is. Additive Effects Leave as is – but this is the key risk factor that should be considered – cumulative impacts – particularly noting that there are several other resource projects planned for this hub area. Cumulative risk should be rated as HIGH. "

	Chevron acknowledges DoF's comments about the risk rankings, however the risk rankings were derived from a solid analysis of data and predicted impacts and will not be amended. There is no intention, at this stage of Project development, to implement a Monitoring Impacts Plan.
8.4.8	**Predicted Environmental Outcome**
20.19	This table appears to be missing: • Disturbance from Project-related boat traffic (which is believed to be longer energy expenditure for slower boats Hodgson & Marsh. 2007, p. 57) • Habitat loss caused by changed local water qualities either from the Project directly or from marine traffic. Examples include, but are not limited to, discharged hypersaline water, altered nutrient levels, algae blooms, toxic contaminants from Project discharges or marine vessels, altered flood run-off patterns and increased sedimentation • Possible critical habitat sites (e.g. leks, calving Sites) • Risk of displacement from boat traffic • Dredging entrainment/injury (in particular at night). It also lacks a cumulative risk assessment for Dugongs from the combination of all the impacts. Dugong populations are vulnerable and the loss of only a few adults can result in chronic population decline (Marsh et al. 2002, p. 1). While each individual risk might be assessed ""medium"", ""low"" or ''very low"" these risks may add up to a more serious consequence for the Dugong. Please provide a cumulative risk assessment for the impact on Dugongs. Similarly this should also be done for other key species found in table 8.47. The management plan puts in place observation or shut down procedures during the day but not at night. Could there be an explanation why the risk at night is reduced to justify continuing dredging when observational and shut-down procedures are not able to be adhered to?
	The risk assessment provided in the Draft EIS/ERMP discusses potential impacts to dugongs, and other marine fauna (Sections 8.4.5.1-8.4.5.8, 8.4.6, 8.4.7), as well as providing "additive" (the sum of all potential Project-attributable impacts), as versus "cumulative", impact predications (Section 8.4.8). The additive risk to all marine fauna as a result of Project-attributable impacts has been determined to be Medium, and is based on a low confidence level. The confidence level has been improved for dugongs through the completion of the dugong-specific aerial survey (Appendix FE of the document). Chevron acknowledges that there has been no modelling undertaken on additive effects. Chevron has proposed outcome-based conditions for the management of marine fauna (Draft EIS/ERMP, Chapter 12, Table 12.6) and will implement adaptive management measures, in consultation with appropriate departments. Part of these conditions will focus on managing all potential impacts to dugong populations in the Project area. Chevron is currently researching different methods for undertaking marine fauna observations at night, in recognition of the challenges that night time observations present.
8.5	**Coastal Processes**
20.46	"Figure 8.72 Shoreline Effects Caused by the Presence of MOF Breakwaters" Does this case scenario take into account the entire life-span of the Project (40-50years)?
	Figure 8.72 does not take into account the entire life span of the Project. It identifies those geomorphic features that may be disrupted through installation of the materials offloading facility breakwaters. Long-term shoreline effects will be influenced by the sand management system adopted for the Project and the future supply of sediment from the Ashburton River. Therefore, Figure 8.72 is effectively an artist's impression, although it has been based upon basic calculations. The "updrift" effect has been determined by considering the potential storage volume west of the MOF, which is approximately equivalent to a significant tropical cyclone impact). Although this area may be destabilised under certain conditions, the net supply from the Ashburton delta determines that it will accrete over time, requiring management of material on the updrift side).

	The "downdrift" effect has been calculated by considering the potential loss of material under three years of interrupted supply, which is approximately equivalent to a significant tropical cyclone impact. The eastern limit was defined by the Hooley Creek spit, which will be disrupted as a geomorphic feature as its western end falls into the "wave shadow" caused by the MOF breakwaters.
29.23	In Appendix P1, there is discussion on coastal and related processes (winds, waves, water levels, currents, rainfall and runoff, tropical cyclones, sediment transport), impacts of coastal processes on the development, and impacts of the development on coastal processes. That stated, it is considered that these impact assessments were limited in quantification. For example, there was no specific assessment of the likely long term recession east of the proposed MOF, or the risk of erosion and recession affecting the proposed development.
	It is recognised that there is a potential for long-term coastal impacts, such as erosion of the coast east of the materials offloading facility. However, Chevron will maintain the shoreline in the vicinity of the materials offloading facility at regular intervals to prevent greater impacts further inshore or to areas east and west of the materials offloading facility.
29.142	See attached comments from DSEWPaC consultants, Worley Parsons. In addition to these comments and associated requests for further information/clarification, DSEWPaC expects that an examination of the viability of a sand transfer system will be included in the Supplementary EIS. The document should also identify the potential impacts to the beach system if the transfer is not undertaken. The proposed future monitoring program should be explained in detail, and trigger levels for management actions identified.
	A sand management system will be implemented. The final version of the Coastal Processes Management Plan will contain full details regarding the sand management system, should this be required, to be implemented to mitigate against downdrift impacts, as well as the monitoring program. The Coastal Processes Management Plan cannot be finalised until after the release of the Ministerial Statement. An Outcome Based Condition (OBC) has been drafted and has been presented in the Draft Coastal Process Management Plan. This OBC is focussed on maintaining key coastal processes to ensure that the development does not impact on key sensitive habitats, including sawfish habitats. Both the OBC and Coastal Processes Management Plan will undergo further revisions and will be finalised prior to commencement of construction activities.

8.5.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.5	**Impact Assessment and Management**
29.19	Figure 8.72 of the EIS has schematics of updrift accretion and downdrift erosion patterns adjacent to the MOF, but given the lack of explanation in the text it is uncertain if this is simply an artist impression as opposed to a rigorous modelling outcome. It is considered that the downdrift impacts should be quantified based on modelling results and coastal processes understanding, such as in terms of predicted long term shoreline recession rates and spatial extents of recession. For example, over the long term these impacts may extend many kilometres downdrift of the MOF (the basis of the eastern limit of the erosion depicted in Figure 8.72 is uncertain and should be clarified).
	Figure 8.72 does not take into account the entire life span of the Project. It identifies those geomorphic features that may be disrupted through installation of the MOF breakwaters. Long-term shoreline effects will be influenced by and sand management system adopted for the Project and the future supply of sediment from the Ashburton River. Therefore, Figure 8.72 is effectively an artist's impression, although it has been based upon basic calculations. The "updrift" effect has been determined by considering the potential storage volume west of the MOF, which is approximately equivalent to a significant tropical cyclone impact). Although this area may be destabilised under certain conditions, the net supply from the Ashburton delta determines that it will accrete over time, requiring management of material on the updrift side). The "downdrift" effect has been calculated by considering the potential loss of material under three years of interrupted supply, which is approximately equivalent to a significant tropical cyclone impact. The eastern limit was defined by the Hooley Creek spit, which will be disrupted as a geomorphic feature as its western end falls into the "wave shadow" caused by the MOF breakwaters.
30.49	Is dredging of the Ashburton River mouth anticipated in future to prevent changes to flow path of the River? If not, how will it be ensured that the River does not alter course through the Project site as the mouth of the River silts up over time?
	Dredging of the Ashburton River mouth is not proposed. River flows, and to a lesser extent tidal exchange, maintains the channels entrance, with active sedimentation causing the growth and evolution of the deltaic structure. The river course is apparently controlled, at least in part, by rock features. Initial investigations suggest that this includes a lithified platform under the delta, which causes increased channel switching, but retains a consistent double-curved plan form. Sand features outside this platform are subject to significant evolution. The Project site is located on an old geomorphic feature corresponding to a previous higher sea level. This feature is likely to provide relative resistance to channel movement due to the height of the ridge and its comparatively coarse sediments. Weaker materials exist to the east of the dune ridge. There is some potential for reactivation of a palaeochannel immediately to the east of the Project site.
8.5.5.1	Construction of Nearshore Infrastructure
20.25	"Whilst remote, the capacity for increased channelization of Hooley Creek west provides potential for re-activation of the palaeochannel identified from the Ashburton River towards the Hooley Creek complex" In view of the following: • Ashburton North site is located within the Ashburton River delta (Chevron, 2010, p. 352) • Inundation could occur as frequently as every two years (Chevron, 2010, p. 355) • It is highly feasible to assume that a large flooding event from the Ashburton River to occur in the Project life-time of 30-50 years (Chevron, 2010, p. 11). • The Ashburton River mouth exit has moved significantly in recent years • Large proportion (25%) of flood flows flow east discharging into the Hooley Creek system (URS Macedon Study, p. 12-3) What is being done to prevent a change in the course of the Ashburton River to prevent an alternative exit point via Hooley Creek? What response will ensue should such an event occur?

The potential pathway from the Ashburton River through Hooley Creek has been considered carefully with respect to possible reactivation (which is increased flow through an existing minor flood path) and avulsion (preferential flow through a new major path). The palaeochannel pathway from the Ashburton River through to Hooley Creek has a 3km section at approximately 2m AHD before descending to the mudflat area. This is above the typical water levels of the Ashburton River and therefore requires a flood event for flows to travel along this pathway, estimated to be a 5 year ARI flood.

Avulsion requires blocking of the major flow path, which may occur at different parts of the river channel, but most commonly occurs near the entrance as a result of the dynamic marine environment. The Ashburton River has a history of avulsion within the low-lying delta due to the combination of channel sinuosity and bank breaching. Due to the large scale of the main Ashburton River channel, major avulsion requires a very large volume of material to cause a blockage. This may occur if:

1) a major cyclonic event caused the entrance to close
2) a sequence of extreme flood events causes massive deposition (such as observed at the Gascoyne River in around 1980)
3) a series of moderate depositions cause the channel to infill.

Although it is possible that these processes could occur, the likelihood of an event large enough to cause avulsion to the Hooley Creek pathway is extremely remote, as it must deposit a solid barrier above the Hooley Creek palaeochannel to a level of +2m AHD.

Reactivation may occur because of relatively minor morphologic change, such as a deepening at the junction of two flow paths, which may preferentially cause an increased volume of floodwaters to flow down the deeper channel, further eroding it. Change to the activation of river channels is a common phenomenon and is a major component of floodplain evolution. The potential for reactivation and avulsion has been discussed in the Draft EIS/ERMP, Appendix P1 (Sections 1.2.3, 4.1, 4.2, 4.3, 5.9.2, 5.10.2), with a risk assessment provided in the Draft EIS/ERMP (Section 8.5.5.2, 8.5.7 (Table 8.50, 8.5.8).

The Coastal Processes Management Plan presents the key risks to the coastal environment (including changes to Hooley Creek) and how the risks of these potential changes occurring will be managed. A key inclusion of this Plan will be detailed management measures that will be adopted to prevent and monitor impact on Hooley Creek and other key coastal habitats. The Coastal Processes Management Plan will not be finalised until after the release of the Ministerial Statement.

8.5.5.2 Construction of Onshore Infrastructure

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.5.3 Excavation of Borrow Pits

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

8.5.8 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.0 Terrestrial Risk Assessment and Management

9.0 Terrestrial Risk Assessment and Management	
9.0	**General Comments**
13.7a	Any treatment and application of pesticides and fumigants must be applied in accordance with the Health (Pesticides) Regulations 1956.
	Chevron wishes to avoid the use of Pesticides and fumigants where possible; however, in the event that chemicals are required the provisions within the *Health (Pesticides) Regulations 1956* will be complied with in regards to any pest control activities.
13.7b	A pest management plan should be adopted to ensure that the use of pesticides are minimised in the control of pests. Pests include insects, rodents, weeds, and where appropriate feral animals.
	The Terrestrial Flora and Vegetation Management Plan and Terrestrial Fauna Management Plan will include provisions for the control of introduced species. However, Chevron will avoid the use of chemical pest control methods wherever possible. Introduced fauna will be managed with quarantine procedures to be outlined in the Terrestrial Fauna Management Plan and appropriate waste control procedures to be described in the Waste Management Plan.
13.7c	Where pesticides are applied by a contractor then those person(s) must hold a current pesticides operator's licence with appropriate endorsements and also hold a current pest management firm registration.
	Any control of pests required by Chevron and/or its contractors will be conducted by a contractor with the appropriate licences and registrations.
13.7d	Where fumigants are applied, a licensed fumigator with the appropriate endorsements and employed by a registered fumigation firm is required. The fumigation must comply with Health (Pesticides) Regulations 1956, Australian Standards (AS 2476:2008) - General Fumigation Procedures and AQIS' quarantine requirements.
	Any contractor which may be employed as a fumigator will have the relevant up to date licenses and registrations. This is stated in the Fauna and Vegetation and Flora Management Plans. Any fumigation will comply with Health (Pesticides) Regulations 1956, Australian Standards (AS 2476:2008) - General Fumigation Procedures and AQIS' quarantine requirements.
13.8a	There are general requirements for all of proponents to control pests (weeds, plant pathogen, rodents, vectors, feral animals etc) on the site.
	Chevron acknowledges this statement.
13.8b	The proponents have highlighted the issues related to clearing of the land (vegetation), and the increase activity around the mine and surrounding area from personnel and vehicles.
	Statement – No Response Required.
13.8c	Proponents should develop a detailed Pest Management Plan which covers the prevention, implementation, monitoring and evaluation of a pest management plan. The Plan should be reviewed and modified as circumstances change or various phases of construction are completed. The Program should include an education component to all employees, contractors, visitors and the public who visit the site.
	The Fauna, and Vegetation and Flora Management Plans will have provisions for the prevention, implementation, monitoring and evaluation of pest species. Any required control of pests will be carried out before, during and after the completion of all construction activity. These Plans will also identify an education component required for all persons entering the site. The management actions relating to pests will be evaluated regularly via an audit process and revised as necessary. Follow-up site inspections to determine the effectiveness of management programs will be conducted.
13.8d	Where proponents/companies intend for their own employees to apply pesticide(s) as part of their Pest Management Program, then employees should be provided with sufficient knowledge, skills, training and personal protective equipment to undertake this task in a safe manner.

	Chevron will employ contractors to carry out any pesticide applications, however Chevron wishes to avoid the use of pesticides and chemicals in pest control where possible.
13.8e	There may be a situation where Chevron's Wheatstone Project may be required to conduct on-site fumigation and associated wash-down facility at the port [Ashburton North Strategic Industrial Area - Australian Quarantine Inspection Services (AQIS) Area]. The proponent should communicate with DOH (WA)'s Pesticide Safety and AQIS regarding the requirements for fumigation under the Health (Pesticides) Regulations 1956 and compliance with Australian Standards (AS 2476:2008) - General Fumigation Procedures. AQIS also have their own condition for fumigation. More detail information is required if fumigation is to be conducted by the proponents. Note: there are significant risks associated with the application of fumigants, including the escape of the fumigant, leaks, and misapplication when handling pesticides and fumigants. Chevron's Wheatstone Project should consider developing appropriate control measures to ensure public health and environmental impacts are minimised during such events or emergencies.
	During construction, Chevron will consult with the DOH and AQIS prior to any fumigation at the port. Should fumigation be required, Chevron (or the contractor conducting the fumigation activities) will develop appropriate control measures to manage any public health or environmental impacts. During operations, the port will be under the management of the Dampier Port Authority (DPA), therefore, any application of fumigants and pesticides will be carried out by the DPA and/or its contractors. It will be the DPA's responsibility to ensure that its obligations are being met under the *Health (Pesticides) Regulations 1956,* Australian Standards (AS 2476:2008) – General Fumigation Procedures and with AQIS regulations.

9.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.2 Soils and Landforms

9.2.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.2.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.2.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.2.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.2.5 Impact Assessment and Management

22.36	Acid Sulfate Soil Investigations and Management DPA suggest that a more detailed assessment be carried out in accordance with DEC Acid Sulfate Soil (ASS) Guideline Series, particularly in areas proposed for excavation or affected by groundwater disturbing activities. This will enable a comprehensive risk based map, and a more detailed management plan which is required to address how these issues are going to be addressed and managed. The material presented in the document was insufficient to adequately identify the risks, and appears to differ markedly from the State guidelines for risk assessment and mapping without explanation.

	The Soils and Landforms report was included in the Draft EIS/ERMP as Appendix H1. The authors believe that this report meets the DEC Guidelines. However, this report has since been updated to include testing of in excess of 2000 soil samples. These assessments were undertaken in general accordance with the DEC ASS Guideline Series. Where sampling and methodology deviated from the guidelines, justification was provided. The report provides sufficient evidence regarding the presence of PASS material within the boundaries of the Terrestrial Assessment Area. The updated report is included as Appendix H1.
22.37	Acid Sulfate Soil Investigations and Management
22.38	The ASS and discharge waters management plan requires more appropriate screening and management techniques to be adopted, Including the testing at discharge waters for acidity and not just pH, as saline waters act as a buffering agent. In addition, the use of liquid lime as the dosing agent is generally ineffective and very expensive. There are other much more effective methods that can be used.
	Chevron acknowledges the response from the DPA. An Acid Sulfate Soils Management Plan will be developed for the Project prior to construction commencing. Chevron will consult with the DEC regarding appropriate management measures, monitoring and mitigation actions.
9.2.5.1	Construction – Clearing and Earthworks
29.75	Based on DEC (2009), it is considered that ANC values should not be used to reduce the level of management required for the disturbance of ASS. The reasons are explained in Chapter 7.2.3 of DEC (2009). DEC (2009) has recommended that an Acid Sulfate Soil Management Plan (ASSMP) should be developed for sites that exceed the Texture-Based Action Criteria regardless of the outcome of standard ANC testing. Therefore, with reference to Chapter 7.2.3 of DEC (2009), justification should be provided as to why an ASSMP is not required for the onshore placement of dredged material.
	Chevron recognises DSEWPAC's concerns. As stated in Section 9.2.5.1 of the Draft EIS/ERMP, the Construction EMP will be developed and will include provisions for the management of Acid Sulfate Soils. The onshore dredge material placement area is no longer being considered as a viable option; as such the area will not require specific PASS management and will be managed under the ASSMP.
9.2.5.2	Operations – Earthworks and Maintenance
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.2.5.3	Leaks and Spills
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.2.6	**Implications for Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.2.7	**Residual Risk Summary**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.2.8	**Predicted Environmental Outcome**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	

9.3 Groundwater

30.52	What groundwater mounding is predicted from the placement of all fill for the elevation of the site (not only marine fill) and what are the potential impacts from the groundwater mounding?
	As stated in the Draft EIS/ERMP, temporary groundwater mounding is expected to occur. Appendix F1, Section 6.3.3, states that groundwater mounding of less than 0.5m may develop beneath the Plant Pad. This will be related to the placement of fill over the Project area and the mounding that may occur will not significantly impact on baseline groundwater flow directions. There is likely to be nominal groundwater mounding associated with SIC, with small scale local changes in water table elevation immediately adjacent to and beneath the access road embankment. Impacts from the groundwater mounding associated with the dredge material placement area are detailed in Section 9.3.5.1 of the Draft EIS/ERMP. However as the onshore dredge material placement area is no longer being considered as a viable option the groundwater impacts associated with its construction are no longer applicable.

9.3.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.5 Impact Assessment and Management

30.43	Trigger values, what ecosystems do these apply to? They appear to be approximately seawater salinity and in fresh water flows wouldn't get any higher. Is this anticipating higher salinities leaching from imported soil? Vegetation can be killed by freshwater inflows too. Could you please explain these criteria and how they relate to vegetation they are protecting?
	As stated in the Draft EIS/ERMP, Chevron will develop surface water trigger values prior to construction commencing. These values will be based on a significant amount of baseline water quality data gathered for the Wheatstone Project and in accordance with ANZECC Guidelines for Fresh and Marine Water Quality (2000).

9.3.5.1 Construction Earthworks – Dredge Material Placement Area

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.5.2 Presence of Infrastructure

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.5.3 Operational Spills and Leaks

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.3.8 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4 Surface Water

9.4.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.5 Impact Assessment and Management

9.4.5.1 Construction Earthworks – Clearing and Disturbance of Surface Soils

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.5.2 Construction Earthworks – Dredge Material Placement Area

30.9	Onshore dredge spoil disposal is discussed in the ERMP. While it is understood that this is not a preferred option by the proponent, it is expected that an Environmental Management Plan would be necessary if this activity is to gain Environmental Approval.
	Onshore dredge material placement is no longer considered a viable option for the Wheatstone Project. Therefore Chevron is not seeking Environmental Approval for this activity.

9.4.5.3 Construction Earthworks – Potential Acid Sulfate Soils

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.5.4 Operations – Presence of the Facilities

18.3	Another area of major concern to the Shire is with regard to the issue of hydrology and the impacts of flood waters from the proposed development and the 'infrastructure corridor'. More specifically, no assessment of the build up from flood waters on the development of the infrastructure corridor has adequately been considered in either the ERMP or the accompanying appendices.
30.41	What areas of vegetation will be affected by changes to surface water patterns? This relates not to flood events but long-term changes in water flows and tidal inundation due to structures, changes in elevations (including borrow areas) and diversions.

30.42	How will vegetation be impacted from changes in salinity in different areas due to changes in surface water flow and changes in tidal inundation? This relates not to flood events but long-term changes due to structures, changes in elevations (including borrow areas) and diversions. There is a wide site variation of surface water salinity. There is also a variation in the vegetation different areas support. Vegetation is adapted to various salinities.
	The Wheatstone Draft EIS/ERMP assessed risk to the surface water system from the presence of infrastructure. Using a conceptual model, residual risk was ranked as low: the conceptual model showed minor changes to surface water flows and flood heights that may be immeasurable. Please refer to Draft EIS/ERMP Chapter 9 (Sections 9.4.5.4 and 9.5.5.6) and Appendix G1 for further details. It is not expected that any changes to surface water flows or tidal inundation caused by the Wheatstone Project will significantly impact salinity levels or vegetation. Monitoring vegetation upstream and downstream of Project will take place to confirm the conceptual model predictions. Should an event occur outside of those predicted by the model, Chevron will implement management measures as outlined in the CEMP to mitigate changes in surface water flow or quality.
25.27	Terrestrial Factors - Fill material and borrow pit rehabilitation **Recommendation 40**: That the impacts of sourcing large amounts of fill from non-local, third-party quarries are defined and assessed as part of the proposal. **Recommendation 41**: That an outcome-based condition be applied that ensures that the transportation and use of fill used in the Project area does not result in the introduction or spread of any weed species or pest animal species within the site and its surrounds. **Recommendation 42**: That an outcome-based condition be applied to ensure that rehabilitated borrow pits included in this proposal are free draining and revegetated with local provenance species, and that the rehabilitation is sustainable and comparable in structure, diversity and weed burden to nearby undisturbed areas. Discussion: In addition to onsite borrow pits, onshore fill material for the raised plant pad may need to be sourced from a third-party quarry (p. 60). The impacts of sourcing fill would preferably have been considered as part of this proposal. Additionally, the movement of fill material from non-local third-party quarries has the potential to result in the spread of weeds and the introduction of new weeds to the site and its surrounds if it is not managed adequately. The ERMP (p. 716) states that "disturbed areas not required for future activities will be progressively rehabilitated....with rehabilitation procedures identified as part of the CEMP". Rehabilitation management strategies are outlined in the draft CEMP (p. 469, Appendix U1), but this document does not specify strategies for rehabilitation of borrow pits, and an appropriate outcome-based condition has not been proposed in Chapter 12. It is recommended that this matter is addressed either by outcome-based conditions or the development of a borrow pit management plan.
	Recommendation 40: Chevron understands the DEC's concerns regarding the importing of fill material. All fill/rock sourced outside of the TAA will be purchased from a third party who will be responsible for obtaining all appropriate environmental licenses. **Recommendation 41**: Chevron acknowledges that the DEC is concerned about the introduction and spread of introduced species from the transportation and use of fill within the Wheatstone site and its surrounds. Chevron currently includes provisions for the control of weed species in its Outcome Based Conditions, and will update these conditions to include pest animal species. The Management Plans will include strict quarantine measures for any fill which may be brought in from external sources as well as any transported within the site. Chevron's proposed Outcome Based Conditions will manage activities through all phases of the Project to reduce, as far as practicable, Project related impacts associated with the introduction and/or spread of introduced weed species or pest animal species within and adjacent to the TAA.

	Recommendation 42: An OBC will be developed on the recommendations of the DEC. As stated in the Draft EIS/ERMP (Section 2.3.3.1), borrow areas are anticipated to be rehabilitated to resemble the surrounding tidal flats as they are expected to be excavated to approximately 1 m AHD (consistent with the height of the adjacent tidal plains). This will allow water in rehabilitated areas to drain naturally into surrounding tidal areas. Should the levels of excavated borrow areas remain higher than 1 m AHD, topsoil collected from the same area will be used for rehabilitation. **Discussion:** Chevron understands the DEC's concerns regarding the importing of fill material. All fill/rock sourced outside of the TAA will be purchased from a third party who will be responsible for obtaining all appropriate environmental licenses. All fill/rock entering the Wheatstone site will be clean and all vehicles entering the site will be required to comply with the Wheatstone Project quarantine procedures.
32.3	The Department of Water in carrying out its role in floodplain management provides advice and recommends guidelines for development on floodplains with the object of minimising flood risk and damage. Our guiding principles are: • Proposed development has adequate protection from 100 year Average Recurrence Interval (ARI) flooding • Proposed development does not detrimentally impact on the existing 100 year ARI flooding regime of the general area
	Chevron acknowledges the recommendations from the DoW. The proposed development will be adequately designed to provide protection from a 1:100 year ARI flood event. For example, the minimum floor level clearance above estimated water levels for 1:100yr flood events throughout the plant area is 0.5 m - 1.0 m. In addition, the conceptual models have shown that in a 1:100 yr ARI flood event the development of the Wheatstone Project has minor, and possibly immeasurable, impact on the surface water characteristics of the area. As such, the residual risk to surface water from the presence of a raised plant pad and other infrastructure was deemed to be low.
32.4	With particular reference to the submitted ERMP, the following points should be noted: The hydrologic and hydraulic modelling methodology (for storm surge, riverine flooding and sea level rise Implications) is considered acceptable by the DoW. The proposed development generally has minimal impact on 100 year ARI flood levels. However, it should be noted that in one particular area, the 100 year ARI flood level increases by up to 0.50-1.0 metre (excluding the borrow pits). Nevertheless, this impact is considered acceptable as its extent is well contained and the area is a green-fields site.
	Chevron notes the statement from the DoW supporting the water modelling conducted for the Project.
32.5	For proposed habitable areas, a minimum floor level of 0.50 metres above the 100 year ARI flood level is generally recommended. As the 100 year ARI flood level in the proposed accommodation village area is up to 7.5 m AHD, this then requires a minimum habitable floor level of up to 8.0 m AHD, depending on where the dwellings are located. The current proposed pad level of 6.0 m AHD for the accommodation village does not provide the required level of flood protection.
	Chevron acknowledges the advice from the DoW. Chevron will undertake to develop the Accommodation Village to provide adequate protection for a 100 yr flood event. Floor levels of the proposed dwellings will be determined in the detailed design stage of the Project and will be subject to more detailed flood modelling.
32.6	For the proposed industrial facilities and shared infrastructure corridor it is proponent's decision to define their acceptable level of risk when establishing fill levels for adequate flood protection.
	Chevron acknowledges the DoWs statement. Chevron will establish adequate fill levels to provide protection from a 1:100 yr ARI flood event.

32.7	Flood protection levees are not considered best practice as they require ongoing management/maintenance and may fail during extreme flood events. If a flood protection levee is used to protect the accommodation village, the proponent must consider the scenario of a levee failure and have an appropriate emergency response plan. Also, all buildings should be set back sufficiently from the levee to protect against the potential erosive velocities in the event of a breach.
	Chevron acknowledges the DoWs recommendations regarding flood protection levees. Chevron does not anticipate using flood protection levees to protect the Accommodation Village.

9.4.5.5 Operations - Spills and Leaks

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.4.8 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5 Flora and Vegetation

30.33	Will the flora survey of borrow hill 4 be done before the end of the assessment and this information provided and impact included?
	A vegetation and flora survey was conducted in late October of the location of Borrow Site 4. This information is provided in Section 2.1.3.1 and is shown in Figure 2.3.

9.5.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.5 Impact Assessment and Management

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.5.1	Vegetation Clearing
25.30	***Weeds*** ***Recommendation 49**: That an outcome-based condition be applied to ensure that there is no increase in weed burden or number of weed species in the former Mount Minnie pastoral lease (proposed extension to Cane River) which DEC has purchased for addition to the conservation reserve system.* ***Recommendation 50**: That a weed hygiene and management plan be developed and implemented to the requirements of the OEPA on the advice of DEC. This plan to include, but not be limited to, mapping and control of the declared plants Parkinsonia (Parkinsonia aculeate) and mesquite (Prosopis pallida).* ***Recommendation 51**: That weed management zones are developed and implemented, based on weed species and burden, over the length of the pipeline.* ***Discussion**: The ERMP (p. 707) states that some vegetation units (in particular CD2, CS2 and CS4) were heavily infested with the weed species buffel grass (Cenchrus ciliaris) and/or mesquite. Section 6.3 of Appendix I1 (pp. 512-513) lists 11 weed species recorded from the Wheatstone study area, including two declared plants, being mesquite and parkinsonia. The infestation of mesquite in the west Pilbara is the largest in Australia, and poses a major threat to biodiversity values. Construction activities may increase the risk of spreading declared plants and environmental weeds, particularly into the proposed addition to Cane River Conservation Park.* *The ERMP provides little detail on proposed weed management. Objectives of the proponent's weed hygiene and management plan should include the eradication of the existing parkinsonia and mesquite within Project areas. The pipeline area may need to be divided into management zones, based on weed species and burden, in order to enable effective management. It is recommended that the weed management plan be developed to the requirements of the OEPA, on the advice of the Department of Agriculture and Food (DAF) and DEC. The Pilbara Mesquite Management Committee (Chaired by DAF) is an effective body to encourage ongoing liaison and cooperation between government agencies, the private sector and the community.*
	Recommendation 49: Weed control provisions are contained within the Vegetation and Flora Management OBC and Plan; however these are quarantine measures for the greater Project site. The OBC and Plan will be reviewed and updated where necessary to include specific requirements for weed control on DEC controlled estate, in consultation with the DEC. Chevron will comply with the: • Agricultural and Related Resources Protection Act 1976 • Western Australia Plant Diseases Act 1989 • Western Australia Conservation *and Land Management Act 1984* **Recommendation 50:** Weed hygiene and management actions are described in the Vegetation and Flora Management Plan. This Plan will continue to be developed prior to construction, and Chevron will continue to consult with the DEC during its development. This Plan will include, but not be limited to, mapping and control of the declared plants Parkinsonia (*Parkinsonia aculeate*) and mesquite (*Prosopis pallida*). **Recommendation 51:** Chevron will consult with the DEC and EPA regarding the development of weed management zones, based on weed species and burden, over the length of the pipeline. This consultation will take into account the fact that the domgas pipeline corridor is a facility that is shared with a number of proponents. **Discussion**: Chevron will consult with the DEC, DAF and The Pilbara Mesquite Management Committee during the development of the Vegetation and Flora Management Plan.
22.14	Common User Infrastructure and Corridors The draft documentation states that the proposed domgas pipeline will be located within the multiuser corridor. It also mentions that the corridor width will be reduced in areas of environmental significance. This may constrain other users of the corridor and prevent future development of the area, or force development into other areas. The document should critically evaluate the impact of avoiding these areas in the context of the ultimate development of the service corridor. It is noted that the Corridor will be vested with and managed by Landcorp.

	The location of the proposed domgas pipeline is constrained to restricted areas that have been designated by the State (Shared Infrastructure Corridor) and the Department of Regional Development and Lands (domgas pipeline). The State requires that the SIC be up to 500m wide to ensure sufficient access for future proponents to the Materials Offloading Facility. The Wheatstone Project will utilise up to 200m of the available width of the SIC. The Department of Regional Development and Lands have issued a Notice of Intention to Take (NOITT) land. This Notice will facilitate the creation of a 60 m wide domestic gas pipeline corridor from the Ashburton North Strategic Industrial Area to the Dampier Bunbury Natural Gas Pipeline. It is expected that both the Wheatstone and Macedon Projects will utilise this corridor for their domestic gas pipelines. Chevron will review the alignment of the linear infrastructure and attempt to avoid conservation significant vegetation units and flora, where practicable.
30.4	Vegetation and Flora Three vegetation sub-associations of High conservation significance and two units of Moderate significance were identified. Of these, one will be considerably impacted by the proposal by direct clearing: 45.81% of C3 Tecticornia spp. Low shrubland in saline claypans (Table 9.16, page 713). This unit supports the significant flora species Eleocharis papillose (see above).
	Chevron acknowledges this concern regarding the potential impact of the Project on vegetation sub-association C3 (*Tecticornia* spp. low shrubland in saline claypans). This issue has been discussed in Draft EIS/ERMP Section 9.5.5.1 (Table 9.16) which states: 1) For the purposes of this impact assessment, a conservative approach has been taken by assuming that all vegetation within the Project area will be cleared ("maximum clearance scenario"). This area of vegetation clearing is expected to be less than the "maximum clearance scenario". 2) Samphire (*Tecticornia* spp.) shrublands habitat occurs from the tip of the Exmouth Peninsula to east of Port Hedland. This comprises over 39,000ha mapped as 'samphire shrublands', along with over 301,000ha mapped as 'mudflat' by Beard (1975). It is therefore unlikely that any samphire sub-associations occurring in the Project area would be restricted to the immediate Project area. 3) The actual proportional clearing of vegetation sub-association C3 would therefore be expected to be considerably less than 40%. Onshore Environmental Consultants conducted a *Tecticornia* targeted survey across and adjacent to the site in 2010. This survey targeted *Tecticornia spp* "samphire shrublands" as described by Beard (1975) and located the vegetation complex within and outside of the TAA. Astron Environmental Services have also conducted flora surveys for the Gorgon Project approximately 150 km to the north of the site and for the Macedon Project to the South west of the Project site. These surveys have also identified *Tecticornia spp* "samphire shrublands" (Beard, 1975) within their survey areas. In summary, it is unlikely that 45.81% of vegetation sub-association C3 will actually be cleared, and it is also evidenced by unrelated surveys that this vegetation sub-association is not restricted to the immediate Project area. *E. papillosa* was recorded in only one location outside of the TAA. To ensure sufficient baseline for the species has been recorded an additional survey will be completed during optimum environmental conditions in 2011.
30.38	Vegetation units clearing percentage, particularly samphires. It should be shown that where the impact to vegetation communities is high, these occur in other areas.
	Chevron proposes that a maximum of 50% of the C3 vegetation unit (*Tecticornia sp* [samphire] shrublands) surveyed for the Wheatstone Project will be cleared during construction activities. This vegetation unit covers approximately 1200 ha of the ecological survey area, with approximately 530 ha of this vegetation unit is outside the TAA. In addition, Astron Environmental Services have also conducted flora surveys for the Gorgon Project (approximately 150 km north east of the site) and the Macedon Project (approximately 15 km south west of the Project Site). These surveys also identified the samphire shrublands.

30.39	The width of the pipeline corridor should be restricted in the proposed Cane River park extension. 20 m is usually recommended in environmentally sensitive areas. The location of turning areas should be shown.
	The Department of Regional Development and Lands have issued a Notice of Intention to Take (NOITT) land. This Notice will facilitate the creation of a 60 m wide domestic gas pipeline corridor from the Ashburton North Strategic Industrial Area to the Dampier Bunbury Natural Gas Pipeline. It is expected that both the Wheatstone and Macedon Projects will utilise this corridor for their domestic gas pipelines. Where practicable, Chevron will also use the same turnaround areas as those utilised by Macedon to reduce vegetation clearing.
30.46	Has the loss of vegetation from fill removal areas been included in the overall loss assessment?
	Vegetation and flora surveys have been conducted over the four Borrow Sites. The vegetation loss calculations have assumed that the entire area of each Borrow Site will be cleared. As stated in the Draft EIS/ERMP, Section 9.5.5.1, a 'maximum clearance scenario' has been assumed for the purpose of the EIS. The impact of this clearing has been taken into account in all risk and impact assessments. The Vegetation and Flora Management Plan will include provisions for the rehabilitation of these areas.
25.31	Conservation Significant Flora **Recommendation 52**: That the proponent avoids impacts on populations of Abutilon uncinatum (priority 1) and Eleocharis papillosa (priority 3 in WA and listed as a vulnerable species under the Environment Protection and Biodiversity Conservation Act 1999) (EPBC Act). **Recommendation 53**: That the proponent clarifies the number, distribution and habitat extent of the Tecticornia spp. within the survey area. **Recommendation 54**: That potential impacts from the Project infrastructure footprint, the dredge material placement area seepage footprint, and changes to surface water on the C3 vegetation unit (low Tecticornia shrubland in saline claypans) and the individual Tecticornia spp. within the vegetation unit be taken into consideration. **Recommendation 55**: That, if impacts on the known distribution of any Tecticornia sp. within the TAA are found to be significant, further survey work be undertaken to demonstrate that their distribution extends beyond the Project impact area. **Discussion**: The ERMP indicates that Eleocharis papillosa (Priority 3 in WA and vulnerable under the EPBC Act) and Abutilon uncinatum (Priority 1) were found in the survey area, but not within the Project area (p. 707). However, Appendix I1 (p. 497) states that the C3 vegetation unit supports E. papillosa and the ERMP indicates that over 44 per cent of the surveyed area of this vegetation unit will be cleared. This suggests that the proposal has the potential to impact on populations of E. papillosa. Efforts should be made to ensure that any amendments to the Project footprint within the survey area avoid impacts on these species. As noted above, over 44 per cent of the vegetation unit C3 (low Tecticornia shrubland in saline claypans) is to be cleared from the combined vegetation unit C3 and the vegetation units C3 /CP1 mosaic in a "maximum clearance scenario" (p. 710). The Tecticornia spp. are not differentiated. The proponent states that it is "unlikely that any samphire sub-associations occurring in the Project area would be restricted to the immediate Project area" (p. 710), but there is no information presented to support this statement. If impacts on any single species of Tecticornia are likely to be significant, further flora surveys beyond the Project footprint may need to be undertaken to demonstrate the wider distribution of the species. The C3 vegetation unit and the Tecticornia spp. are likely to be impacted by the seepage from the dredge material placement area and potential changes to surface water resulting from the raised plant bed. These potential impacts have not been factored into the flora survey area and the environmental impact assessment.

Recommendation 52: Chevron acknowledges the DECs concerns over the Project's impact on protected species. Chevron will endeavour to have as little impact on Conservation Significant species as reasonably practicable.

As stated in the Draft EIS/ERMP, Table 9.17, *E. papillosa* and *A. uncinatum* were not identified within the Project Footprint (TAA); however they were located within the Ecological study area. A subsequent survey (URS, 2010) located a number of populations of *A. uncinatum* alongside Onslow road (see Section 2.1.3.1). Biota (2009a) notes that this species is widespread within the Onslow locality. There is unlikely to be any impact to these roadside populations from the Wheatstone Project as the domgas pipeline will be situated in the NOITT corridor which is located approximately 50 m from the road.

E. papillosa has only been located at one site and this population is unlikely to be impacted. Subsequent surveys have failed to locate *E. papillosa* within the Project footprint due to environmental conditions not being appropriate for observation. An additional survey will be conducted at the optimal time in 2011 to determine if it does occur elsewhere in the area. As stated in the Draft EIS/ERMP, Table 9.17, Biota (2009a) notes that '*this species has a considerably broader distribution than previously thought*': this distribution includes a range of over 3000 km. If it is concluded that there will be significant impact to the species Chevron may consider relocation of any impacted individuals.

Recommendation 53: A *Tecticornia* targeted survey was conducted by Onshore Environmental Consultants across the site in 2009. Seven *Tecticornia* taxa were identified from samples collected. Six of these subspecies are not conservation significant; other samples found were grouped by the WA herbarium into the *Tecticornia halocnemoides* 'complex'. These taxa can not be identified to species in the field. As such, the number of each species identified within the survey area is not able to be provided.

Astron Environmental Services have also conducted flora surveys for the Gorgon Project approximately 150 km north east of the site. These surveys have also identified the *Tecticornia halocnemoides* complex. In addition, the Macedon Project to the south-west of the Project site identified undescribed *Tecticornia* species. It can therefore be concluded that the *Tecticornia halocnemoides* complex is not restricted to the Project area. Chevron's Vegetation and Flora Management Plan will contain measures to manage clearing activities within the TAA and avoid locations of the *Tecticornia halocnemoides* complex where practicable.

Recommendation 54: The DEC's concerns will be addressed in the OBC's and Environmental Management Plans which will be developed to assess potential impact on vegetation from potential changes in surface water quality and flows, within and adjacent to the TAA. However, the concern relating to seepage from the onshore dredge material placement area is now no longer applicable with the removal of this option.

Recommendation 55: Onshore Environmental Consultants conducted a targeted *Tecticornia* survey across the site in 2009. This survey identified seven *Tecticornia* taxa from samples collected. Six of these subspecies are not conservation significant; other samples found were grouped by the WA Herbarium into the *Tecticornia halocnemoides* 'complex'. Although the Herbarium was unable to provide any guidance on the conservation significance of this complex, Chevron has taken a conservative approach and classified them as "undescribed".

Astron Environmental Services have also conducted flora surveys for the Gorgon Project approximately 150 km north east of the site. These surveys have also identified the *Tecticornia halocnemoides* complex. In addition, the Macedon Project to the south-west of the Project site identified undescribed *Tecticornia* Species. As such it was concluded that the *Tecticornia halocnemoides* complex is not restricted to the Project area. Chevron's Terrestrial Vegetation and Flora Management Plan will contain measures to manage clearing activities within the TAA and avoid locations of the *Tecticornia halocnemoides* complex where practicable, and Chevron will investigate other opportunities to conduct further work in association with other ANSIA proponents to increase our knowledge of the Tecticornia halocnemoides complex.

9.5.5.2 Earthworks

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.5.3	Vehicular Activity
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.5.5.4	Fire
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.5.5.5	Air Emissions
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.5.5.6	Surface Water Diversion
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.5.5.7	Dust Suppression
30.45	Dust suppression on roads, tracks and hardstand – will saline water be used? How will run-off from roads be managed (particularly in non-saline environments)?
	Chevron recognises the EPA's comment. Dust suppression will be required to reduce risk to road users and site personnel, and to reduce the risk of vegetation loss due to suffocation of flora by dust. Saline water is likely to be used for dust suppression on roads during construction. As stated in Section 9.5.5.7 of the Draft EIS/ERMP, there may be some impact from dust suppression activities however with the adoption of the management controls and mitigation measures presented this section, and which will be contained within the subsidiary Dust Management Plan developed as part of the CEMP, the residual risk of dust suppression activities to vegetation and flora has been assessed as low.
9.5.5.8	Operational Leaks and Spills
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
9.5.5.9	Dredge Material Placement Area
25.29	Impacts of the dredge material placement area and raised plant bed Recommendation 44: That an outcome-based condition be applied that ensures that the Project has no significant impacts on flora, fauna and vegetation communities outside the Terrestrial Assessment Area (TAA), as areas outside the TAA have not been subject to environmental impact assessment. Recommendation 45: That any potential areas of impact outside the TAA, such as the seepage footprint from the dredge material placement area or creeklines potentially impacted by changes to surface water flows resulting from the raised plant pad, are subject to Level 2 flora and vegetation surveys (in accordance with EPA Guidance Statement No. 51) and environmental impact assessment prior to disturbance. Recommendation 46: That potential impacts on flora, vegetation and watercourses of the Ashburton River Delta (in particular at West Hooley Creek, East Hooley Creek, Eastern Creek and Four Miles) caused by the seepage discharge from the dredge material placement area and/or changes to surface water flow resulting from the raised plant pads, are monitored over the duration of the Project, with monitoring commencing prior to construction to ensure that adequate baseline data are collected. Recommendation 47: That appropriate trigger levels for water quality and vegetation health are developed for potentially affected species and communities of conservation significance adjacent to and downstream of the dredge material placement area and the raised plant pad. Recommendation 48: That contingency measures are developed prior to construction of the dredge material placement area, and the raised plant pad be implemented in the event that the seepage or changes to surface water flow result in exceedance of the agreed trigger levels for water quality and vegetation health.

Discussion: The proponent has not identified possible impacts on areas outside the TAA resulting directly from this proposal. It appears from Figure 9.3 (p. 687) that the potential seepage discharge footprint from the dredge material placement area extends outside the TAA. The presence of a raised plant pad and other infrastructure may result in a residual risk to surface water flows. The ERMP indicates that stream flow in the tidal reaches of West Hooley Creek, East Hooley Creek, Eastern Creek and Four Mile Creek may be altered, resulting in changes to floodwater depths, stream flow periods, peak discharges and stream flow velocities (p. 700). There is also the potential for increased sediment loads (p. 703). These factors have the potential to impact on flora and fauna beyond the TAA. If this Project is approved, then Level 2 flora and vegetation surveys (in accordance with EPA Guidance Statement No. 51) of the expected seepage footprint and the creeklines potentially impacted by changes to surface water flow should be undertaken and impacts on species and communities of conservation significance assessed, either prior to approval or as a condition of approval.

The seepage of saline to hypersaline groundwater and seawater beneath the perimeter bunds of the dredge material placement area may express as groundwater discharge on the ground surface on the outside perimeter of the placement area. Deposition and accumulation of salt is expected at locations where the seepage expresses at the ground surface. The potential for inundation over an extended period and the accumulation of salt may cause impacts on vegetation and habitat outside of the TAA.

In relation to surface water flows, the proponent notes (p. 697) that "sedimentation traps and silt fences may be constructed on the local water courses and on the perimeters of the earthworks areas". It is unclear in the document whether and where sedimentation traps and silt fences will be installed and what would trigger this action. These matters require consideration with respect to a number of environmental impacts, but in particular impacts on vegetation communities of local conservation significance, such as 'Tecticornia spp. Low shrubland in saline claypans' (Vegetation Code C3) and watercourses of the Ashburton River Delta. The potential for such impacts beyond the TAA has not been adequately considered in the ERMP.

The proponent states that a "framework Construction EMP (Appendix U1) has been developed which, in part, provide a high level indication of how impacts to surface water will be managed" (p. 707). However, the draft CEMP document includes less management information than the ERMP on this matter. Chapter 12 of the ERMP also contains a commitment to the development of subsidiary environmental management plans (EMP), which would detail work scopes and specific mitigation and management measures, but these subsidiary EMPs are internal Chevron documents, not subject to regulatory review. If the proposal is approved, then conditions are suggested to ensure that the proponent assesses and limits potential impacts on locally significant vegetation communities, and the Ashburton River Delta watercourses beyond the current extent of the TAA and not considered in the ERMP.

Recommendation 44: The Wheatstone Project Ecological Survey Area is approximately 13 000 ha and the TAA occupies an area of approximately 3460 ha within this survey area (see Figure 3.6). Chevron does not anticipate any impacts from the Wheatstone Project to the flora and vegetation communities outside the TAA, and as such, have not subjected these areas to an environmental impact assessment.

Recommendation 45: Onshore dredge placement is no longer considered an option for the Wheatstone Project. Therefore, Chevron does not anticipate any impact on vegetation communities outside the TAA due to seepage from the onshore dredge material placement area. In addition, Chevron does not anticipate any impacts to vegetation communities outside the TAA due to changes in the surface water flows resulting from the raised plant pad.

Recommendation 46*:* Environmental monitoring will form an integral part of the Project construction and operations. Chevron will conduct monitoring of the flora, vegetation and surface water of the Ashburton River Delta, including prior to construction to provide adequate baseline data. Please refer to Draft EIS/ERMP Chapter 12 (Section 12.2.2.1) for further details.

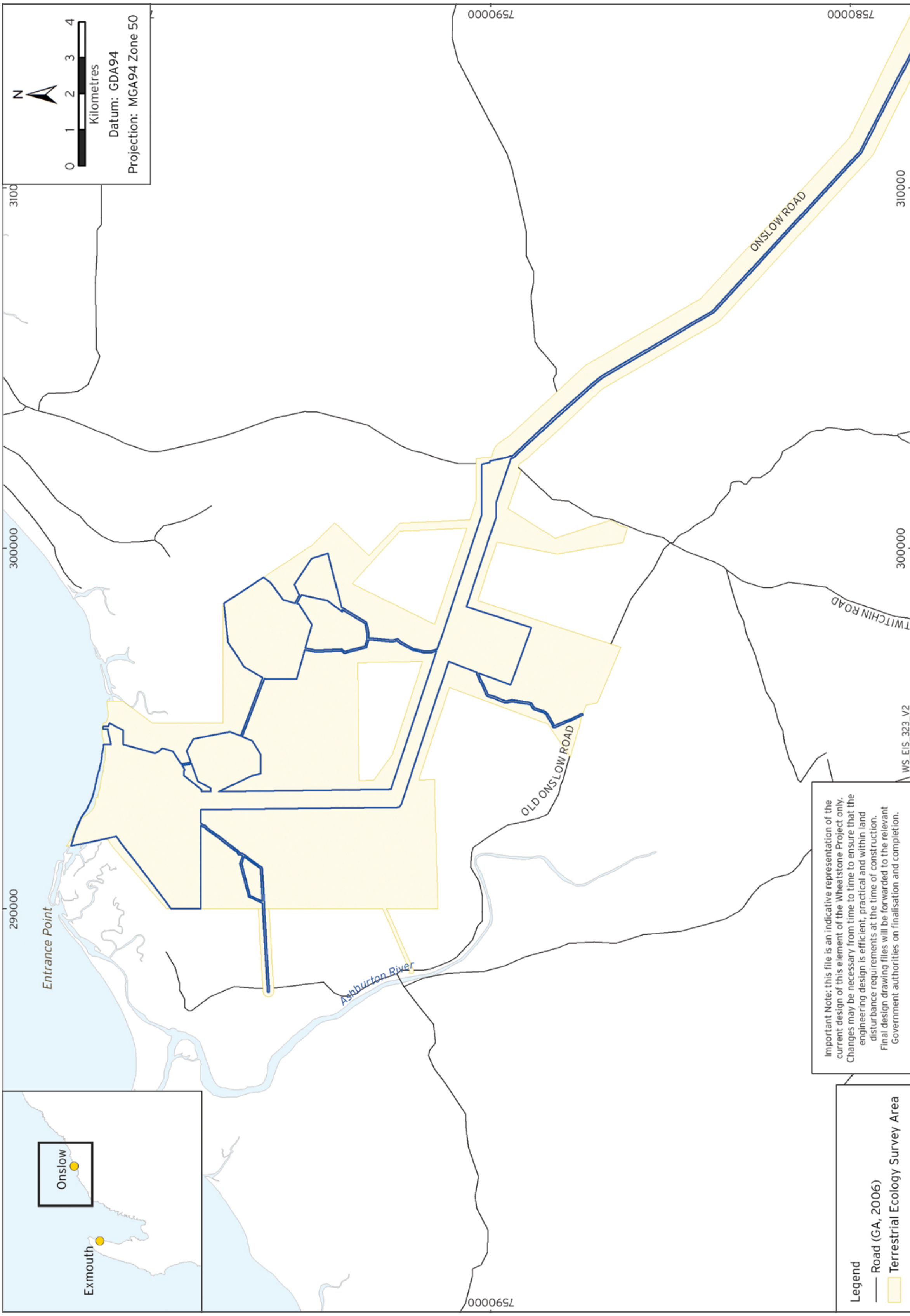


Figure 3.6: Terrestrial Ecological Survey Area

Recommendation 47: The Vegetation and Flora Management Plan and Outcome Based Conditions will include monitoring of vegetation adjacent to, and downstream of, the raised plant pad. This monitoring will be used to assess the impact of any possible changes in surface water quality or quantity has on vegetation. Trigger levels for water quality and vegetation health will be developed in consultation with the DEC. These levels have yet to be developed as Chevron is continuing to conduct studies to further inform the baseline knowledge from which these trigger levels will be determined. The onshore dredge placement area is no longer being considered a viable option for the Wheatstone Project.

Recommendation 48: The Vegetation and Flora Management Plan and Outcome Based Conditions will provide a framework for management of potential impacts on the water quality and vegetation health of the site. The plan will include a monitoring program to observe any potential impact of changes in surface water quality and quantity which may impact on the diversity and health of the vegetation adjacent to, and downstream of, the raised plant pad. These management plans will also include contingency measures in the event that the trigger levels, which will be finalised in consultation with the DEC prior to construction, are exceeded. The option of an onshore dredge spoil placement area is no longer being considered.

Discussion: Chevron acknowledges the DEC's comments. Chevron does not anticipate major changes in the quality and quantity of surface water over the Project. The sporadic nature of the areas surface water and the inclusion of engineering measures over the Project area will assist in reducing and potential impacts to flows.

It is anticipated that the Project may have some minor impact on groundwater mounding. As such groundwater management and monitoring measures will reflect the final design of the Project.

Chevron will develop monitoring programs to survey any possible impacts changes in surface water quality and quantity and groundwater mounding may have on the diversity and health of the vegetation across the Project site. Management plans will also include contingency measures in the event that the trigger levels, which have yet to be determined, are exceeded. These programs will extend outside of the current boundaries of the TAA.

9.5.6 Implications for Matters of National Environmental Significance

29.135 Dwarf Desert Spike-rush

It is noted that Chevron does not anticipate having an impact on the species, however the Supplementary EIS must outline the contingency measures in place in the event that the species is identified within the pipeline footprint. This includes consideration of the feasibility of pipeline realignment.

Chevron acknowledges WorleyParsons' concerns associated with the potential impacts to the Dwarf Desert Spike-rush Eleocharis papillosa, which was recorded within the creekline habitat in the northern section of the domgas pipeline survey area. No populations of E. papillosa were located within the domgas pipeline corridor

Biota (2009) considers it likely that this species is present throughout this creekline habitat and potentially in suitable habitat elsewhere in the survey area, however due to its small size and seasonal/environmental growth habit it can only be located under suitable environmental conditions. In an attempt to find additional locations outside of the Project impact area, Chevron commissioned a further two surveys to search for threatened flora species and in particular E. papillosa - OES in January 2010 and URS in June 2010. However, these surveys were not able to locate the species. This is likely due to lack of significant precipitation in the last half of 2009 and 2010. Consequently Chevron is preparing to conduct another targeted survey following appropriate rainfall in the first half of 2011.

It is Chevron's intention to be able to illustrate that the species is not just found in the one known location, but is also found in additional locations outside of the survey area. Pre-clearance threatened flora surveys will also be conducted and should E. papillosa be found in the footprint of the proposed domgas pipeline in the Project Area, the plants may be moved, in liaison with DEWHA, as stated in Chapter 9 (Section 9.5.6) of the Draft EIS/ERMP. Realignment of the domgas pipeline may be possible; however the alignment is currently contained to within a 60m wide pipeline corridor lease area designated by Department of Regional Development and Lands.

9.5.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.5.8 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6 Terrestrial Fauna

30.5	The fauna survey reports contained in Appendices J1, K1, L1 and M1 used appropriate survey methodology and generally provide adequate information to determine the respective fauna values present or expected to be present at the site. Other regional fauna surveys in similar habitats nearby have been used to provide regional context for the fauna and compensate for limitations of the current survey which was a single season survey and some areas were not able to be accessed. No additional fauna management issues have been identified by this review.
	Chevron acknowledges this submission.

9.6.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.2 Description of Factor

9.6.2.1 Fauna Habitat

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.2.2 Vertebrate Fauna

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.2.3 Invertebrate Fauna

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5 Impact Assessment and Management

9.6.5.1 Vegetation Clearing

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.2	Earthworks
25.32	***Fauna management with respect to trenching for pipeline construction*** ***Recommendation 56****: That the environmental approval conditions incorporate management commitments for terrestrial fauna with respect to onshore pipeline trenches. At a minimum, it is recommended that the conditions reflect the conditions applied to the proposed Macedon pipeline, as these pipelines are proposed to occur within the same infrastructure corridor or directly adjacent to each other.* ***Recommendation 57****: That the proponent develops and implements a fauna management plan that includes best practice management to mitigate potential impacts on fauna resulting from trenching for the domgas pipeline construction to the requirements of the OEPA, on the advice of DEC.* ***Discussion****: Given that a large number of vertebrate fauna have been recorded in the survey area, including six threatened species, and that trenching will be undertaken within a proposed conservation reserve, this activity poses a significant risk to fauna conservation if not managed to an appropriate standard.* *The proponent does not provide a firm commitment to best practice fauna management in relation to trenching for pipeline construction. The proponent indicates that strategies for mitigating impacts on fauna during the domgas pipelines trenching operations will be prepared taking into account The Australian Pipeline Industry Association Ltd Code of Environmental Practice Onshore Pipelines (2009), and then lists some management strategies that may be applied (p. 733).* *The ERMP refers to the draft CEMP for additional management. However, the draft CEMP contains little management detail in this area. The ERMP contains more detailed management strategies, but lacks the commitment to implement these strategies. The proponent states that a "Subsidiary (internal) Management Plan will be developed that specifies the management and mitigation measures and actions which will be implemented to limit Project related impacts to terrestrial fauna" (p. 743). However, the subsidiary management plans are not externally reviewed or legally binding. Furthermore, a subsidiary management plan for terrestrial fauna is not included in the list of management commitments and plans in Table 12.13 (p. 891).* *It is suggested that a fauna management plan be developed in consultation with DEC, incorporating the proponent's commitments and the Regulation 17 Licence to Take Fauna For Scientific Purposes, under the Wildlife Conservation Act 1950. Under conditions of the fauna licence, DEC may require that the proponent be required to provide monthly fauna reports, take photographs of rare or significant species to confirm species identification, notify DEC immediately of any taking of species of conservation significance and provide deceased fauna to the WA Museum as voucher specimens where appropriate.*
	Recommendation 56: Chevron will employ The Australian Pipeline Industry Association Ltd *Code of Environmental Practice Onshore Pipelines* (2009) in the development of a Fauna Management Plan and will include management actions to reduce the impact of trenching for the domgas pipeline on fauna. This will include engineering controls in addition to monitoring programs. **Recommendation 57:** Chevron will develop a Fauna Management Plan and will include management actions to reduce the impact of trenching for the domgas pipeline on fauna. This will include engineering controls in addition to monitoring programs. Chevron will develop practicable management measures and will implement these in accordance with The Australian Pipeline Industry Association Ltd *Code of Environmental Practice Onshore Pipelines* (2009). **Discussion:** Chevron will develop the Terrestrial Fauna Management Plan in consultation with the DEC. It should be noted that of the six species of threatened fauna identified within the survey area, only one species was not avian (Pebble Mound Mouse), and only signs of the past presence of this species (disused Pebble Mound Mouse Mound) was located. As stated within the EIS, it is anticipated that the Project will have an overall low residual risk of having a significant impact on terrestrial fauna in the region.
9.6.5.3	Fire

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.4 Vehicular Activity

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.5 Flaring

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.6 Noise Emissions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.7 Operational Leaks and Spills

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.8 Light Emissions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.9 Waste Handling and Storage

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.5.10 Physical Presence of Infrastructure

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.6 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.7 Residual Risk Summary

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.6.8 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.7 Subterranean Fauna

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

9.8 Air Quality

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.0 Social Risk Assessment and Management

10.0 Social Risk Assessment and Management	
10.0	**General Comments**
7.1	Some of our concerns regarding the Wheatstone Project are: safety of our boat and crew
	Chevron acknowledges concerns surrounding the safety of commercial fishing boats and crew within the local area. Chevron is committed to conducting activities associated with the Wheatstone Project in an environmentally responsible and safe manner. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role will be to liaise between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities such as dredging, pipelaying and vessel traffic. The liaison will be the point of contact for discussing and addressing safety concerns should they arise. Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing, including the safety of boats and crew.
8.1	An initial general comment is the ad hoc nature of reference to commercial fishing, pearling and aquaculture throughout the document. There are times when it is unclear if pearling is included under fishing or aquaculture within the studies proposed across the range of environmental and social issues.
	Chevron acknowledges concerns associated with the reference to commercial fishing, pearling and aquaculture throughout the Draft EIS/ERMP and would like to confirm baseline characteristics of the receiving social environment as described in Chapter 6: Overview of the Existing Environment. In particular, sections 6.3.9.8 – Fish, 6.3.9.9 – Prawns, 6.3.9.10 – Pearl Oysters and 6.5.3.1 – Natural Capital, were all considered in the development and assessment process of the Draft EIS/ERMP. Pearling was assessed as part of a Fishing and Pearling study, and was analysed from both a fishing and aquaculture perspective to ensure the full range of impacts were analysed.
8.10	Employment Risk Assessment - needs to include as an outcome an understanding of the impact of LNG on other industries across labour and infrastructure access/costs (e.g. port facilities).
	Chevron acknowledges the submitter's comment, although it notes that as approved in the Scoping Document, Chevron was not required to undertake an employment risk assessment in the Draft EIS/ERMP. However, Chevron considers it has provided sufficient information within the Draft EIS/ERMP for commercial businesses to conduct an assessment of how the Project may impact them.
8.13	*Public Submission* looks forward to participating in the future consultation process established for these assessments in an effort to ensure the pearling and LNG industries can co-exist in the Pilbara region.
	Chevron acknowledges the interest in ensuring pearling continues to be represented in future consultation processes and looks forward to working with the pearling industry during the development of the Wheatstone Project. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing and pearling, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities such as dredging, pipelaying and vessel traffic. Chevron has, and will continue to liaise with the DoF on matters relating to commercial and recreational fishing.

8.22	Issue: Better boating facilities for Onslow Impact: Upgrade of boating facilities in Onslow Phase: Construction & Operation Risk: Critical
	Chevron acknowledges concerns surrounding the upgrade of boating facilities in Onslow. As approved in the Scoping Document, upgrading boating facilities is outside of the scope of the EIS/ERMP assessment requirements. Chevron will be evaluating investment in recreation infrastructure for Onslow, including marine recreational infrastructure that may be directly or indirectly impacted by Chevron's construction and operation activities.
13.6	Water The proponent has considered potential cumulative impacts associated with future industrial development and impacts on the town of Onslow. However, there is little indication of the potential burden of future developments on the town's water supply and sewerage.
	Chevron acknowledges the Department of Health's concern regarding the potential burden of future developments on Onslow's water supply and sewerage. Chevron is aware of the water supply and sewerage constraints in Onslow. Chevron is, therefore, proposing to establish a dedicated water supply for its activities as soon as practical. Chevron is intending that this water supply is available during the early stages of construction; however, it is possible that any Chevron personnel accommodated in existing Onslow facilities will use water from the existing sources for personal purposes – washing etc. Chevron's preferred water source option is for seawater desalination. Currently Chevron is not proposing to abstract groundwater. However, if this option becomes more viable then appropriate testing and permitting will be carried-out in consultation with the Department of Water to ensure that there is no impact on Onslow's water supply. Chevron also participates in the Ashburton North Infrastructure Working Group which is responsible for such issues and is in the process of negotiating a funding contribution towards a future water supply and waste water treatment facilities that can service the Onslow community.
18.1	Social Impact Assessment A significant omission in the ERMP documentation is the lack of social or community assessment resulting from there being two permanent towns - one at Onslow with very limited community infrastructure and the other some 16km away in the form of a well provisioned operational workforce camp within the ANSIA which will have duration of up to 50 years. The Council does not support the 'two town' proposal as envisaged by Chevron Australia and reflected in the Social Impact Assessment of the ERMP.
	Chevron acknowledges concerns regarding the establishment of a well provisioned operational workforce camp within the ANSIA that could lead to a 'two town' situation. This concern is outside the assessment framework of the EIS/ERMP, however Chevron is in ongoing discussions with the Shire of Ashburton, the Department of State Development and other key government agencies to determine a suitable location for the FIFO operations camp.

18.2	Social Impact Assessment A contradiction appears to exist in between Chevron's advice to the Shire and the community in relation to operational staff. Chevron has clearly stated in the ERMP that all (400) operational staff will be located in the proposed transient workforce accommodation camp within the ANSIA. Based on Chevron's own ERMP, no operational staff is proposed to be located in Onslow. This arrangement for operational staff conflicts with what is stated in Chevron's draft Amendment No. 10, where the provisions provide that no operational staff is anticipated at Ashburton North, except for the proviso that should the opportunity in Onslow for available accommodation not arise (due to infrastructure limitations), temporary operational staff would be housed at the ANSIA. The draft Structure Plan however proposes some operational staff to be located in Onslow potentially comprising: Scenario 1: 25 per cent of ANSIA operations workforces are residential in Onslow. The remaining 75 per cent of the operations workforces are fly-in, fly-out and reside in fully self sufficient operations camps at the ANSIA. Scenario 2: 25 per cent of operations workforces are residential in Onslow. The remaining 75 per cent of the operations workforces. Clearly the operational workforce arrangements conflict with the planning proposals as submitted by the company. No alteration or clarification to the ERMP to reflect the above advice has been provided by Chevron.
	Chevron acknowledges the Shire of Ashburton's comment regarding the location of the operational workforce accommodation. A final decision on locating a portion of the workforce as residents in Onslow had not been made before the Draft EIS/ERMP was made public, and therefore it was not included. Chevron is assessing the feasibility of locating a portion of its operational workforce as residents within Onslow with the remaining staff being fly-in-fly-out (FIFO). At present, the lack of essential infrastructure at Onslow means it is not feasible to locate the operational workforce in Onslow, and Chevron cannot make a final decision on the location of its operational workforce until there is more information about the future availability of essential infrastructure. Chevron is in ongoing discussions with the Shire of Ashburton, the Department of State Development and other key government agencies to determine a suitable location for the FIFO operations camp.
18.4	As the EPA is aware, the ERMP is a massive document covering over 900 pages with Technical Appendices covering over 7000 pages. The Shire does not have the facilities, staff or resources to address the information provided. Accordingly, the Shire will depend upon the professional assessment of the EPA in determining the appropriateness or otherwise of the ERMP. However, the matters raised in this submission are critical for the Shire and the ultimate development of the ANSIA and in particular, Chevron's proposed LNG and domestic gas plant near Onslow.
	Chevron acknowledges the Shire of Ashburton's comments in regard to their resource constraints and subsequent dependence on the professional assessment of the EPA.
20.23	Social impacts on Exmouth DEWHA general advice and guidelines (Appendices A1, p.11) states a requirement to "Identification of effected parties, including a statement mentioning any communities that may be affected and describing their views." The Exmouth community doesn't appear to have been identified. Should the community of Exmouth be impacted by any of the following: • Population growth (either permanent residential, as suggested by Premier Barnett, or a construction camp) • Increased vehicular traffic utilising North West Cape air space or marine bases • Increased marine traffic utilising the nearby waters, then the community of Exmouth should have been identified and included in this process, should there be any impacts to the community of Exmouth please provide a social impact assessment of such.

	Chevron acknowledges the Cape Conservation Group's concerns associated with social impacts at Exmouth, however as approved in the Scoping Document, assessment of these impacts is not required in the Draft EIS/ERMP. At the present time, Chevron intends to accommodate its construction workforce at the Ashburton North Strategic Industrial Area (Ashburton North SIA). Fly-in-fly-out staff may be recruited from any location in Australia (including Exmouth), and Chevron will provide transport to and from Onslow for the employee's shift rotation. Due to the distance between Exmouth and the Ashburton North SIA, Chevron does not anticipate any significant population growth in Exmouth as a result of the Project's construction workforce. As with the construction phase, Chevron will support fly-in-fly-out operations by recruiting people from around Australia (including Exmouth). During the operations phase, it is likely that employees will be based in Onslow due to its proximity to the Ashburton North SIA, and Chevron is in ongoing discussions with the Shire of Ashburton, the Department of State Development and other key government agencies to determine a suitable location for the operations workforce accommodation. Due to the distance between Exmouth and the Ashburton North SIA, Chevron does not anticipate any significant population growth in Exmouth as a result of the Project's operations workforce. There has been no decision about whether the Project will utilise the North West Cape air space or marine bases. If Chevron decides to pursue this option in the future it will be subject to standard impact assessments as required by the EPA, and stakeholder consultation. If necessary, a traffic impact assessment will be completed as part of the assessment process. Chevron has yet to finalise its assessment of marine traffic as logistics are continuing to evolve through the Front End Engineering Design phase. When this body of work is completed, Chevron will liaise with the relevant state and local authorities regarding management measures and whether a social impact assessment is required.
29.145	While social and economic considerations are not driving the assessment at this point, the Minister will need to consider these aspects in making an approval decision. As such, DEWHA may have further comments or questions on these matters.
	Chevron acknowledges the Minister's role in considering social and economic considerations when making an approval decision.
10.1	**Introduction**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
10.2	**European Cultural Heritage**
10.1	Heritage Matters It appears that heritage matters are addressed by the ERMP document. A review of sites and records in this Department and seven comprehensive heritage surveys of the proposed plant site and surrounding areas have been completed between 2009 - 2010. The reports identifying the 78 previously unrecorded archaeological sites should be supplied to DIA. It is stated that a Heritage Agreement has been signed with the Buurabalayji Thalanyji Association Incorporation (BTAI), for and on behalf of the Thalanyji people in 2008, and it is the Thalanyji representatives who have taken part in the surveys. Chevron state that additional surveys will be performed to investigate other areas identified by Chevron that could be potentially affected (p781 , Volume II) The map at Figure 10.4 shows where Aboriginal heritage surveys have been conducted at Ashburton North (p780, Volume II). It is assumed that the blue Terrestrial Assessment Area in that map still remains to be surveyed, and will be surveyed as stated.
	Chevron will undertake additional surveys to investigate other areas identified by Chevron that could be potentially affected. Chevron will provide an updated map of survey areas for the Department of Indigenous Affairs' (DIA) reference in December 2010 and June 2011.

26.1	Subsequent Approvals We note that planning approval is required from the Shire of Ashburton for the Project. Under Section 78 of the Heritage of Western Australia Act 1990, where any land is entered in the State Register of Heritage Places, all applications for approval of development under the Planning and Development Act 2005 must be referred to the Heritage Council for advice. We further note that the Shire of Ashburton's process outlined in Section 6.5.2 includes an assessment of social issues affecting the locality's amenity, cultural significance and heritage.
	Chevron is aware that development applications which impact on the Old Onslow Townsite will be referred to the Heritage Council for advice, and that this is the appropriate mechanism under the Heritage of Western Australia Act 1990 for the Heritage Council to provide its advice. Chevron will provide information on heritage impacts to the Shire of Ashburton in the Wheatstone Project Social Impact Statement, which is included as part of the Project's development application.

10.2.1 Management Objective

No submissions were received on this section of the draft EIS/ERMP. See appendix a for the location of all submissions in this document.

10.2.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.2.3 Assessment Framework

26.2	Assessment Framework The draft Development Impact Mitigation Plan (DIMP) was submitted to the Heritage Council for their preliminary assessment In May 2010. The Council recommended a Heritage Agreement as a mechanism to ensure that the cultural significance of the Old Onslow Townsite is managed appropriately. This is further outlined in the Heritage Council's advice to the proponent dated 21 June 2010, which is attached.
	Chevron will enter into a Heritage Agreement with the Heritage Council WA and is in the process of reviewing the draft Agreement provided by the Office of Heritage.

10.2.4 Impact Assessment and Management

26.3	Impact Assessment and Management The levels of significance referred to in the document are based on conservation policies contained within the Old Onslow Townsite Conservation Plan (1998), which is not a statutory document. The Heritage Council does not endorse levels of significance, nor does it classify significance for places on the State Register of Heritage Places. Guiding documents such as Conservation Plans identify levels of significance for each place, and provide policies in relation to managing that significance. For the purposes of this review, it is considered that all areas in the registered curtilage are significant and further research will need to be undertaken to inform subsequent management policy. The Conservation Plan for the place will be reviewed and updated to better reflect the current situation.
	Chevron acknowledges the Heritage Council's concerns associated with identifying levels of significance within the registered place 3444. Chevron has committed to develop an updated Conservation Plan based on new research currently being undertaken. The new Conservation Plan is likely to be completed late 2011 and will be developed in consultation with the Office of Heritage and the Shire of Ashburton.

10.2.4.1	Impact on European Cultural Heritage Sites and Artefacts
26.4	Impact on European Cultural Heritage Sites and Artefacts Archaeological investigations are currently underway to survey and document the existing archaeological evidence prior to any physical impact as a result of the Wheatstone Project. Archaeologists have identified remains of an earlier jetty structure dating from 1896 that is considered significant for its contribution to an understanding of the development of nineteenth century northwest ports. Furthermore, as a result of maritime and terrestrial archaeological excavations it has been determined that the registered curtilage will need to be amended to reflect current surveys of the place. Internal processes are currently underway to ensure that this takes place prior to any formal development application being submitted with the Shire of Ashburton.
	Chevron acknowledges the Heritage Council WA is in the process of amending the registered curtilage to reflect current surveys, and the amendments will be in place before the Project's development application is submitted to the Shire of Ashburton.
26.5	As outlined above, the Heritage Council has not assigned levels of significance to the Old Onslow Townsite or Cemetery, which is identified here as being the "most significant areas of heritage value in the locality". A review of the Conservation Plan, which is a condition of the Heritage Council's support for the proposed Project, will make recommendations regarding the levels of significance at the time of writing. Furthermore, it is anticipated that the potential impact to the Old Townsite including the cemetery will increase considerably with the Influx of visitors to the place as a result of the construction and operation of the Project. The Heritage Council has recommended that appropriate guidelines for visitors are developed by Chevron Australia to ensure that such impact Is minimised.
	Chevron acknowledges the Heritage Council's concerns associated with identifying levels of significance within the registered place 3444. Chevron has committed to develop an updated Conservation Plan based on the new research currently being undertaken. The new Conservation Plan is likely to be completed late 2011 and will be developed in consultation with the Office of Heritage. While Chevron has no jurisdictional authority to develop guidelines for access to the Old Onslow Townsite by non-Project personnel, all workers on the Project will receive information about Old Onslow and guidelines for visiting Old Onslow as part of their induction training.

10.2.4.2 Impact on European Cultural Heritage Values

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.2.5 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.2.6 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.3 Aboriginal Cultural Heritage

10.3.1 Management Objective

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.3.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.3.3	**Assessment Framework**
10.2	The document also states that Chevron will develop a Wheatstone Project Cultural Heritage Management Plan (CHMP) in consultation with BTAI and DIA, which is expected to be finalised in 2010 (p781, Volume II). It was stated in the Draft EIS/ERMP that the CHMP would be submitted to DIA after the submission of the EIS/ERMP (12.4, p37). DIA advise that consultation has not yet taken place on the CHMP, and the CHMP has not been received. It is hoped that this consultation will begin soon, particularly if it is intended to complete the plan in 2010
	Chevron consulted with DIA regarding the CHMP on September 15, 2010. The meeting was held with Dr Kathryn Przywolnik (Registrar of Aboriginal Sites), Ryan Crawford (Senior Heritage Officer), Robert Brock (Senior Heritage Officer) and Cesar Rodriguez. Chevron will consult with DIA when the CHMP is being finalised in late 2010.
10.3.4	**Impact Assessment and Management**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
10.3.5	**Implications for Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
10.3.6	**Predicted Environmental Outcome**
10.3	Section 10.3.6 states that Chevron will manage impacts to sites, with the objective that such impacts do not breach the Aboriginal Heritage Act 1972, and this may include obtaining all necessary Section 18 Notices (p781, Volume II). It is suggested that the word "may" be removed, and "will" added instead.
	Chevron will change the wording to reflect DIA's comment. The new wording will read: "Chevron will manage impacts to sites, with the objective that such impacts do not breach the Aboriginal Heritage Act 1972, and this will include obtaining all necessary Section 18 Notices".
10.4	**Local Fishing and Pearling**
7.3	Some of our concerns regarding the Wheatstone Project are: Loss of fishing grounds due to the permanent changing of the ocean floor.
	Chevron acknowledges the concern associated with potential alteration of the ocean floor. Potential direct and indirect impacts to fisheries from habitat disturbance are discussed in Chapter 8 (Section 8.4.5.2) of the Draft EIS/ERMP, while Chapter 10 (Section 10.4) of the Draft EIS/ERMP outlines the fisheries applicable to the Onslow area. It is expected the Environmental Protection Act management objective for local fishing will be achieved. *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.* In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including a loss of fishery access. Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing throughout the development of the Project. Additional information outlining potential impacts to the Onslow Prawn Managed Fishery, in particular, has been included in Appendix FH of the document.

8.2	As pearling is a mixture of wild resource fishing as well as aquaculture (in the pearl culture grow-out phase) the public submitter would appreciate the inclusion of the word 'pearling' together with fishing and aquaculture in each instance in future documentation so as not to lose its significance through any reader's assumption that our industry is covered by reference to one of the others. It is also recognition of pearling as one of the longest established and significant industries in the region which is noted in the text of the document on several occasions.
	Chevron acknowledges the concern associated with the recognition of the pearling industry's significance, and as a result Chevron will ensure that 'pearling' is included in all instances considered appropriate in future documentation.
8.4	The public submitter is also concerned at the wording relating to pearling activity in the vicinity of Onslow LNG site which appears to brush off the area as unimportant for the pearling industry. The public submitter wishes to advise that with changes in pearl farming technology and potential shift of species due to climate change the Onslow area may again be a major site for pearling operations well within an impact distance of the LNG precinct area.
	The potential direct and indirect impacts to pearl species from Project construction and operation are discussed in Chapter 8 (Section 8.4.5.2) of the Draft EIS/ERMP. This section indicates that *Pinctada maxima* is able to cope with high suspended sediment loads and that they have a long breeding season. This information suggests that spawning and settling would still occur during and after dredging and placement activities. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including a loss of access to the fishery. Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing throughout the development of the Project. Fisheries key to the Onslow area are outlined in Chapter 10 (Section 10.4) of the Draft EIS/ERMP. As approved in the Environmental Scoping Document, potential impacts to the pearling industry were deemed to be negligible and therefore not considered in the risk assessment process for social impacts.
8.5	Concerned about at the lack of formal inclusion of the Department of Fisheries WA in the schedule of roles and responsibilities of key parties in the assessment stages such as 'understanding the environment' and 'predicting impacts, proposing alternatives and assessing effectiveness of potential mitigation and management of impacts'. DoF WA has the expertise to provide the necessary role in regard to fish and molluscs.
	This issue is addressed throughout the Draft EIS/ERMP. In particular, Section 5.3 states that: "Consultation was undertaken with key identified stakeholders as part of the scoping and EIS/ERMP preparation process…. Workshops and meetings were held with…. Department of Fisheries (DoF)… focused on: • Chevron's application of the risk-based approach to the Project • Initial risk assessment results • The scopes and methodologies associated with the high and medium environmental, social and health factors for the Project • Issues associated with dredging and dredge material disposal. Section 10.4.7.1 states that: "In cases where the Project footprint intersects a fishery, advice was sought from fishing industry stakeholders and the DoF to determine which fisheries should be further assessed." Section 10.4.2 states that: "a total of 26 interviews were conducted with key stakeholders including the Western Australian DoF….for their views on potential issues/impacts." Chevron is committed to engaging with relevant stakeholders and has actively consulted representatives from the DoF. Chevron would kindly refer the public submitter to Appendix B (Table 2 : Summary of Stakeholder Consultation Completed to Date) of the Draft EIS/ERMP. A summary of the consultation with DoF is provided as follows:

Purpose	Date
Project overview and site selection process comments	Dec 3, 2008
Discussions on fishing industry operations around Onslow and potential impacts	Dec 8, 2008
Risk-based scoping workshop – Intro to process and Chevron's application	Feb 17, 2009
Project update and dredge program information	Feb 16, 2009 Mar 22, 2010
Discuss DoF comments on Draft EIS/ERMP	May 11, 2010 June 21, 2010

In addition to Chevron's consultation stated above, the following table presents consultation undertaken by Chevron's contractors for the Wheatstone Project when developing the fishing and pearling impact assessment.

Interviewee	Relevant Expertise	Date
Errol Sporer Mervi Kangas	Prawn fisheries	11/5/09
Mike Cranley	License sale administration and fisheries adjustment scheme	10/6/09
Martin Holts	Administration of fisheries closure compensation scheme	10/6/09
Mike Dunne	Pilbara fishing activity, enforcement and education	10/5/09
Jason Froud	Pearl fisheries	18/6/09
Fiona Vom Berg	Aquaculture	22/6/09

Chevron has also engaged with industry peak bodies and commercial licence holders which can also be identified in Table 2 of Appendix B of the Draft EIS/ERMP.

Chevron considers DoF and local fisheries as key stakeholders in the Project and will continue to engage with them. Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing throughout future development of the Wheatstone Project.

28.32 The effect of increased vessel traffic does not appear to have been addressed in this section. There will be a large increase in vessel movement during both the construction and the operational phase of this project. If fishing vessels engaged in fishing operations are required to pull up nets prematurely to avoid vessels, this will result in reduced catches.

Chevron acknowledges the DoF's concerns associated with increased vessel traffic during the construction and operational phase of the Project. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner.

This issue is discussed in Chapter 10 (Section 10.4.7.1 – Commercial Fishing) of the Draft EIS/ERMP, and was assessed as a Medium impact (of Major consequence and Possible likelihood). It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved.

> *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.*

In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will be the point of contact should license holders believe they are experiencing significant commercial or operational impacts from increased vessel traffic associated with the Project. Further, Chevron has, and will continue to, liaise with DoF on matters relating to commercial and recreational fishing.

28.33	Some of the descriptions of fisheries and fishery areas in table 10.9 (p 792) are not totally accurate. For instance, the Trawl fishery actually is limited to 4 Areas within the one zone. It is likely the spatial exclusion of fishing operations on the fleet will be greater than considered by the proponent. In addition, the northern shark fishery is still operating and is likely to continue for some time; in the table it is citied as, "effectively closed". This table needs to be reviewed.
	Chevron acknowledges the DoF's concerns associated with the descriptions of fisheries and fishery areas noted in Table 10.9 – Interaction of Commercial Fishing Areas with Project Footprint of the Wheatstone Project Draft EIS/ERMP. The information contained in the Draft EIS/ERMP was drawn from published reports such as the State of Fisheries Reports, and from interviews with key stakeholders. In cases where the Project footprint intersected a fishery, advice was sought from fishing industry stakeholders and the DoF to determine which fisheries should be further assessed. For example, it was in a meeting with DoF that Chevron was advised that the northern shark fishery is "effectively closed" and therefore no further assessment was undertaken. Chevron acknowledges that some of information may not be "totally accurate", however it was based on the best information available at the time.
31.1	It must be highlighted that it has been extremely difficult to respond to the EIS, in the level of detail that is required, within the required timeframe. With a significant number of resource sector developments underway around the State, overlapping with the fishing grounds of many of WA's commercial fisheries, it has and continues to put considerable strain on organisations such as ours to respond adequately on behalf of our members. Consequently, WAFIC sought funds from Chevron to engage the services of an Independent consultant to prepare a submission, based on their advice. This request was not supported by Chevron. In fact, we received no formal response to our letter.
	Chevron acknowledges WAFIC's concerns associated with providing a resource to assist with a response to the EIS/ERMP. Chevron has assessed the range of environmental and social impacts of the Project in this EIS/ERMP, as approved in the Project's Scoping Document. Chevron's internal process requires a peer review which provides Chevron with a level of assurance as to its assessment. In additional, as a result of extensive consultation, Chevron has received 32 submissions with approximately 550 individual comments in relation to the EIS/ERMP. Chevron has not accepted requests from individual reviewers to provide resources as Chevron considers that the EIS/ERMP has been the subject of extensive independent review. Chevron apologises this was not formally conveyed to WAFIC following its request for funding assistance.
31.6	We also note the comments made by the NBPFA about the installation of moorings by Chevron in Mangrove Passage, within the fishing boundaries of the Onslow Prawn Fishery without consultation with the fishing industry. Clarification as to whether this matter should be covered in the EIS would be useful.
	The moorings referred to by the Western Australian Fishing Industry Council have not been installed for the Project and have therefore not been included in the Draft EIS/ERMP. Should the installation of moorings become necessary in the future, Chevron will consult with the affected fisheries via the Western Australian Fishing Industry Council and obtain all necessary approvals, including those that may be required by the Dampier Port Authority. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including installation of moorings. Further, Chevron has, and will continue to liaise with DoF on matters relating to commercial and recreational fishing throughout the development of the Project.

10.4.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.4.2	Description of Factor
28.26	More specific details of recreational fishing methodology are required. It is stated that interviews were conducted, but was a standard questionnaire used? How was this data analysed? Was there calibration or validation of survey answers? How does the methodology used in this survey compared with that used in the National Recreation and Indigenous Fishing survey 2003. (Hernry, G. and Lyle J. editors. Australian Government Department of Agriculture, Fisheries and Forestry publication.

Chevron acknowledges DoF's concerns associated with the methodology of the recreational fishing study. Chevron is committed to a best-practice approach with regard to the assessment of the Wheatstone Project and can confirm the following.

This Fishing and Pearling study included:

- A literature review
- Individual and group interviews
- Several types of analysis including a prediction of socio-economic impacts and development of impact management responses.

Interviews were conducted with the Western Australian DoF, State commercial fishing industry bodies and commercial fishers concerned with prawning, trap fishing, pearling and crabbing – in total 21 interviews were undertaken across the commercial fishing industry.

Intercept surveys/Validation

Intercept surveys were also conducted of recreational fishers at popular fishing and recreational locations around Onslow. Recreational fishing industry organisations (for example, RecFishWest, charter boat operators, tourism providers) were interviewed for their views on potential issues.

Recreational fishing values were identified in two rounds of interview research. Firstly, as part of broad-ranging interviews with a sample of more than 60 residents of Onslow, areas of highest fishing activity were identified by the individual mapping of recreational uses and values. Values data were then collated and geographically referenced to highlight "hot spots" – where intercept surveys were then conducted.

10.4.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.4.4	**Consequence Definitions**
28.10	The marine impacts consequence definitions in Table 7.7 do not adequately capture the consequences in relation to commercial loss. A short term (one season) reduction in catch is defined as minor. DoF believes that a reduction of catch for one season can have massive consequences for commercial viability. Likewise a temporary restriction of access from certain areas of the fishery can result in massive commercial loss. Even short-term reduction in catches can have major long-term effects on commercial viability. Markets can be lost to competitors as a result of even a short-term disruption in supply. Running and operating costs remain high while revenue is reduced from reduced sales. A short-term reduction in catches will usually result in the loss of experienced crew. Crew on fishing boats are paid as a percentage of the catch. A short-term reduction in catch will result in a decrease in wages for the crew, often making it unviable to remain in the industry. Fishing vessel owners are already struggling to keep experienced crew due to the competition from the mining industry in this area. In summary, the definitions do not reflect the consequences and need to be revised. It is expected that this re-evaluation will affect the risk rating.
	Chevron acknowledges DoF's concerns associated with consequence definitions. This issue is discussed in Chapter 7: Impact Assessment Methodology (Section 7.3.5.1 – Consequence definitions) of the Draft EIS/ERMP. In particular, this section describes the thorough process by which consequence definitions were developed, including being drafted by various experts, their presentation to and recommendation by the Environmental Protection Authority (EPA) Board and then testing and revision through stakeholder workshops. Chevron is committed to a best-practice approach with regard to the assessment of the Wheatstone Project. Chevron has, and will continue to liaise with the DoF on all matters relating to commercial and recreational fishing.
28.11	The marine impacts consequence definitions in Table 7.7 do not adequately capture the consequences in relation to a reduction in the recreational fishing experience. In this region, there are limited recreational opportunities to occupy residents and workers. Recreational fishing is one of the most popular recreational activities available. A reduction in the quality of the fishing experience for one year is not a minor consequence. There may be an increase in anti-social behaviour due to boredom. The effects may be greater for some groups within the community than others. For example, individuals in lower socio-economic groups and minors may engage predominately in shore-based fishing, therefore if access to these local areas is restricted, then the ability to fish elsewhere may not be an option. Individuals with boats may not be affected to the same extent and can seek alternative sites to fish. In summary, the definitions do not reflect the consequences and need to be revised. It is expected that this re-evaluation will affect the risk rating.
	This issue is discussed in Section 7.3.5.1 of the Draft EIS/ERMP. In particular, this section describes the thorough process by which consequence definitions were developed including being drafted by various experts, presentation to and recommendation by the Environmental Protection Authority (EPA) Board and then testing and revision through stakeholder workshops. Chevron is committed to a best-practice approach with regard to the assessment of the Wheatstone Project and will continue to liaise with DoF throughout its future development.
10.4.5	**Impact Assessment and Management**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	

10.4.5.1	Recreational Fishing

25.26	Key residual impacts and conservation offsets
	Recommendation 38: That the proponent commits to offset actions as part of an overall offset strategy to address residual impacts on fauna of conservation significance and nature reserves. Proposed offset actions to be formalised and include actions to address the following residual impacts:
	• Loss and degradation of threatened fauna habitat (including around island nature reserves, seagrass habitats, macroalgae communities and filter-feeder habitat) and regionally significant reef communities surrounding island nature reserves resulting from dredging, spoil disposal and trunkline installation
	• Loss of ecosystem integrity at Hooley Creek and Four Mile Creek ecosystems resulting from the onshore construction footprint and subsequent changes to their hydrology and primary productivity
	• Disturbance to marine fauna of conservation significance (including humpback whales, marine turtles, dugong and shorebirds/seabirds) resulting from marine construction activities, vessel disturbance, light emissions and noise emissions
	• Impacts associated with increased recreational activities within island nature reserves and marine parks and reserves in the locality and region.
	Recommendation 39: That the following projects be considered as possible offset measures to improve collective knowledge of marine conservation values in the region and assist in long-term conservation management in the proposal area.
	• Studies to improve the understanding of the ecological connectivity between areas in the Zones of Impact and Zone of Influence and regionally significant conservation areas:
	  • To the north (Montebello Islands and Barrow Island marine conservation reserves)
	  • To the east (areas of interest for marine conservation - Great Sandy Islands/Dampier Archipelago)
	  • To the west (Muiron Islands Marine Management Area and Ningaloo Marine Park).
	• Regional dugong and turtle foraging activity surveys to determine areas that are regionally significant for dugong in the south-west Pilbara, and to better characterise key habitats in the Zone of Influence
	• Long-term monitoring of marine turtles and shorebirds/seabirds on island nature reserves to determine trends in nesting abundance and recruitment during the implementation of the Project
	• Assisting DEC with resources to manage and monitor the predicted increased recreational impacts on island nature reserves due to the implementation of this development, including the collection of baseline data on seabird and turtle populations
	• Assisting DEC with resources to develop and implement management plans for nature reserves potentially affected by increased recreational access associated with the significant increase in residential human population attributed to both the construction and operational phases of this project.
	Discussion: There is currently no commitment by the proponent toward offsetting key residual impacts associated with the implementation of this project. As highlighted in this advice, there are a number of residual impacts on high value conservation assets that will result from the implementation of this project.
	Given the degree of residual impacts predicted by the proponent and on the basis that high conservation value assets will be impacted, consideration needs to be given to the development and implementation of a conservation offsets package of initiatives.

31.9	The report states that "There is potential for recreational fishing by the Project workforce to impact on commercial and recreational fishing in the area". WAFIC does not support the take of fish recreationally from commercial resource sector vessels and has recently approached Government to introduce legislation that will prohibit this activity from occurring. The take of fish recreationally by these vessels, not only by the Wheatstone workforce but all resource developments, has the potential to substantially increase fishing effort and impact on the sustainability of a range of Pilbara species and result in a resource re-allocation from the commercial to the recreational sector. That is, noting that the catch of Pilbara commercial fisheries is capped. The Department of Fisheries are insufficiently resourced to monitor or manage increasing recreational fishing effort in the Pilbara region (and other regions), with the last creel survey conducted in 1999/2000.

	Chevron acknowledges the submitters' concern about the impact of increased marine recreational activities and recreational fishing by the Project workforce. It also acknowledges the Environmental Protection Agency's (EPA) Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the relevant departments. Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management, Section 10.4.5.1 Recreational Fishing which explains: *"The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:* • Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road. • Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct. • A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken. • Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery. • Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow. • For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF). The Recreation Code of Conduct will set expectations about how the workforce engages in recreational activities within island nature reserves, marine parks and reserves in the locality and region. Chevron will also provide workforce education about the local marine environment, no-take zones, DoF's regulations, fishing restrictions in marine parks, adhering to rules governing island nature reserves and marine parks, and sustainable fishing practices. Compliance with government regulations designed to minimise human impacts will be mandatory. Personal boats and recreational vehicles will be prohibited from the workforce accommodation village and the access road from Onslow Road to the Ashburton North SIA to discourage the construction workforce from bringing their own boats to Onslow. Chevron will work with the Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands generally, with a key focus being those islands within a 25km radius of Onslow. It will also work in partnership with the WA DoF to reduce potential risks from workforce recreational fishing to fish stocks, island nature reserves, marine parks, and reserves in the locality. Chevron acknowledges the Environmental Protection Agency's (EPA) Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the relevant departments.
31.10	Some options to address this issue could be to support Government introducing the necessary legislation to restrict on-board recreational fishing from Chevron and its contracting vessels associated with the Wheatstone report (as suggested above). In addition to this, ensuring there is sufficient funding provided to the Department of Fisheries to conduct regular surveys of recreational fishing effort so that adequate recreational fisheries management can be put In place.

	Chevron acknowledges the Western Australian Fishing Industry Council's (WAFIC) concerns associated with recreational fishing by the Project workforce. Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management, Section 10.4.5.1 Recreational Fishing which explains: *"The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:* • Boats and recreational vehicles will not be permitted within the workforce accommodation village or the access road from the Onslow Road. • Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct. • A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken. • Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery. • Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow. • For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF)." Chevron has, and will continue to liaise with DoF on all matters relating to commercial and recreational fishing, which may include discussion on the issues raised in this submission.
28.25	The Department is keen to discuss the development of a package of mitigation strategies to combat this risk, as part of the proponent's social licence.
	Chevron would like to confirm information included in Chapter 10: Social Risk Assessment and Management, Section 10.4.5.1 Recreational Fishing which explains that Chevron will work with DoF to reduce potential risks to the existing recreational fishery.
10.4.6	**Implications for Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
10.4.7	**Residual Risk Summary**
10.4.7.1	Commercial Fishing
7.2	Some of our concerns regarding the Wheatstone Project are: loss of fishing grounds from exclusion zones while work is done
7.6	We compared chart pages 4 & 16 in the Community booklet against our fishing charts (c-plot) which identified the pipe line and dredge material disposal/storage area to cover some of the main areas of our fishing business.
8.23	Issue: Exclusion areas around rigs and infrastructure. Impact: Loss available fishing areas. Existing productive fishing areas may become off limits. Phase: Operation Risk: High
28.31	This section does not consider the impact on the State's biggest finfish fishery – Pilbara Trawl (see also table 10.9, p 792). This fishery is likely to be the significantly impacted due to the exclusion zones around submarine facilities. This section should be revised to reflect this potential impact. Table 10.8 (pp 799-790) and Table 10.10 (pp 795-797) list residual risks to fisheries of the Project. Many of the Project activities will impose medium (residual) risk.
28.34	Cyclone mooring buoys required for this and other projects in this area will have an impact on the fishing grounds. A large number of cyclone moorings will be constructed over the coming months in Mangrove Passage and this will have further impact on the OPF and should be considered in the risk assessment.

31.8	The report states that "The Project will affect only a small proportion of the available commercial and recreational fishing areas in the region. Target fish species are well-represented in the region and permanent changes as a result of the Project should have negligible effect on fish abundance". It would be useful to know what information has been used to support this statement. Advice consistently across all Pilbara Wetline Fishery operators is that the proposed location of the pipeline (that appears to follow the 100m depth contour) overlaps with their main fishing grounds for Goldband Snapper and Saddletail where there are commercial quantities of these species. The pipeline travels approximately 180km through the middle of this fishery. These fishermen, who operate from Exmouth and operate predominantly the western end of the Pilbara have not been able to locate these species in any numbers in other areas. Restricted access to this area during the construction phase is likely to heavily impact on the viability of these businesses. Further assessment of the importance of this area for these species is required. With regard to the Mackerel Fishery, fishermen have indicated that the proposed pipeline will intercept key areas of mackerel spawning aggregation which are fished at key times of the year north-west of Thevenard Island.
31.11	The report states that "It is possible there will be some impacts on commercial fishing. However, Chevron will liaise with holders of commercial fishing licences to manage any impacts identified. The residual risk from the Project on local fishing and pearling is Medium." Given the direct overlap between the key fishing grounds and prawn nurseries of the Onslow Prawn Fishery with the proposed marine facilities site and corridors and the Pilbara Wetline with the proposed pipeline how does Chevron propose it will 'manage' any impacts identified? We find these comments somewhat unhelpful and it suggests a considerable lack of understanding about where and how these commercial fisheries operate.
31.13	Exclusion zones during dredging will be temporary and impacts will only affect a small proportion of fishing areas." More information is required by industry on the exclusion zones that will apply, where and for how long to minimise impacts on industry and to work in with current fishing seasons. While the areas being affected may be small they may be significant in terms of abundance re Goldband Snapper stocks deeper than 100m depth.

Chevron acknowledges the submitters' concerns about how exclusion zones, restricted access, dredge material disposal and the presence of Project-related infrastructure may affect commercial fishing and pearling operations in the Project area.

The following information and data sources were used to support the finding that the Project will affect only a small proportion of the available commercial fishing areas in the region, and that target fish species are well-represented in the region and permanent changes as a result of the Project should have negligible effect on fish abundance:

- Chapter 8 of the Draft EIS/ERMP
- A literature review (including State of Fisheries reports and other Department of Fisheries publications)
- Individual and group interviews, including with Western Australian Fishing Industry Council, the Western Australian Department of Fisheries, other commercial fishing industry bodies, and commercial fishers involved with prawning, trap fishing, pearling and crabbing – in total 21 interviews were undertaken across the commercial fishing industry
- Several types of analysis including a prediction of socio-economic impacts and development of impact management responses.

In regard to the fisheries included for assessment, in Chapter 10: Social Risk Assessment and Management, Table 10.9 lists those to be screened for further examination and upon which the Draft EIS/ERMP has been developed and assessed. For the Pilbara trawl fishery, it was found that the Project footprint intersects the fishery, and hence there was analysis of whether to include an assessment of impacts. The analysis showed the fishery consists of two zones, and Zone 1 in the south west of Fishery has had zero effort allocated for more than ten years. The Project pipeline and offshore platform intersects Zone 2 of the fishery but represents a very small proportion of the license area and interaction is likely to be minimal. There will be some operational and commercial impacts from safety exclusion areas, however no significant impacts are expected on trawling operations. Therefore, no additional assessment was warranted.

	In regard to concerns associated with the installation of moorings in Mangrove Passage, the moorings referred to are not being put in place for the Wheatstone Project and therefore they do not need to be included in the EIS/ERMP. Should the Project need to install moorings in the future, it will consult with DoF and the affected fisheries via WAFIC, and will obtain all necessary approvals, including those that may be required by the Dampier Port Authority. In order to manage potential impacts on fishing within the area, Chevron will appoint a staff member whose role will involve liaising between Chevron and holders of commercial fishing licenses. The liaison person will provide information on key Project activities such as exclusion zones, restricted access, dredge material disposal activities and the presence of Project-related infrastructure. Further, Chevron has, and will continue to, liaise with DoF on all matters relating to commercial and recreational fishing.
8.12	Vessel Movements - outcomes should include an assessment of the cost of additional marking & lighting of marine leases forced upon operators due to increased vessel traffic and a risk assessment of the impact of increased vessel traffic on pearl industry.
	Chevron acknowledges the public submitter's comment, although it notes that as approved in the Environmental Scoping Document, Chevron was not required to undertake an assessment of the cost of additional marking and lighting of marine leases due to increased vessel traffic in the Draft EIS/ERMP. However, Chevron has provided sufficient information within the Draft EIS/ERMP for commercial businesses to conduct an assessment of how the Project may impact them. In regard to assessing the impact of increased vessel traffic during the construction and operational phase of the Project, this issue is discussed in Chapter 10 (Section 10.4.7.1 – Commercial Fishing) of the Draft EIS/ERMP, and was assessed as a "Medium" impact (of "Major" consequence and "Possible" likelihood). In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will be the point of contact should license holders believe they are experiencing significant commercial or operational impacts from increased vessel traffic associated with the Project. Further, Chevron has, and will continue to, liaise with DoF on matters relating to commercial and recreational fishing.
8.21	Issue: Access to marine areas potentially hindered Impact: The LNG plant could prevent normal coastal traffic around the precinct. Phase: Construction & Operation Risk: High
	Chevron acknowledges concerns associated with exclusion zones around the LNG plant and its associated infrastructure, which could prevent normal coastal traffic. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. With this comes the unavoidable limitation of access to certain areas for safety reasons. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role will be to liaise between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities and impacts such as temporary and permanent exclusion zones around the LNG plant and its associated infrastructure. The appointed person will be the point of contact should license holders believe they are experiencing significant commercial or operational impacts from altered coastal traffic. Further, Chevron has, and will continue to, liaise with DoF on matters relating to commercial and recreational fishing.

28.29	The risk ratings should be reviewed. We consider that the risk to commercial fishing from exclusion zones or reduced access is Medium. – not Low. The paragraph on proposed footprint of development may represent less than one per cent of trawl ground – but as stated above this can mean more than one per cent of catches. The management strategy to manage impacts is planned to be via a liaison person…this does not provide sufficient information as to any mitigation strategies that might be implemented – i.e. fitting in activities with seasonal fishing nature etc.… The Summary needs to be modified to take into account reviewed risk assessment. Both areas should be Medium risk not Low.
	Chevron acknowledges DoF's concerns associated with commercial fishing risk ratings presented in the Draft EIS/ERMP. This issue is discussed in Section 7.3.6 of the Draft EIS/ERMP. In particular, these sections describe the thorough process by which risk rankings were developed according to a "best practice" approach. Chevron is committed to a best-practice approach with regard to the assessment of the Wheatstone Project and will continue to liaise with DoF throughout its future development.
31.3	We also expect there will be a significant impact on the viability of the Pilbara Wetline Fishery. To a lesser extent, the Mackerel Fishery, Marine Aquarium Fishery, Specimen Shell Fishery, Exmouth Gulf Fishery, Pilbara Trap Fishery, Pearling Industry and the Developmental Blue Swimmer Crab Fishery may also be directly or indirectly impacted by either the near shore or offshore development. It is also possible that other fisheries may be impacted that WAFIC is unaware of.
	Chevron acknowledges the Western Australian Fishing Industry Council's (WAFIC) concerns associated with impacts on commercial fisheries with reference to the Draft EIS/ERMP. The assessment in the EIS/ERMP found the Project has the potential to impact local fishing and pearling through the combined consequence of dredging, construction activities, operational activities, and physical presence of infrastructure. The Draft EIS/ERMP has assessed the consequence of the Project on local fishing and pearling as of "Major" consequence. The likelihood of this consequence occurring is "Possible". The additive risk from the Project on local fishing and pearling is therefore "Medium". Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved. *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.* In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. Further, Chevron has, and will continue to liaise with DoF on all matters relating to commercial and recreational fishing.
31.4	There has already been a direct impact on the fishermen operating in this area as a result of this proposal. In preparation for the 2011 fishing year, fishermen have indicated that they've had to postpone refitting vessels and leasing of licences in anticipation that they may have to cease their fishing operations due to the commencement of construction.
	Chevron acknowledges the WAFIC's concerns associated with impacts on commercial fisheries and their investment planning. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner.

	Chevron has consulted twice with WAFIC in relation to Project scope and timelines so that it could inform its member fishing licencees about the Project activities. Chevron has always warned that until it takes a Financial Investment Decision the Project does not have absolute certainty of proceeding. Given this information, it is up to the fishing licencees to decide how best to manage their forward budgets and works programs. While Chevron acknowledges this may cause some impacts, Chevron can add no further certainty to the process than this.
31.5	There are a range of other impacts, some of which have been highlighted in the PPA's submission, such as industry's concerns about their safety when on anchor (resource vessels expecting right of way), the threat of marine pests and the cumulative impacts of numerous developments occurring in the region.
	Chevron acknowledges the WAFIC's concerns associated with impacts on commercial fisheries with reference to the Draft EIS/ERMP. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved. *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.* Chevron would also like to highlight Chapter 8: Marine Risk Assessment and Management (Section 8.4.5.4 – Vessel Movements) for information on marine pests and Chapter 11: Cumulative Impacts for information cumulative impacts occurring in the region. In addition, in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities and will be the contact point should commercial fishers become concerned about safety when on anchor or marine pests. Further, Chevron has, and will continue to, liaise with DoF on all matters relating to commercial and recreational fishing.
31.7	While these fisheries are small when considering the number of licence holders, they are significant in terms of the supply of seafood to Pilbara and Perth markets. It is evident there is increasing reliability by metropolitan retailers on the Pilbara fisheries to supply their markets. Many of these Pilbara based fishing businesses have been built up over a number of decades.
	Chevron acknowledges the WAFIC's concerns associated with impacts on commercial fisheries and subsequent impacts on the supply of seafood to Pilbara and Perth markets. Having assessed the Project's potential impact on fisheries, Chevron considers that the Project will have an insignificant impact on the supply of fish to regional and metropolitan markets. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved. *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.* In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose will be to liaise between Chevron and holders of commercial fishing licenses. Further, Chevron has, and will continue to, liaise with the DoF on matters relating to commercial and recreational fishing.

32.8	An appropriate emergency response management plan for the site must consider the construction workforce accommodation village being isolated from the Onslow Road during extreme flood events, as the proposed connecting road will be overtopped by the 100 year ARI event. Please note that a failure to properly adhere to these recommendations will result in a greater exposure to risks of flood damage.
	Chevron proposes to design an appropriate Emergency Response Management Plan. This plan will consider the accommodation village being isolated from the Onslow Road during extreme flood events and the risks associated with this.
10.4.8	**Implications for Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
10.4.9	**Residual Risk Summary**
31.12	The report suggests a number of measures to reduce the potential for over fishing occurring in the Project area from increasing recreational fishing. From a commercial fishing perspective these measures do not adequately address this issue and a much greater level of action is required when considering there will be an additional 3000 people in Wheatstone's workforce during the construction phase. This must also be considered in light of the cumulative impact of Wheatstone, Macedon and Scarborough in the region contributing a workforce of approximately 5000 to the area. Please see our comments under 1.12.4.3.

Chevron acknowledges the WAFIC's concerns associated with recreational fishing by the Project workforce and confirms information included in Section 10.4.5.1, which explains:

"The following management measures will be implemented to reduce the impact of Project activities on recreational fishing:

- Boats and recreational vehicles will not be permitted within the Construction Workforce Accommodation Village or the access road from the Onslow Road.
- Behaviour standards to be expected from all construction workers will be clearly articulated in the Recreation Code of Conduct. Construction workers will be asked to sign the Code of Conduct.
- A community feedback procedure will be established whereby any complaints from the community about unacceptable behaviour from construction workers will be investigated and where necessary appropriate action taken.
- Chevron will work with the WA Department of Fisheries to reduce potential risks to the existing recreational fishery.
- Chevron will work with the WA Department of Environment and Conservation to reduce potential risks from excessive recreational use of the islands within a 25km radius of Onslow.
- For safety reasons, recreational activities such as fishing will not be permitted within the nearshore exclusion zones (for example, MOF and PLF).

Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved.

EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.

In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose will be to liaise between Chevron and holders of commercial fishing licenses. The liaison person will be the contact point should commercial fishers become concerned about the impact of recreational fishing by the Project workforce.

10.4.10 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.5 Disturbance to Other Recreational Use

10.5.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.5.2 Description of Factor

28.27	The management controls and mitigation measures in this table (10.10) are too vague. The statement that "Chevron will create a commercial fishing industry liaison role to liaise with Chevron and commercial fishers" does not give any indication of the process of how concerns will be addressed. For example, will a joint working group be set with Chevron and industry representatives to work through issues of serious concern? More detail needs to be provided before DoF can evaluate whether this is an effective management control.

Chevron acknowledges DoF's concerns regarding the amount of detail surrounding controls and mitigation measures for the commercial fishing industry. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner.

The commercial fishing liaison role will provide information to commercial fishers on key Project activities such as dredging, pipelaying, dredge disposal and vessel traffic. The Wheatstone Project has successfully used this approach since 2008 to keep commercial fishers informed of Project activities and to address their issues and concerns. Chevron is open to participating in a joint working group with other industry representatives, and would view such a proposal favourably. However, it would expect the working group to be organised through the appropriate body, such as the DoF or WAFIC.

Chevron has, and will continue to, liaise with the DoF on matters relating to commercial and recreational fishing and will work with the Department to develop management controls.

10.5.2.1 Natural Environment – Values and Uses

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.5.2.2 Physical (Urban) Environment

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6 Public Amenity

10.6.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.4 Consequence Definitions

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.5 Implications for Matters of National Environmental Significance

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.6 Public Amenity - Noise

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.6.7 Public Amenity - Air Emissions

10.8	Chevron representatives informed DIA that under their health impacts report they would investigate respiratory health amongst Aboriginal people more carefully as a result of our previous comments about particulate levels and NEPM standards, and that they would undertake a dust management plan. The health impacts report was not provided with the ERMP, so DIA is unable to comment further on this matter.
	Chevron acknowledges the DIA's concerns associated with the respiratory health of Aboriginal people, and additional work was completed on the Health Impact Assessment as previously agreed. Chevron will develop a dust management plan as part of the Construction Environmental Management Plan.

10.6.8 Public amenity – Visual Impacts

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.7 Health and Well-being

10.7.1 Management Objectives

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.7.2 Description of Factor

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.7.3 Assessment Framework

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.7.4 Impact Assessment and Management

10.7.4.1 Increase in Mosquito-borne Disease

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

10.7.4.2 Increase in Motor Vehicle Accidents

4.1	a). Onslow Road is an existing State Road and the new road access from Onslow Road to the new Port, Common User facilities and Wheatstone LNG Plant will be a future State Road, under the control of Main Roads. The ERMP plans and description provide only very broad information on the construction and likely impact of the proposed road access corridor from Onslow Road and any road improvement requirements on Onslow Road. b). The Construction Environmental Management Plan (Appendix U1) outlines the key construction activities associated with the Project, including road construction and indicates that any environmental impact will generally to be low. A number of engineering solutions are proposed to manage surface water impact, which I assume includes the proposed road access corridor. However, this area is very complex in terms of surface water and hydrology. A comprehensive hydrological, including flood modelling, study is required in consultation with Main Roads to assess the impact of the Project on the existing and future road network in the area.

	a) Chevron acknowledges Main Roads WA (MRWA) concerns associated with the EIS/ERMP providing only very broad information on the proposed road access corridor and road improvements. Chevron (through its contractor Bechtel) is currently undertaking a Traffic Impact Assessment (TIA) for operations and construction which is due to be completed early 2011. The TIA will provide important information, such as the number of expected heavy vehicle loads between the North West Coastal Highway and the Access Road, which will help MRWA establish the design specifications required for an upgrade. Chevron will share the key findings of the TIA with MRWA. Chevron, BHPBilliton, Landcorp, Dampier Port Authority and Department of State Development have been meeting with MRWA to discuss road requirements and specifications. Chevron commits to continuing this dialogue with MRWA. b) Chevron acknowledges the importance of a comprehensive assessment of potential impacts to surface water, which are addressed in Section 9.4 of the Draft EIS/ERMP. The presence of the facilities, which includes the Shared Infrastructure Corridor (SIC), was assessed as having a low residual risk. A conceptual model was employed in the risk ranking process, which made a predictive assessment of the altered hydrology for the Project area as documented in Section 9.4.2.2. Section 5 of Appendix G1 details the assessment. Chevron are confident that this rigorous approach adequately addresses the hydrological complexities of the study area in order to assess and manage potential impacts to surface water resulting from the SIC and other Project facilities. Additional studies are being undertaken and the hydrology modelling is being updated to reflect more detailed Project information as it becomes available. For example, new modelling is being done on flow rates and break-out flows. This modelling is being done in consultation with MRWA engineering. Chevron will share relevant outputs of new modelling with MRWA to assist with engineering design.
4.3	The proponent has undertaken extensive consultation with regulatory agencies and the community. Traffic and transport impact has been raised as an issue by the community. The Wheatstone Project will result in a significant increase in road traffic, particularly heavy vehicles, during the construction and operation phases of the Project. Main Roads considers that a traffic impact assessment and traffic management plan for the construction and operational phases of the Project is a high priority to confirm the implications of the Project on road users and the road network. Main Roads has requested this information from the proponent, however, this information has not been provided to date.
	Chevron acknowledges Main Roads WA's concerns associated with increased traffic during construction and operation of the Project. Chevron will complete a traffic impact assessment and traffic management plan and will discuss the key points of both documents with MRWA and the Shire of Ashburton. The traffic management plan will be ready prior to Project execution.
4.4	More detailed information on the proposed road improvements required for the Project should be developed in consultation with Main Roads. Main Roads will continue to provide input and advice on the Project, as required, on the key road planning, construction and traffic operation matters.
	Chevron appreciates the valuable discussions that have already occurred with Main Roads WA regarding road planning, construction and traffic operation matters. Chevron will continue to engage with MRWA as road infrastructure requirements and traffic management plans are refined, and welcomes MRWA's advice on these matters.
10.7.4.3	Public Risk from Upset Conditions
22.33	DPA Comment: The document does not provide assessment criteria or the relative impact on areas surrounding the Wheatstone plant and infrastructure. This Information is directly relevant to future users of the Port, CUCA and MOF facilities, and therefore should be provided as part of this document.
30.55	EPA Comment: It needs to be shown that EPA public risk criteria are met. Please explain the treatment of risk in the common user areas, which will be used and ultimately controlled by 3rd parties and, therefore, will not be part of the Wheatstone site.

Chevron acknowledges the concerns of both the EPA and DPA in relation to the potential for an incident at the LNG facilities to impact the future users of the facilities surrounding the Wheatstone site such as the Port, CUCA and MOF. It is recognised that certain of these facilities (the multi-user facilities including the MOF but excluding the Product Loading Facility and associated trestle) will, at an agreed time after construction and commissioning, be handed over by Chevron and operated by third parties, and as such will not be considered part of the Wheatstone site but rather as separate industrial facilities.

The selection of appropriate risk acceptance criteria that will be applied to the boundaries between the Project site and adjacent facilities is discussed in Section 10.7.4.3 of the Draft EIS/ERMP. It states that "Chevron will conduct a quantitative risk assessment of potential health and safety impacts to the public that could be posed by the Project. The Project will meet all legislative requirements and EPA guidelines relating to management of safety risks. This assessment will be completed prior to commencement of works."

The off-site individual risk levels determined in the Quantitative Risk Assessments (QRA) will be compared with the Individual Risk Criteria as described in the EPA's Guidance for the Assessment of Environmental Factors; Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant to ensure they are met. If necessary, modifications to the facilities will be made to ensure that the EPA guidelines are complied with.

Chevron is committed to ensuring that the risk to personnel, whether they are employees, workers at neighbouring facilities or the general public, is reduced to As Low As Reasonably Practicable. Work is ongoing to ensure the design and operation of the facilities meets this commitment. Details of the safety measures incorporated into the design, and a demonstration that risk levels meet the relevant criteria, will be provided in the Safety Report that is required to be approved by the Department of Mines and Petroleum prior to operation of the facilities. Provision of this detailed safety related information is considered to be outside the scope of the Draft EIS/ERMP.

10.7.5 Predicted Environmental Outcome

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.0 Cumulative Impacts

11.0 Cumulative Impacts	
11.0	**General Comments**
5.3	Cumulative impacts must be addressed with modelling conducted of emissions and discharges to ensure that additional of facilities to the hub will be environmentally and socially acceptable.
	Chevron acknowledges the concerns regarding cumulative environmental and social impacts relating to emissions and discharges. Modelling of cumulative air emissions has been undertaken for the Wheatstone, Macedon and Scarborough Projects. See Section 11.5.2.7 and Appendix C1 of the Draft Wheatstone EIS/ERMP. Significant impacts to air quality were not predicted. There is little information publically available for the Scarborough Project as it has not been referred; therefore the potential emissions for this facility have been taken as similar to that of the fifth train. Chevron is not aware of any reasonable foreseeable projects, as defined under the EPBC Act, proposed for development within the Ashburton SIA. Therefore no other activities from this location have been included in the cumulative assessment. Modelling has not been conducted for discharges. As discussed in Section 11.5.1.1, the Scarborough Project referral has been withdrawn and there is little information available. Should the Scarborough Project proceed, it is expected commissioning discharges are likely to occur approximately 300 km offshore. The Macedon Gas Project will be discharging water to evaporation ponds or at the offshore field, as stated in the Macedon Gas Project Environmental Protection Statement. There is also a large schedule difference between the projects. The low likelihood of cumulative impacts occurring removes the need for modelling studies. Any modelling studies relating to discharges from the Scarborough Project would be extremely variable given the lack of information and uncertainty over the Project design details.
17.1	*The following submission applies to all sections of this chapter.* The DSD's key consideration for the Wheatstone Project is that it does not result in environmental impacts that will impede or constrain development of future projects within the ANSIA. Therefore the DSD considers that the Wheatstone Project should aim to minimise environmental impacts by: • Avoiding impacts outside of the Project area that may have an effect on other (existing and proposed) Project areas • Identifying the cumulative environmental impacts of the Wheatstone Project and other reasonably foreseeable projects and minimising and managing Wheatstone's contribution to these impacts.
	Chevron recognises the importance of the development of future projects within the Ashburton North Strategic Industrial Area (ANSIA). The Wheatstone Draft EIS/ERMP includes a risk assessment of potential impacts, including those that may occur outside the Project Area, for example, due to the mobile nature of emissions and discharges. Chevron does not foresee the potential impacts from preventing future proposed actions from being developed within the ANSIA and has developed appropriate mitigation and management measures for the potential impacts identified. The Wheatstone Draft EIS/ERMP identifies the cumulative impacts associated with the Project and other reasonably foreseeable projects in the Ashburton North SIA, namely the Macedon Gas Project, and the withdrawn Scarborough action. The cumulative impact assessment concludes that potential impacts identified are manageable. Chevron is committed to conducting activities associated with the Project in a responsible manner and, as previously stated, has developed appropriate mitigation and management measures that reduce the Project's contributions to these impacts. These measures are stated in Chapters 8 and 9 of the Wheatstone Draft EIS/ERMP under the same titles as the Cumulative Impact Assessment factors.
20.1	Wheatstone is the largest planned project in the area and requires careful, and holistic, consideration of the impact of the Project to the region. Such regional cumulative impact consideration doesn't appear to be adequately addressed. Each activity and possible consequence appears to have been broken down for the risk management process. Cumulative impact of the net effect of activities and the Project as a whole appears to be lacking in the EIS/ERMP. Similarly there appears to be limited comprehensive risk assessment done of the cumulative impact of all the activities affecting each environmental consideration.

23.1	We are concerned by the increasing level of development approved or proposed for the area, referred to hereinafter as "the Region".
23.3	The Study (or Spatial Assessment) Area is limited, particularly in light of other cumulative impact studies published for the Region (i.e. For 4 of the 5 approved oil developments in the Exmouth Sub Basin, the two most recent being the BHPB Pyrenees Development Draft EIS and Supplement and Apache Van Gogh Development Draft PER and Supplement). Of concern, these developments are not mentioned in the EIS/ERMP. The level of information presented in the Wheatstone EIS/ERMP should at a minimum be commensurate with those 4 publically available documents, these having set a minimum industry best practice standard and precedent for the Region. Any Studies, Modelling, Management and Mitigation Measures, Environmental Conditions should at a minimum, build on those for these nearby Developments and other similar Developments (e.g. Gorgon).
23.4	The spatial assessment area should be set at a regional level alike the previous cumulative assessments undertaken for nearby oil developments, thereby incorporating the area referred to herein as the "Region" including potential cumulative impacts on onshore, nearshore and offshore areas including primary and secondary features and environmentally significant features (e.g. World Heritage Nominated Areas and others identified or recognised as being of high conservation value). The assessment should also be undertaken in the context of other existing, proposed and potential developments at Ashburton North and in the Exmouth Sub Basin (existing 5 oil developments and Macedon Gas Development), Exmouth Gulf (particularly with regards to shipping, emissions and discharges) and Carnarvon Basin.
23.5	We assert that the assessment should be undertaken under the auspices of a "Strategic Assessment" under the EPBC Act. This was first requested of Government in 2008 and again more recently due to concerns that developments impacting on both State and Commonwealth areas are not being considered holistically or in a regional context.
23.6	This preference by the Government's regulatory agency is reflected in EPA Report No. 1360 (July 2010) which states "5. Other Advice The EPA is strongly supportive of undertaking strategic assessments in a regional context prior to assessing individual projects. The Macedon Gas Project is located in the proposed Ashburton North Strategic Industrial Area (SIA) and the EPA is of the view that it would have been preferable to consider the cumulative impacts of the Ashburton North SIA prior to assessing the Macedon proposal".
23.7	As the Proponent, Chevron is able to request of the State and Federal Governments that both commit to undertake an assessment under Section 146 of the EPBC Act and recognise the requirements for assessment under Section 38 of the EP Act. Based on the information presented, it appears likely that the Project will have significant impact on Matters of National Environmental Significance and State and Commonwealth Marine Areas based on its existing scope and suggested later expansion (e.g. into the Exmouth Gulf). Such an assessment would independently verify whether the site selected minimises environmental and biodiversity impacts on the Region and the adequacy of Chevron's risk ranking/assessment and hence, management and mitigation measures and suitability of any Government imposed (Environmental) Conditions of any Approval.
23.8	Whilst State and Federal assessments of each individual project may consider localised risks and impacts, we assert that the collective risks and impacts of these projects, and others in the Region, both within or across State and Commonwealth boundaries, should be properly assessed by both levels of Government via a regional Strategic Assessment to ensure consistency in the application of "best practice" Environmental Conditions and, as the aims of such an assessment, address issues facing this Region including: • "Region-wide development pressures • High growth areas with a large number of projects requiring assessment and approval • Multiple stakeholders • Complex large scale additions Cumulative Impacts on Matters of National Environmental Significance (NES) protected by the EPBC Act" (DEWHA website).

23.9	Our position is that no significant development in the above-mentioned Region should be considered until the risks and impacts, both individual and cumulative, can be assessed within the context of environmental parameters developed as a result of a comprehensive environmental Strategic Assessment under the EPBC Act and EP Act. This would also provide for independent and wider community consultation and opportunities for expert involvement and peer review.
23.10	We seek, therefore, that Chevron initiate an urgent request of the State Government to partner with the Federal Government under the terms of the EPBC Act to enable a Strategic Assessment of the Region (including the Ashburton North site and associated proposed, potential and likely associated infrastructure) to be undertaken. This would demonstrate due diligence by both Chevron and the Government, ensure strategic evaluation of the proposed Project, confirm Chevron's Guidance Policies of Environmental Stewardship and Biodiversity Conservation described in the Draft EIS/ERMP are achievable and verify the veracity of statements and claims made in that document.

Chevron acknowledges concerns raised in submissions from the Cape Conservation Group, the Conservation Council of WA and the Wilderness Society (WA) regarding the cumulative impacts assessment.

In consideration of the actions to include for the cumulative impacts assessment, guidance was drawn from the EPA whose comments on the Scoping Document stated "As the Ashburton North area has been designated as a Strategic Industrial Area (SIA), the proponent will need to ensure potential environmental impacts are not addressed in isolation. Cumulative impacts must be addressed due to other users operating in the proposed area into the future and the close proximity to the town of Onslow". Future projects and developments within Ashburton North and the vicinity that are not currently referred, with the exception of the Scarborough Project, are not included in the cumulative impact assessment. No information is currently available to suggest the nature or details of any such future projects and developments.

Chevron has assessed potential cumulative impacts largely via a qualitative approach due to a lack of publicly available information of many of the actions included. For example, the proposed Macedon Project is currently undergoing design and the Scarborough development has not publically announced any final concept decisions for the development, its location, or when the development is likely to begin. As a result, a risk ranking process was not appropriate. Instead, the assessment is a largely a high level analysis of potential impacts. Professional judgement has been used, underpinned by baseline studies and a range of quantitative impact assessments where possible, for example, the modelling of air emissions as per Chapter 11 (Section 11.5.2.7) and Appendix C1 of the Wheatstone Draft EIS/ERMP. The assessment of cumulative impacts for each factor concludes that potential impacts to the environment can be managed and the development of further mitigation measures for the proposed Wheatstone development is not required. Please note the additional information on cumulative impacts assessment and the design features incorporated in the proposed Wheatstone Project to facilitate the reduction of potential cumulative impacts from potential future but as yet unknown developments (See Section 2.4.4).

11.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.2 Cumulative Impacts Assessment Methodology

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.3	**Considered Actions**
23.2	Need for strategic assessment for industrial development in region. According to EPA Report No. 1360 (July 2010) relating to the Macedon Gas Development, the Wheatstone Project is also "the largest project currently under consideration for the Ashburton North SIA and is considered to be the foundation industry. The Wheatstone assessment will therefore include assessment of cumulative impacts associated with the: • Macedon Gas Project • Wheatstone Project (25MTPA LNG) plant, pipelines and port • Scarborough Project (anticipated 6MTPA LNG plant), possibly with additional tanker berths and offshore infrastructure; and Existing activities in the vicinity". That Report also states that "the EPA will consider cumulative air quality and footprint impacts of the SIA when assessing Chevron's Wheatstone Project". Based on our review of the Draft EIS/ERMP, it appears that the above level of assessment has not occurred. Neither scientific studies nor desktop modelling appear to have been used to support or clearly illustrate conclusions made on the cumulative impacts of these developments.
	Chevron acknowledges the Wilderness Society/Conservation Council of Western Australia's concerns. The cumulative impact assessment in Chapter 11 of the Draft EIS/ERMP examines each factor related to the proposed Project. The Wheatstone, Macedon and Scarborough projects are included in the assessment. Chevron is not aware of further reasonable foreseeable projects proposed for development within the Ashburton SIA. Therefore no other projects from this location have been assessed. Modelling of cumulative air emissions has been undertaken for the Wheatstone, Macedon and Scarborough projects. Please refer to Section 11.5.2.7 and Appendix C1 of the Draft EIS/ERMP for further details. Significant impacts to air quality were not predicted. In addition, a cumulative assessment of potential noise impacts was also undertaken (see Appendix E1 Section 5.3). This concluded that "Therefore, any increase in noise received at Onslow and 10 Mile Dam will be marginal and will not result in cumulative impacts which exceed the assigned noise levels" The footprint of the Wheatstone, Macedon and Scarborough Projects has been considered in the cumulative assessment. For example, Chapter 11 (Section 11.5.2.4) quantifies the extent of expected vegetation clearance and details information on the condition of the vegetation, introduced weeds and species listed under the EPBC Act 1999. This was informed by flora and vegetation surveys conducted across an area which incorporates these project areas, as described in Chapter 6 (Section 6.4.8.2). Other factors related to the footprint of projects included in the cumulative impact assessment are surface water, ground water and benthic primary producer habitats and soils and landforms. Please see Chapter 11 (Sections 11.5.1.2, 11.5.2.1, 11.5.2.2, 11.5.2.3). The evaluation of potential cumulative impacts to these factors is assessed largely via a qualitative approach due to a lack of publicly available information. For example, the proposed Macedon Project is currently undergoing design and the Scarborough development has not publically announced any final concept decisions for the development, its location, or when the development is likely to begin. The assessment of cumulative impacts for each factor concludes that, with appropriate controls in place, potential impacts to the receiving environment can be managed.
11.4	**Matters of National Environmental Significance**
No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.	
11.5	**Impact Assessment and Mitigation**
17.2	The DSD considers that the Wheatstone ERMP should identify the cumulative environmental impacts in particular to surface water, flora and vegetation, air quality and to sensitive receptors from noise and light. In addition the ERMP should outline the mitigation and management measures that will be implemented by the Wheatstone Project to minimise its contribution to cumulative impacts and reduce the risk of constraints to future projects within the ANSIA.

Chevron acknowledges the DSD's concerns regarding potential cumulative environmental impacts. The Wheatstone Project, as defined in the Draft EIS/ERMP, indicates the spacial extent of the development. Additional reasonably foreseeable developments are included in the cumulative impact assessment, including the Macedon and Scarborough projects. The evaluation of potential cumulative impacts is assessed largely via a qualitative approach due to a lack of publicly available information. For example, the proposed Macedon Project is currently undergoing design and the Scarborough Project referral is currently withdrawn. No information on any other activities in this area is publicly available, and cannot, therefore, be considered to be reasonably foreseeable.

Flora and vegetation cumulative impacts are described in Section 11.5.2.4 of the Draft EIS/ERMP. The survey area, as described in Section 6.4.8.2 and Appendix I1 (Section 2.2), covers the majority of the Ashburton North SIA and informs the cumulative impacts assessment. It is concluded that significant cumulative impacts to terrestrial flora and vegetation are not predicted and impacts to the receiving environment can be managed.

Air Quality cumulative impacts are described in Section 11.5.2.7 of the Draft EIS/ERMP. Modelling of cumulative air emissions has been undertaken for the Wheatstone, Macedon and Scarborough actions. There is no information available for the Scarborough action; therefore, the potential emissions for this facility have been taken as similar to that of the fifth train. Please refer to Appendix C1 of the Draft EIS/ERMP for further details. Significant cumulative impacts to air quality are not predicted.

Cumulative impacts to surface water are described in Section 11.5.2.3 of the Draft EIS/ERMP and significant cumulative impacts are not predicted. The assessment is largely qualitative due to lack of available information. It is concluded that with appropriate controls in place, impacts to the receiving environment will be on a local scale and can be managed.

Noise cumulative impacts are described in Chapter 11 of the Draft EIS/ERMP: Marine noise is addressed in Section 11.5.1.3; noise that may impact terrestrial fauna is addressed in Section 11.5.2.5; and cumulative potential risk to public amenity is assessed in Section 11.5.3.4. A qualitative approach is used, as insufficient details exist to conduct a more thorough assessment. However, it is concluded that, with appropriate controls in place, the impacts to the receiving environment can be managed. Further information can be found in Appendix E1 (Section 5.3) of the Draft EIS/ERMP.

Cumulative impacts relating to light are described in sections 11.5.1.3, 11.5.2.5 and 11.5.3.4 of the Draft EIS/ERMP. These sections assess cumulative potential impacts to marine fauna, terrestrial fauna and public amenity, respectively. It is concluded that potential impacts are manageable, and that future actions in the Ashburton North SIA will adopt management practices to meet EPA guidelines and legislative requirements. Insufficient information is available to conduct light modelling assessments.

Chevron has undertaken rigorous baseline studies, including desktop research, surveys and modelling to understand the complexities of the potential impacts posed by the Project on the receiving environment. A number of studies, including those detailed above, have assisted in the investigation of potential cumulative impacts. Chevron appreciates the importance of managing potential impacts and is confident that the extensive mitigation and management measures proposed, developed by subject matter experts and through extensive research and development, are appropriate and adequate.

11.5.1 Marine Factors

11.5.1.1 Marine Water and Sediment Quality

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.5.1.2	Benthic Primary Producer Habitat
20.24	Cumulative impacts on Ashburton River Mouth Mangrove System This regions mangrove system as a whole is considered important maintaining nutrient cycles and coastal zone productivity (DEC, 2006, p. 14). This includes contribution made by the backing intertidal flats towards mangrove functioning (DEC, 2006, p. 14). In view of their significance could a cumulative impact risk assessment be done on the Ashburton River Mouth Mangrove System? To include, but not be limited to: • Direct loss • Expected contamination • Unplanned contamination (e.g. oil spill) • Potential introduction of marine pests, bacteria, viruses or parasites • Changes in salinity • Changes in sedimentation • Changes in flood flow and composition • Changes in Coastal processes • Removal of intertidal flats".
	Chevron recognises the importance of the Ashburton River Delta mangrove system and has provided risk assessment of "additive" (as versus "cumulative") impacts in the Draft EIS/ERMP (Chapter 8, Section 8.3.5.2, 8.3.5.4, 8.3.5.5, 8.3.5.7, 8.3.5.8, 8.3.5.9, 8.3.5.11, 8.3.5.14, 8.3.5.16, 8.3.5.17, 8.3.7 (Table 8.37); Chapter 9, Section 9.5.5, 9.6.2.1, 9.8.5)). These Sections outline all potential impacts to the mangroves (e.g. onshore infrastructure, nearshore infrastructure, discharges, dust impacts etc). The additive risk assessment resulted in a High risk ranking, however impacts to the mangroves is not anticipated to be significant. This is mainly due to the nature of operations and the commitment to implementing management and mitigation measures during Project construction and operation to manage impacts. Further detail on the impact assessment for the mangrove system in provided in the Draft EIS/ERMP (Appendix N4: Ashburton River Delta Mangrove System: Impact Assessment). Chapter 11 (Section 11.5.1.2) assesses potential cumulative risk to BPPH, which includes the Ashburton River mangrove system, and significant cumulative impacts are not predicted. The cumulative impact assessment concludes that the potential impacts identified are manageable. The evaluation of potential cumulative impacts was assessed predominantly via a qualitative approach, due to the limited information available at the time of publication of the Draft EIS/ERMP.
11.5.1.3	Marine Fauna
20.2	Finally, CCG requests that Exmouth Gulf not be used by vessels in any circumstances. Exmouth Gulf is under increasing pressure from rising levels of marine vessel activity; the cumulative impact of further vessel activity needs to be avoided at all costs.
	Chevron acknowledges the Cape Conservation Group's concern for cumulative impacts occurring in the Exmouth Gulf from vessel activity. The majority of Project vessels are not likely to use Exmouth Gulf waters. However, a limited number of vessels may be supported out of Exmouth itself and will therefore travel through Exmouth Gulf waters. These may include vessels for surveys or supply, or construction activities such as pipe lay or microtunneling. It is also possible that vessels may use Exmouth Gulf waters for safety reasons during cyclone activity. Vessel activity is included in the Draft EIS/ERMP and significant cumulative impacts are not predicted. Further details can be found in Sections 11.5.1.1 and 11.5.1.3 of the Draft EIS/ERMP.
11.5.1.4	Coastal Processes

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.5.2 Terrestrial Factors

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.5.3 Social Factors

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

11.6 Conclusion

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

12.0 Environmental Management Program

12.0 Environmental Management Program

12.0 General Comments

25.33 Environmental Management Program

Recommendation 58: That the outcome-based conditions for environmental management identified in the Environmental Management Program be revised in consultation with DEC.

Recommendation 59: That the management commitments and environmental management plans that form the basis of the determination of the residual risk and environmental acceptability of the proposal, be included in the environmental approval conditions. DEC to be consulted with respect to environmental management plans relating to impacts on species and communities of conservation significance or DEC-managed lands.

Discussion: Environmental management is a significant consideration in the assessment of the Project, in particular with respect to determination of residual risk and environmental acceptability. The ERMP refers to construction and operational EMPs throughout. The operational EMP is yet to be developed and for several key issues the draft construction EMP included in the appendices contains less management information than the ERMP itself. Although management actions/activities are expected to be described in more detail in 'subsidiary' EMPs, these documents are understood to be internal Chevron documents that are not externally reviewed or legally binding (p. 363, draft CEMP). Consequently, some of the management controls and mitigation measures referred to in the management control and residual risk tables throughout the ERMP may not be effectively implemented or enforceable under the proposed environmental management program described in Chapter 12.

For example, with respect to fauna management, the residual risk to fauna from trenching is considered 'low' (p. 738), but only if appropriate management and mitigation measures are applied. The ERMP only lists management strategies that 'may' be implemented (p. 733) and states that a "Subsidiary (internal) Management Plan will be developed that specifies the management and mitigation measures" (p. 743). Additionally, the management commitments in proposed outcome-based condition 6.1.2 in Table 12.9 (p. 882), which would be the only enforceable management commitments, provide insufficient detail with respect to management of fauna entrapment in trenches. In this case, the environmental approval condition needs to include the minimum level of management that would be required for the residual risk to be considered "low", as described in the ERMP, or alternatively more detailed management commitments need to be incorporated into an enforceable EMP.

Recommendation 58: Chevron recognises the DEC's request to be consulted in the development of the final Outcome-based Conditions. Chevron will continue to liaise with the DEC to discuss these conditions.

Recommendation 59: Chevron acknowledges the DEC's request to be consulted on the final Environmental Management Plans. These will be developed prior to construction commencing and Chevron will consult with the DEC on these matters.

12.1 Introduction

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

12.2 Wheatstone Environmental Management Program

12.2.1 Tier 1 – Chevron Operational Excellence Management System

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

12.2.2	**Tier 2 - Environmental Management and Assessment Program**
12.2.2.1	Outcome-based Conditions
23.22	4. Section 12.2.2.1 Outcome Based Conditions or OBCs (pg. 861) states "The proposed OBCs have been developed based on the current understating of relevant environmental factors and propose mitigation and management measures. As the Project continues to undergo FEED, the set of applicable mitigation and management measures is likely to expand and/or change. As such it, it is Chevron's intent to further develop the proposed OBCs as feed and the regulatory review process for the Project progress". An EIS/ERMP Commitments Table is required clearly demonstrating and detailing future consultation processes with regards to the details of management, monitoring and mitigation measures. Furthermore, any related Plans (e.g. Environment Plan, Oil spill Contingency Plan, Marine Fauna Observer Guidelines etc) should be the subject of public comment and include an undertaking for responding to any public submissions prior to the lodgment of the document to Government and commencement (and approval) of any related activity. Details of regular and ongoing studies and impacts, public reporting of results and the achievement of EIS/ERMP targets and the success (or otherwise) of mitigation measures should also be provided for public comment and advice. We would welcome the opportunity (and for independent resources) to be provided by Government and/or Chevron beyond this comment period to enable us to respond to the OBCs as they evolve and to the Draft EIS/ERMP in a manner commensurate with submissions made previously by Conservation Groups on oil and gas related activities and developments in this Region for which resources have been historically provided by Proponents for this purpose.
	Chevron acknowledges the Conservation Council and Wilderness Society's submission associated with public comment on Environmental Management for the Wheatstone Project, the development of draft Outcome-based Conditions and the finalisation of the Draft EIS/ERMP for the Wheatstone Project. Chevron has sought to consult with key eNGOs throughout the development of the Wheatstone EIS/ERMP and has provided a number of opportunities for eNGOs to provide input during this process. EMPs which are required as a Ministerial condition of approval will be developed by Chevron in consultation with the Office of the EPA (State) and DSEWPaC (Cth). While relevant government agencies, such as the Department of Environment Conservation, may be consulted, the development of EMPs is not typically subject to public comment / review. Approved EMPs that fulfil ministerial conditions are typically required to be made publically available prior to commencement. Information associated with the Wheatstone Project's performance against environmental standards and/or environmental monitoring data will be made publicly available through the project's annual performance reporting or where there is an additional ministerial requirement to do so. Details of additional ongoing studies and environmental monitoring data will not be released for public review and comment unless a specific prior undertaking has been made to do so. While Chevron has actively sought to consult with eNGOs during the EIS/ERMP process, Chevron's internal process requires a peer review of the EIS/ERMP which provides Chevron with a level of assurance as to the determined assessments. In addition, as a result of extensive consultation, Chevron has received 32 submissions with 550 individual comments in relation to the EIS/ERMP. Chevron has not accepted requests from individual reviewers to provide resources as Chevron considers that the EIS/ERMP has been the subject of extensive independent review. Regarding the drafting of (WA state) environmental conditions of approval, which includes Outcome-based conditions, Chevron notes that this role is the sole responsibility of the Office of the EPA. Section 44(2)(b) of the EP Act requires the EPA report to set out the EPA's recommendations as to the conditions of the Project. To this end, Chevron would refer the Conservation Council of WA and The Wilderness Society to the EPAs Environmental Protection Bulletin No. 11: "Consultation on conditions Recommended by the EPA" which details the provision for the EPA to consult in relation to the draft recommended conditions for a proposal.

	The bulletin explains the process by which the EPA will consult in relation to the draft recommended conditions. This includes routinely seeking comment from proponents and key government agencies. The EPA may also seek to consult with technical experts at its discretion, but does not seek wider consultation on a routine basis. The EPA will publish the outcomes of any consultation within its Report to the Minister. Should environmental groups wish to comment on draft Outcome-based Condition prior to the release of this report, any request for opportunity / and or independent resources to do so, should be directed to the EPA. A copy of the EPA Bulletin No. 11 can be found at: http://www.epa.wa.gov.au/template.asp?ID=66&area=Policies&Cat=Environmental+Protection+Bulletins.
25.34	Recommendation 60: That vegetation codes in Table 12.8 (p. 880) reflect the vegetation codes in associated Figure 12.15 (p. 881) and Table 9.16 (p. 711-715). Discussion: The vegetation codes in Table 12.8 do not match the vegetation codes in Table 9.16 or Figure 12.15.
	On advice from the DEC, the codes in Draft EIS/ERMP Table 12.8 will be changed to reflect those within in the remainder of the document.

12.2.2.2 Statutory Environmental Management Plans

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

12.2.3 Tier 3 - Subsidiary Plans

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

12.3 Conclusion

No submissions were received on this section of the Draft EIS/ERMP. See Appendix A for the location of all submissions in this document.

General Comments

General Comments on the Draft EIS/ERMP	
Appendices	
Appendix G1: Wheatstone Project Surface Water Studies	
30.6	Fauna A few minor errors or questionable identifications and omissions were noted in the vertebrate fauna report: e.g. page 709, 712 and 743 the identification of the Dusky Woodswallow is questionable (as this is so far outside its normal range), the Republic of Korea Australia Migratory Bird Agreement is missing on page 719, minutus is misspelt on page 721, on page 740 Egernia depressa is erroneously listed as a snake instead of a skink lizard and Varanus is misspelt, on page 741 Striated is misspelt.
	Chevron acknowledges the concerns associated with the vertebrate fauna report. Biota Environmental Sciences has confirmed that the records for the Dusky Woodswallow (*Artamus cyanopterus*) were a database entry error and should actually have been *Artamus cinereus* (Black-faced Woodswallow). These records have been amended within the report. Neither species is of conservation significance. The report has also been updated with the following corrections: • Include the Republic of Korea Australia Migratory Bird Agreement on page 719 • Correct spelling of *minutus* on page 721 • Correct listing of *Egernia depressa* as a skink lizard on page 740 • Correct spelling of *Varanus* on page 740 • Correct spelling of Striated on page 741.
Appendix I1: A Vegetation and Flora Survey of the Wheatstone Project Area, near Onslow	
25.35	Floristic analysis Recommendation 61: That the floristic analysis be supplied to DEC for review. Discussion: Appendix I1 states that the dendrograms arising from the PRIMER analysis are available for inspection, if required (Appendix I1, p. 494). DEC would like the opportunity to review the floristic analysis and provide further advice with respect to this analysis subject to the review.
	Chevron is happy to provide the floristic analysis for review and would appreciate any further advice from the DEC's review to assist in this analysis
30.3	Vegetation and Flora Further targeted surveys for Eleocharis papillose (P3, 'Vulnerable') should be undertaken to substantiate the claim that" ... this sedge should be considered likely to occur throughout this particular creek habitat" (Appendix I1, page 62). The ERMP states that the known location of this taxa does not occur within the Project area, but it is possible that it may be impacted given the confidence that all locations have been identified is low. The ERMP should discuss the implications to its conservation status if targeted surveys did indeed find this species to be more widespread.
	Chevron acknowledges the concerns associated with the potential impacts to *Eleocharis papillosa* and the potential need for further information regarding this species. Chevron has already undertaken two additional surveys since the initial Biota (2009) baseline survey to target this threatened flora species. However, these were unable to locate the known population or additional populations. This is likely to be due to the lack of significant rainfall in the last half of 2009 and 2010. Therefore Chevron is preparing to conduct another survey to target *E. papillosa* following appropriate rainfall in the first half of 2011. This species is found over a 3000 km area and is only observed under optimal environmental conditions. Therefore, it is highly likely that additional populations exist and would be visible under optimal environmental conditions within this 3000 km area. Although it is not anticipated that the relocation of some specimens would alter the conservation status of this species, this will be further assessed once the additional targeted survey in the most ideal seasonal conditions has been conducted. The potential realignment of the domgas pipeline may also be considered should any impact on this species be deemed significant.

30.35	"Samphire specimens from survey area were identified as far as possible by the WA Herbarium who indicated that as many as nine different taxa may be represented within the sterile material collected, although some may be referrable to existing named taxa or to each other". Has there been any further investigation done of these in the intervening time?
	A targeted flora survey was conducted by Onshore Environmental Consultants in 2009. The W.A. Herbarium identified seven *Tecticornia sp* throughout the Project site, one of which was identified as belonging to the *Tecticornia halocnemoides sens. lat.* 'large seed aggregate' complex. None of the seven species collected are listed threatened species. The W.A. Herbarium has not been able to provide any further information on the taxonomic or conservation status of the *T. halocnemoides* complex.
Appendix N3: Tolerance Limits Report	
29.65	Overall, N3 contains a good overview of existing literature relating to the monitoring and management of dredging projects in Western Australia. The basis for development of tolerance limits for the various end receptors was sound, and the limitations and advantages of the various approaches were also considered and presented in a logical sequence The main comment of Worley Parsons on N3 relates to a critique of the MacArthur approach in Section 4.2.1. It is stated in that Section that the "more recent WA projects have a tendency to set TSS limits based on the approach recommended by MacArthur et al (2002) which proposes the development of TSS or turbidity threshold limits based on naturally occurring levels at the site". On closer inspection, the key points from the MacArthur approach are very similar to the overall approach for setting trigger levels as outlined in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000). However, it appears that the authors of N3, who are based in Singapore, have not considered ANZECC/ARMCANZ (2000) and its significance in developing triggers as part of a water quality monitoring program. ANZECC/ARMCANZ (2000) is fundamental to most water quality based monitoring programs undertaken in Australia. The remainder of the critique of the MacArthur approach is valid and some important points of the limitations in using the approach have been discussed in N3. It is therefore recommended that the proponent address ANZECC/ARMCANZ (2000) in either a future revision of N3 or supplementary EIS document.
	Discussion of the ANZECC/ARMCANZ guidelines in this report was not considered strictly relevant, as the objective of the report was the development of coral and seagrass tolerance limits to elevated TSS for comparison against model results as part of an impact assessment, not the development of trigger levels for water quality monitoring. However, the ANZECC/ARMCANZ approach is broadly similar to the McArthur et al approach, in that it bases TSS trigger levels on a specific percentile value derived from a long and "high quality" monitoring data set. It is Chevron's position that neither the ANZECC/ARMCANZ methodology or the McArthur et al methodology are suitable for determining the partial or total morality tolerance limits required for the impact assessment. Chevron has therefore included a discussion of the ANZECC/ARMCANZ guidelines in Section 4.2.1 of the version of the N3 released for public comment, reflecting this position.
29.66	The 10mg/L TSS value mentioned should be referenced (even if it refers to unpublished DHI reports).
	As requested, reference to "DHI unpublished reports" was added to the updated version of Appendix N3: Tolerance Limits Report, as submitted with the Draft EIS/ERMP.
29.67	Section 2.2.1, 2nd paragraph: It is unclear on what basis the percentile values of turbidity has been calculated. Clarification is required as there is reference to a "number of weeks", "late January" and "ten days" in the one paragraph.
	The median and 80% percentile values mentioned in Section 2.2.1 were based on data from a turbidity sensor deployed near the Project site. The median value of 77NTU and 80% percentile of 143NTU were based on 24hrs of data from 27 Jan 2009, when a cyclone passed over the area. The other references to periods of time are more descriptive, and not related to the calculation of the percentile values.

29.68	Section 2.2.2: It can be noted that it is important that sedimentation rates quoted are comparable as they will vary between studies (as methods of assessment can vary and the difference between net and gross sedimentation needs to be considered). There is consideration of this in later sections of N3, and its importance should not be underestimated.
	Chevron thanks The Department of Sustainability, Environment, Water, Population and Communities for highlighting this important point, and fully agrees with the sentiments expressed.
29.69	Section 3.1.1, 2nd paragraph, 2nd sentence: Should there be a comma rather than a full stop at the start of the sentence?
	This edit was made in the updated version of Appendix N3: Tolerance Limits Report, as submitted with the Draft EIS/ERMP.
29.70	Section 3.1.1: A good distinction has been made between TSS and SSC but it is unclear until the bottom of p.23 in Section 5 why the distinction is made.
	Chevron considers that the structure of the document, which defines the terms first, and then provides the technical discussions in the relevant subsequent sections, is appropriate.
29.71	Section 4.3: The recommended approach is sound, although the need to collect baseline water quality data should not be underestimated.
	Chevron thanks The Department of Sustainability, Environment, Water, Population and Communities for highlighting this important point, and fully agrees with the sentiments expressed.
29.72	Section 4.3.1 & 4.3.2: The adaptive management approach outlined at the end of Section 4.3.1 and Section 4.3.2 is considered to be sound.
	Chevron acknowledges the positive feedback regarding the proposed adaptive management approach.
29.73	Section 5 to 9: All sections follow a similar format with a discussion of tolerance to suspended sediment and sedimentation in corals, octocorals, seagrass, macroalgae and mangroves, respectively. The sequence of thought and basis for defining the zones of impact appear to be satisfactory and conservative as stated.
	Chevron acknowledges the positive feedback regarding the proposed tolerance limits and the overall approach taken to define the zones of impact.
29.74	Appendix A Much of the information in the literature review has been incorporated into the main report and appears to be satisfactory.
	Chevron acknowledges the positive feedback regarding the literature review and its incorporation into the main tolerance limits report.

Appendix O5: Survey of Fish in Hooley Creek and North-eastern Lagoon of the Ashburton Delta	
28.50	It appears that this study was only undertaken during daylight hours and therefore "true" species composition of these sites is not represented. Gillnets, trammel nets etc. could have been set prior to dark and pulled up after dawn, therefore staff would only be working during daylight hours, but would obtain an indication of nocturnal species composition. From the way the data is presented there is no way of determining if variables such as time of day, depth or tidal phase are affecting species composition or abundance. Different fishing gear was used which will present another variable. Data needs to presented in such a way that these any variables can be assessed. Although this study was a "snap shot", there is no indication of whether this "snap shot' is true representation of the fish composition at these sites. It appears that there were only three days of actual sampling to cover both sites and all sampling was done during the day. I have concerns that when the study is repeated in November, that it will be difficult to determine whether differences observed are due to temporal differences or the natural variability within this system. DoF will like further discussions on the study methodology.
	It is emphasised that there were no data available on the fish species inhabiting the north-eastern Ashburton lagoon or Hooley Creek. The survey was in fact intended as a snapshot, not as a detailed long term study. A deliberate decision was made to not leave nets out overnight to minimise the number of fish killed during the study. Use of any net size will selectively sample fish populations. Using two nets provided a broader range of species that were caught than using a single net size. The April survey was conducted over three days, whereas the November survey will including a doubling in fishing effort.
Appendix O6: Draft Protected Marine Fauna Management Plan	
29.134	Table 8.47 and App O6 meet DSEWPaC requirements for the Draft EIS/ERMP. DSEWPaC notes that Appendix O5 states that a further sawfish survey is planned for November 2010, and notes that Chevron has committed to including the results of Sawfish studies in the Supplementary EIS.
	The sawfish study will be undertaken by the Centre for Fish and Fisheries Research, Murdoch University. Dr. David Morgan has advised Chevron that November to February is a suitable period to sample for sawfish because pups and adults are likely to be present. Also, it is important to avoid sampling when the creek systems are in flood as this may flush out species that cannot tolerate fresh water. As such, the survey will be conducted in summer based on advice from Dr. Morgan. Therefore, the survey results have not been submitted within the document. Results will be made available soon after the survey. Although the dedicated sawfish survey has not been completed, Chevron has developed a management framework to limit impacts to sawfish during the construction and operational phases of the Project. This framework is found in the Marine Fauna Management Plan. The primary goal of this framework is to prevent permanent impacts to potentially important habitat such as Hooley Creek and the Ashburton Delta.
29.139	App O6 meets DSEWPaC requirements for publication of the Draft EIS.
	DSEWPaC comment noted and no further action taken.
29.144	DSEWPaC notes Chevron's commitment and expects Chevron will provide a revised DSDMP and Marine Fauna Management Plan (MFMP) as part of the Supplementary EIS/ERMP. Proposed adaptive management measures for marine fauna should be outlined within the Supplementary EIS/ERMP.
	Updated drafts of Appendix S1: Dredging and Spoil Disposal Management Plan and Appendix O6: Marine Fauna Management Plan have been included in Appendix S1 and Appendix O6 of the document. These documents include proposed management measures to reduce the risk of turtle entrainment during dredging. The proposed framework combines the strengths of an adaptive management framework (i.e. learning by implementation) with an incident investigation reporting approach (similar to what is done with human-related injuries). Incident investigation reporting is consistent with Chevron health and safety procedures relating to human injury and risk minimisation.

29.148	DSEWPaC notes the addition of the agreed text in the Draft EIS/ERMP and that Chevron has committed to developing a draft BEMP for inclusion within the Supplementary EIS if blasting activities are still a potential activity that will be undertaken. (Section 8.4.5.8, p596). DSEWPaC will review the Draft Blasting EMP included in the Supplementary EIS.
	The draft Appendix O6: Marine Fauna Management Plan includes potential environmental management procedures for blasting that could be adopted if blasting is required (Section 4.4). If blasting is required, management measures will be selected in consultation with the appropriate departments. Exclusion zones for a range of species will be developed prior to the need to undertake blasting. Establishing accurate blasting exclusion zones can only occur once there is knowledge about the water depths where the blasting will occur, type of rock to be blasted, timing (i.e. outside the humpback whale migration period) and type of blasting method. A revised version of Appendix O6: Marine Fauna Management Plan has been included in Appendix O6 of the document. The blasting section of Appendix O6: Marine Fauna Management Plan now supersedes the proposed Blasting Environmental Management Plan.
30.31	A complete Marine Fauna Management plan is required for the assessment.
	The Marine Fauna Management Plan cannot be finalised until after the release of the Ministerial Statement.
30.32	Noise impacts to marine fauna: consider the draft Guidelines for the Conduct of Noise-Intensive Marine Activities Along the Western Australian Coast (URS 2008) and explain how proposed management compares with the guidelines.
	The guidelines have been considered. However, the primary guidance in regards to noise impact assessments has come from the Department of Environment and Conservation and the Department of Sustainability, Environment, Water, Population and Communities. Workshops and meetings with staff from these agencies has made clear the concerns of the agencies for noise impacts associated with piling and other activities. An assessment of underwater noise is given the Draft EIS/ERMP (Section 8.4). More recently, an underwater noise modelling study was undertaken to predict noise impact zones associated with piling and is provided in Appendix FA of the document.
Appendix O9: Possible Effects of Underwater Noise on Marine Fauna and Fish in the Wheatstone Project Area	
28.49	Relevant literature appears to have been overlooked. A recent Google search by this reviewer found the following report "Radiated underwater noise measured from the drilling rig Ocean General, rig tenders Pacific Ariki and Pacific Frontier, fishing vessel Reef Venture and natural sources in the Timor Sea, northern Australia." McCauley, R. (1998). In this study fish species are similar/identical to those targeted by the PDSF. The fishing vessel is a similar to PDSF vessels. Appendix O9 should be rewritten incorporating findings from this study to ensure that a relevant assessment is made of the potential affects of underwater sound on fish, particularly as McCauley found that the highest levels of noise were audible out to 20 km from the source under excellent conditions. This was produced by the rig-tender when maintaining station off the rig for loading.
	Appendix O9 specifically refers to literature that documents noise produced by petroleum field support vessels, such as rig tenders, particularly those with thrusters. Appendix O9 contains in excess of two dozen references from 2000 onwards including published scientific journals and international conference proceedings. While it is acknowledged that the McCauley (1998) reference has not been cited, the information presented in Appendix O9 represents contemporary thought and understanding of marine anthropogenic noise and its ecological implications for a range of marine fauna, including fish.

Appendix O10: Potential Interactions with the Onslow Prawn Managed Fishery	
28.35	Even though the overall impact of the Project on local fishing and pearling is considered Medium, for the Onslow Prawn Managed Fishery the impact is considered to be High. The Executive Summary down plays the risk associated to the prawn industry – as the fishery is fairly marginal, any reduction in overall productivity can be significant in the viability of the industry. The first paragraph is not needed as it confuses the issue about prawn trawling. Should just use the second paragraph and then expand to say - that prawn trawling is undertaken using low opening otter trawl systems operating close to or in contact with the seabed.
	Chevron acknowledges DoF's editorial comments and comments regarding the marginal nature of the Onslow Prawn Managed Fishery, however the document will not be amended. In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including a loss of access to the fishery. Further, Chevron has, and will continue to liaise with the DoF on matters relating to commercial and recreational fishing throughout the development of the Project.
28.36	Section 2.1 The reference to the Northern Prawn Fishery and Kimberley fishery should be deleted in the second paragraph, as they are not relevant to Onslow
	The reference to the Northern Prawn Fishery and Kimberley fishery were used to place the Onslow fishery into a broader managed prawn fisheries context, and it is appropriate for the list to be complete.
28.37	Section 2.5 Remove the last paragraph as this statement is not quite factual as although there are some Onslow licensees with dual/multiple fishery licences the Onslow fishery. Season arrangements are established to optimise the value of prawns from that fishery, not to accommodate movement of boats from one fishery to another.
28.38	Section 2.7.1 Trawl nets do not spread fully and generally the width of the trawl path is between 60 and 70% of the headrope length. Also, in some prawn fisheries that primarily target banana prawns the nets are high opening otter trawl systems (fly wire to hold the mouth of the net open higher) compared to standard low opening otter trawl systems for tiger and king prawns. These nets have a wider opening and more net body. However, in Onslow Area 1, the boats do not generally convert their gear to banana prawn nets but use the same gear for all species.
28.39	Section 2.7.2 This section needs to be re-written as they have confused the main gear with the try-gear (5m) specifications. In Onslow Areas 2 and 3 the boats can use standard otter trawl systems in any configuration so long as the total head rope does not exceed 29.27m. Generally they use either twin (two nets) or quad gear (four nets).
	Chevron acknowledges DoF's editorial comments, however the document will not be amended.
28.40	Section 3.1 Third paragraph - this needs to include a reference to fishing for tiger prawns as this is the most commercially valuable species in Area 1.
	The DoF is correct in noting the importance of tiger prawns as is shown in Table 3.2. At the time the Draft EIS/ERMP was published, the primary concern was in regard to the possible impact of the development of an LNG plant near the coastline and effects on the banana prawn component of the fishery.

28.41	Section 3.2 The last sentence above table 3.1 is incorrect and the personal communication by Kangas (2009) was relating to two 'fish trawl' licences purchased by MG Kailis from the Pilbara Fish trawl fishery and that these boats now are based in Exmouth. The remaining two licences in Area 1 are owned by individual operators.
28.42	Section 3.3 Reference to bycatch species i.e. bugs etc. should be referred to as by-product (retained species). Bycatch is species which are discarded. Last paragraph - the last sentence should be removed as the reference to improved catches of banana prawns in 2010 is incorrect. Last paragraph - the reference to anticipated improved catches in 2011 - my recollection of a conversation was that we anticipated improved catches on the very low catch levels seen in 2007 and 2008 to the historical catch range levels in the future (but no year given). Therefore this part of the sentence should also be removed.
	Chevron acknowledges DoF's editorial comments; however the document will not be amended.
28.43	Section 3.3.1 Tiger prawns are the major species caught in the Onslow Prawn fishery and therefore the habitat requirements for this species should be highlighted. Structured inshore habitats (seagrass and macroalgae) are important for tiger prawn juveniles (Haywood et al 1995, Kenyon et al 1995, Longeragan et al 1998, 2001) and subsequent recruitment to the fishery. The protection of suitable habitats for this species is a key factor.
	The DoF is correct in noting the importance of tiger prawns as is shown in Table 3-2. At the time the Draft EIS/ERMP was published, the primary concern was in regard to the possible impact of the development of an LNG plant near the coastline and effects on the banana prawn component of the fishery. Please refer to Appendix O10 of the Draft EIS/ERMP for an overview of the Onslow Managed Prawn Fishery. Additional information on predicted impacts to these fisheries has been provided in Appendix FH of the document.
28.44	Section 3.4 Second paragraph. The Onslow prawn fishery season is generally April to end of September but the amount of fishing is dependent on prawn abundance. The second sentence needs to be removed as this is incorrect. MG Kailis did not purchase two Onslow Area 1 licences - these are held by independent operators. MG Kailis had purchased two Pilbara Fish Trawl licences and these boats are based in Exmouth with fish processing in Learmonth.
	Chevron acknowledges the DoF's concerns associated with the descriptions of fisheries and fishery areas, however the document will not be amended. The information contained in the Draft EIS/ERMP was drawn from published reports such as the State of Fisheries Reports, and from interviews with key stakeholders. Chevron acknowledges that some of information may not be totally accurate; however it was based on the best available information available at the time.
28.45	Section 3 The Project will have definite short-term impacts on the Onslow prawn fishery particularly for tiger prawns and for banana prawns in those years when their abundance is higher. In addition there will be impacts on the fishery for the whole life of the Project due to the infrastructure and boat movements and potential changes to some of the inshore structured habitats (particularly for tiger prawns). Any extension of exclusion zones etc (as noted in paragraph 2, 4.1) further restricts boats access to fishing grounds and is likely to make a marginal fishery even more so.

	Chevron acknowledges DoF's concerns associated with Project infrastructure, vessel movements, potential changes to inshore habitats, and exclusion zones. Chevron is committed to conducting activities associated with the Project in an environmentally responsible manner and aims to implement best practice environmental management. It is expected the EPA management objective (please see following) for local fishing and pearling will be achieved. *EPA Guidance Statement No 33: Environmental Guidance for Planning and Development (EPA 2008) – Chapter 4D. This guidance statement aims to ensure that existing and planned recreational uses of the environment are not compromised, and that the principles of ecologically sustainable development (as they relate to the integration of long-term and short-term economic, social and environmental considerations) are upheld.* In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including vessel movements, potential changes to inshore habitats, and exclusion zones. Further, Chevron has, and will continue to liaise with the DoF on matters relating to commercial and recreational fishing throughout the development of the Project.
28.46	Section 4 The term "prawns" should be used throughout the report which includes all prawn species (tiger, king, endeavour and banana) without the emphasis on just banana prawns. The aspect of loss of fishing grounds and issue of boat movements restricting trawling operations is not addressed in this section and is a significant issue.
	The Draft EIS/ERMP is not being revised, therefore the addition of other species under the banner of "prawns" cannot be made. However, additional information on predicted impacts to other prawn species has been provided in Appendix FH of the document. Although the aspect of loss of fishing grounds, through the placement of marine infrastructure and vessel movements, has not been discussed in Appendix O10, these issues are discussed in the Draft EIS/ERMP Chapter 8 and Chapter 10 (Sections 8.2.5.5, 10.4.7, 10.4.9). In addition to consultation activities conducted to date and in order to manage potential impacts on commercial fishing, Chevron will appoint a staff member whose role includes liaising between Chevron and holders of commercial fishing licenses. The liaison will provide information on key Project activities, including vessel movements and fishery exclusion zones. Further, Chevron has, and will continue to liaise with the DoF on matters relating to commercial and recreational fishing throughout the development of the Project.
28.47	Section 4.2.2 Dredging in Area 1 will impact all prawn species (tiger, king and banana prawns). The report has a focus on banana prawns but this is a minor species and the major species are also caught in Area 1.
	While Area 1 is predominantly linked to banana prawn catches, the trawling for king and tiger prawns is indicated in Appendix O10 (Section 2.7.1, 3.1). As the Draft EIS/ERMP is not being revised, the suggested corrections cannot be made throughout. However, additional information on king and tiger prawns, and there importance in the fishery, has been provided in Appendix FH of the document.
28.48	Section 4.3 The Port of Onslow area is closed to trawling for social impact reasons. The Coolgra Nursery is closed to protect small prawns and habitat and is not associated with any industrial development.
	Chevron acknowledges DoF's correction, however the document will not be amended.

Appendix P1: Geomorphology of the Ashburton River Delta and Adjacent Areas	
22.15	Coastal Processes The accuracy of the coastal geomorphology and coastal impacts modelling presented in the document is of concern to the DPA. Of particular importance is longshore sediment transport as it will affect the amount of sand that will accumulate on one side of the MOF harbour and erode from the other side. This will impact on the design of the access channel, breakwaters, maintenance dredging and the design of coastal protection as well as determine how much sand may need to be bypassed.
	The geomorphology report provides a summary of available data and observed shoreline responses. As such, the accuracy is restricted to the quality of historic information. The report highlights the extremely variable nature of alongshore sediment transport at the site, which is affected by sediment supply from the Ashburton River; seasonal and inter-annual variations on wind and waves; and occasional tropical cyclones. Within this framework, coastal modelling has been undertaken to identify the relative contributions of these sources to alongshore sediment transport. The littoral sediment transport is driven by the climatic conditions, and the modelling demonstrates the large variability in the littoral sediment transport that prevails at the site. These findings and the overall rates agree with the findings from the geomorphological assessment of the site. The extreme variability and episodic character of alongshore sediment transport at the site indicates that management of alongshore sediment transport cannot practically be undertaken using median transport rates, as the year-to-year range may differ by an order of magnitude. Consequently, shoreline management will be adaptive, whilst fixed features such as the breakwater configuration, will be designed with conservative allowance for the impact of extreme events.
22.16	The coastal geomorphology report is a comprehensive review of the coastline in the Project area and Includes an estimate of longshore sediment transport calculated by utilisation of historical shoreline movement plans. That review suggests that on average there is a net 60,000 to 100,000m3 per annum longshore sediment transport in the area adjacent to the proposed port. Longshore sediment transport was mathematically modelling using a programme called LITDRIFT based on 10 years of hindcast waves. The output from that model is suggesting an average longshore transport of about 45,000 m3, The reports suggest that the difference between the two approaches may result from the fact that the mathematical model did not consider cyclones. If this is the case then it is clear that cyclones have a very significant episodic impact on the coastal processes in the area.
	Chevron considers that cyclonic forcing is a significant factor influencing longshore transport at the site, and considers that it is an essential consideration for shoreline management. Discrepancies between photogrammetric and numerical modelling rates may come from several sources. Longshore transport estimates developed using both photogrammetric measures and numerical modelling are sensitive to a range of assumptions and estimates. One of the most critical factors is wave direction relative to the shore, hence the variability of cyclone wave directions allows large and variable transport rates in comparison to swell waves, which have a smaller directional range. Although the potential for cyclonic contribution to longshore transport is recognised, it is not the only source for discrepancy between transport estimates. The geomorphology report indicates that "*Discrepancy along Ashburton eastern chenier is possibly due to a relative absence of cyclonic transport in the model, or representation of transport due to waves approaching at an acute angle to the shore*." The similarity of transport estimates at other locations along the Ashburton-Onslow shore suggests that the discrepancy west of the proposed materials offloading facility is more likely related to the shoreline aspect. When interpreting the two sources of information, it is important to recognise that they are derived from different time scales, the geomorphic estimate is derived over a 50 year period, whilst the modelled transport is has been determined from a 10 year hindcast. As noted in Appendix P1 "*Considerable variability may be expected on a year-to-year basis due to episodic supply from the Ashburton River, variable cyclone effects and the potential for inter-annual and seasonal variability in the magnitude and direction of transport*."

22.17	Coastal Processes Both reports recognise that the MOF structures will interrupt the longshore sediment transport resulting in accretion on one side of the MOF harbour and erosion on the other. It is crucial that a better understanding is obtained of not only the quantum of this accretion and erosion but the likely shape of the beach following a severe cyclonic event. This is critical as it will help establish how far the accretion may move the shoreline seaward and its potential impacts on the dredged channel, and how far the shoreline may be moved inland on the downstream side and the consequent reduction in the protective dune structure.

Onshore/offshore sediment movement during a severe cyclone has been modelled as part of the engineering studies for a design 1 in 1000 year storm event.

Critical facilities at the materials offloading facility have been designed with the assumption that, should the sand dunes fail, waves will directly hit the structures. The coastal morphology in the Project area is primarily shaped by the littoral transport induced by "normal" wave conditions, but cyclones can generate very high sediment transport rates and this can lead to significant morphological changes over a short period of time. The shape of the beach following a severe cyclone event also depends on the position of the shoreline at that time, which is a function of how the beach is evolving, which in turn is determined by the approach to ongoing shoreline management adopted for the materials offloading facility.

Whereas the impacts of cyclones are considered more critical from an engineering point of view, and the present comment to a large extent is considered a design and engineering rather than an environmental issue, it is acknowledged that the impacts of cyclones also need to be considered from an environmental impact perspective (i.e. whether the development will further aggravate the potential coastal morphological impacts induced by cyclones). There are significant uncertainties related to the modelling of cyclones, both in terms of defining "relevant" cyclone(s) and in terms of the modelling of the morphological processes taking place at likely raised water levels. Cyclone modelling, in support of the environmental impact assessment, using regional Cyclone Vance (1999) simulated up to 5m surge, which would completely flood large areas and potentially cause dune erosion and other coastal impacts. Modelling of Cyclone Vance was documented in Appendix P2: Coastal Impacts Modelling. Cyclone Vance caused major morphological impacts along the coastline in the study area. In terms of potential incremental morphological impacts from the Project, the following is considered:

- The track and landfall of Vance resulted in net westerly sediment transport. The clockwise rotation of cyclones in the southern hemisphere combined with the common tracks will often lead to dominant westerly transport. This is opposite to the predominant littoral transport direction at the site. Cyclone impacts thus have the potential to temporarily reverse the impacts at the site with accumulation on the eastern side of the MOF and erosion on the western side. As described in Section 4.1 of Appendix P2, on average the MOF is expected to cause a build-up of the coastline on the western side of the MOF, which will act as a buffer against periods with reversed transport rates. Cyclones add to the risk of reversal of the littoral transport rate as outlined in Section 4.1 of Appendix P2. If a cyclone impacts the site shortly after construction prior to any significant sediment buffer building up to the west of the MOF, or after a potential "maintenance removal" of material to the west of the MOF, it could lead to aggravated erosion in an area to the west of the MOF.
- Cyclones can also lead to easterly directed transport and, in particular if combined with severe rainfall, the Hooley Creek entrance configuration can completely change character with the outlet potentially shifting location (i.e. breach of the entrance spit). This may happen with or without the presence of the MOF. Therefore cyclones have the potential to increase the erosion to the east as described in Section 4.2 of Appendix P2.
- In terms of channel sedimentation, a single cyclone is estimated to potentially cause sedimentation several times the expected annual channel sedimentation depending upon cyclone intensity and location of landfall. The channel may have to be surveyed following a severe cyclone with a potential requirement for maintenance dredging. Whereas the potential downtime caused by this is an operational issue, the sedimentation caused by cyclones has been considered in the overall channel sedimentation and maintenance requirements.
- The impact on the design of the facilities from cyclones is a separate structural design issue and not covered by the modelling and assessment reported for the Draft EIS/ERMP.

22.18	Coastal Processes There has been no attempt to model the onshore/offshore sediment transport during a severe cyclone. This, when combined with longshore transport, has the potential to move sediment further offshore into the channel or erode further Into the dunes on the downstream side. Coastal Processes A review of the dune cross sections of the dunes to the East of the MOF shows that they have the potential to be demolished in a severe cyclone in much the same way as some dunes were demolished during Cyclone Vance. This would allow waves to penetrate to the rear of the MOF. His would indicate that current preliminary designs are not sufficient to withstand such wave attack.
	Chevron recognises that these processes occur. These details have greater significance for project engineering than for environmental impacts, and therefore information contained in the Draft EIS/ERMP documents do not represent the extent of modelling.
22.19	Coastal Processes DPA recommend a review the whole coastal processes and determine its impact on aspects of the design such as breakwaters, seawalls, channels etc. Modelling should include the development of longshore and onshore/offshore model techniques, using verified model for both ambient and severe cyclone conditions.
	The modelling of coastal processes reported for the Draft EIS/ERMP was provided to support an environmental impact assessment. Design issues beyond those relevant to the Draft EIS/ERMP are considered a separate issue and are not covered by the modelling and assessment. Specifically, the effect of the materials offloading facility on onshore/offshore sediment transport modelling is considered to be significantly less than its effect on alongshore sediment transport, the consequent sand management requirements, and shoreline response. Available geomorphic information has been taken into account in the development of alongshore transport modelling. The value of intense verification of transport models through a short-term field program was considered to be limited due to the highly variable and episodic nature of alongshore transport events in this area. It is not practical to provide a fully verified sediment transport model for cyclonic conditions. There is a limited likelihood that any field program of less than 20 years would be suggestive of the range of cyclonic conditions likely to be experienced by the facility. Monitoring of selected coastal features will be conducted as per the final Coastal Processes Management Plan. If required, mitigation measures will be developed in consultation with appropriate departments.
29.22	In numerous locations in the EIS, there is mention of a 19.6 year cycle in astronomical tides developed from lunar nodical motion. Note that it is considered that this should actually be quoted as 18.6 years.
	Chevron acknowledges that the correct lunar nodal cycle should have been quoted as being 18.6 years.
29.24	In Section 3.5 of P1, it is noted that the 100 year ARI water level for Onslow is 4.7m AHD, presumably an elevated ocean water level. Discussion on the validity of this value, including its relevance for the Project site, would be beneficial, as well as further information on the components in its derivation. It is uncertain if this value has been adopted as the present day 100 year ARI ocean water level for the Project, and this should be clarified.
29.25	The implication of the 100 year ARI elevated ocean water level on the proposed development should be assessed in more detail. Further discussion on this issue is provided in Section 2.5 herein.
	Water levels for storm surge and rainfall based on 100 year ARI events were determined by the Project to establish certain elevations of the plant site elevations. Storm surge included effects of cyclones including low pressure system and sea level rise. Rainfall associated with a 100 year event in the Ashburton River catchment area was used to estimate fluvial site flooding.
29.26	Discussion on tsunami is provided in Section 3.8 of P1. It is noted that the information provided in this discussion is not of sufficient quantitative detail to assess the risk of tsunami to the proposed development, and that there has been no assessment of such risk in the EIS.

	A detailed tsunami study is currently being undertaken. The study is utilising a combined probabilistic/ numerical model method, simulating full chain tsunami events from the point of subsea generation through deepwater to nearshore propagation and dispersion to onshore inundation of the proposed site layout. Seismic generation parameters will be determined probabilistically and used as input for the numerical tsunami generation/propagation and flood models. Flood elevations, velocities, and periods of inundation will be developed for a range of return intervals (1:500 yr, 1:1000 yr, 1:10 000 yr). From these results, acceptable risk to the site can then be accurately gauged.
29.27	Numerous Figures and Tables have limited information in captions (and sometimes corresponding references to these Figures and Tables in the text have limited supporting information) to explain the site, source of data, time span of data etc presented (e.g. in Figure 2-4, 3-1, 3-5, 3-9, 3-14, 3-15, 3-16, 3-18, 3-21, 3-22, 3-27, 3-28, 3-33, 3-34, 3-35, 3-37 and Table 3-1, 3-2, 3-4), and additional information would be beneficial.
	This information has been provided to support the geomorphic assessment and was not intended to be used as a data summary. Supporting information was limited for the sake of brevity. The original source of the data has been identified where appropriate and can be referred to by the reader.
29.28	Some labels of axes are unreadable, e.g. in Figure 3-1, 3-5, 3-7, 3-8, 3-12, 3-13, 3-14, 3-37, which should be corrected for clarity.
29.29	Numerous Figures are too small to be readable, particularly in Appendix B.
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, these figures will not be included in the document.
29.30	In relation to Section 2.1 to 2.3, it would be beneficial if a map showing the locations of the places mentioned in the text was developed.
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, a map will not be included in the document.
29.31	The addition of a length scale to Figure 2-1 would be beneficial.
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, a length scale will not be added to Figure 2-1.
29.32	In Section 2.4.3, it is noted that the "area is currently subject to investigation of its bathymetry and marine habitats", and clarification on the nature of these investigations would be beneficial.
	At the time of publication of Appendix P1: Geomorphology of the Ashburton River Delta and Associated Areas, further coastal impacts modelling work was being competed as well as finalisation of water and sediment studies, BPPH investigation and mapping, and marine fauna surveys. Further details on these investigations can be found in Appendices N1 – N15, O1 – O13, P2, and Q1 – Q7.
29.33	In Section 3.2, quantification of the height difference between the Onslow Jetty and Onslow Airport weather stations would be beneficial.
	Onslow Weather Station (21.64°S 115.11°E) 4 m Elevation http://www.bom.gov.au/climate/averages/tables/cw_005016.shtml Onslow Airport Weather Station (21.67°S 115.11°E) 11 m Elevation http://www.bom.gov.au/climate/averages/tables/cw_005017.shtml
29.34	In Section 3.2, to further assess the timing effects in relation to the difference in Onslow Jetty and Onslow Airport winds, it would beneficial to compare the winds collected at the same time, e.g. at 9am.
	This information has been provided to support the geomorphic assessment and was not intended to be used as a data summary. Supporting information was limited for the sake of brevity. The original source of the data has been identified where appropriate and can be referred to by the reader. Additionally, the Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, a comparison of wind collection timing will not be included.

29.35	In Section 3.2, clarification of the reason for the gap in Onslow Airport weather data from 1975 to 1998 would be beneficial (e.g. station closure).
	The data gap exists due to the closure of the Onslow Airport weather station.
29.36	In Figure 3-12 and 3-13 (Section 3.2.3), clarification of the meaning of the two blue lines surrounding the fitted curve should be provided, and an explanation of the type of distribution fitted would be beneficial.
	The blue lines are 90% confidence intervals and a more detailed description is contained within the source document. Analysis technique, type of distribution and other details have not been included to reduce the likelihood of misuse. This information has been provided to support the geomorphic assessment and was not intended to be used as a data summary. Supporting information was limited for the sake of brevity. The original source of the data has been identified where appropriate and can be referred to by the reader.
29.37	Clarification of the reason for the significant outlier in Figure 3-13 should be provided.
	The outlier can be attributed to a tropical cyclone (TC318; 8 Feb 1963) passing close by to Onslow. Wind distribution for cyclones within ~100km of a site is expected to have a different asymptote than that developed for observations from further away.
29.38	In Section 3.2.3 (page 22), it is noted that Onslow Airport data requires factoring by approximately 20%, and for clarity this should (presumably) be noted as factoring up.
	Onslow Airport data shows stronger recorded winds than from Onslow Jetty. This is reflected in both ambient (Figure 3-6, page 16) and storm conditions (Figures 3-10/3-11 and 3-12/3-13). There are several possible contributing factors, including elevation, position relative to the coast and sampling frequency. As an indication that this difference may need to be considered for any cyclone modelling, it was noted that previous parametric modelling (Damara WA 2009) indicated that Onslow Airport extreme winds were 20% higher than determined from an estimation using cyclone pressure distribution and radius of maximum winds. Reference: Damara WA (2009) Pilbara Region Parametric Cyclone Modelling. Climate Change Analysis. Report 77-01-RevB.
29.39	In Figure 3-15 (Section 3.2.4), the y axis has not been captioned, and this should be corrected (including units).
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, a caption will not be included. Additionally, the units have no particular meaning, given the derived nature of the cumulative summation (addition of 9am wind speed E/N components each day).
29.40	Relating to Figure 3-20 (Section 3.3), the difference in wind fields for the NW and NE cyclones could be more closely explained in relation to the typical pathways of the cyclone tracks presented, for clarity.
	The text immediately above Figure 3-20 in Section 3-3 outlines why the distinction between NE and NW cyclones has been made. The purpose of its inclusion was to provide background information, additional details can be found in Appendix P2: Coastal Impacts Modelling.
29.41	In Section 3.5 (page 43), it is noted that debris lines from TC Bobby and TC Vance have been observed, and it would be of relevance if the elevation of these lines was provided, given that the tidal gauge did not capture these events.
	References within Appendix P1: Geomorphology of the Ashburton River Delta and Associated Areas indicate that the debris lines were measured (e.g. Nott & Hubbert, 2005). Validation of the debris line measurements requires additional interpretation which was beyond the scope of the geomorphology technical appendix.
29.42	In Section 3.7, it would be beneficial if the discussion on Ashburton River turbidity was linked to other sections of the EIS (with more detailed information) such as Section 6.4.7.4, Appendix F1 (Section 2.5.3), and Appendix G1 (Section 4.9.2).
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, linkages to other surface water documents cannot be included.
29.43	In Section 4.2.1, it is noted that drilling was being undertaken at the time of inspection, and it would be beneficial if the results of this drilling were reported.

	As Appendix P1: Geomorphology of the Ashburton River Delta and Associated Areas focuses on providing a coastal geomorphological assessment of the Project area, the presentation of results of any drilling campaigns are outside of this scope.
29.44	Figure 4-21 in Section 4.6 is difficult to read, and could be made clearer.
	The Draft EIS/ERMP is not being revised and, as the suggestions are not a correction of information, updated figures will not be included.
29.45	It is noted in P1 that "the effects of sea level rise should be incorporated into design parameters adopted for the development, with an understanding an acceptance of the appropriate level of risk". It is uncertain how rigorously this issue has been assessed.
	With regard to the geomorphology assessment, no significant assessment of impacts of sea level rise has been undertaken. Maritime structures and the plant site have been designed to account for an increase in water level due to the effects of global warming. The 0.2 m allowance was sourced from Table 4.1 of AS 4997 –2005, Guidelines for the Design of Maritime Structures for facilities with a design life of 50 years.

Appendix P2: Coastal Impacts Modelling

9.12	The average sediment transport field presented in Figure 3.55 to 3.59 (Appendix P2) could be misleading as without taking into account the spatially variable threshold shear stress the transport rate calculations are meaningless. There are two different sediment transport models used by DHI. One is used for plume transport called MT model which is relatively well documented. Another is the non-cohesive sediment transport model for coastal impact and channel backfill modelling. However, insufficient information has been made available by DHI to provide reviewers with any confidence on this second model. For example, it is unknown if this model has simulated mud (d50<0.063 mm) fraction of the sediment for the mean grainsize of 0.1 mm and 0.2 mm.
	The comment above is addressed in two parts: 1) As stated in Section 3.3.2 of Appendix P2, transport capacities rather than sediment transport rates are simulated. The transport rates will depend both on the transport capacity and on the availability of loose sediment for transport. Chevron notes the concern that the transport fields for constant mean grain sizes could be misleading (i.e. they may give the impression of higher transport rates in areas with coarser sediments or rock armoured bottom). The model used can readily apply a spatially varying sediment map, but it is noted that presenting transport fields based on sediment transport capacities derived from the spatially varying sediment type found on the bottom can be equally, if not more, misleading. The transported sediment is not necessarily well correlated to what is found on the bottom and picked up in a sampling campaign. Coarse sediment on the gravel banks, for instance, does not necessarily mean that there is not transport of finer sediments across this area. It most likely indicates an erosional environment where the transport capacity of finer sediments is higher than the supply of finer sediments, and therefore the bottom is being "armoured" by the coarser material remaining. Applying a sediment map in the model for transport calculations would lead to low transport rates in the areas with coarse sediments (for instance the gravel banks), whereas in reality it is possible that the transport across the armoured bottom section (controlled by the supply of finer sediments) could be higher than the transport at a section with fine sediments (controlled by the transport capacity). Using transport rates derived based on maps of grain sizes found on the sea floor to, for instance, estimate channel backfilling rates could be unconservative. It is generally preferred to model transport capacities for a range of relevant grain sizes, which provides a good impression of the potential transport rates. This is used in conjunction with available sediment grain size information to assess the overall transport rates. 2) Chevron acknowledges that the non-cohesive sediment transport model applied (Mike 21 ST) has not been as well documented for the Project as the model applied for the dredge plume modelling (Mike 21 MT). Additional information on the model documentation has been included in Appendix FP of the document. The model assumes non-cohesive sediment transport, i.e. silt and sand fractions, and mud fractions are not included in the simulations.

29.1	In general, it is noted P2 could potentially be enhanced by specifically cross-referencing other sections of the EIS as appropriate. Furthermore, there is only limited discussion on the assumptions and limitations of the modelling in P2.
	Chevron notes the suggestion. Due to the way the document was put together, with numerous components running in parallel, comprehensive cross-referencing has not been carried out.
29.2	In Section 4.0 of P2, there is discussion on morphological impacts due to the proposed development, and options to manage these impacts. As noted in Section 2.1 herein, it is considered that the results should be presented in terms of likely shoreline movements over timeframes of decades. Without this information, a rigorous assessment of impacts (and the suitability of sacrificial erosion) cannot be undertaken.

Shoreline response over long time frames is influenced primarily by cyclonic transport, episodic supply from the Ashburton River and any adopted sand management system.

As documented in the Draft EIS/ERMP (Appendix P1), the existing morphology both to the east and to the west of the proposed site has historically been highly dynamic with bar systems being formed, reshaped and breaking down, and shifting entrances to the creek and lagoon systems. Sediment supply to the coastal area is highly variable due to episodic river flow, seasonal and inter-annual variability, and occasional tropical cyclones. The dynamic nature of the Project area is illustrated below. The two images were recorded less than one year apart (according to the dates of the images). The images illustrate the closing of the former eastern entrance to the Ashburton delta area to the west of the site, and changes to the sandbar configuration at the Hooley Creek entrance to the east of the site. In such a dynamic setting, long-term coastal evolution is not well expressed in terms of expected coastal advance or retreat rates as could be the case in a simpler morphological setting. From a modelling perspective, a "shoreline evolution model", which may show the anticipated shoreline development over decades under simpler coastline settings, is not suitable under these conditions, and the morphological impact assessment in Section 4 of P2 has therefore been expressed in relative terms in relation to the changes to the local sediment budget. This is a more meaningful measure of the interruption to littoral transport, when coastal management at the site is anticipated to include sand bypassing.

The future morphological impacts will be highly dependent upon the adopted coastal process management strategy. An extension of the potential impacts described in the Draft EIS/ERMP (Appendix P2, Section 4) over a period of decades, assuming NO mitigation is implemented and the MOF channel is maintained such that there is NO bypass of sediment, is briefly outlined below:

- **West of MOF:** A continued build up of the coastline will occur to the west of the MOF. If the accumulation of material to the west of the MOF is not removed, the coastline immediately to the west of the MOF will advance until it reaches the outer limit of the breakwater, causing an initial local anti-clockwise rotation of the coastline orientation, which in turn will cause the coastline to also accrete further towards the west. When the coastline locally reaches the outer limit of the breakwater, the continued build-up of the coastline further to the west will lead to a clockwise rotation of the coastline back towards the original orientation. The build-up of the coastline to the west of the MOF would lead to gradually increasing bypass of sediment of the western MOF breakwater and increased sedimentation rates in the access channel at the MOF entrance, which would require maintenance dredging.

- **East of MOF:** To the east of the MOF, the lack of sediment supply from the west would disrupt the balance of processes forming the Hooley Creek entrance spit, and although the area would likely receive some material from east during years with stronger easterly conditions or during passage of cyclones, it is expected that the Hooley Creek entrance area would suffer erosion which would gradually extend eastward. Collapse of the spit would initially balance the lack of updrift supply, for an estimated period of 5-8 years. Subsequently, a very slow anti-clockwise rotation of the coastline would occur, gradually reducing the net easterly directed transport of sediment. As a very rough indication of potential erosion rates, 50,000 m^3 distributed over a 1 km stretch of coastline at an initial erosion height of 5m corresponds to a coastal retreat of 10m in a year. The erosion will gradually affect the coastline eastward towards Beadon Point. Looking at the entire stretch of coastline from Hooley Creek to Beadon Point and ignoring all other sources or losses other than the longshore sediment drift, the coastal stretch as such will suffer erosion corresponding to what is "lost" through transport east of Beadon Point and what is building up close to the MOF on the eastern side. In the longer term, this is not anticipated to be more than about 50,000 m^3/year. Distributing this over the 10 km coastal stretch from Hooley Creek to Beadon Point, and assuming a 10m erosion height for longer term adjustment of profile and dune erosion, leads to an average erosion rate of 0.5 m/year over the entire stretch, likely to be higher in the vicinity of Hooley Creek, reducing towards Beadon Point. The sediment bypass of Beadon Point is relatively limited under existing conditions, and it will likely take at least a decade before it would be impacted by unmitigated erosion from the Project.

In addition to the long-term net shoreline movement, installation of the MOF breakwaters is anticipated to increase the shoreline variability in response to seasonal forcing and cyclonic events. Under typical conditions, this will cause an annual cycle of retreat and recovery, with locally focused erosion in the order of 10m for 1km to the east of the MOF, as described above. The pattern of retreat and recovery may be heightened during certain tropical cyclones. Under very extreme transport conditions, 200,000 to 300,000 m^3 transport in either direction is possible, which could locally cause 40 to 60m erosion adjacent to either side of the MOF. Such erosion would be subject to recovery through seasonal alongshore transport, with dune rebuilding occurring more slowly through aeolian and vegetative processes.

As noted in the Draft EIS/ERMP (Appendix P2, Section 4.3) sacrificial erosion can be considered if it is considered acceptable to let the coastline between the MOF and up to Beadon Point erode. The erosion would be greatest in area from a few hundred metres to east of the MOF and eastward to about 4-Mile Creek, and progressively less towards Beadon Point. As noted in the Draft EIS/ERMP (Appendix P2, Section 4.3), the beach would, to some extent, change character. The erosion would affect the tidal entrances found in the area, and would also, over a time frame of decades, lead to a reduction in sediment supply to the Onslow area coming around Beadon Point.

Refer to Figure 3.7.

29.3	In P2 (and in the EIS in general) there does not appear to have been any assessment undertaken of the potential impacts of altered seabed elevations on wave climate (and hence longshore sediment transport). As part of the Project, seabed elevations are proposed to be altered due to dredging and spoil dumping.

The altered seabed configuration was included in detailed 2D modelling of waves, currents and sediment transport, and was included in the assessment of the morphological impacts from the development in the Draft EIS/ERMP (Appendix P2, Section 4). Examples of comparisons of wave patterns with and without the development in place are illustrated in Appendix P2 (Section 3.1.5). The seabed alterations do impact the local wave patterns, e.g. by "trapping" the waves in the deeper navigation channel. These impacts are, however, local scale and small compared to the impact of the direct blockage of littoral drift by the MOF.

An assessment of the placement grounds, including the effects of the placement grounds on waves, is documented in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendix EE: Spoil Ground Stability Assessment). The potential impacts on a regional scale by, for instance, placement ground C are found to be negligible along the coastline for several reasons:

- The average relative depth alteration at the placement ground is very limited.
- The waves are limited in height and mainly short period, which limits their penetration to and impact by the seafloor in the water depths at the placement ground.

The placement ground is far from shore, and the limited impacts are not felt that far away from the coastline.

Figure 3.7: Coastal Erosion affecting Tidal Entrances

29.4	It is considered that an assessment of potential alteration to wave climate and longshore sediment transport as a result of the Project bathymetry changes should be undertaken as part of a future revision of the EIS or in a supplementary EIS document. This should include the effects of nearshore infrastructure such as breakwaters, as well as bathymetry changes as noted above.
	Seabed changes were included in detailed coastal modelling (Appendix P2). Please refer to response for # 29.3 above.
29.5	In Section 2.2.1 of P2, there is a statement that "the potential natural sand bypassing of the MOF by littoral sediments needs to be addressed to establish the overall impacts to the existing littoral sediment budget". This statement is considered to be potentially misleading given that there is no expectation that any natural sand bypassing of the MOF breakwaters and dredged navigation channel will occur (that is, these features are expected to be a total barrier to longshore sediment transport).
	Chevron acknowledges the DSEWPaC's concern. However, Appendix P2 (Section 2.2.1)contains a subsection under the Problem Assessment and Methodology, and simply describes the methodology applied to assess the potential coastal impacts, and in this context it is correct that the natural sand bypass has to be taken into account in the assessment. The assessment is located in Appendix P2 (Section 4) and it is clearly stated that "The 2D sediment transport assessment showed that the MOF essentially blocks the entire littoral transport. Even for a high wave event, the littoral sediment transport bypassing the MOF breakwaters is trapped in the dredged MOF approach channel. For the coastal impact assessment it has been assumed that there is no natural sand bypass."
29.6	There is no discussion on the effects of cyclones on sediment transport in P2. Given the significant quantities of sediment that can be mobilised in cyclones, it is considered that this issue should be addressed.
	Chevron acknowledges the DSEWPaC's concern. The coastal morphology in the Project area is primarily shaped by littoral transport induced by "normal" wave conditions, but cyclones can generate very high sediment transport rates and this can lead to significant morphological changes over a short period of time. Whereas the impacts of cyclones are considered more critical from an engineering point of view, it is acknowledged that the impacts of cyclones also need to be considered from an environmental impact perspective, i.e. will the development further aggravate the potentially severe coastal morphological impacts induced by cyclones. In terms of numerical modelling of cyclones, the specific challenges and limitations must be carefully considered. This includes, but is not limited to: • Highly variable transport patterns and potential impacts depending on cyclone track, strength, etc. • Challenges in definition of cyclones. Severe cyclones are relatively infrequent, and the statistical basis for defining tracks and other important parameters and assigning a probability to given events is therefore tenuous. • Morphological modelling of the complex cross-shore processes and potential dune erosion at raised water levels is not well represented in oceanographic models. • Cyclones may generate extreme rainfall, and the related flood discharges may further complicate the assessment and modelling. Based on these limitations, it has been considered that extensive cyclone modelling would provide limited value in support of the environmental impact assessment. Cyclone modelling in support of the environmental impact assessment was therefore limited to a simulation of regional Cyclone Vance (1999), which was a severe cyclone impacting the Project area, and deemed to provide some information on the potential impacts to the site. The modelling of TC Vance was primarily set up to look at the potential transport rates and bottom mobility in relation to the navigation channel backfilling, the sediment transport patterns around the MOF and the stability of the placement grounds. Due to the above mentioned limitations, in modelling of the coastal erosion under cyclonic conditions, the model has not been set up to simulate coastal morphological changes from cyclones. Whereas the cyclone modelling for Vance has been considered in the overall assessment, the modelling has not previously been reported in detail. The key findings from the modelling of cyclone Vance include:

- Up to 5m surge simulated. This combined with high waves and strong currents will obviously have the potential for severe coastal impacts.
- Simulated waves in deeper water (> 20-30m) seaward of Thevenard Island are severe with significant wave heights up to about 7m. The (~30 km wide) shallow area towards the coastline combined with the numerous islands, reefs and shallow outcrops provides significant protection, and the waves reaching the coastline are significantly reduced, but still several times higher than the "normal" waves which rarely exceed a meter at the coastline.
- Simulated current speeds up to 2 m/s are reached at the outer channel section.
- The combined effects of waves and currents generate bottom shear stresses which are a magnitude higher than under normal conditions. This will mobilise the seabed throughout the study area, including the placement grounds.
- The sediment transport during Cyclone Vance was predominately westerly directed, i.e. opposite the dominant littoral transport direction generated by "average" climatic conditions.

Cyclone Vance caused severe morphological impacts along the coastline in the study area. In terms of potential incremental morphological impacts from the Project, the following is considered:

- The track and landfall of Vance resulted in net westerly sediment transport. The clockwise rotation of cyclones in the southern hemisphere combined with the common tracks will often lead to dominant westerly transport. This is opposite the predominant littoral transport direction at the site. Cyclone impacts thus have the potential to temporarily reverse the impacts at the site with accumulation on the eastern side of the MOF and erosion on the western side. As described in the Draft EIS/ERMP (Appendix P2, Section 4.1), on average the MOF is expected to cause a build-up of the coastline on the western side of the MOF, which will act as a buffer against periods with reversed transport rates. Cyclones add to the risk of reversal of the littoral transport rate as outlined in the Draft EIS/ERMP (Appendix P2, Section 4.1), If a cyclone impacts the site shortly after construction prior to any significant sediment buffer building up to the west of the MOF, or after a potential "maintenance removal" of material to the west of the MOF, it could lead to aggravated erosion in an area to the west of the MOF.
- Cyclones can also lead to easterly directed transport, and in particular if combined with severe rainfall, the Hooley Creek entrance configuration can completely change character with the outlet potentially shifting location (i.e. breach of the entrance spit). This may happen with or without the presence of the MOF, although the MOF may lead to aggravated erosion of the entrance spit at Hooley Creek. Cyclones thus have the potential to increase the erosion to the east as described in the Draft EIS/ERMP (Appendix P2, Section 4.2).
- In terms of channel sedimentation, a single cyclone is estimated to potentially cause sedimentation several times the expected annual channel sedimentation. The channel may have to be surveyed following a severe cyclone with a potential requirement for maintenance dredging. Whereas the potential downtime caused by this is an operational issue, the sedimentation caused by cyclones has been considered in the overall channel sedimentation and maintenance requirements.

The severe nature of cyclones obviously has a profound impact on design of the facilities. This is a separate structural design issue and not covered by the modelling and assessment for the Draft EIS/ERMP.

29.7	It would be useful if the GEMS (2010) reference was cross-referenced to Appendix GG of Appendix Q1 of the EIS.

Chevron notes the suggestion. Due to the way the document was put together, with numerous components running in parallel, comprehensive cross-referencing has not been carried out.

29.8	In Section 3.1.3, it is noted that two wave conditions have been modelled (namely Summer and Winter scenarios), and it would be useful if some discussion on the relative length and representativeness of these scenarios was provided.
	The fine grid coastal model with wave driven currents included is computationally very demanding, and is therefore generally not applied for extended periods spanning years. For the important long-term morphological assessment, the littoral sediment drift model, documented in the Draft EIS/ERMP (Appendix P2, Section 3.4) has been applied for a 10 year period, including inter-annual variations. The simulated periods as listed in the Draft EIS/ERMP (Appendix P2, Table 3-1) were chosen from within the periods covered by the climatic scenarios selected for the dredge plume modelling to cover two periods during summer and winter with events of relatively stronger winds and associated higher waves. The winds and resulting net currents for the climatic scenarios are documented in detail in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendixes FF: Comparison of Net Currents from Onslow and MesoLAPS Wind Driven Hydrodynamics and Appendix JJ: Des Mills Closeout Review & DHI Response of Draft EIS/ERMP).
29.9	In Section 3.2.4, there is a statement that "waves were simulated based on the MesoLAPS winds as previously documented in Section 3.1", but it is uncertain where in Section 3.1 this information is documented.
	This information is located in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendix N: Wave Modelling: Setup and Validation of Draft EIS/ERMP). As mentioned in response to the previous comment (# 29.8), the simulated periods are listed in the Draft EIS/ERMP (Appendix P2, Table 3-1), while the winds and resulting net currents for the climatic scenarios are documented in detail in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendixes FF: Comparison of Net Currents from Onslow and MesoLAPS Wind Driven Hydrodynamics and Appendix JJ: Des Mills Closeout Review & DHI Response of Draft EIS/ERMP).
29.10	In Section 3.2.5, there is the introduction of a "rough" wave conditions scenario, but it is uncertain where this has been defined.
	The definition of the rough wave condition was omitted from the Draft EIS/ERMP (Appendix P2) due to oversight. The rough wave condition was introduced by choosing a period which included strong winds in the first week of January, 2007. Figure 3.8 illustrates the stronger winds as recorded at Onslow and Barrow Island during January 2007.
29.11	In Section 3.3.1, a description of the formulation to derive the amount of sediment in suspension and transported as bed load would be useful, as well as discussion on its selection and suitability.
	Documentation on the Mike 21 ST model has been provided in Appendix FP of the document. The model provides a choice between different transport formulations. For the present setup, deterministic intra-wave description of the boundary layer and sediment transport in combined waves and currents has been applied. The theoretical background was developed at the Technical University of Denmark and is documented in several papers, referred to in Appendix FP of the document. The model has been applied extensively for coastal engineering and environmental studies over the past 25 years. A key strength of this model is its detailed boundary layer description with an intra-wave period approach. This allows the inclusion of a detailed description of the transport in combined waves and currents
29.12	In Section 3.3.1, it is stated that two grain sizes with a d50 of 0.1mm and 0.2mm respectively were simulated, but it is noted that the d50 of beach sediments was found to be between 0.24mm and 0.28mm in Appendix P1, so clarification on the relevance of 0.1mm simulations would be useful.
	The sediment transport model is not only applied for the beach sediment, but covers a larger study area and is also used for assessment of channel sedimentation. Different approaches may be taken in sediment transport simulations. Whether for instance a range of constant mean grain sizes or a map of grain sizes is applied in the modelling depend on the circumstances and the application. It is important to note that the model, as stated in the Draft EIS/ERMP (Appendix P2, Section 3.3.2), is simulating transport capacities rather than sediment transport rates, i.e. it assumes full availability for suspension of the specified grain size distribution at any given location. The realised sediment transport is not necessarily well correlated to the grain sizes found on the bottom, which may lead to misleading results if a grain size map is used to estimate actual transport rates. Please also refer to responses for # 9.11 and 9.12 for further discussion.

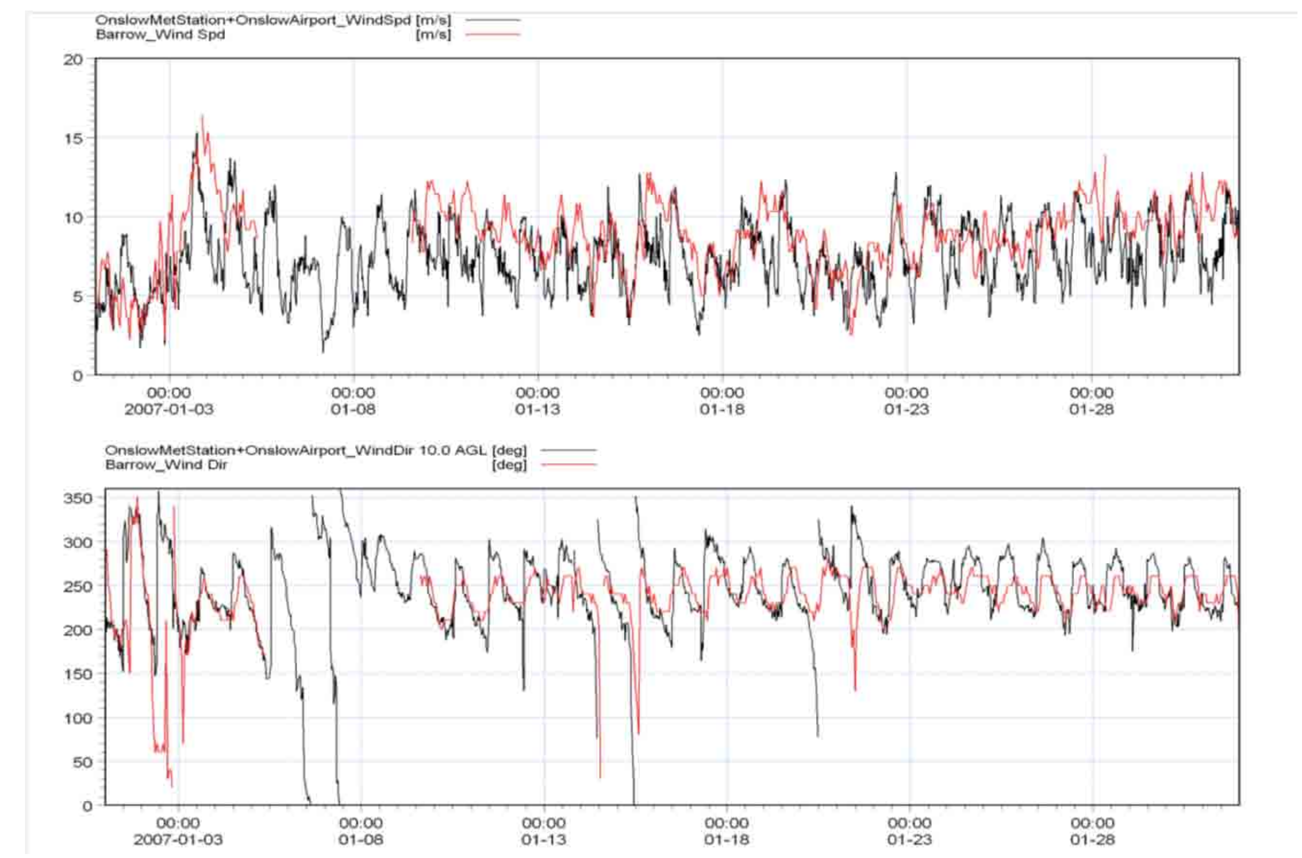


Figure 3.8: Strong Winds Recorded at Onslow and Barrow Island

29.13	For clarity, it would be useful if Figure 3.72 (in Section 3.4.2) included a note that the transport direction was to the east.
	The Draft EIS/ERMP is not being revised therefore a note on transport direction cannot be included.
29.14	In Section 5.0, it is noted that changes to the drainage patterns of Hooley Creek were not considered in P2, and clarification is required as to where this issue has been addressed in the EIS.
	Changes to surface water drainage patterns in Hooley Creek have been considered in the Draft EIS/ERMP (Appendix G1: Wheatstone Project Surface Water Studies).
29.15	In Section 5.2, it is noted that the bathymetry of the Hooley Creek channels was guessed based on producing "reasonable" current velocities within the channels, and clarification is required on how this was undertaken.
	The channels of Hooley Creek are dynamic and change with time in response to sediment infilling (from the hinterland and/or the sea) and flushing by tides and larger runoff events. Depending on the relative magnitude of these components, a balance between the infilling and the flushing will normally exist. Whereas large flushing events may create channels with a relatively larger cross-sectional area than the tidal flushing can maintain, the tidal flushing in the environment experienced at Hooley Creek will normally be expected to keep channels flushed with current speeds only occasionally exceeding 1-1.5 m/s under spring tide conditions. The adjustment was therefore to increase the channel depths if channel constrictions causing speeds significantly in excess of this was encountered. Whereas measured data is obviously desirable, it is noted that measurements in the small channels can be problematic, and with dynamic channels, as described above, measurements will only represent a snapshot in time. LiDAR data was used where appropriate. Limited profile surveys of the Hooley Creek channels have since been carried out, and the model bathymetry found to be in reasonable agreement with these.

29.16	Further to the above point, it is also recommended that sensitivity testing to variations in bathymetry is undertaken.
	The channel depths will only influence the results inside the creek system, i.e. the impact assessment for the reduction in tidal prism of the Hooley Creek system. The impact assessments are carried out in relative terms, i.e. the potential impacts of the reduction in the tidal prism of the estuary on the flushing has been expressed in relative terms, and the impacts only been used in a qualitative assessment. Whereas changes in the bathymetry may change the magnitude of impacts, the overall findings will not be very sensitive to changes in the bathymetry.
29.17	In Section 5.2, it is noted that a temporary increase in flood levels may be experienced until the entrance is scoured (and that this component should be evaluated in conjunction with the potential changes to flow and discharge patterns within the tidal creek system), but it is uncertain where in the EIS this evaluation has been undertaken.
	Changes to surface water drainage patterns and altered hydrology patterns in Hooley Creek have been considered in the Draft EIS/ERMP (Appendix G1: Wheatstone Project Surface Water Studies).
29.18	It would be beneficial if P2 included a Conclusions section drawing key points in the Appendix together.
	The Draft EIS/ERMP is not being revised therefore a Conclusions section cannot be included.
Appendix Q1: Dredge Spoil Modelling	
9.11	The model used to assess the potential for channel backfilling is not the one used for the transport and fate of the dredge sediment plume (DHI MT model). The channel backfilling is simulated by another DHI model which is the one used for coastal impact simulation with a higher resolution than the plume impact assessment model. The dredge plume model did not estimate the thickness of fine sediment deposition on the seafloor at the impact zones during the dredging operation period. The fine sediment (plume) deposition at the Wheatstone channel and the Salt Channel are unknown. The channel backfilling model used in the report is oversimplified and not capable to provided engineering predictions for following reasons: • The 'representative' scenarios are used in the model to represent long-term (a year or decades) sediment transport. However the report did not demonstrate how those scenarios were selected. The sediment transport theory used in the model is unknown and not in the DHI documents referenced. There is no explanation that why the model cannot run for a year with real wind, wave, current, and seabed sediment distribution. The report did not demonstrate that inter-annual variability is considered. • It is unusual to use uniform mean grain size through the simulation seabed when large quantity of sediment sampling information (Appendix Q5) is available and should be used; in addition the estimated grainsize distribution for the placement material is also available. • The critical modelling formulae on the calculation of sedimentation rate, threshold shear stress or shear velocity, bed-load transport rate, suspend load transport rate, dealing with mud (clay) fraction are unknown As the only calibration data available the model is adjusted to the low backfill rate of the nearby Salt Channel. However, the Salt Channel does not extend to shore, was only excavated to -6m contour offshore. As it is further away from the Ashburton Delta than the proposed channel the placement material was much coarser and in much smaller volume. With large volume of extremely fine and highly mobile unconsolidated mud available at the nearshore placement grounds A, B and C the model could significantly underestimate the channel backfill rate. Especially with the unstable placement grounds.

	It is noted that Mike 21 ST, run for the non-cohesive sediment transport model, is not as comprehensive as Mike 21 MT, run for the dredge plume modelling. The modelling applied for the channel backfill assessment is the finer-resolution Coastal Modelling Complex, documented in Appendix P2: Coastal Impacts Modelling. The model builds on the detailed hydrodynamic and wave models by applying an intra wave period description of the turbulent boundary layer in combined wave and current motion, together with a deterministic approach to calculating non-cohesive sediment transport. The channel sedimentation assessment is intended to support the environmental assessment rather than engineering design considerations. For the channel sedimentation assessment, the focus has been on providing a robust estimate of the likely sedimentation rates to address the long-term need for maintenance dredging. For the channel siltation of fines during construction the Dredging and Spoil Disposal Management Plan (Appendix S1) includes "clean-up" dredging at the end of the campaign, and siltation rates due to spillage from the dredging operations have therefore not been a concern. Specifically it is noted that: • The fine grid coastal model, including wave driven currents, is computationally demanding and is therefore generally not applied for extended periods (i.e. multiple years). For the important long-term morphological assessment, the littoral sediment drift model (Appendix P2: Coastal Impacts Modelling) has been applied for a ten year period and includes inter-annual variations. The simulated periods listed in Appendix P2: Coastal Impacts Modelling (Table 3-1) were chosen from within the periods covered by the climatic scenarios for the dredge plume modelling to cover two periods during summer and winter with events of stronger winds and associated higher waves. The winds, and resulting net currents, for the climatic scenarios are documented in detail in Appendix Q1: Dredge Spoil Modelling (Appendix FF; Appendix JJ). • Whether a range of constant mean grain sizes for a map of grain sizes is applied in the modelling of non-cohesive sediments depend on the circumstances and the application. It is important to note that the model (Q1: Dredge Spoil Modelling, Section 3.3.2) is simulating transport capacities rather than sediment transport rates i.e. it assumes full variability for suspension of the specified grain size distribution at any given location. The realised transport is not necessarily well correlated to the grain sizes found on the bottom, which may lead to misleading results if a grain size map is used to estimate actual transport rates. Please also refer to the response for the submission below for further discussion. • The Mike 21 ST model provides a choice between different transport formulations. For the present setup, deterministic intra-wave description of the boundary layer and sediment transport in combined waves and currents has been applied. The model was not "adjusted" to the observed low sedimentation rates in the Onslow Salt channel. The model is deterministic, and as such, is perhaps less reliant on calibration than empirical formulations. An assessment of the stability of the dredge material placement sites has been carried out separately (Chapter 8: Marine Risk Assessment & Management; Appendix Q1: Dredge Spoil Modelling, Appendix EE). It is anticipated that, although the placement sites are not initially stable, limited siltation of the Onslow Salt Channel will originate from the spoil grounds.
9.7	Appendix JJ, Section 2.3 The issue of inter-annual variability requires further consideration. It should be demonstrated whether wind records used to drive the models for the seasonal climate scenarios are typical or atypical of those seasons.
	The representativeness of the adopted periods has been assessed and reviewed as additional site-specific data has become available. This is documented in Draft EIS/ERMP Appendix Q1: Dredge Spoil Modelling (Appendix JJ, Section 2.3). The assessment focused on the wind-driven net currents, which are the primary drivers for the dispersion of the sediment plume away from the spill sources. The analysis has shown that the adopted climatic scenarios encompass the full range of net current strengths experienced, except for cyclonic conditions when dredging will cease. The inter-annual variability has been analysed for known El-Nino and La-Nina periods, and the generated net currents shown to be within the bounds of the adopted climatic scenarios.

22.29	Dredge Plume Management A large number of reports have been prepared on the assessment and management of the suspended sediment plumes which will be generated during the dredging process. The DPA have a number of concerns regarding the assumptions and methodology used. The key issues of concern, with respect to the assessment to the dredge plumes, include: a. 2D hydrodynamic modelling has been undertaken rather than 3D. A 2D model averages the currents over the depth of the water column whereas a 3D model represents both the current magnitude and direction at all depths. Tidal currents tend to be relatively constant with depth, whereas the currents driven by winds are only felt in the top part of the water column. Where the direction of the wind and the current are not aligned, a 2D model cannot correctly represent the processes. We note that this concern was also raised by Dr Mills in his technical review of the dredge modelling Appendix JJ. In response, DHI stated that in their view the 2D model was conservative as it was less dispersive. This is not necessarily the case when considering very fine material which can remain in suspension for a long period of time. Experience has shown that this can have a significant impact.
	The modelling strategy adopted has been demonstrated to be the one best suited to the Project area. The modelling strategy developed for the Project has been based on international experience in the assessment of large dredging projects. This includes the choice of the appropriate model tools as well as the design of the assessment methodology. The motivation for the choice of applied methodology is outlined in the Draft EIS/ERMP (Appendix Q1, Appendix C, Section 3.0). A more detailed discussion on specific model choices and setup is included in the Draft EIS/ERMP (Appendix Q1). The appropriateness of the choice of a 2D as versus a 3D modelling approach is site-specific and has been based on careful consideration of the Project site. The motivation for the approach adopted for the Project is documented in the Draft EIS/ERMP (Appendix Q1, Appendix E: Sediment Transport Modelling using 2D vs. 3D Hydrodynamics). Appendix Q1 (Appendix E) outlines why 2D modelling of a "line source" representation of the dredging along the channel combined with the assessment methodology, leads to a conservative result. Additional simulations were undertaken and reported in the technical appendices of the Draft EIS/ERMP (Appendix Q1) that demonstrate that this is the case through comparisons between impact zones derived from 2D and 3D modelling. The 2D versus 3D approach has undergone extensive scrutiny as part of the review process. The final outcome of the review process is partly documented in the Draft EIS/ERMP (Appendix Q1, Appendix FF). An extension of the 2D versus 3D scenario comparison is included in Appendix FP of the document, which also includes results for the offshore dredge material placement ground where 3D effects become more important in deeper water and for a point source, and for which 3D modelling has been undertaken.
22.30	Dredge Plume Management b. The 2D modelling considers a quite low range of material sizes. The suspended sediment of concern is that below 80 um. The DHI model considers only a range between 6um and 35um. This means that the material between 35um and 80um is ignored and that below 6um is ignored. Based on the PSD's available from the Coffey reports, the material ignored represents between 40% and 80% of the total mass below 80um. Clearly the model does not represent the potential conditions which might be experienced during dredging under these circumstances.

	The representation of sediments in the model is critical for the modelling assessment. This is described in detail in the Draft EIS/ERMP (Appendix Q1, Appendix G: Characterisation of Sediment as used in the Transport Model). The sediment spill properties are uncertain at the EIA stage as the sediment spill is not necessary well correlated to the partly consolidated source material. A best estimate settling distribution, based on laboratory measurements of settling velocities derived from extensive overflow sampling from dredging in a similar environment, has been applied. The adopted sediment properties based on the overflow sampling is not necessarily well correlated to the sediment distribution derived from the source material. The adopted settling curve was derived based on the full range of fines (mud and silt fractions) in the overflow samples, not just the 6 - 35 µm range as indicated in the submission. The derived settling curve from all the fines has been represented by six sediment fractions in the model with median settling velocities in the range of 0.03 to 1 mm/s. The issue of representation of the sediments, both at the fine and the coarse end of the curve, has previously been raised in the review of the modelling, and sensitivity testing has been carried out as documented in the Draft EIS/ERMP (Appendix Q1, Appendix G, Appendix JJ). This demonstrates that the adopted settling curve is well represented by the six fractions, and adding additional fractions within either end of the curve does not significantly alter results.
22.31	Dredge Plume Management c. The overflow rates used in the model were based on measurements of overflow at a dredging operation in Singapore. The low or “”realistic”” overflow used in the model is 80% to the average overflow measured during that dredging campaign. It is not clear why the “”realistic”” overflow used would not at least be equal to the average overflow measured.
	The spill rate assessment for the Project is documented in the Draft EIS/ERMP (Appendix Q1, Appendix B, Section 2.3). The procedure was based on spill rates from DRL models. A bench-marking of this information against the monitoring data available from Singapore was undertaken. The benchmarking showed that the value put forward for trailing suction hopper dredge overflow with a turbidity reducing (green) valve was in the order of 82 per cent of the median estimate derived by DHI from data without a turbidity reducing valve. As the green valve technology is known to generally lead to a significant reduction in dispersion of the fines into the water column (i.e. the overflow spill), it was concluded with LWI that the adopted spill rate is likely conservative for operations which include the use of a turbidity reducing valve as specified in the Draft EIS/ERMP Appendix S1: Dredging and Spoil Disposal Management Plan.
22.32	Dredge Plume Management d. The dredge scenarios used have been limited to 14 days. Given that upwards of 40% of the material likely to be in suspension is less than 1um we believe that the model should be run: • With a reasonable representation of the fines. • For a longer duration so that it can be demonstrated that the worst conditions have been achieved. In other words the model should be run for a long enough period that the peak of aerial extent and mass concentrations of sediment have begun to decline. Calculations show that the finer fractions of suspended sediment will still be in suspension well after 14 days and therefore concentrations have the potential to increase with time. • The model should be run for a very calm condition. We do not believe, based on previous project experience, that storms represent the worst conditions, rather the opposite. • Consideration needs to be given to the potential of light deprivation with low concentrations of very fine material.

It is noted that the impact criteria have been developed for 14 day periods, and the impacts assessment is therefore based on statistics derived over 14 day periods. However, for each of the summer, winter and transitional periods, modelling has been undertaken for a two month period for each dredging scenario. The statistics for the 14-day assessment periods have been derived from each of the three seasonal scenarios with a minimum of a 14 day "warm-up period" prior to the assessment period.

- As noted in the response to Comment 22.26b, based on the available data, an appropriate representation of fines has been applied in the modelling.
- As part of the documentation of the scenario approach, the impact of simulation times adopted in the scenario approach have been extensively tested. The Draft EIS/ERMP (Appendix Q1, Appendix F: Studies in Support of the Scenario Approach) documents the results of simulations undertaken to highlight the sensitivity of results presented to the length of the simulation (both in terms of the time required to establish "quasi-stationary conditions") and the effects of re-suspension on the overall derivation of the impact zones. It is concluded that the plume is "well established" after a 14-day warm-up period, and the impacts of sediment re-suspension for a longer simulation has insignificant impact on the boundaries of the zones of impact and only has potential changes to the zones of influence.
- Chevron agrees that not only "storms", but also calm periods can lead to impacts. Wind driven net currents are extremely important in carrying the sediment plume away from the sources, and stronger winds (without necessarily being classified as a storm when dredging operations may cease) will lead to higher concentrations being carried further away from the sources, and therefore potential far-field impacts. Calm periods with minimal dispersion will lead to higher concentrations and higher sedimentation rates in the near-field area. Very simplified, calm periods are more likely to lead to near-field impacts while stronger wind situations are more likely to lead to "far"-field impacts, and no "worst-case" conditions in terms of climatic conditions are defined. To address the possible range of worst-case conditions, six climatic scenarios were identified and have been applied in the modelling. Two for each of the winter and summer seasons with variable strength winds and wind driven net currents and two during the relatively calm, transition period between summer and winter. In addition to the wind driven current fields, the tidal currents are significant at the site and causes significant dispersion of the plumes. During the calm seasons, the tidal currents often dominate the plume dispersion from the spill sources. The applied climatic scenarios contain periods of neap tide combined with calm conditions.

Chevron agrees that light reduction due to suspension of very fine particles is one of the major potential impacts associated with the proposed dredging programme. In order to assess this potential impact, a series of tolerance limits for impacts of suspended sediments on corals and seagrass were developed. This was based on an extensive review of available literature (Draft EIS/ERMP, Appendix N3), which included the effects of light deprivation associated with concentrations of very fine material. However, literature values for the effects of very fine suspended material on light reduction are limited.

Literature values, limits set for previous dredging projects in Western Australia, extensive experience of monitoring dredging operations around the world (particularly in southeast Asia) and the site-specific background conditions were taken into account by the modellers, and a conservative approach in setting tolerance limits for corals and seagrass (in both cases using the most sensitive species recorded in the Project area) to both suspended sediments and sedimentation was used for the impact assessment. The tolerance limits were independently reviewed by Professor Charles Sheppard, an acknowledged expert from Warwick University, and assessed overall to be suitably conservative (Draft EIS/ERMP, Appendix N1, Appendix A). Chevron therefore considers that this potential impact has been adequately addressed in the Draft EIS/ERMP. In addition it is noted that under the Dredging and Spoil Disposal Management Plan, reactive management framework, relevant water quality parameters, including light reduction, and any associated habitat changes related to the dredging programme will be monitored, in order to confirm and manage the levels of impact to conform with those predicted in the Draft EIS/ERMP.

29.58	By definition, the critical shear stress for deposition must be less than or equal to the critical shear stress for erosion. This was discussed directly with Chevron during the review process, and based on an email from Tony Rouphael of Chevron to Peter Horton of Worley Parsons on 30 June 2010 (prompted by our concerns), we were advised that the critical shear stress values should be swapped above. This should be corrected in the EIS document.
	Table 4.6 of Appendix Q1: Dredge Spoil Modelling of the Draft EIS/ERMP was been updated to reflect the correct values applied in the modelling.
29.59	It is agreed that adopted critical shear stress values strongly influence the simulated behaviour of dredge plumes, including the predicted extent of suspended sediment impacts. Therefore, it is considered that sensitivity testing should be undertaken to assess the variability in sediment plume behaviour for a range of critical shear stresses for erosion and deposition. This is particularly the case as the adopted values are not based on testing of sediment from the Project area, and there is wide variability in literature values.
	Chevron recognises that there are significant uncertainties associated with dredge material modelling at the Draft EIS/ERMP stage including those model parameters used in defining the simulated behaviour of the fines released into the water column and deposited on the bottom during dredging. These model parameters are discussed in the Draft EIS/ERMP (Q1: Dredge Spoil Modelling, Section 4.3.2) and include: • Sediment properties of the material, typically represented by grain size distribution / settling curve (percentage weight fraction on given settling velocities). This may change with flocculation. • Dispersion of sediments in both the horizontal and vertical plane. • Sediment interaction with the bottom, including siltation and re-suspension, consolidation processes and cohesive forces established with time. The initial phases of the modelling included testing of different settling and deposition/erosion characteristics, and this clearly demonstrated that these parameters as expected have the potential to strongly influence the simulated behaviour of the dredge plume. These parameters can in general not be accurately derived from the site as site-specific testing to derive critical shear stresses for erosion and deposition are complex and associated with large uncertainties. Establishing these parameters for modelling therefore relies heavily on previous experience including studies for which sufficient monitoring has been undertaken in order to enable model calibration and validation. For the Project, Chevron has relied on internationally experienced modellers to define the model parameters. DHI have applied parameters from a setup extensively validated in Singapore, as outlined in the Draft EIS/ERMP (Q1: Dredge Spoil Modelling, Appendix G, Section 4.3.2.3 – 4.3.2.7). The conditions in the Project area are considered to be comparable to those experienced in Singapore in terms of bottom sediments and currents. The extensive monitoring campaigns carried out in Singapore have allowed the establishment of the settling curve for the material as well as validation of the plume behaviour. The overall objective of the dredge plume modelling is to provide input to the environmental impact assessment to produce conservative but realistic estimates of the impacts caused by suspended sediments and sedimentation. The modelling strategy and approach to achieve this is outlined in the Draft EIS/ERMP (Q1: Dredge Spoil Modelling, Section 3 and supporting technical appendices). This includes the use of sediment-related parameters from the validated Singapore model setup. In addition to "representative" spill rates used for the assessment of the most realistic plume behaviour, "high" spill rates have also been assessed to take into account the uncertainties related to the spill rates and modelling of fine sediments. Whereas it is agreed that parameters related to the settling velocities and the deposition and erosion may have a significant influence on the results, Chevron does not believe that additional sensitivity analyses will provide significant additional insight into the potential impacts of realistic rates, and the combining of conservative estimates of all values would lead to un-realistic estimates of impacts that may be realised in practice.

29.60	Furthermore, a critical shear stress for deposition of 0.1N/m2 can be considered to be towards the upper end of typical literature values (at suspended sediment concentrations less than about 300mg/L), with higher values enhancing deposition. This is therefore potentially unconservative in terms of the assessment of suspended sediment impacts, unless the adopted value can be shown to be realistic based on measurements of sediments in the Project area. A similar argument could be applied that the critical shear stress for erosion of 0.3N/m2 may be unconservative, with lower values enhancing erosion.
	The adopted values are part of an overall calibrated setup applied in Singapore and validated extensively through comprehensive monitoring programmes. The conditions in Singapore are considered comparable to the Project with respect to the dominance of currents in the transport of sediment away from the initial disturbance area and the predominance of silty sand. The critical shear stresses for erosion will generally change with time as the sediment consolidates and cohesive forces are established. As noted in the Draft EIS/ERMP (Q1: Dredge Spoil Modelling, Section 4.3.3), the consolidation over the 2 months simulation period has been ignored in the scenario approach, which may be considered conservative (i.e. the critical shear stress for erosion is applied for all sediment settled out over the two-months simulation period).
29.61	In Figure F.4 of Q1, the effects of resuspension by currents and waves over a 2 month simulation period are illustrated. This was undertaken using "high" critical shear stresses for erosion (allowing no resuspension) and "normal" critical shear stresses for erosion. The critical shear stress values used in both of these cases should be clarified. The relevance of using a high value that allows no resuspension should also be clarified.
	The "normal" values for the critical shear stresses refers to the values applied in the modelling for the assessment, i.e. 0.1 N/m^2 for deposition and 0.3 N/m^2 for erosion. The same value for deposition was applied together with a much higher value for the critical shear stress for erosion of 10 n/m^2 for the case with no erosion in the model. The intention of the test and plot is to investigate and demonstrate the relative importance of re-suspension and the impact of waves in this connection in the model setup applied for the assessment. Whereas the combinations of strong tidal currents during spring tide combined with conditions with stronger wind driven net current flows have been identified as the main drivers for (higher bottom shear stresses) and sediment re-suspension, the plot illustrates that waves also play a role and cannot be neglected.
29.62	With regard to the density of initial deposits of 400kg/m3 noted above, it stated in Section 4.3.2.6 of Q1 that the value is based on the density of sediments recovered from sediment traps and is considered a robust and well validated figure. For clarity, this density should be defined (presumably it is a dry density), and evidence for its validity should be provided.
	The value for density of initial deposits is a dry density, derived from the extensive sediment trap sampling in Singapore. Data used to derive the value are proprietary and are therefore not available for presentation. It is noted that the density is not applied in the modelling itself, it is only a value used for "post-processing" of the results to derive for instance thickness of deposited layers from the model output. It therefore should not have been included in the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Table 4.6). In order to provide a conservative conversion in terms of layer thickness (the lower the value for density, the thicker the layer will be for the same mass of sediment) the value used in the modelling was at the lower end of the range of recorded values.
29.63	The methodology for erosion of sediment in the numerical model used should also be clarified, e.g. in terms of the type of erosion that was simulated (surface erosion or mass erosion) and the number of layers allowed for on the bed.
	As noted in the response to submission 29.60, the consolidation over the two-month simulation period was not included for the scenario modelling. Only one bottom layer was therefore included.

29.64	Based on Section 4.3.2.3 of Q1, we understand that settling velocities for use in the modelling were derived based on "settling tube measurements in overflow samples from silty sand material with bed silt/clay content in the 10-30% range", from other studies not in the Project area. From Table 4.7 of Q1 (Section 4.3.3), it is evident that a six fraction sediment description was adopted, with settling velocities ranging from 0.03mm/s to 1mm/s. It was also recognised in Appendix G1.1 of Q1 that "defining settling characteristics at the present stage of the Project development is fraught with a significant degree of uncertainty", and therefore that "the approach adopted was to use a best estimate grain size distribution, and include the uncertainties related to the grain size distribution and spill rates through two different spill rates". However, it is considered that there are also significant uncertainties in the settling velocities relating to each grain size, and that sensitivity testing or conservative estimation of settling velocities would be appropriate to be carried out. This is particularly the case given that cohesive sediment settling velocities in seawater reported in the literature can be significantly slower than those adopted. Testing of the sediments to be dredged could also be carried out now to refine the estimates provided, and is recommended.

It is correct that the settling velocities applied in the model were derived from settling tube measurements from overflow. The settling curve derived from the settling tube tests is represented in the model by 6 settling velocities, each with an ascribed weight fraction out of the total spill (Draft EIS/ERMP, Appendix Q1: Dredge Spoil Modelling, Section 4.3.2.3).

The model uses settling velocities rather than grain sizes to represent the sediment, and there is thus no uncertainty introduced by converting the settling tube velocities to grain sizes. The referenced phrase from the Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendix G) "the approach adopted was to use a best estimate grain size distribution, and include the uncertainties related to the grain size distribution and spill rates through two different spill rates" should more correctly read "the approach adopted was to use a best estimate settling velocity distribution, and include the uncertainties related to the settling velocity distribution and spill rates through the use of two different spill rates". Draft EIS/ERMP (Appendix Q1: Dredge Spoil Modelling, Appendix G and Appendix JJ) include comprehensive testing of the ability of the applied 6 settling fractions to represent the adopted settling curve.

The overall approach to establishing the setup and ensuring the overall objective of achieving a conservative but realistic assessment of the impacts was briefly discussed in the response to # 29.1. Whereas it is agreed that parameters related to the settling velocities and the deposition and erosion can change the results significantly, it is not considered that a sensitivity analysis will provide better insight into the assessment of realistic rates, and combining conservative estimates of all values would lead to un-realistic impact estimates.

In terms of the recommendation to carry out sampling and testing of the sediments to be dredged, the following is noted:

- A comprehensive geotechnical campaign has been carried out for the Project and the results used in the assessment of dredging methodology, dredge and associated spill rates.
- The properties of the sediment spill (once it has been through a dredger and a given fraction of the fines found its way to the overflow) are not necessarily well correlated to the parent material, as is the case for consolidated material.
- Whereas the geotechnical information is important for an overall classification of the material and the assessment of expected spill rates, a settling curve derived from overflow measurements from dredging is comparable material will provide a better estimate of the settling velocities expected for the overflow from dredging at the site.

Based on the above considerations, specific testing for settling velocities was not carried out in connection with the geotechnical campaign. Chevron is committed to an intensive field campaign at the start-up of dredging, which will be used to collect site specific data and review the modelling assumptions and impact assessment.

30.16	The "Response to Independent Peer Review, 8 June 2010" by DHI, addresses issues raised in the 10 May Review by Dr Des Mills. However the report points to further work that is to be completed. This includes 3D modelling of outer sections of the shipping channel to confirm that 2D modelling provides conservative predictions (page3) and an examination of the El Nino / La Nina climatic variation to confirm that the modelled scenarios "can be considered inclusive of net currents affected by inter-annual climatic variations" (page 14). If this further work has been completed the OEPA request, for the sake of completeness, to view a copy of this work and any final "Closing Out" comments from the independent reviewer.
	A closeout note was prepared by the independent reviewer in response to the Draft EIS/ERMP, Appendix Q1, Appendix JJ: Response to Independent Peer Review, 8 June 2010. The independent reviewer closeout note dated July 28 2010 and additional work carried out per recommendations by reviewer are documented in Appendix FP of the document.
Appendix Q4: Nearshore Acid Sulfate Soils Investigation (Turning Basin and Dredge Channel)	
29.76	Appendix H The laboratory sheets in Appendix H of Q4 included results for a series of samples with the prefix "MV". Elsewhere in Appendix H only samples with the prefix "MC" were referred to. Clarification as to the relevance and location of the "MV" samples is required.
	The environmental sampling program (ASS investigation) was undertaken in conjunction with the geotechnical program undertaken by Coffey. The samples submitted (MV series) by Coffey were done so erroneously as they were not within the scope of work for the nearshore acid sulfate soils investigation (i.e. they were considered to be outside the dredging area of investigation). Chevron is obviously unable to remove them from the lab certificates.
Appendix Q5: Sediment Quality Assessment – Wheatstone Dredging Program	
29.77	Figure 1-2 It would be beneficial if the placement sites (A to E) were labelled on Figure 1-2.
	Figure 1.2 was updated in Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program as part of the submission of the Draft EIS/ERMP.
29.78	Table 2-4 In Table 2-4, the following are not consistent with the National Assessment Guidelines for Dredging 2009 (Commonwealth of Australia, 2009), and should be corrected: • PQL for Ba should be "na" • PQL for TOC should be 0.1% • Screening Level for TBT should be 9µg Sn/kg.
	Table 2.4 was updated in Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program as part of the submission of the Draft EIS/ERMP
29.79	Section 2.5 & 2.6 It is considered that the QA/QC samples for the Dredge Area were adequate. However, clarification is sought as to whether QA/QC samples were undertaken for the grab samples recovered from the proposed placement sites.
	QA/QC samples from the proposed placement sites include nine duplicate samples (representing in excess of ten per cent of primary samples) and two triplicate samples, which were all analysed for trace metals (refer to Table 3.2). This degree of sample duplication is considered adequate and supported by the primary sample data which clearly shows that concentrations of COPCs in each proposed placement area are very similar. Additional sample duplication via a greater number of QA/QC samples is therefore not considered to provide a greater data homogeneity.

Table 3.2 95% Upper Confidence Limits of Mean Contaminant Concentrations

	Sample Number	As	Ba	Cr	Cu	Hg	Ni	Pb	Zn
NAGD Screening Level		20	na	80	65	0.15	21	50	200
Short Cores	61	19.4	26.4	45.5	13.3	0.01	14.4	8.1	26.5
Deep Cores	72	7.8	87.1	48.8	23.9	0.05	23.4	9.8	31.1

All values and in mg/kg

29.80	In Q5, reference is made to the calculation of the 95% UCL using Procedure G of the NSW EPA (1995) Guidelines. However, if data is log-normally distributed, the Jack-knife or Bootstrap methods are recommended in the NAGD. In the NAGD, it is stated that the H-statistic (used in Procedure G) should not be used. Clarification is required as to whether the data was found to be log-normally distributed and whether the H-statistic was used. If the H-statistic was adopted, the statistics should be recalculated as per the NAGD recommendations noted above. The USEPA's ProUCL statistical software can be used to calculate 95% UCL values from data sets with and without non-detect observations. This software can be obtained at http://www.epa.gov/esd/tsc/software.htm.
	The United States Environmental Protection Agency's ProUCL program, which assesses log normality and calculates by alternate methods and recommends suitable method, was used to calculate the 95% UCLs.
29.81	Section 3.2.3 The following comments should be noted: • in Figure 3-3, zinc rather than arsenic concentrations should be shown • in Figure 3-5, CaCO3 rather than nickel concentrations should be shown • in Figure 3-6, the particle size distribution rather than nickel concentrations should be shown.
	Figures 3.3, 3.5, 3.6 were updated in Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program as part of the submission of the Draft EIS/ERMP.
29.82	Section 4.6.4 In accordance with Appendix A of the NAGD, the 95% UCL of the mean should be used to determine compliance with the screening levels. The 95% UCL of the mean should be calculated for all contaminants unless all results for a particular analyte are below laboratory detection.
	Individual NAGD Screening Levels in sediment samples from the dredge area were exceeded for As, Ni and Cr (Short Cores) and Ni (Deep Cores) (Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program, Section 3). However, the 95% UCL concentrations were calculated for all COPCs and are shown in Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program, Section 4).
29.83	Section 4.6.5 The 95% UCL of the mean nickel concentration for the deep core samples exceeded the screening level and concentrations observed at the proposed placement areas. Dilute acid extractions of nickel were undertaken indicating that nickel is unlikely to be bioavailable. However, elutriate testing for nickel has not been undertaken despite being included in Section 4.6.3 of the Sampling and Analysis Plan (SAP) in Appendix A of Q5. Clarification is required as to why elutriate testing for nickel was not undertaken.
	Concentrations of nickel in surface sediments collected at the potential disposal sites (muddy sands) are not suitable for assessing background concentrations of nickel in clays found at depth in the dredging areas. Nickel concentrations in proposed dredging areas would probably not exceed background levels in deeper sediments at the disposal ground. Weak acid tests would probably not be triggered but were nevertheless undertaken to further assess the significance of the likely higher concentrations. The 95% UCL screening level exceedance of the concentrations of nickel in deep core sediments is only minor, i.e. 23.4 mg/kg vs screening level of 20 mg/kg and the absence of a 95% UCL screening level exceedance in short core sediments, i.e. 14.4 mg/kg suggests that all of the nickel is of natural origin. The NAGD provides a staged assessment approach.

	If NAGD screening levels were exceeded additional assessments such as elutriate testing would be triggered and involve additional sampling. There was no provision for collecting, storing and analysing elutriate samples within holding times in the proposed sampling program.
29.84	Section 4.7 Whilst the geochemical properties of the sediments of the Trunkline Route area may be similar to the other sites, it is considered that two samples do not adequately represent the area. It is recommended that additional samples are obtained to characterise the sediments of the Trunkline Route area and to assess their suitability for sea disposal (which is required to support a Sea Dumping Application for this material).
	Chevron is in consultation with the appropriate departments regarding the need for additional sampling in the trunkline area.
29.85	Appendix A Clarification is required as to whether the SAP was submitted to DEWHA for review and approval prior to implementation.
	A draft of the Sampling and Analysis Plan was submitted to DEWHA for review.
Appendix S1: Draft Dredging and Spoil Disposal Management Plan	
15.8	The Chevron documents do not provide detail on the management plans to be implemented for the dredging operation. We would expect these to be essential to limiting turbidity and should be considered a crucial part of any approval for this programme.
	The management plan to be implemented for the dredging program is outlined in Chapter 8: Marine Risk Assessment & Management (Appendix S1: Dredging and Spoil Disposal Management Plan) of the Draft EIS/ERMP. The Plan outlines proposed management and mitigation measures to limit turbidity. The final Appendix S1: Dredging and Spoil Disposal Management Plan will contain an approved turbidity monitoring program that will detail in full the monitoring programme to be adopted. The Dredging and Spoil Disposal Management Plan will not be finalised until after the release of the Ministerial Statement.
22.21	Dredging The document refers to the 1996 London Protocol, which promotes onshore dredge spoil disposal. However, the document does not state what percentage will be disposed of onshore compared with offshore or any methods of assessment proposed to determine the suitability for onshore disposal. DPA's general comments regarding dredging include: • Seems to be focused on offshore disposal. • No mention of suitability of spoil for onshore disposal. • No comparison of costs for onshore vs. offshore. • Limited mention of onshore management of spoil. • No consideration of WA Port Authorities Act 1999 provisions and conditions. • No comparison of risk assessment of onshore vs. offshore spall disposal. • Where is the location of "marine outfall" for drainage from onshore spoil? • Maps/diagrams difficult to Interpret. • The request for permit does not include maintenance dredging.
	The base case for dredge material disposal is for 100 per cent of the dredge material to be placed offshore. An option for onshore disposal of dredge material is presented as an optional case in the Draft EIS/ERMP. This evaluation of the placement options indicates that placing of the material onshore does not present reduced environmental impacts, in comparison to placing material offshore. It should be noted that no comparison has been made between 100 per cent offshore placement and 100 per cent onshore placement as 100 per cent onshore placement is not an option under consideration.

22.25	Dredging What are the proposed under keel clearance depths and what insurance dredging has been allowed for given this high potential for siltation?
	Hydrodynamic modelling has indicated that minimal infill will occur throughout operation. Future siltation should accumulate along the channel toe lines, which would have little to no impact on navigation. The LNG carriers for Wheatstone are expected to have a fully loaded draft of no greater than 11.5 m. The over-dredge allowance within the channel design provides for an allowable area of siltation while maintaining full channel depth; an allowable 0.5 m depth has been provided for the tolerance of dredging equipment to achieve channel design grade. An additional 0.7 m over-dredge depth allowance has also been provided to accumulate infill between maintenance dredging periods.
22.26	Dredging The documents do not propose any solution for the disposal of contaminated material if national guideline values are exceeded in the future, which is likely in the MOF and/or PLF berth pockets (finer material deposition).
	Chevron will follow standard industry practice for handling contaminated dredge material. This will be handled on a case-by-case basis depending on the contamination. This will be Chevron practice while Chevron has operational control of the facilities.
22.42	Marine Biosecurity Appendix S1- Draft Dredging and Spoil Disposal Management Plan states that: "construction vessels ... represent a key risk pathway as a vector for the introduction of marine pests", and then presents a framework for a management plan for construction vessels used in the dredging program. The DPA notes that in this framework, the DPA is not listed as one of the agencies to be notified of the discovery of a marine pest. The DPA will need to be included as a part of the detailed response plan, as if will need to undertake actions to protect the port in this situation. The DPA also recommends that responding agencies such as the federal Department of Agriculture, Forestry and Fisheries are involved In the production of these plans, and that the plans include a strategy to liaise with key agencies in the prevention and treatment of the introduction of marine species.
	Chevron will liaise with the Dampier Port Authority on all future matters regarding the potential introduction of marine pests and will ensure they are notified in the event that a marine pest is identified in the Project area.
25.1	Recommendation 1: That the EPA is provided with suitable documentation, such as a dredge plan, to confirm that dredge plume, water quality and benthic habitat impact predictions are based on practicable dredging scenarios, and provide confidence that the predictions for project induced water quality changes and benthic habitat impacts are suitably conservative. Discussion: There is potential for dredge plumes to reach the Muiron Islands Marine Management Area, which is located approximately five to 10 kilometres from the outer extent of the predicted Zone of Influence. The Muiron Islands Marine Management Area contains regionally significant coral reef communities, and supports significant green turtle nesting and inter-nesting. Based on the information provided in the ERMP, it is unclear whether a full dredge plan has been completed for this project to provide the basis for predictive modelling of water quality and benthic habitat impacts (p. 428). A dredge plan would typically contain proposed scheduling for dredging activities including dredging locations, dredge type, timing, dredge volumes, sediment characteristics and proposed spoil sites for each dredge area. Provision of this documentation would assist in correlating planned dredging activities, equipment and management with model predictions.
	Chevron acknowledges the Department of Environment and Conservation's (Environmental – Marine Branch) for its concern with regard to the need for a dredge plan. The final Dredging and Spoil Disposal Management Plan will provide details relating to dredge activities, dredge scenarios and impact predictions, and proposed monitoring and mitigation. A revised version of the Dredging and Spoil Disposal Management Plan will be submitted as part of this document (Appendix S1). The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.

25.11	Recommendation 14: That the environmental conditions for this project require the development of a dredge and spoil disposal monitoring and management plan (DSDMP) to the requirements of the EPA (on the advice of DEC). An objective of the DSDMP to include validation of the dredge plume model. The current DSDMP in Appendix S1 appears incomplete and warrants inclusion of additional management and monitoring measures, such as monitoring sites, parameters, intervals and methods. Discussion: Whilst the DSDMP has been developed to include some basic information on dredge and spoil disposal management, key elements of the plan appear incomplete. It is suggested this plan includes a comprehensive monitoring program incorporating monitoring sites, parameters to be measured and methods to be utilised in both data collection and analysis, and specific measures to validate the accuracy of the dredge plume modelling exercise.
	A revised draft has been included in Appendix S1 of the document and includes additional details relating to the monitoring plan (e.g. monitoring sites, parameters, intervals, methods). Consultation with the appropriate departments is ongoing. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
25.19	Loss of critical habitat - Dugong Recommendation 29: Marine fauna observers be required on all vessels (including dredge vessels) to limit the potential for impacts on dugong (and other marine fauna) during the construction period. Recommendation 30: That the proponent gives consideration to funding further studies to better understand dugong occurrence and movements within the study area, particularly within the area subject to vessel movements and dredging. Discussion: The proponent has predicted that there is unlikely to be population level impacts from dredging or spoil disposal on marine fauna species including dugong. However, it is likely that dugong may be displaced during dredging and construction given their susceptibility to disturbance from vessels, and the disturbance of Halophila seagrass meadows which are a prime food source for dugong. This area is considered important for dugong during the survey period, however additional studies are required to determine their use of the area during the rest of the year.
	It is proposed that marine fauna observers will be stationed only on dredging vessels (Draft EIS/ERMP, Appendix S1: Dredging and Spoil Disposal Management Plan), as these vessels are considered to pose the greatest level of risk for marine mammals, including dugongs. Although marine observers are not proposed for other vessels, vessel masters of all construction vessels will be provided with the DSEWPaC (2005) guidelines, outlining expectations regarding vessel – marine mammal interactions. Vessel captains will also receive training to identify protected marine fauna (humpbacks, dugong, turtles, dolphins). Details of the proposed measures will be provided in the final Appendix O6: Marine Fauna Management Plan. Additional information describing the distribution and abundance of dugongs in the Project area is contained in Appendix FE of the document.
29.86	Section 1.4 It is noted that nearshore trunkline installation and pipeline dredging are not addressed within S1. Clarification is required as to when and how the monitoring and management associated with these activities will be addressed.
	The Proponent will provide a separate DSDMP for the trunkline installation clarifying any associated monitoring and management associated with these activities (Appendix S2).

29.87	Section 4.2.1 & 4.2.2 The following comments should be noted: • more detail is required defining the type of material proposed to be dumped at Site A • a near bed 'diffuser' is mentioned with regard to placement using a CSD, and specific details of the type of diffuser proposed (e.g. simple plate, inverted cone, perforated plate etc.) should be provided • the capacity of each site to receive material has been quoted, but the basis for storage volumes should be clearly outlined in terms of existing seabed levels and maximum placement height/thickness • the available water depth at each dump site should be quoted in the description.
	The final version of the Dredging and Spoil Disposal Management Plan will contain full details regarding placement material type, diffusers, placement site capacity and available water depths. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.88	Section 4.2.3 If required to minimise environmental impacts, an impermeable bund could be constructed around the entire perimeter of the onshore placement area, and an impermeable floor could be constructed. If natural features on the western side are used, drainage into the mangrove area could be minimised by lining the internal face with PVC sheeting or a bentonite clay layer. It is emphasised that these measures would only need to be undertaken if required, and are not recommendations.
	Chevron notes the information but no action has been taken, however onshore dredge material placement is no longer considered an option for the Project.
29.89	Section 4.4 In general, Section 4.4 (and subsections) of S1 would benefit from a summary table detailing dredging location, material type, quantities and placement destinations to provide additional clarity on the distribution of different types of dredged material. In Section 4.4.1 of S1: • the type of material expected to be encountered within the dredging footprint should be specified • the alignment of the sunken pipeline chosen for material placement using a CSD should be selected to avoid impacts on local ecosystems (e.g. coral reefs, seagrass beds etc.), and this should be stated as a consideration in the method • the type of diffuser proposed to be used should be specified. In Section 4.4.2 of S1: • the datum for dredging depths quoted should be stated (e.g. relative to Lowest Astronomical Tide, LAT) • the type of material expected to be encountered within the dredging footprint should be specified • it is not clear which spoil ground this material has been allocated to, and the destination of the material should be specified • the alignment of the sunken pipeline chosen for material placement using a CSD should be selected to avoid impacts on local ecosystems (e.g. coral reefs, seagrass beds etc.), and this should be stated as a consideration in the method. In Section 4.4.3 of S1: • the datum for dredging depths quoted should be stated (e.g. relative to Lowest Astronomical Tide, LAT) • the quantity of dredging with CSD should be provided • it is not clear which spoil ground the material dredged with the CSD has been allocated to, and the destination of the material should be specified • the types of material expected to be encountered within the dredging footprint (above rock) should be specified • spoil ground Site C has been nominated for disposal of rock removed by backhoe and barges, but Site B was allocated for disposal of rock in Section 4.2.1 of S1, and clarification of this discrepancy is required. should be stated as a consideration in the method.

	In Section 4.4.4 of S1: • the description of high spot removal above -6m LAT should include the type of material encountered • a quantity of 0.2m3 has been stated for removal of high spots, and clarification is required as this may be a typographical error • spoil ground Site C has been nominated for disposal of rock removed by backhoe and barges, but Site B was allocated for disposal of rock in Section 4.2.1 of S1, and clarification of this discrepancy is required.
	The final version of the Dredging and Spoil Disposal Management Plan will contain full details addressing the abovementioned concerns. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.90	Section 5.1, 5.4, 5.5, 5.6 It is noted that details on key roles and responsibilities, performance reporting, auditing and management review are to be provided in a future revision of S1.
	The final version of the Dredging and Spoil Disposal Management Plan will contain full details regarding key roles and responsibilities, performance reporting, auditing and management review. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.91	Section 7 It is noted that Section 7 of S1 is based on draft preliminary modelling results, will require updating, and the results presented should not be taken as complete or correct. A detailed review of this section has therefore not been completed. In Section 7.2 of S1, it is stated that tolerance limits have been established for various receptors and have been used in plume modelling. It would be useful if these were summarised in a table for reference.
	Chevron notes the suggestion.
29.92	Section 8.1.2 It is noted that some species of seagrass are extremely sensitive to reduced levels of incident light on the seabed, and when light is reduced to zero per cent of surface irradiance, may only last for weeks (rather than months). Therefore, there should be some consideration given to the sensitivity of the seagrass species present in developing management triggers.
	Appendix N3 Tolerance Limits Report provides an extensive review of the potential impacts of turbidity and sedimentation on seagrasses and other BPP. As reported in Section 8.3 of the Draft EIS/ERMP, dredging is predicted to result in the partial loss of seagrass biomass at some locations in the Project area. However, the dominant seagrasses in the Project area are from the genus *Halophila*, which are known to be temporally and spatially dynamic, and recover rapidly following disturbance events. Therefore, any potential impacts to seagrasses are considered temporary under the EAG3 definition of 'recoverable within 5 years'. For these reasons, seagrasses will not be managed adaptively using feedback monitoring. Instead, seagrass loss predictions and recovery will be assessed using a before and after (control versus impact) monitoring program.
29.93	Details regarding the type of diffuser specified for use to minimise turbidity should be provided
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the type of diffusers that will be used. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.94	Section 8.1.2 More detail needs to be provided to explain how the 'Restricted Overflow Areas' will be defined in practice.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on how Restricted Overflow Areas will be defined in practise. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.

29.95	Section 8.1.2 Preventative management measures should include setting the alignment of the sunken dredge pipeline to avoid sensitive areas of the seabed.
	Chevron notes the suggestion and will consider it in future revisions of the Dredging and Spoil Disposal Management Plan.
29.96	Section 8.1.2 A freeboard should be nominated for the water levels within the bunded onshore placement area;
	A freeboard is no longer required as onshore placement for dredge material is no longer an option.
29.97	Section 8.1.2 Water quality monitoring locations should be defined on a figure.
29.98	Section 8.1.2 Frequency of data collection from water quality loggers should be specified to ensure that timely management responses during the works are possible.
29.99	Section 8.1.2 The number and location of coral health monitoring sites should be defined on a figure and a monitoring frequency should be nominated.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on water quality monitoring locations. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.100	Section 8.1.2 Silt curtains installed around turbidity producing operations (where practicable) should be listed as a possible responsive management measure.
	The use of silt curtains around turbidity-producing operations is not considered feasible due to the local conditions and required dredging methodology. The effectiveness of silt screens in preventing the distribution of turbidity depends on the local metocean conditions (currents, waves, tides, winds). They can generally only be used effectively in calm (low energy) waters. The metocean conditions experienced at the Project site (especially currents) preclude the effective deployment and use of silt curtains. Rather, attempting to utilise silt curtains in this environment would likely prove to be costly and logistically challenging while provide no or limited benefit. There is also potential for the use of silt curtains to present a safety hazard especially during times of strong currents. The prevalence of cyclones at the Project site would result in a lengthy demobilisation and remobilisation time each time a cyclone threat is observed (1-2 days). The use of silt curtains around the dredging operations is not considered feasible due to the proposed dredging methodology and the scale/size of the dredging area. The amount of silt curtain that would be required could not be practically deployed. The protection of specific key sensitive receptors using silt curtains would also prove problematic due to the location of these receptors, the conditions around the receptors and difficulties managing the silt screen. It is considered that the current management measures identified provide much more practical and effective turbidity management measures than silt curtains.
29.101	Section 8.1.2.1 Water quality early warning criteria are stated as being based on baseline monitoring, but the method used to define these criteria should be clearly outlined in the narrative.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the water quality monitoring program. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.

	The actual values of these criteria will not be calculated until the full baseline data set has been collected (just prior to the commencement of dredging activities) in order to capture the widest possible range of natural turbidity events.
29.102	Section 8.1.2.1 It is evident that the Coral Health and Water Quality management trigger criteria are not yet fully defined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the coral health monitoring program. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement. The actual values of these water quality management triggers will not be calculated until the full baseline data set has been collected (just prior to the commencement of dredging activities) in order to capture the widest possible range of natural turbidity events.
29.103	Section 8.1.2.1 if no management triggers for gross sedimentation are established (it is stated in S1 that "sedimentation data will not be formally assessed against management triggers"), there is unlikely to be any point in monitoring sedimentation (it would just be monitoring for the sake of monitoring), so management triggers for gross sedimentation should be defined.
	Sedimentation data will not be formally assessed against management triggers due to the following issues: i) gross sedimentation data (collected using sediment traps) will only provide a relative, rather than absolute measure of potential impacts to corals. Sediment is likely to be deposited and removed regularly in the existing macro-tidal environment, hence it is net rather than gross sedimentation rates which determine the potential for impacts to occur; and ii) while net sedimentation would provide a better indication of potential impacts to corals, net sedimentation is not able to be measured accurately using existing technology and data could not be compared against management triggers. While gross sedimentation data is not appropriate for assessment against management triggers, this data would prove useful in inferring causal relationships between elevations in sedimentation and changes in coral health. Relative differences in gross sedimentation rates between impact and reference sites could be used to infer the cause of these observed changes.
29.104	Section 8.1.2.2 Given that the percentage loss of seagrass and macroalgae has been estimated in previous sections of S1, together with percentage loss of corals, it is uncertain why the relationships between seagrass and macroalgae and TSS/turbidity/incident light would not be considered (where relationships exist or can be determined) in addition to coral health. This should be clarified. It is recommended that the literature on all of the relevant species which occur in the BPPH is consulted, so that when trigger limits are set, they reflect the sensitivity of all species.
	The relationship between TSS/turbidity and BPP (corals, seagrasses and macroalgae) is discussed extensively in Appendix N3 Tolerance Limits Report. Reactive monitoring is only proposed for corals because: i) the temporally dynamic nature of seagrass and macroalgae do not make them amenable to monitoring for the purposes of reactive dredge management; ii) any losses of seagrass and macroalgae are considered to be non-permanent (recoverable within 5 years as per definition of EAG3); iii) corals are considered to be representative of other sensitive receptors; and iv) impacts to corals are of greatest concern since some corals may not recover within 5 years if lost. Macroalgae and seagrass will be monitored before and after the dredging program. Clarification of the reasons for using corals in the Reactive Monitoring Program as an indicator of change in other BPP types has been included in Appendix S1 of the document.

29.105	Section 8.1.3 In Section 8.1.3 of S1, it is stated that monitoring is to be undertaken on a quarterly basis. It is considered that Internal reports should be produced quarterly rather than annually to trigger responsive management measures (as required) during operations.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on monitoring and reporting frequency. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.106	Section 8.4.2 In Section 8.4.2 of S1, the frequency of pH monitoring within the placement area material, discharge water and receiving environment should be specified.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the water quality monitoring program. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.107	Section 8.5.2 In relation to Section 8.5.2 of S1, it is considered that periodic progress surveys of placement areas should also be undertaken during the works to monitor any movement of material and allow adjustment of dump locations during operations
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the proposed reporting frequency. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.108	Section 9.1 It is noted that a table detailing approved losses of BPPH is to be included in Section 9.1 of S1.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on approved losses of BPPH. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.109	Section 9.2 The location of background and near-field water quality monitoring stations should be clearly defined on a figure.
	The final version of the Dredging and Spoil Disposal Management Plan will contain figures depicting the location of background and near-field water quality monitoring sites. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.110	Water quality exceedance criteria should be defined using baseline data, and the procedure used to derive the trigger values should be outlined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details regarding water quality exceedance criteria. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement. The actual values of these criteria will not be calculated until the full baseline data set has been collected (just prior to the commencement of dredging activities) in order to capture the widest possible range of natural turbidity events.
29.111	Section 9.2 Frequency of data collection, analysis and internal reporting should be defined (this should be designed to ensure that the dredging Contractor would be regularly kept informed of their environmental performance and any requirement to alter work methods as part of the responsive management procedures)
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the frequency of data collection, analysis and internal reporting. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.

29.112	Section 9.2 The reporting timeframe for exceedances should be defined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the reporting timeframe for exceedances. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.113	In Section 9.2.2.2 of S1, the location of proposed sediment traps should be clearly defined on a Figure.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the location of proposed sediment traps. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.114	It is also stated in Section 9.2.2.2 of S1 that "if instruments become available during the dredging program that accurately measure net sedimentation rates, then it is possible that these instruments may substitute sediment traps or be added to the program". Clarification is required as to the point of collecting data on gross sedimentation and then replacing instrumentation with instruments that measure net sedimentation, especially when the data is not comparable.
	This data would be used primarily for inferring the cause of any changes in coral health. As such, relative differences in net sedimentation data between impact and reference sites would be used in the first instance to infer the cause of changes in coral health. While data may not be comparable through time, it may be possible to develop an approximate relationship between net and gross sedimentation rates for the purposes of determining whether the elevations observed were anomalous or part of a natural cycle.
29.115	Section 9.2.3 The location of coral health monitoring sites should be clearly defined on a figure.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the location of proposed coral health monitoring sites. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.116	Section 9.2.3 The monitoring frequency should be defined
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the proposed monitoring frequency. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.117	Section 9.2.3 The reporting frequency should be defined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the proposed reporting frequency. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.118	Section 9.3.3 The sites nominated for predictive links monitoring should be clearly defined on a figure.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the proposed predictive links monitoring sites. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.119	Section 9.3.3 The frequency of data collection to develop predictive links should be defined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the frequency of data collection, in order to develop predictive links. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.

29.120	Section 9.5 Baseline and near-field monitoring sites should be clearly defined on a figure.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the location of baseline and near-field monitoring sites. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.121	Section 9.5 The frequency of monitoring and reporting should be defined.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the frequency of monitoring and reporting programs. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.122	Section 9.6 In Section 9.6 of S1, it is noted that the risk assessment form for IMP inspections needs to be developed.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on risk assessments completed for introduced marine pest inspections. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.123	Section 10 It is noted that procedures to review and update the management plan throughout the works need to be developed.
	The final version of the Dredging and Spoil Disposal Management Plan will contain details on the procedures that will be implemented to review and update the Dredging and Spoil Disposal Management Plan throughout Project construction and operation. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement. Procedures to review and update the Dredging and Spoil Disposal Management Plan will be developed in consultation with the appropriate departments.
29.124	Sea Dumping Permit Application Given that the EIS has been completed, it is considered that the proponent should resubmit a completed Sea Dumping Permit Application Form, preferably using the recently updated version of the form.
	Chevron acknowledges the suggestion and is currently working on updating the Sea Dumping Permit Application using the latest form available on the DSEWPaC website (http://www.environment.gov.au/coasts/pollution/dumping/publications/pubs/dredge.pdf).
29.125	Sea Dumping Permit Application However, as set out in Sections 4.1 and 4.3 of the NAGD, the following key information is required to support a Sea Dumping Permit Application: • the assessment of disposal alternatives and waste minimisation, including evaluating alternatives to ocean disposal and waste prevention • disposal site assessment, including consideration of alternative sites and impacts.
	The Draft EIS/ERMP (Chapter 8, Chapter 3) presents a description of the alternatives to ocean disposal. These discussions will be presented in the completed Sea Dumping Permit Application.
29.126	Sea Dumping Permit Application Notwithstanding the other requirements in completing a Sea Dumping Permit Application Form, it is highlighted that there is a need for the proponent to ensure that the requirements of Sections 4.1 and 4.3 of the NAGD are fully addressed in their preparation of the Sea Dumping Permit.
	"The requirements of Section 4.1 and 4.3 of the NAGD will be fully addressed in the completed Sea Dumping Permit."

30.14	The draft Dredging and Spoil Disposal Management Plan [DSDMP] (Appendix S1) is incomplete. Details and in particular Chapter 10 "Reporting, Reviews and Corrective Actions" are yet to be developed. All management plans will need to be finalised prior to the EPA making a recommendation on Environmental Approval.
	The final version of the Dredging and Spoil Disposal Management Plan will contain final details regarding reporting, reviewing and corrective actions to be taken. The Dredging and Spoil Disposal Management Plan cannot be finalised until after the release of the Ministerial Statement.
30.15	The DSDMP proposes the development of sensitivity criteria on an empirical basis in situ during the dredging program. It is not clear however whether this approach will provide environmental protection in practice since it will take time to acquire the necessary sensitivity data and during this time coral and other receptors will necessarily be stressed and potentially killed in the process of determining appropriate criteria. The proponent is requested to further explain and justify this approach.
	Chevron has made predictions in the Draft EIS/ERMP Appendix S1: Dredging and Spoil Disposal Management Plan and the Draft EIS/ERMP relating to the sensitivity of corals and other BPP to turbidity and sedimentation. These were based on an extensive literature review given in the Draft EIS/ERMP (Appendix N3: Tolerance Limits Report). To test these predictions, a coral monitoring program is planned for the dredging phase of the Project. A reactive management program, linked to the coral monitoring program, will assist is managing coral loss.
30.40	What off-sets are proposed – particularly for proposed park, but generally due to large area of clearing?
	Chevron acknowledges the Environmental Protection Authority's (EPA) Position Statement No. 9: Environmental Offsets. If offsets are determined to be required, Chevron will develop an appropriate offset package in consultation with the relevant departments.
30.57	Appendix S1: DSDMP;Trunkline DSDMP; Appendix O6: Marine Fauna Management Plan; Appendix T1: Coastal Processes Management Plan Completed statutory EMPs should be provided for assessment.
	Updated versions of all marine-related Environmental Management Plans have been included in Appendix S1, Appendix S2, Appendix O6 and Appendix T1 of the document. These will be developed further in consultation with the appropriate departments as more firm management and environmental performance commitments are developed. Environmental Management Plans cannot be finalised until after the release of the Ministerial Statement.
Appendix T1: Draft Coastal Processes Management Plan	
22.20	The technical reports referred to above conclude that upwards of 100,000m3 of sand each year is likely to accrete on the western side of the MOF and that there will be a corresponding 100,000 m3 of erosion on the downdrift side. The management plan undertakes to monitor and provide beach nourishment from external sources such as dredging as required. This Is very unlikely, based on the geotechnical studies undertaken, to be suitable sources of beach sand available and even if there were the time frame to obtain environmental clearance and mobilise suitable equipment would be too long. DPA recommend a commitment to bypass sand from the west to east on a regular basis. This addresses both the accretion and erosion Issues and ensures that the beaches do not become contaminated with unsuitable material.
	Median annual (non-cyclonic) longshore transport is in the order of 50 000 m^3, ranging up to 100 000 m^3 due to inter-annual variability of forcing conditions. In addition to this, cyclones may occasionally cause longshore transport in either direction, with up to 300 000 m^3 modelled during an extreme cyclone (Tropical Cyclone Vance). Based on this high level of variability, on both an annual and inter-annual basis, the selection of an appropriate sand management system will be discussed with the appropriate departments.
29.20	If the predicted long term recession impacts are found to be significant, it is considered that specific mitigation measures should be identified and assessed for feasibility and effectiveness. Although it is identified in the EIS that monitoring of beach width and beach profiles and the like would be undertaken, it is considered that the potentially significant downdrift impacts (once quantified) would require mitigation measures to be identified prior to monitoring commencing.

29.21	It is recognised that potential management measures have been identified in the EIS that would assist in mitigating the impacts on coastal processes (in particular the recession downdrift of the MOF) if they are implemented. These measures include beach nourishment (noted in Table 8.48), which presumably could be achieved by sand bypassing of the MOF. However, no specific details are given in the EIS on the feasibility and effectiveness of these measures.
29.46	It is considered that although there is some uncertainty in predicting sediment transport changes as a result of the Project, there are adequate tools available to make a reasonable prediction of the potential long term recession of the shoreline as a result of the Project. Given that downdrift impacts from the Project are certain, it is not considered to be adequate to only adopt a system for bypassing sand (or other suitable mitigation measure) once impacts are actually being measured, given the long timeframe that would be required to receive appropriate approvals and design and implement such a system. This is consistent with Item 8 and Item 9 above, that is that the sand bypassing system (or other suitable mitigation measure) should be specifically designed now, and assessed for its effectiveness in mitigating downdrift erosion impacts. Furthermore, it is considered that Item 6 above cannot be achieved without implementation of a sand bypassing system (or other suitable mitigation measure).
	The final version of the Coastal Processes Management Plan will contain final details of mitigation measures to be adopted, including sand management. The Coastal Processes Management Plan will not be finalised until after the release of the Ministerial Statement.
29.47	Although the focus of prediction of shoreline recession would be expected to relate to non-cyclonic impacts, it would also be necessary to consider the effects of cyclones in the assessment of recession. In Section 3.2.7 of T1, it is stated that "further work is required to determine littoral drift rates under cyclonic conditions".
	Median annual (non-cyclonic) longshore transport is in the order of 50 000 m^3, ranging up to 100 000 m^3 due to inter-annual variability of forcing conditions. In addition to this, cyclones may occasionally cause longshore transport in either direction, with up to 300 000 m^3 modelled under an extreme cyclone (e.g. TC Vance). Based on this high level of variability, on both an annual and inter-annual basis, the selection of an appropriate mitigation measures for shoreline recession will be discussed with the appropriate departments prior to finalisation of the Plan, and may include an adaptive mechanism for sand management. The Coastal Processes Management Plan will not be finalised until after the release of the Ministerial Statement.
29.48	In Section 3.2.2, a map of the soil types discussed would be useful.
	Chevron will include a map of soil types within Section 3.2.2 of the final Coastal Processes Management Plan.
29.49	In Section 3.2.4, a map labelling the landforms discussed would be useful.
	Chevron will endeavour to include a labelled map of landforms discussed within Section 3.2.4 of the final Coastal Processes Management Plan.
29.50	In Section 3.2.8, it would be useful to include discussion on the wind climate (or include a reference to other sections of the EIS with discussion on this).
	Chevron will include references to technical appendices dealing with discussion of wind climate in Section 3.2.8 of the final Coastal Processes Management Plan.
29.51	In Section 3.2.9, it would be useful to include discussion on measured water levels (or include a reference to other sections of the EIS with discussion on this).
	Chevron will include references to technical appendices dealing with discussion of measured water levels in Section 3.2.9 of the final Coastal Processes Management Plan.
29.52	In Section 3.3, it would be useful to include a map of habitats (or include a reference to other sections of the EIS with a map).
	Chevron will include a map of BPPH within Section 3.3 of the final Coastal Processes Management Plan.

29.53	Section 10.2, 10.3 With regard to indigenous heritage (discussed in Section 3.6.2) and European heritage (discussed in Section 3.6.3), it is noted that an assessment of the potential impacts of long term recession on these features would be relevant.
	Potential Project impacts on European cultural heritage and Aboriginal cultural heritage are discussed in Section 10.2 and Section 10.3 respectively of the Draft EIS/ERMP. All impacts on European cultural heritage sites and artefacts will be managed in accordance with relevant legislative requirements and the Old Onslow Townsite (3444) Development Impact Mitigation Plan. Chevron will also have a Heritage Agreement with the Heritage Council WA that will guide management of European cultural heritage sites and artefacts throughout the life of the Project. Should long term coastal recession result in impacts on European cultural heritage, Chevron will consult with the Heritage Council WA, the Shire of Ashburton, and the Western Australian Maritime Museum and will manage impacts in accordance with the Heritage Agreement and relevant legislation. All impacts to Aboriginal cultural heritage sites will be managed in accordance with Section 18 Notices (AH Act) and the Cultural Heritage Management Plan. Should long term coastal recession result in impacts on Aboriginal cultural heritage, Chevron will consult with the Buurabalayji Thalanyji Association Incorporated and the Department of Indigenous Affairs, and will manage the impacts in accordance with relevant legislation and the Cultural Heritage Management Plan.
29.54	It would be helpful if the coastal geomorphology assessment, coastal processes modelling investigation and desktop geological heritage study referred to in Section 4.1 were referenced.
	Chevron will include references to all studies completed within Section 4.1 of the final Coastal Processes Management Plan.
29.55	It is noted that Section 6 of T1 (on roles and responsibilities) is incomplete.
	The final version of the Coastal Processes Management Plan will contain full details regarding the roles and responsibilities of involved parties. The Coastal Processes Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.56	It is noted that Section 7 of T1 (on training and education) requires further updates.
	The final version of the Coastal Processes Management Plan will contain full details regarding training and education required to implement the Plan. The Coastal Processes Management Plan cannot be finalised until after the release of the Ministerial Statement.
29.57	There are incorrect references to a Figure X and Table X in Table 10.1.
	As Chapter 10 of the draft Appendix T1: Coastal Processes Management Plan presents proposed Outcome-based Conditions it is not possible at this stage to refer to the correct Table or Figure number. Once the Table and Figure have been finalised (following release of the Ministerial Statement), the Table and Figure will be included in Chapter 10 and the references will be updated.

4.0

Glossary and Abbreviations

4.0 Glossary and Abbreviations

Table 4.1: EIS/ERMP Glossary

Term	Definition
Algae	Simple plant-like organisms that contain chlorophyll, allowing them to derive their energy needs from photosynthesis. Types of algae range from microscopic forms such as phytoplankton that are suspended in the water column to giant kelp.
"As far as practicable", "where practicable" and "practicable"	All mean reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.
Atmospheric emissions	Any emission or discharge to air, for any period of time, of solid, liquid or gaseous matter. Examples include, but are not limited to, dust and greenhouse gases.
Benthic habitats	Areas on the sea floor or seabed that support living organisms. Examples include, but are not limited to, limestone pavement, reefs, bare sand and deepwater soft sediments.
Bioaccumulation	The increase in concentration of a usually toxic substance (such as a heavy metal like lead or mercury or a pesticide like DDT) in the tissues of a plant or an animal at a particular level in a biological food chain. Such toxins accumulate because they are absorbed at a faster rate than they can be excreted or broken down.
Biodiversity	The variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part. This includes diversity within species, between species and of ecosystems.
Biofouling	The unwanted build-up of organisms on human-made structures, in the marine environment especially on the submerged portions of ships' hulls, oil and gas platforms, jetties, etc. It also applies to similar growths on filters, inside pipelines, and on other items of equipment used, for example, in the wastewater treatment industry.
Bioregion	A bioregion is a biogeographical region characterised by a distinctive fauna and flora and made up of a group of interacting and related ecosystems. Terrestrial bioregions are defined in terms of their climate, geology, landforms and vegetation.
Biosecurity	Protection of all natural resources from biological invasion and threats.
Biosequestration	The process of converting a chemical compounds through biological processes to a chemically or physically isolated or inert form. The term is most commonly used to refer to the "locking", through photosynthesis, of atmospheric carbon dioxide (CO_2) into plant biomass (usually trees) to offset the effect of the CO_2 and other greenhouse gases released by the development of natural gas fields, the burning of fossil fuels, etc.
Cetacean	Various aquatic (mainly marine) mammals of the order *Cetacea*, (including whales, dolphins and porpoises) characterised by a nearly hairless body, front limbs modified into broad flippers and a flat notched tail.
Claypan	A type of ephemeral wetland often found in arid or semi-arid regions of the world.

Term	Definition
Clearing	1. The killing, destruction, removal, severing, ringbarking or doing substantial damage to native vegetation including grass, shrubs, trees, tree stumps, tree roots, logs and brush. 2. The removal of noxious weeds and decayed vegetable matter. 3. The removal of surface obstructions such as concrete paving, concrete edging, drainage pits, foundations, fences and disused structures, but not underground obstructions such as drainage pipes or service conduits. 4. The removal of refuse such as pole stumps and rubbish resting on or protruding from the ground surface.
Condensate	In the oil and gas industry, condensate is the name given to the mixture of heavier hydrocarbons which are present in hydrocarbon containing reservoirs in gaseous form, but which condense into liquid form when extracted.
Consequence	The implication of the impact (as defined).
Construction	Construction includes any proposal-related construction and commissioning activities within the terrestrial and marine disturbance footprints, excluding investigatory works such as, but not limited to, geotechnical, geophysical, biological and cultural heritage surveys, baseline monitoring surveys and technology trials.
Construction period	The period from the date on which Chevron first commences construction of the Proposal until the date on which Chevron issues a notice of acceptance of work under the EPCM, or equivalent contract entered into in respect of the second LNG train of the gas treatment plant.
Controls	The methods used to eliminate or reduce the risk of an activity on the receiving environment.
Controlled Action	Category of DEWHA approvals process, means that the proposal requires approval by the Minister under the EPBC Act.
Controlled waste	Defined by the DEC as all liquid waste, and any waste that cannot be disposed at a Class I, II or III landfill site. Controlled Waste also includes asbestos, clinical or related waste, tyres and waste that has been immobilised or encapsulated.
Cumulative	Increasing or enlarging by successive addition.
Dredge material	Material unearthed during the dredging program.
Duration	In relation to marine water quality, duration refers to the length of time, in hours, days or weeks, that a predetermined threshold of suspended sediment concentration is exceeded.
Dust	Generic term used to describe fine particles that are suspended in the atmosphere. This term is non-specific with respect to the size, shape and chemical makeup of the particles, including PM_{10}.
Earthworks	The movement or removal of dirt, rocks and soil. Earthworks include activities such as grading (removing topsoil), scraping, digging, and creating embankments and stockpiles.
EIS/ERMP	The Environmental Impact Statement/Environmental Review and Management Programme for the proposed Wheatstone Project.
Endemic	Unique to an area; found nowhere else.
Environmental aspect	An element or activity of a project or operation that may result in an impact upon the environment, e.g. gas emissions, light emissions, production of waste material or clearing of vegetation.

Term	Definition
Environmental factor	An environmental receptor such as marine fauna or terrestrial flora.
Environmental risk assessment	The overall process of environmental risk identification, analysis and evaluation.
Ephemeral	Something that exists for a short period of time e.g. an ephemeral water body is a wetland, river or lake that only exists for a short period following precipitation.
Floatel	A vessel used for accommodation of workforce offshore
Frequency	In relation to marine water quality, frequency refers to how often a predetermined threshold of suspended sediment concentration is exceeded.
Fuel NO_X	NO_X emissions generated from combustion of organic nitrogen in fuel.
Geotechnical	Relating to engineering study of subsurface soils, involving specialised drilling or sampling for soil analysis and testing.
Greenfield	Projects constructed on previously undeveloped land.
Habitat	The area or environment where an organism or ecological community normally lives or occurs.
Hazard	A source of potential harm, or a situation with a potential to cause loss or adverse effect. Hazard has the same meaning as "threat".
IMCRA	Interim Marine and Coastal Regionalisation for Australia.
Impact	Direct interaction of a stressor with the environment.
Intensity	In relation to marine water quality, intensity refers to the concentration of suspended sediment in the water.
Introduced fauna	An animal (either established or not) in any given ecosystem, which is not native to that ecosystem and has arrived there usually as a result of human activities.
Introduced marine species	Species other than native species known or those likely to occur in the waters of the Pilbara Inshore and Offshore Region. (Some of these may be southern Australian or west coast endemics that do not occur in the Indo-West Pacific.)
Introduced marine pests	Introduced marine species that do, or may, threaten biodiversity in the Pilbara Inshore and Offshore Region, as determined by the National Introduced Marine Pests Coordination Group (2006), or any subsequent NIMPCG revisions.
Invertebrate fauna	Animals that do not have a backbone (vertebrae). Examples include, but are not limited to, spiders, scorpions, land snails, millipedes and some subterranean fauna.
Light glow	Atmospheric scattering of light particles that result in a luminescent background or sky.
Light spill	Excessive brightening of the environment from both direct light and light glow.
Likelihood	The probability of a stressor impacting on the key receptors.
Liquefied natural gas (LNG)	Natural gas that has been converted to liquid form by cooling to under −160 °C. It contains only the lightest gaseous hydrocarbons of the alkane series, predominantly methane (CH_4), but also ethane (C_2H_6), a small amount of propane (C_3H_8), and a very small amount of butane (C_4H_{10}).
Local area	In relation to marine environment, the local area refers to areas within the defined BPPH Management Units. In relation to the terrestrial environment, the local area refers to an approximate 2 km radius of the onshore Project area.

Term	Definition
Long term	In relation to marine impacts, long term refers to greater than ten years. In relation to terrestrial impacts, long term refers to greater than five years.
Lux	A unit of measure of illuminance and luminous emittance.
Macroalgae	Macroscopic (visible to the naked eye) and multicellular algae (e.g. seaweed, kelp), in contrast with microscopic algae.
Matters of National Environmental Significance	Under the EPBC Act, matters of National Environmental Significance are: • Listed threatened species and ecological communities • Migratory species protected under international agreements • Ramsar wetlands of international importance • The Commonwealth marine environment • World Heritage properties • National Heritage places • Great Barrier Reef Marine Park • Nuclear actions.
Minister	Western Australian Minister for the Environment.
Nearshore	Marine habitat from the 20 m contour to the shoreline.
North West Shelf	A geographic province rather than a physiographic feature. The North West Shelf extends about 2400 km along the northwest margin of the continent, and includes the continental shelf proper and the marginal platforms and plateaus, out to about the 2000 m isobath. The entire region lies within the tropics.
Offshore	Marine habitat beyond the 20 m contour.
Onshore	Above the water level at the low tide.
Operations	For the respective LNG trains, this is the period from the date on which Chevron issues a notice of acceptance of work under the Engineering, Procurement and Construction Management (EPCM) contract, or equivalent contract entered into in respect of that LNG train of the Gas Treatment Plant; until the date on which Chevron commences decommissioning of that LNG train.
Outcome-based conditions	Conditions contained within the EIS/ERMP, which are legally binding under the Ministerial Approvals of the EIS/ERMP.
Particulate matter (PM)	A term used to describe a complex group of air pollutants that are regarded as a severe health hazard. These pollutants are a mixture of fine airborne solid particles and liquid droplets (aerosols) and include, for example, smoke and dust particles, pollen, a variety of chemical compounds, trace metals, and nitrogen oxides (NO_X). Particulate matter is usually categorised as PM_{10} or $PM_{2.5}$. The fraction of suspended particles whose diameter is less than 10 micrometres (10 µm or ten millionths of a metre) is PM_{10}; these particles can enter the main passages in the lungs. The smallest particles, designated $PM_{2.5}$ (less than 2.5 µm in diameter), can enter the fine tubules deep in the lungs.
Pollution	Direct or indirect alteration of the environment to its detriment or degradation.
Population	A group of organisms of the same species occupying an area.
The Project	The Wheatstone Project: the Proposal (under the WA EP Act); or the Controlled Action (under the Commonwealth EPBC Act), that is the subject of this assessment.

Term	Definition
Project area	The geographic locations in, at or through which the work or part thereof is to be performed.
Proposal	Term used by EPA to refer to the Project.
Receptor	An ecological entity (e.g. species, population, community or habitat) exposed to a stressor.
Region	In relation to the marine environment, Region refers to the Pilbara bioregion as defined by the Interim Marine and Coastal Regionalisation for Australia (IMCRA). In relation to the terrestrial environment, Region refers to the Carnarvon and Pilbara Bioregions as defined by the Interim Biogeographic Regionalisation of Australia (IBRA).
Rehabilitation	The ongoing management and monitoring of the site after reinstatement works are completed and handover of the site has been accepted by the Company.
Reef	Sedimentary features, built by the interaction of organisms and their environment, that have synoptic relief and whose biotic composition differs from that found on and beneath the surrounding sea floor. A reef lies beneath the surface of the water. Reefs are held up by a macroscopic skeletal framework. Coral reefs are an excellent example of this kind. Corals and calcareous algae grow on top of one another and form a three-dimensional framework that is modified in various ways by other organisms and inorganic processes.
Residual risk	In environmental risk management, the "residual risk" is the level of risk remaining after the implementation of risk control strategies.
Seagrass	Unrelated to seaweed, seagrasses are the flowering plants of the ocean, having roots, stems, leaves and inconspicuous flowers with fruits and seeds much like the flowering plants of the land.
Short term	Less than five years.
Statutory Environmental Management Plans (EMP)	Environmental Management Plans which are required to be submitted for regulatory review/ approval as part of the Project's Ministerial Approvals process. Statutory EMPs are triggered by the requirements of the West Australian *Environmental Protection Act 1986*, the Commonwealth *Environment Protection Biodiversity Conservation Act 1999*, and / or the requirements of specific guidelines that have been approved by the EPA and DEWHA for this Project
Stormwater	Natural rainwater run-off that occurs during or after storms or heavy rainfall events.
Subterranean fauna	Fauna that live in sub-surface habitats. In Western Australia these include: • Stygofauna - groundwater-dwelling aquatic fauna. • Troglofauna - terrestrial fauna that inhabit sub-surface air-filled cavities above the groundwater table.
Taxon	A taxonomic category or group, such as a phylum, order, family, genus, or species. Taxa is the plural of taxon.
Trunkline	A main pipeline.
Upstream	The upstream scope of work for the Wheatstone Project. The battery limit extends from the wellheads on the seabed at the gas fields through a network of subsea infrastructure and pipelines to the first valves upstream of the LNG plant inlet facilities.

Term	Definition
Vegetation	Any aquatic or terrestrial plant, whether it is dead or alive. Examples include, but are not limited to, grass, shrubs, trees, tree stumps, tree roots, logs, seeds and brush.
Vertebrate fauna	Animals that have a backbone (vertebrae).
Weed	Any plant that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Weeds are also known as invasive plants.
Widespread	Impacts extending to areas outside the identified impact zone of the Project.

Table 4.2: EIS/ERMP Abbreviations

Abbreviation	Meaning
°C	Degrees Celcius
2D	Two-dimensional
3D	Three-dimensional
AGRU	Acid Gas Removal Unit
AH Act	Aboriginal Heritage Act
AHD	Australian height datum
ALARP	As low as reasonably practicable
AMSA	Australian Maritime Safety Authority
ANSIA	Ashburton North Strategic Industrial Area
ANZECC	Australian and New Zealand Environment and Conservation Council
AQIS	Australian Quarantine and Inspection Service
AQMB	Air Quality Management Branch
ARI	Average Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
ASS	Acid sulfate soils
ASSMP	Acid sulfate soil management plan
bbl	barrels
BP	British Petroleum
BPP	Benthic primary producers
BPPH	Benthic Primary Producers Habitat
BTAI	Burrabalayji Thalanyji Association Incorporated
BTEX	Benzene, toluene, ethyl-benzene, xylene
$CaCO_3$	Calcium carbonate
CCG	Cape Conservation Group
CEMP	Construction Environmental Management Plan
Chevron	Chevron Australia Pty Ltd.
CHMP	Cultural Heritage Management Plan
CLG	Cumulative loss guideline
CO_2	Carbon dioxide

Abbreviation	Meaning
CO	Carbon monoxide
Condensate	Natural gas condensate
COPC	Contaminants of potential concern
CRCP	Cane River Conservation Park
CRG	Community Reference Group
CSD	Cutter Suction Dredge
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Cth	Commonwealth
CUCA	Common User Coastal Access
CW	Cooling water
CWR	Centre for Whale Research
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DDP	LWI/Bechtel Dredging and Disposal Plan
DEC	Western Australian Department of Environment and Conservation
DEWHA	Commonwealth Department of the Environment, Water, Heritage and the Arts
DHI	Danish Hydraulic Institute
DIA	Western Australian Department of Indigenous Affairs
DIMP	Development Impact Mitigation Plan
DLE	Dry Low Emissions
DoE	Western Australian Department of Environment (now DEC)
DoF	Western Australian Department of Fisheries
DoH	Department of Health
DoIR	Department of Industry and Resources (now restructured to form Department of Mines and Petroleum, Department of State Development and Department of Commerce)
Domgas	Domestic gas plant
DoW	Western Australian Department of Water
DPA	Dampier Port Authority
DPI	Western Australian Department for Planning and Infrastructure (now restructured to Department of Planning and Department of Transport)
DRDL	Western Australian Department of Regional Development and Lands
DSD	Western Australian Department of State Development
DSDMP	Dredging and Spoil Disposal Management Plan
DSEWPaC	Department of Sustainability, Environment, Water, Population and Community
DWT	Dead weight tonnage
EAG	Environmental Assessment Guideline
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMB	(DEC) Environmental Management Branch
EMP	Environmental Management Plan

Abbreviation	Meaning
EMS	Environmental Management System
ENGO	Environmental Non-government Organisation
ENSO	El Nino Southern Oscilation
EP	Environmental Plan
EPA	Western Australian Environmental Protection Authority
EP Act (WA)	Western Australian *Environmental Protection Act 1986*
EPBC Act (Cth)	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERMP	Environmental Review and Management Programme
ETS	Emissions trading scheme
EU	European Union
FCPA	Foreign Corrupt Practices Act
FEED	Front End Engineering Design
FIFO	Fly-in, fly-out
Framework	Wheatstone Environmental Management Framework
g/m^2/month	Grams per square metre per month
GHG	Greenhouse Gas
GIS	Geographic Information Systems
H_2S	Hydrogen sulfide
ha	Hectare(s)
HAZOP	Hazard and Operability
HCWA	Heritage Council Western Australia
ICARE	Industrial Communities Against Rubbishing the Environment
IPPC	Intergovernmental Panel on Climate Control
ISO	International Organization for Standardisation
kHz	Kilohertz
kL	10^3 Litres
kL/day	Kilolitres per day
km	Kilometre
KP	Trunkline Kilometre Point
KW	Kilowatts
LAT	Lowest astronomical tide
LAU	Local Assessment Unit
LEP	Levels of ecological protection
LMP	Light Management Plan
LNG	Liquefied natural gas
Lux	Lumens/m^2
LWI	Lanier Walingford International
m	metres

Abbreviation	Meaning
m/s	Metres per second
m^2	Square metres
m^3	Cubic metres
m^3/sec	Cubic metres per second
m^3/hr	Cubic metres per hour
m^3/day	Cubic metres per day
m^3/month	Cubic metres per month
Macedon	BHP Billiton/Apache Macedon Gas Development
MARPOL	"Marine Pollution". Refers to the International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978.
MEG	Mono ethylene glycol
MFMP	Marine Fauna Management Plan
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
mm	Millimetres
Mm^3	Million cubic metres
MMscfd	Million standard cubic feet per day
MODU	Mobile offshore drilling unit
MOF	Materials Offloading Facility
MOPP	Marine Oil Pollution Plan
MRWA	Main Roads Western Australia
MTPA	Million tonnes per annum
MW	Megawatts
NAGD	National Assessment Guidelines for Dredging
NEPM	National Environment Protection Measure
NERDDC	National Energy, Research, Development and Demonstration Council
NES	National Environmental Significance
NGO	Non-government organisation
NHMRC	National Health and Medical Research Centre
N/m^2	Pascal unit
NOITT	Notice of Intention to Take
NORM	Naturally occurring radioactive material
NO_X	General terms for oxides of nitrogen
NRB	Noise Regulation Branch
NRU	Nitrogen Rejection Unit
NSW	New South Wales
NTU	Nephelometric turbidity units
NWCH	North West Coastal Highway
NWS	North West Shelf

Abbreviation	Meaning
NWSJV	North West Shelf Joint Venture
OBC	Outcome-based condition
OEC	Onshore Environmental Consultants
OEPA	Office of the Environmental Protection Authority
ONPMF	Onslow Prawn Managed Fishery
OPGGS Act (Cth)	Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006*
PAH	Polycyclic aromatic hydrocarbon
PAM	Passive acoustic monitoring
PASS	Potential acid sulfate soils
PCWQCO	Pilbara Coastal Water Quality Consultation Outcomes
PDSF	Pilbara Demersal Scale Fishery
PIANC	World Association for Waterborne Transport Infrastructure
PLF	Product Loading Facility
PM	Particulate matter
$PM_{2.5}$	Particulate matter of 2.5 microns or less
PM_{10}	Particulate matter of 10 microns or less
PNEC	Predicted No Effect Concentration
PW	Produced water (including formation water)
PCWQCO	Pilbara Coastal Water Quality Consultation Outcomes
QA/QC	Quality Assurance/Quality Control
QRA	Quantitative Risk Assessment
RO	Reverse osmosis
SAP	Sampling and Analysis Plan
SCV	Submerged Combustion Vaporiser
Scoping Document	Wheatstone Environmental Scoping Document
SEL	Sound energy levels
SIA	Strategic Industrial Area
SKM	Sinclair Knight Merz Pty Ltd.
SIC	Shared infrastructure corridor
SO_X	General term for sulfur oxides
SSC	Suspended sediment concentrations
TAA	Terrestrial Assessment Area
TBT	tributyltin
TC	Tropical cyclone
TIA	Traffic Impact Assessment
TPA	Tonnes per annum
TSHD	Trailing Suction Hopper Dredge
TSP	Total suspended particulates

Abbreviation	Meaning
TSS	Total suspended solids
URS	URS Australia Pty Ltd
USA	United States of America
US EPA	United States Environmental Protection Authority
VIV	Vortex induced vibrations
VOCs	Volatile organic compounds
VSP	Vertical seismic profiling
WA	Western Australia
WAA	Wheatstone Assessment Area
WAFIC	Western Australian Fishing Industry Council
WET	Whole effluent Toxicity
WHR	Waste heat recovery
WLNG	Wheatstone LNG Plant
WQ	Water quality
WWF	World Wildlife Fund
WWTP	Waste water treatment plant
ZoMI	Zone of Moderate Impact
µm	Micrometre
µg/m^3	Micrograms per cubic metre

5.0

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5.0 References

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Appendix A

Submitters and Comments Summary

Appendix A Submitters and Comments Summary

A total of 32 submissions were received from various entities including members of the public, non-governmental organisations, industry groups and government departments, as outlined in Table A 1.

Table A 1: Submitting Entities

Number	Submitter
1	Department of Mines and Petroleum
2	Public Submission
3	Public Submission
4	Main Roads Western Australia
5	Department of Environment and Conservation – Pilbara Industry Regulation Branch
6	Public Submission
7	Public Submission
8	Public Submission
9	Department of Transport
10	Department of Indigenous Affairs
11	Public Submission
12	Woodside Energy
13	Department of Health
14	Radiological Council
15	Mackerel Islands
16	Department of Environment and Conservation – Strategic Policy and Programs Division, Waste Management Branch
17	Department of State Development
18	Shire of Ashburton
19	Department of Environment and Conservation – Environmental Regulation Division, Noise Regulation Branch
20	Cape Conservation Group
21	Public Submission
22	Dampier Port Authority
23	Conservation Council of Western Australia
24	CARE Group
25	Department of Environment and Conservation – Environmental Management Branch
26	Heritage Council of Western Australia
27	Department of Environment and Conservation – Air Quality Management Branch
28	Department of Fisheries
29*	Department of Sustainability, Environment, Water, Population and Community (formerly DEWHA)
30*	Office of the Environmental Protection Authority
31	Western Australian Fishing Industry Council
32	Department of Water

Approximately 550 individual comments were identified from the 32 submission received. These comments have been coded according to the submission number (see Table A 1) and the number of the comment within the submission. For example, the 28th comment raised by submitter number 25 is listed as 25.28.

Each separate comment identified from the submissions appears only once in this document. Chevron has located its response within the document in the section most relevant to the comment, following the Draft EIS/ERMP structure. Table A 2 lists where each comment is addressed within this Response to Submissions.

Table A 2: Summary of Comments and Response Location

Item No.	Short description of comment	Chevron Response Located in
1.1	No safe haven accommodation provisions for ongoing operation personnel.	2.3.3.7
1.2	Concern that ongoing operations personnel will be housed close to the pipeline.	2.3.3.7
2.1	Recommend that Wheatstone Development is not approved on basis of estimated carbon pollution .	4.2
3.1	Estimated carbon emissions are unacceptable, suggest that it should be considered that the Wheatstone Development should not be approved.	4.2
4.1	A comprehensive hydrological, including flood modelling, study is required in consultation with Main Roads to assess the impact of the Project on the existing and future road network in the area.	10.7.4.2
4.2	Inland rock sources should be discussed with Main Roads to avoid potential issues relating to sites, extraction and environmental impact.	2.2
4.3	No information on implications of Project on road users and road networks has been provided, despite requests by Main Roads.	10.7.4.2
4.4	More detailed information on proposed road improvements required should be developed with Main Roads.	10.7.4.2
5.1	Specific mitigation for emissions from construction, commissioning and operations phases of the Project required.	4.3
5.2	Effluent toxicity testing of discharges should occur and a level of species protection at a defined mixing zone will need to be determined to ensure ANZECC guidelines are being met.	4.6
5.3	Cumulative impacts must be addressed with modelling conducted of emissions and discharges.	11
6.1	General statement about vagueness and lack of detail in the EIS/ERMP.	8.0
6.2	No description of existing marine constructions and environmental impacts of those constructions.	2.0
6.3	More detail required on seawater demand for desalination to determine impacts on Onslow Prawn Managed Fishery.	2.5.3
6.4	More detail required on shipping channel location and changes to water flows.	2.3.2
6.5	More detail required on Materials Offloading Facility location and changes to water flows.	8.4.5.1
6.6	Length of construction of trestles for Product Loading Facility is a critically long time period for prawns.	8.4.5.2
6.7	Need for a more detailed and transparent re-assessment of dredging impacts on seagrass and algal habitats for prawns.	8.2.5
7.1	Concern for safety of boats and crew.	10.0

Item No.	Short description of comment	Chevron Response Located in
7.2	Concern for loss of fishing grounds from exclusion zones while work is done.	10.4.7.1
7.3	Concern for loss of fishing grounds due to the permanent changing of the ocean floor.	10.4
7.4	Concern for water clarity while dredging.	8.2.5.1
7.5	Concern for boat activity and other issues changing the migration pattern of mackerel and other species in the short and long term.	8.4.5.4
7.6	Community booklet indicates that pipeline and dredge material disposal/storage areas will cover main areas of fishing business.	10.4.7.1
8.1	No clear indication as to whether pearling is included under commercial fishing or aquaculture studies.	10.0
8.2	The word ‘pearling’ should be included with fishing and aquaculture to highlight pearling as a separate entity.	10.4
8.3	Regional Area of Interest’ should include 80 Mile Beach *P. maxima* pearl oyster wildstock.	8.4.5
8.4	Changes in pearl farming technology and effects of climate change may result in Onslow being a major site for pearling operations.	10.4
8.5	Department of Fisheries should have been included in the schedule of roles and responsible of key parties in various assessment stages.	10.4
8.6	Social risk assessment studies need to better accommodate commercial marine tenure through fisheries and pearling legislation.	10.4.7.1
8.7	Marine Water and Sediment Quality study should extend to include pearling leases at Monte Bello Island and Exmouth Gulf.	8.3.5
8.8	Tidal Regimes, Currents and Hydrodynamics study should extend to include the 80 Mile Beach *P.maxima* pearl oyster fishery.	8.3
8.9	Fish study needs to include *P. maxima* pearl oyster stocks.	8.4.5.2
8.10	Employment Risk Assessment needs to include the impact of LNG on other industries across labour and infrastructure access/costs.	10
8.11	No suggested ‘last port of call’ management framework for marine pest management.	8.4.3
8.12	Vessel Movement outcomes should include assessment of additional costs and risk assessment of increased vessel traffic on pearl industry.	10.4.7.1
8.13	Submitter looks forward to participation in future consultation processes.	10
8.14	Dredging will be disruptive.	8.0
8.15	Dredging may result in loss of habitat.	8.3.5.3
8.16	Suspension of solids in water column, sedimentation and changes to water quality and flow.	8.2.5
8.17	Fear that seismic and other disturbance will damage fishery.	8.4.5.8
8.18	Possible introduction of marine pests; Possible introduction of oyster disease.	8.4.3
8.19	Pipelines may disturb local area.	8.3.5
8.20	Creation of new undersea structures.	8.4.5
8.21	Access to marine areas potentially hindered.	10.4.7.1

Item No.	Short description of comment	Chevron Response Located in
8.22	Better boating facilities for Onslow.	10
8.23	Exclusion areas around rigs and infrastructure.	10.4.7.1
9.1	The disposal Site A is unlikely to be a suitable location for the disposal of material dredged by the CSD.	8.2.5.3
9.2	The disposal sites B and C are unlikely to be stable as the material to be placed at these locations does not resemble the parent material.	8.2.5.3
9.3	The residual risk for placement of dredge material near-shore should be High instead of Medium.	8.2.5.3
9.4	The dredge plume model should be calibrated and validated against the field water quality data.	8.3.5
9.5	It is recommended that a preventative and impact minimisation 'adaptive management' approach be adopted.	8.3.5
9.6	It is suggested that the proponent be required to contribute to scientific research and make data publicly available.	8.3.5
9.7	The issue of inter-annual variability requires further consideration.	Appendix Q1
9.8	The assumptions of the DHI model are not correct.	8.2.5.1
9.9	There is low confidence in the boundaries of the 100% mortality zone.	8.3.5.2
9.10	There is no proper consideration of the natural background turbidity and sedimentation.	8.3.5.2
9.11	The channel backfilling model used in the report is oversimplified and not capable to provide engineering predictions.	Appendix Q1
9.12	The average sediment transport field presented could be misleading.	Appendix P2
9.13	Trunkline stability analysis should be conducted if it has to pass sand-wave fields.	2.2.1
10.1	General statement that Aboriginal heritage matters are addressed by the EIS/ ERMP.	10.2
10.2	Consultation with DIA for the development of the CHMP should begin soon.	10.3.3
10.3	Suggested that proponent should commit to obtaining all necessary Section 18 Notices, rather than saying 'may'.	10.3.6
10.4	General comment that it appears there has been adequate consultation with the Onslow Aboriginal community.	5.7
10.5	Emissions from bushfires have been excluded from the SKM air quality study, despite recommendations for their inclusion.	4.3
10.6	Ambient particulate concentration sampling should continue for the life of the Project.	4.3
10.7	Concern that background PM_{10} maximum levels are above NEPM standards, and that this is not mentioned.	4.3
10.8	Health impact report was not included with ERMP, so DIA cannot comment on it.	10.6.7
11.1	Please take action to ensure that the carbon pollution from this Project is not allowed.	4.2
12.1	Woodside does not agree with Chevron's statements that third-party production facilities on the Burrup Peninsula have limited potential for project development in a timely manner.	3.2

Item No.	Short description of comment	Chevron Response Located in
12.2	Woodside supports additional studies on cumulative impacts, and believes that they are necessary.	3.2.2.2
13.1	General statement of commendation for extensive and comprehensive assessments.	4.6.3.4
13.2	Proposals for approval for the use of treated sewage effluent must examine treatment process, quality assurance and the method of use.	2.3.3.3
13.3	Concern at the prospect of the Project sharing Onslow's potable water supplies.	2.3.3.3
13.4	Proponent should note that a Drinking Water Quality Management Plan is required.	2.3.3.3
13.5	Need to include the Australian Drinking Water Guidelines 2004 and the (draft) Guidelines for the Use of Recycled Water in Western Australia.	2.3.3.3
13.6	There is little indication of the potential burden of future developments on the town's water supply and sewerage.	10
13.7	Any treatment and application of pesticides and fumigants must be applied in accordance with the Health (Pesticides) Regulations 1956.	(a-d) 9.0
13.8	There are general requirements for all of proponents to control pests (weeds, plant pathogen, rodents, vectors, feral animals etc) on the site, and for a Pest Management Plan to be developed.	(a-e) 9.0
13.9	It is recommended that studies undertaken include analysis of dust constituents and relevant risk assessments be completed where necessary.	4.3
13.10	Appropriate regulatory requirements are to be met for transportation of waste and safety of public is addressed.	4.7
14.1	General statement that the Radiological Council has no objections to the ERMP.	14
14.2	The Radiological Council must be consulted in regard to any radiological matters arising out of the Project.	4.7
15.1	Concern that a dredging program of this size and time span will have significant effects on the marine environment around the Mackerel Islands.	8.3.5.2
15.2	There has been limited consultation between Chevron and the Mackerel Islands and an opportunity to discuss concerns and suggestions would be welcomed.	5.0
15.3	It is important that Mackerel Islands are preserved due to high coral health and diversity at specific locations.	6.3.8
15.4	The loss of filter feeders will impact detrimentally on the food chain.	6.3.8.3
15.5	No mention is made of the Northern Wobbegong nor of sea snake species such as *Aipysurus tenuis*.	8.4.2
15.6	It is recognised that any dredging program is likely to cause some damage, and therefore limits of damage need to be set to manage deleterious effects on marine environments.	8.3.5.2
15.7	Every effort must be made to minimise the generation of turbidity and the impacts on coral communities and filter feeders.	8.3.5.2
15.8	The Chevron documents do not provide detail on the management plans to be implemented for the dredging operation, and this is considered to be essential for approval.	Appendix S1

Item No.	Short description of comment	Chevron Response Located in
15.9	If additional dredging is required for the five train case, this should be described or a statement made that no further dredging is needed.	2.2
16.1	DEC will consider any proposals to establish incinerators on the basis of their merits.	4.7.5
16.2	While NSW emissions standards may be a good starting point for presenting a proposal, DEC will consider any proposals to establish incinerators on the basis of their merits.	4.7.5
17.1	The DSD's key consideration for the Wheatstone Project is that it does not result in environmental impacts that will impede or constrain development of future projects within the ANSIA.	11
17.2	The DSD considers that the Wheatstone ERMP should identify the cumulative environmental impacts to surface water, flora and vegetation, air quality and to sensitive receptors from noise and light.	11.5
18.1	A significant omission in the ERMP documentation is the lack of social or community assessment resulting from there being two permanent towns - Onslow and the operational workforce camp 12 km away.	10
18.2	The operational workforce arrangements conflict with the planning proposals as submitted by the company.	10
18.3	No assessment of the build up from flood waters on the development of the infrastructure corridor has adequately been considered in either the ERMP or the accompanying appendices.	9.4.5.4
18.4	Given its lack of resources, the Shire will depend upon the professional assessment of the EPA in determining the appropriateness or otherwise of the ERMP.	10
19.1	Noise from the proposed Project would be able to be managed to comply with noise regulations at both construction and operational phases.	4.5
19.2	It seems that the major potential noise impacts on marine fauna have been properly identified and addressed.	8.4.5.8
19.3	The proposed management and mitigation measures seem reasonable and practicable to NRB.	8.4.5.8
19.4	Noise from the proposed Project, at both construction phase and operation phase, would be able to be managed to comply with noise regulations at all neighbouring noise sensitive premises.	8.4.5.8
20.1	Cumulative impact of the net effect of activities and the Project as a whole appears to be lacking in the EIS/ERMP.	11
20.2	CCG requests that Exmouth Gulf not be used by vessels in any circumstances.	11.5.1.3
20.3	Request is made for an explanation as to why sites deemed suitable by BHP Billiton were deemed unsuitable for the Wheatstone Project.	3.3
20.4	Request is made for an explanation as to why a new site will have less environmental impact than combining with an existing project.	3.3.1.2
20.5	Table 3.2 does not separate the 2 possible tie-back options.	3.2.2.2
20.6	Request for details of community and specific stakeholder groups consulted during the site-selection process.	3.0

Item No.	Short description of comment	Chevron Response Located in
20.7	Question as to what provisions have been made in the Wheatstone Project to accommodate further tie-backs.	2.2.1
20.8	Please provide details of the pipelines that the trunkline will cross.	2.2.1
20.9	Question as to why the BHP Billiton Macedon gas plant cannot be used for Wheatstone and Macedon.	3.7.7
20.10	Question as to what investigations have been done for considering sharing of multiple industrial facilities along the Pilbara coast.	3.7
20.11	Possibility of expanding Onslow Salt's dredged channel to eliminate the need for 2 channels in close proximity.	1.8
20.12	Multiple comments on the potential of future sharing of infrastructure corridors.	3.7.1
20.13	It would appear the survey time-frame is insufficient to properly ascertain the variation in seagrass cover. Explanation required as to the statement that there will be no irreversible loss of seagrass habitat.	8.3
20.14	Request for a cumulative impact assessment on the threats to seagrasses.	8.3
20.15	It would be highly recommended that extensive, long-term research is undertaken to look at the current residential and migratory Dugong population use which required both localised studies and regional studies.	6.3.9.5
20.16	Limited research to date indicates that Dugongs can use a variety of habitats for a number of different key life processes. The precautionary principle should be in place until the information has been obtained.	6.3.9.5
20.17	Risk rankings for Dugongs appear to be under-rated, and boating impacts on Dugongs need to be considered.	8.4.5.5
20.18	Evidence is required to show that impacts will not result in Dugong displacement from the marine environment.	8.4
20.19	Multiple impacts are missing from Table 8.47, as well as cumulative impacts for Dugongs. Justification is needed for the lack of observational and shut-down procedures at night.	8.4.8
20.20	"…. in depths (<6m) characterised by the proposed piling location, and Dugongs and turtles occur only in very low densities at these depths" - refer to submission 20.15.	8.4
20.21	Clarify assumption that Dugongs will spend most of their time in waters several kilometres offshore.	8.4.5.8
20.22	There doesn't appear to have been any risk management done on the impacts to Exmouth Gulf.	8.4
20.23	The Exmouth community doesn't appear to have been identified as a group affected by the Project.	10
20.24	Suggestion for a cumulative impact assessment on Ashburton Delta mangroves.	11.5.1.2
20.25	Question as to what is being done to prevent a change in the course of the Ashburton River, and a response if this was to happen.	8.5.5.1
20.26	Request that the presence and effect on whale sharks is more fully researched in the literature and through liaison with Whale shark experts such as Brad Norman (Ecocean) and/or Mark Meekan (AIMS).	8.4

Item No.	Short description of comment	Chevron Response Located in
20.27	Please clarify if the volume and duration of whale shark satellite-tagging data is sufficient to make assumptions regarding Whale Shark migration routes.	6.3.9.8
20.28	Question as to whether further studies on marine turtles are planned, and justification if not.	8.4.5.9
20.29	Please expand on marine fauna observers.	8.4
20.30	The proposal does not appear to address planning activities with migration patterns of different species to minimise impact.	8.4
20.31	Please clarify where required rock will be sourced from.	2.3.3
20.32	Please clarify if 1.85 million tonnes of backfill rock is in addition to the 1.85 million tonnes required for "a continuous full berm".	2.3.1.3
20.33	If rock quarry locations have been decided, please disclose locations.	2.3.3.1
20.34	Explanation required of provisions put in place to ensure port is safeguarded against marine pests.	8.4.5.4
20.35	Request for details of any additional measures being put in place over and above regulatory requirements for reducing the risk of biofouling.	8.4.5.4
20.36	Explanation required for measures to ensure ships and international traffic will adhere to AQIS requirements.	8.4.5.4
20.37	Explanation required for measures to safeguard against condensate shipping leaks.	8.2.5.12
20.38	Question as to whether base-line sediment sampling has been conducted during both prawn trawling season and non-trawling season in the Exmouth Gulf and waters to its north.	8.2.5.12
20.39	If the Project is being assessed for its possible life-span of 40-50 years then all Project life assessments should address the full time-frame not just the first 25 years alone.	8.2.5.12
20.40	Please provide a comparison of the original volumes dredged by the Dampier Salt Channel.	8.2.5.12
20.41	Question as to what base-line ocean background noise has been done.	8.4.5.8
20.42	Question as to whether in the event of pile-driving soft start procedures will be done for every start-up.	8.4.5.8
20.43	Details requested on alternatives for CO_2 reuse that have been considered.	4.2
20.44	Question as to whether brine will be combined discharged treated waste water.	8.2.5.7
20.45	Question as to whether the desalination plant will have open seawater intake and mitigation for reducing effects on ocean life.	2.3.3.3
20.46	Question as to whether the case scenario for Shoreline Effects Caused by the Presence of MOF Breakwaters takes into account the entire life-span of the Project.	8.5
21.1	Recommend that Wheatstone Development is rejected outright on basis of estimated carbon pollution.	4.2
22.1	The purpose and scope of the document does not mention the Strategic Industrial Area (SIA), located to the south of the Wheatstone industrial site.	1.2

Item No.	Short description of comment	Chevron Response Located in
22.2	Due to the fact that the risk assessment technique is in its infancy, DPA recommends an independent review of the risk ratings applied to the Project.	7.0.
22.3	Key subsequent approvals that will be required for the Wheatstone Project must include DPA's Development Approval.	1.14
22.4	Approval for the proposed fill source within the Onslow Salt Agreement area should also be included.	1.14
22.5	There is limited detail in the Draft EIS/ERMP of how the MOF and/or breakwater/s will be constructed.	2.2.2.2
22.6	No details have been provided on the diesel fuel source to service support vessels.	2.2.2.2
22.7	Hydrodynamic modelling results should be provided to demonstrate that the current configuration of the MOF facility and associated channels have been optimised to minimise maintenance dredging requirements.	2.2.2
22.8	Clarification required for the term 'temporary access channel'.	2.3.2
22.9	The DPA has serious concerns about the location of dredge spoil locations A and B.	2.3.2
22.10	More detail should be provided on the main shipping channel, including a cross-section indicating maximum design capacity and the channel-declared depth.	8.2.5.2
22.11	More detail is required on the trunklines and shore crossing option selected.	8.3.5.7
22.12	DPA would like to see the justification for the proposal of the Product Loading Facility, and more detail regarding the offshore discharge line.	2.3.2.6
22.13	DPA would like to know the proposed location and capacity of the water intake lines.	2.3.3.3
22.14	The document should critically evaluate the impact of avoiding these areas in the context of the ultimate development of the service corridor.	9.5.5.1
22.15	The accuracy of the coastal geomorphology and coastal impacts modelling presented in the document is of concern to the DPA.	Appendix P1
22.16	The coastal geomorphology report is a comprehensive review of the coastline in the Project area. If modelling differences are due to the consideration (or lack of) cyclone events, it is clear that cyclones have a very significant episodic impact on the coastal processes in the area.	Appendix P1
22.17	It is crucial that a better understanding is obtained of not only the quantum of accretion and erosion due to the MOF but the likely shape of the beach following a severe cyclonic event.	Appendix P1
22.18	There has been no attempt to model the onshore/offshore sediment transport during a severe cyclone.	Appendix P1
22.19	DPA recommend a review the whole coastal processes and determine its impact on aspects of the design such as breakwaters, seawalls. channels etc.	Appendix P1
22.20	DPA recommend a commitment to bypass sand from the west to east on a regular basis.	Appendix T1
22.21	Multiple comments on dredging impacts.	Appendix S1
22.22	The request for a Sea Dumping Permit does not include maintenance dredging approval.	8.2.5.2
22.23	Explanations of provisions made for disposal of maintenance dredge material.	8.2.5.2

Item No.	Short description of comment	Chevron Response Located in
22.24	Further explanation as to how maintenance dredging will occur is required.	8.2.5.2
22.25	Further information required on the proposed keel clearance depths and insurance dredging.	Appendix S1
22.26	The documents do not propose any solution for the disposal of contaminated material if national guideline values are exceeded in the future.	Appendix S1
22.27	Insufficient information is provided in the draft documents as to the risk of significant in-fill; the expected maintenance dredging requirements; the options for efficient disposal of maintenance dredging material.	8.2.5.2
22.28	The DPA have a number of concerns regarding the assumptions and methodology used for the assessment of suspended sediment plumes.	n/a
22.29	2D hydrodynamic modelling has been undertaken rather than 3D; the DPA does not necessarily agree that a 2D model is conservative.	Appendix Q1
22.30	Clearly the 2D model does not represent the potential conditions which might be experienced during dredging under these circumstances.	Appendix Q1
22.31	It is not clear why the "realistic" overflow used would not at least be equal to the average overflow measured.	Appendix Q1
22.32	The dredge plume model should be run with a reasonable representation of the fines; for longer; for a very calm condition; and for consideration of light deprivation.	Appendix Q1
22.33	The document does not provide assessment criteria or the relative impact on areas surrounding the Wheatstone plant and infrastructure.	10.7.4.3
22.34	Further explanation as to how Chevron will comply with MARPOL and facilitate the disposal of ships waste.	4.7
22.35	Further explanation as to how Chevron will comply with MARPOL and facilitate the disposal of ships waste.	4.7
22.36	DPA suggest that a more detailed assessment be carried out in accordance with DEC Acid Sulfate Soil (ASS) Guideline Series, particularly in areas proposed for excavation or affected by groundwater disturbing activities.	9.2.5
22.37	The ASS and discharge waters management plan requires more appropriate screening and management techniques to be adopted.	9.2.5
22.38	In addition, the use of liquid lime as the dosing agent is generally ineffective and very expensive.	9.2.5
22.39	The DPA feels that the document would be improved by additional information on how Chevron proposes to manage the potential risks involved with introduced species at the Port of Onslow.	8.4.5.4
22.40	The DPA understands that there are currently no baseline surveys of introduced species in the Onslow area; it would be a valuable exercise for a baseline survey to be undertaken before construction activities and Port operations commence.	8.4.5.4
22.41	The DPA would encourage Chevron to discuss implementation of Marine Pest Monitoring with the DoF and DPA.	8.4.5.4
22.42	The DPA will need to be included as a part of the detailed response plan in the case of a marine pest discovery, as if will need to undertake actions to protect the port in this situation.	Appendix S1

Item No.	Short description of comment	Chevron Response Located in
23.1	We are concerned by the increasing level of development approved or proposed for the area, referred to hereinafter as "the Region".	11
23.2	Based on our review of the Draft EIS/ERMP, it appears that assessment of cumulative impacts with Macedon and Scarborough has not occurred.	11.3
23.3	The Study (or Spatial Assessment) Area is limited, particularly in light of other cumulative impact studies published for the Region.	11
23.4	The spatial assessment area should be set at a regional level alike the previous cumulative assessments undertaken for nearby oil developments.	11
23.5	We assert that the assessment should be undertaken under the auspices of a "Strategic Assessment" under the EPBC Act.	11
23.6	The preference by the Government's regulatory agency for strategic assessment for industrial development in region is reflected in EPA Report No. 1360 (July 2010).	11
23.7	As the Proponent, Chevron is able to request of the State and Federal Governments that both commit to undertake an assessment under Section 146 of the EPBC Act and recognise the requirements for assessment under Section 38 of the EP Act.	11
23.8	We assert that the collective risks and impacts of these projects, and others in the Region, both within or across State and Commonwealth boundaries, should be properly assessed by both levels of Government.	11
23.9	Our position is that no significant development in the above-mentioned Region should be considered until the risks and impacts, both individual and cumulative, can be assessed.	11
23.10	We seek, therefore, that Chevron initiate an urgent request of the State Government to partner with the Federal Government under the terms of the EPBC Act to enable a Strategic Assessment of the Region.	11
23.11	We are also extremely alarmed by the very large carbon pollution output projected for the Wheatstone Project with no proposed mitigation actions.	4.2
23.12	Discussion of carbon pollution abatement opportunities through geosequestration or biosequestration totals four paragraphs. This is an extremely cursory approach to perhaps the largest single environmental impact of this project.	4.2
23.13	Chevron's claims that LNG will result in reduced carbon pollution lack any credibility without detailed modelling to demonstrate and guarantee that LNG sales will displace dirtier fuel sources.	4.2
23.14	In the absence of a broad-based policy measure to deal with carbon pollution in Australia (such as an ETS), it will be necessary to continue dealing with carbon pollution on an ad-hoc basis by State Government regulators.	4.2
23.15	There can be no doubt that carbon pollution from this project will have a direct effect on the WA environment, and therefore should be regulated by the WA EPA under the Environmental Protection Act.	4.2
23.16	The vulnerability of key WA terrestrial ecosystems to climate change, particularly those in the biodiverse South West continue to be highlighted in major reports such as IPCC.	4.2

Item No.	Short description of comment	Chevron Response Located in
23.17	It is totally unacceptable that Chevron are proposing no action to reduce the massive carbon pollution output predicted from this project.	4.2
23.18	Section 5 Stakeholder Consultation suggests that Best Practice consultation has been undertaken for the Project, but this position is questionable.	5.0.
23.19	Of concern, there a number of statements throughout the Draft EIS/ERMP that appear to be contradicting, misleading, unsubstantiated or false.	4.2
23.20	Neither the Site Selection Study nor results of in the independent review have been made available to the public, those not invited to participate or those unable to be involved in the site selection process.	1.7
23.21	Of concern, there a number of statements throughout the Draft EIS/ERMP that appear to be contradicting, misleading, unsubstantiated or false in relation to waste management.	4.7
23.22	An EIS/ERMP Commitments Table is required clearly demonstrating and detailing future consultation processes with regards to the details of management, monitoring and mitigation measures.	12.2.2.1
23.23	Comment number captured for Chevron's purposes only. Does not need a response	n/a
24.1	Commit to 'naked' cargo. Plastic wrapping degrades extremely rapidly on exposure to UV light and the temperatures experienced in the Pilbara region.	4.7
24.2	Ban plastic shrink wrapping. Plastic shrink wrapping accounts for a significant proportion of the roadside litter within the Burrup Peninsula.	4.7
24.3	Be pro-active and own your roadside litter. The 'Industrial Communities Against Rubbishing the Environment' (ICARE) group was formed in late 2009 to tackle the issue of roadside litter along Burrup and Karratha-Dampier Roads.	4.0
24.4	Encourage Litter Reporting by the Workforce. Currently members of the public can report acts of littering or dumping to Ranger Services (Shire of Roebourne).	4.0
24.5	To summarise, the CARE group would like to see a firm roadside litter management commitment by Chevron Wheatstone in their Draft EIS/ERMP. We (CARE) would be happy to discuss this issue further with Chevron at any time.	n/a
25.1	Recommendation 1: That the EPA is provided with suitable documentation.	Appendix S1
25.2	Recommendation 2: That an outcome-based condition or conditions be applied to the construction dredging program.	8.2.5.1
25.3	Recommendation 3: That the proponent develops a water quality and benthic habitat monitoring program associated with outfall 1.	8.2.5.6
25.4	Recommendation 4: That the discharge of produced water to the nearshore marine environment (outfall 2, Figure 8.17) is removed as a key Project characteristic.	8.2.5.6
25.5	"Recommendation 5: That the proponent mitigates or offsets impacts on benthic habitats in LAU ECO0.	8.3.5.8

Item No.	Short description of comment	Chevron Response Located in
25.6	Recommendation 6: That the proponent's zones of "Partial Mortality" and "Total Mortality" be changed Recommendation 7: That the proponent redefines and refines calculations for the extent of mortality within the Zone of Moderate Impact (ZoMI) with distance from the source of pressure, so that a more accurate and limited loss calculation can be provided for each habitat type and significant habitat feature within the ZoMI. Recommendation 8: That the extent of mortality within significant benthic features in close proximity to the dredge channel, such as End of Channel Shoal and Saladin Shoal (located within close proximity to the Zone of High Impact (referred to by the proponent as the Zone of Total Mortality), be specified by the proponent.	8.3.5.2
25.7	Recommendation 9: That an outcome-based condition be applied to the Zone of Influence requiring that net live cover of benthic habitats within the Zone of Influence does not fall below 100 per cent.	8.3.5.2
25.8	Recommendation 10: That the following outcome-based condition for the ZoMI (referred to by the proponent as the zone of partial mortality) be applied Recommendation 11: That the proponent demonstrates that the above benthic habitat health criteria will be met via a benthic habitat health monitoring program, to be developed in consultation with the OEPA and DEC prior to the completion of this assessment.	8.3.5.2
25.9	Recommendation 12: That the following outcomes be used as the basis for developing outcome-based conditions for the ZoMI	8.3.5.2
25.10	Recommendation 13: That the following objectives be used as the basis for developing outcome-based conditions for protection of benthic habitat.	8.3.5.2
25.11	Recommendation 14: That the environmental conditions for this project require the development of a dredge and spoil disposal monitoring and management plan.	Appendix S1
25.12	Recommendation 15: That the following outcome-based condition be applied to the maintenance dredging program based on the proponent's predictions.	8.3.5.3
25.13	Recommendation 16: That the proponent undertakes ongoing monitoring and management until defined criteria for minimal loss of mangroves and other BPPH are met.	8.3.5.4
25.14	Recommendation 17: That fauna management protocols be applied for trunkline related shoreline crossing activities Recommendation 18: That trunkline installation trenching be scheduled to occur outside of the calm transitional periods to minimise the loss of benthic habitats (primarily filter-feeders, coral and seagrass) from the impacts of suspended sediment concentrations (SSC) and sedimentation.	8.3.5.6

Item No.	Short description of comment	Chevron Response Located in
25.15	Recommendation 19: That the proponent undertakes coral health monitoring and management during trunkline construction Recommendation 20: That the following outcome-based condition be established to limit the loss of filter-feeder habitat during trunkline installation. Recommendation 21: That the proponent includes the area of partial mortality predicted for seagrass in Table 8.31, and undertakes monitoring to confirm that seagrass habitat impacted by trunkline installation recovers within less than five years from the completion of installation.	8.3.5.6
25.16	Recommendation 22: That the proponent undertakes a monitoring program to demonstrate that the predicted areas of coastal benthic habitat loss are not exceeded. Recommendation 22: That the proponent undertakes a monitoring program to demonstrate that the predicted areas of coastal benthic habitat loss are not exceeded. Recommendation 23: That the proponent develops and implements a mangrove, algal mat and samphire management plan in consultation with DEC, which addresses the direct and indirect impacts from onshore construction and operation. Recommendation 24: That the proponent offsets impacts on the Hooley Creek – Four Mile Creek in the event that monitoring indicates significant impacts. Recommendation 25: That the proponent commits to further surveys to clarify the presence and significance of the local population and habitat of Pristis zijsron (green sawfish).	8.3.8
25.17	Recommendation 26: That the proponent develops a hydrocarbon management plan to the requirements of the OEPA and DEC.	8.4.5.7
25.18	Recommendation 27: That the following additional dredge management measures are incorporated into the approved dredging management program. Recommendation 28: That a full season of in-water marine turtle surveys is undertaken to determine whether there are important seasons of in-water occurrence within the study area (particularly the construction area supporting vessel activity).	8.4.5
25.19	Recommendation 29: Marine fauna observers be required on all vessels (including dredge vessels) to limit the potential for impacts on dugong Recommendation 30: That the proponent gives consideration to funding further studies to better understand dugong occurrence and movements within the study area, particularly within the area subject to vessel movements and dredging.	Appendix S1
25.20	Recommendation 31: That the following management measures be applied to intake pipes for the reverse osmosis plant.	8.4.5.3
25.21	Recommendation 32: That the conditions for this project include a requirement for a marine fauna management plan that includes the following vessel related mitigation measures.	8.4.5.4
25.22	Recommendation 33: That the conditions for this project include a requirement for the development of a recreation management program to minimise impacts of increased population.	8.4.5.5

Item No.	Short description of comment	Chevron Response Located in
25.23	Recommendation 34: That the proponent undertakes an underwater acoustic noise modelling exercise for pile driving Recommendation 35: Once the proponent has undertaken the underwater acoustic modelling exercise and has assigned suitable zones of physical disturbance and avoidance (based on the most sensitive marine fauna receptor), management procedures for pile driving be developed and included in an outcome-based condition for this project.	8.4.5.8
25.24	Recommendation 36: That underwater blasting be excluded from this project.	8.4.5.8
25.25	Recommendation 37: That the conditions for this project include a requirement for a light management plan (LMP).	8.4.5.9
25.26	Recommendation 38: That the proponent commits to offset actions as part of an overall offset strategy to address residual impacts on fauna of conservation significance and nature reserves. Recommendation 39: That the following projects be considered as possible offset measures to improve collective knowledge of marine conservation values in the region and assist in long-term conservation management in the proposal area.	10.4.5.1
25.27	Recommendation 40: That the impacts of sourcing large amounts of fill from non-local, third-party quarries are defined and assessed as part of the proposal. Recommendation 41: Outcome-based condition re: introduction or spread of any weed species or pest animal species within the site and its surrounds. Recommendation 42: Outcome-based condition re: rehabilitation of borrow pits.	9.4.5.4
25.28	Recommendation 43: That the proposed Wheatstone domgas pipeline be located within, or, if this is not possible, directly adjacent to the proposed Macedon domgas pipeline corridor	2.2.3.3
25.29	Recommendation 44: outcome-based condition be applied that ensures that the Project has no significant impacts on flora, fauna and vegetation communities outside the Terrestrial Assessment Area (TAA) Recommendation 45: potential areas of impact outside the TAA are subject to Level 2 flora and vegetation Recommendation 46: That potential impacts on flora, vegetation and watercourses of the Ashburton River Delta (in particular at West Hooley Creek, East Hooley Creek Recommendation 47: That appropriate trigger levels for water quality and vegetation health are developed for potentially affected species and communities of conservation significance adjacent to and downstream of the dredge material placement area and the raised plant pad. Recommendation 48: That contingency measures are developed prior to construction of the dredge material placement area, and the raised plant pad be implemented in the event that the seepage or changes to surface water flow result in exceedance of the agreed trigger levels for water quality and vegetation health. Recommendation 51: That weed management zones are developed and implemented, based on weed species and burden, over the length of the pipeline.	9.5.5.9

Item No.	Short description of comment	Chevron Response Located in
25.30	Recommendation 49: That an outcome-based condition be applied to ensure that there is no increase in weed burden or number of weed species in the former Mount Minnie pastoral lease. Recommendation 50: That a weed hygiene and management plan be developed and implemented to the requirements of the OEPA on the advice of DEC. Recommendation 51: That weed management zones are developed and implemented, based on weed species and burden, over the length of the pipeline.	9.5.5.1
25.31	Recommendation 52: That the proponent avoids impacts on populations of Abutilon uncinatum (priority 1) and Eleocharis papillosa Recommendation 53: That the proponent clarifies the number, distribution and habitat extent of the Tecticornia spp. within the survey area. Recommendation 54: That potential impacts from the Project infrastructure footprint, the dredge material placement area seepage footprint, and changes to surface water on the C3 vegetation unit (low Tecticornia shrubland in saline claypans) and the individual Tecticornia spp. within the vegetation unit be taken into consideration. Recommendation 55: That, if impacts on the known distribution of any Tecticornia sp. within the TAA are found to be significant, further survey work be undertaken to demonstrate that their distribution extends beyond the Project impact area.	9.5.5.1
25.32	Recommendation 56: That the environmental approval conditions incorporate management commitments for terrestrial fauna Recommendation 57: That the proponent develops and implements a fauna management plan that includes best practice management to mitigate potential impacts on fauna resulting from trenching for the domgas pipeline construction to the requirements of the OEPA, on the advice of DEC.	9.6.5.2
25.33	Recommendation 58: That the outcome-based conditions for environmental management identified in the Environmental Management Program be revised in consultation with DEC Recommendation 59: That the management commitments and environmental management plans that form the basis of the determination of the residual risk and environmental acceptability of the proposal, be included in the environmental approval conditions.	12
25.34	Recommendation 60: That vegetation codes in Table 12.8 (p. 880) reflect the vegetation codes in associated Figure 12.15 (p. 881) and Table 9.16 (p. 711-715).	12.2.2.1
25.35	Floristic analysis Recommendation 61: That the floristic analysis be supplied to DEC for review.	Appendix I1
26.1	We note that planning approval is required from the Shire of Ashburton for the Project. Under Section 78 of the Heritage of Western Australia Act 1990.	10.2
26.2	The draft Development Impact Mitigation Plan (DIMP) was submitted to the Heritage Council for their preliminary assessment In May 2010.	10.2.3
26.3	The levels of significance referred to in the document are based on conservation policies contained within the Old Onslow Townsite Conservation Plan (1998).	10.2.4
26.4	Archaeological investigations are currently underway to survey and document the existing archaeological evidence prior to any physical impact.	10.2.4.1

Item No.	Short description of comment	Chevron Response Located in
26.5	As outlined above, the Heritage Council has not assigned levels of significance to the Old Onslow Townsite or Cemetery, which is identified here as being the "most significant areas of heritage value in the locality".	10.2.4.1
27.1	The outline provided for air quality aspects in the ERMP and Air Quality Impact Assessment is, in general, well-structured	4.3.1.1
27.2	AQMB notes that the presented peak concentrations for the Proposed Wheatstone Project (by itself) are probably representative.	4.3.1.1
27.3	The peak concentrations during cumulative impacts and non-routine upset conditions (cold start or emergency shutdown) are generally expected to be significantly higher than normal conditions.	4.3.4.2
27.4	It is stated that Chevron is currently undertaking a monitoring study of baseline conditions for dust (TSP and PM_{10}), NO2, SO2 and VOCs.	4.3.2
27.5	Odour from Hydrogen Sulfide emissions has been identified as an air quality issue in the ERMP.	4.3.
27.6	There are some other important air quality related guidelines that are worthy of mention in Table 9.26.	4.3
28.1	These sections [*2.3.3.3 and 2.5.5.1*] refer to the possible construction of a desalination plant.	2.3.3.3
28.2	No reference is made to the commercial finfish fisheries and target species.	6.3.9.8
28.3	PDSF and Mackerel need to be described in this "Natural Capital" section.	6.5.3.1
28.4	Table 6.7 (page 261) lists 'studies of marine fauna'. No fish studies have been listed.	6.3.9.8
28.5	A statement is made that a summer survey is planned to document seasonal variation in fish composition.	6.3.9.8
28.6	Need to emphasise the importance of structured habitats for tiger (and endeavour) prawns.	6.3.9.9
28.7	The Onslow prawn fishery is a multi-species prawn fishery and Area 1 in particular is significant for tiger prawn catches.	6.3.9.9
28.8	Commercial finfish fishing activities are only briefly mentioned, as compared to prawn and pearl fisheries.	6.5
28.9	Fisheries are spatially defined with species abundance restricted to specific areas.	7.3.5.1
28.10	For both Major and Moderate Consequences a percentage area impacted is used as a measure.	10.4.4
28.11	The marine impacts consequence definitions in Table 7.7 do not adequately capture the consequences in relation to commercial loss.	10.4.4
28.12	There is no discussion of Indigenous fishing for either town-based or community-based groups.	7.3.7
28.13	Table 7.2 lists 'aspects' identified for the Project. None of these appear to cover the issues around the long-term operations of the pipe-line or the facilities.	7.3.3
28.14	Table 7.5 (p 396) lists the consequence definitions used to assess the risks to marine fauna.	7.3.5.1

Item No.	Short description of comment	Chevron Response Located in
28.15	The potential impact on fish is only considered in relation to the inshore component of the Project.	6.3.9.8
28.16	Table 8.39 (p 557-8) lists the potential for impact of proposed Project activities on demersal scalefish resources as overfishing.	8.4.2
28.17	Pages 576-77, works through this risk assessment due to recreational effort caused by the workforce for the Project.	8.4.5.5
28.18	While some mitigation measures for recreational fishing can be enforced on staff while they are on-site.	8.4.5.5
28.19	Table 8.44 (p 589) identifies various sources of noise from the operations and identifies it as a risk to bony fish.	8.4.5.8
28.20	Three years of increased turbidity is likely to have impacts on inshore areas but not easily quantified.	8.3.5.1
28.21	Currently, the 'consequence' seems to have been assigned '5' (minor) with likelihood being '3' (possible), resulting in a residual risk of 'low'.	8.4.7
28.22	DOF would like the following clarifications to be included – as requested in its initial comments.	8.4.7
28.23	Mitigate: (i) all vessels mobilising to the Project to undergo risk assessment (not just 'construction vessels entering the nearshore area.').	8.4.7
28.24	This section [Section 8.4.5.5] focuses too much on protected species and not enough on fish resources.	8.4.5.5
28.25	The Department is keen to discuss the development of a package of mitigation strategies to combat this risk, as part of the proponent's social licence.	10.4.5.1
28.26	More specific details of recreational fishing methodology are required. It is stated that interviews were conducted.	10.4.2
28.27	The management controls and mitigation measures in this table (10.10) are too vague. The statement that "Chevron will create a commercial fishing industry liaison role.	10.5.2
28.28	For both Major and Moderate Consequences a percentage area impacted is used as a measure.	7.3.5.1
28.29	The risk ratings should be reviewed. We consider that the risk to commercial fishing from exclusion zones or reduced access is Medium. – not Low.	10.4.7.1
28.30	Dredging: 1. Leave as is; 2. Consequence change from 5 to 4, Likelihood leave as 2 – Results in overall risk as MEDIUM.	8.4.7
28.31	This section does not consider the impact on the State's biggest finfish fishery – Pilbara Trawl (see also table 10.9, p 792).	10.4.7.1
28.32	The effect of increased vessel traffic does not appear to have been addressed in this section.	10.4
28.33	Some of the descriptions of fisheries and fishery areas in table 10.9 (p 792) are not totally accurate.	10.4
28.34	Cyclone mooring buoys required for this and other projects in this area will have an impact on the fishing grounds.	10.4.7.1

Item No.	Short description of comment	Chevron Response Located in
28.35	Even though the overall impact of the Project on local fishing and pearling is considered Medium, for the Onslow Prawn Managed Fishery the impact is considered to be High.	Appendix O10
28.36	The reference to the Northern Prawn Fishery and Kimberley fishery should be deleted in the second paragraph, as they are not relevant to Onslow.	Appendix O10
28.37	Section 2.5 Remove the last paragraph as this statement is not quite factual.	Appendix O10
28.38	Section 2.7.1 Trawl nets do not spread fully and generally the width of the trawl path is between 60 and 70% of the headrope length.	Appendix O10
28.39	Section 2.7.2 This section needs to be re-written as they have confused the main gear with the try-gear (5m) specifications.	Appendix O10
28.40	Section 3.1 Third paragraph - this needs to include a reference to fishing for tiger prawns as this is the most commercially valuable species in Area 1.	Appendix O10
28.41	Section 3.2 The last sentence above Table 3.1 is incorrect.	Appendix O10
28.42	Section 3.3 Reference to bycatch species i.e. bugs etc. should be referred to as by-product.	Appendix O10
28.43	Section 3.3.1 Tiger prawns are the major species caught in the Onslow Prawn fishery.	Appendix O10
28.44	Section 3.4 Second paragraph. The Onslow prawn fishery season is generally April to end of September.	Appendix O10
28.45	Section 3 The Project will have definite short-term impacts on the Onslow prawn fishery.	Appendix O10
28.46	Section 4 The term "prawns" should be used throughout the report which includes all prawn species	Appendix O10
28.47	Section 4.2.2 Dredging in Area 1 will impact all prawn species (tiger, king and banana prawns).	Appendix O10
28.48	Section 4.3 The Port of Onslow area is closed to trawling for social impact reasons.	Appendix O10
28.49	Relevant literature appears to have been overlooked.	Appendix O9
28.50	Study was only undertaken during daylight hours and therefore "true" species composition of these sites is not represented.	Appendix O5
29.1	In general, it is noted P2 could potentially be enhanced by specifically cross-referencing other sections of the EIS as appropriate	Appendix P2
29.2	In Section 4.0 of P2, there is discussion on morphological impacts due to the proposed development,	Appendix P2
29.3	In P2 (and in the EIS in general) there does not appear to have been any assessment undertaken of the potential impacts of altered seabed elevations on wave climate.	Appendix P2
29.4	It is considered that an assessment of potential alteration to wave climate and longshore sediment transport.	Appendix P2
29.5	In Section 2.2.1 of P2, there is a statement that "the potential natural sand bypassing of the MOF by littoral sediments needs to be addressed.	Appendix P2
29.6	There is no discussion on the effects of cyclones on sediment transport in P2.	Appendix P2

Item No.	Short description of comment	Chevron Response Located in
29.7	It would be useful if the GEMS (2010) reference was cross-referenced to Appendix GG of Appendix Q1 of the EIS.	Appendix P2
29.8	In Section 3.1.3, it is noted that two wave conditions have been modelled (namely Summer and Winter scenarios).	Appendix P2
29.9	In Section 3.2.4, there is a statement that "waves were simulated based on the MesoLAPS winds.	Appendix P2
29.10	In Section 3.2.5, there is the introduction of a "rough" wave conditions scenario, but it is uncertain where this has been defined.	Appendix P2
29.11	In Section 3.3.1, a description of the formulation to derive the amount of sediment in suspension and transported as bed load would be useful.	Appendix P2
29.12	In Section 3.3.1, it is stated that two grain sizes with a d50 of 0.1mm and 0.2mm respectively were simulated.	Appendix P2
29.13	For clarity, it would be useful if Figure 3.72 (in Section 3.4.2) included a note that the transport direction was to the east.	Appendix P2
29.14	In Section 5.0, it is noted that changes to the drainage patterns of Hooley Creek were not considered in P2.	Appendix P2
29.15	In Section 5.2, it is noted that the bathymetry of the Hooley Creek channels was guessed based on producing "reasonable" current velocities within the channels.	Appendix P2
29.16	Further to the above point, it is also recommended that sensitivity testing to variations in bathymetry is undertaken.	Appendix P2
29.17	In Section 5.2, it is noted that a temporary increase in flood levels may be experienced until the entrance is scoured.	Appendix P2
29.18	It would be beneficial if P2 included a Conclusions section drawing key points in the Appendix together.	Appendix P2
29.19	Figure 8.72 of the EIS has schematics of updrift accretion and downdrift erosion patterns adjacent to the MOF.	8.5.5
29.20	If the predicted long term recession impacts are found to be significant.	Appendix T1
29.21	It is recognised that potential management measures have been identified in the EIS that would assist in mitigating the impacts on coastal processes.	Appendix T1
29.22	In numerous locations in the EIS, there is mention of a 19.6 year cycle in astronomical tides developed from lunar nodical motion.	Appendix P1
29.23	In Appendix P1, there is discussion on coastal and related processes (winds, waves, water levels, currents, rainfall and runoff, tropical cyclones, sediment transport.	8.5
29.24	In Section 3.5 of P1, it is noted that the 100 year ARI water level for Onslow is 4.7m AHD, presumably an elevated ocean water level.	Appendix P1
29.25	The implication of the 100 year ARI elevated ocean water level on the proposed development should be assessed in more detail.	Appendix P1
29.26	Discussion on tsunami is provided in Section 3.8 of P1. It is noted that the information provided in this discussion is not of sufficient quantitative detail	Appendix P1
29.27	Numerous Figures and Tables have limited information in captions.	Appendix P1
29.28	Some labels of axes are unreadable, e.g. in Figure 3-1, 3-5, 3-7, 3-8, 3-12, 3-13, 3-14, 3-37, which should be corrected for clarity.	Appendix P1

Item No.	Short description of comment	Chevron Response Located in
29.29	Numerous Figures are too small to be readable, particularly in Appendix B.	Appendix P1
29.30	In relation to Section 2.1 to 2.3, it would be beneficial if a map showing the locations of the places mentioned in the text was developed.	Appendix P1
29.31	The addition of a length scale to Figure 2-1 would be beneficial.	Appendix P1
29.32	In Section 2.4.3, it is noted that the "area is currently subject to investigation of its bathymetry and marine habitats", and clarification on the nature of these investigations would be beneficial.	Appendix P1
29.33	In Section 3.2, quantification of the height difference between the Onslow Jetty and Onslow Airport weather stations would be beneficial.	Appendix P1
29.34	In Section 3.2, to further assess the timing effects in relation to the difference in Onslow Jetty and Onslow Airport winds.	Appendix P1
29.35	In Section 3.2, clarification of the reason for the gap in Onslow Airport weather data from 1975 to 1998 would be beneficial.	Appendix P1
29.36	In Figure 3-12 and 3-13 (Section 3.2.3), clarification of the meaning of the two blue lines surrounding the fitted curve should be provided.	Appendix P1
29.37	Clarification of the reason for the significant outlier in Figure 3-13 should be provided.	Appendix P1
29.38	In Section 3.2.3 (page 22), it is noted that Onslow Airport data requires factoring by approximately 20%, and for clarity this should (presumably) be noted as factoring up.	Appendix P1
29.39	In Figure 3-15 (Section 3.2.4), the y axis has not been captioned, and this should be corrected (including units...	Appendix P1
29.40	Relating to Figure 3-20 (Section 3.3), the difference in wind fields for the NW and NE cyclones could be more closely explained.	Appendix P1
29.41	In Section 3.5 (page 43), it is noted that debris lines from TC Bobby and TC Vance have been observed.	Appendix P1
29.42	In Section 3.7, it would be beneficial if the discussion on Ashburton River turbidity was linked to other sections of the EIS.	Appendix P1
29.43	In Section 4.2.1, it is noted that drilling was being undertaken at the time of inspection.	Appendix P1
29.44	Figure 4-21 in Section 4.6 is difficult to read, and could be made clearer.	Appendix P1
29.45	It is noted in P1 that "the effects of sea level rise should be incorporated into design parameters adopted for the development.	Appendix P1
29.46	It is considered that although there is some uncertainty in predicting sediment transport changes as a result of the Project.	Appendix T1
29.47	Although the focus of prediction of shoreline recession would be expected to relate to non-cyclonic impacts.	Appendix T1
29.48	In Section 3.2.2, a map of the soil types discussed would be useful.	Appendix T1
29.49	In Section 3.2.4, a map labelling the landforms discussed would be useful.	Appendix T1
29.50	In Section 3.2.8, it would be useful to include discussion on the wind climate.	Appendix T1
29.51	In Section 3.2.9, it would be useful to include discussion on measured water levels.	Appendix T1

Item No.	Short description of comment	Chevron Response Located in
29.52	In Section 3.3, it would be useful to include a map of habitats	Appendix T1
29.53	Section 10.2, 10.3 With regard to indigenous heritage (discussed in Section 3.6.2) and European heritage (discussed in Section 3.6.3).	Appendix T1
29.54	It would be helpful if the coastal geomorphology assessment, coastal processes modelling investigation and desktop geological heritage study referred to in Section 4.1 were referenced.	Appendix T1
29.55	It is noted that Section 6 of T1 (on roles and responsibilities) is incomplete.	Appendix T1
29.56	It is noted that Section 7 of T1 (on training and education) requires further updates	Appendix T1
29.57	There are incorrect references to a Figure X and Table X in Table 10.1.	Appendix T1
29.58	By definition, the critical shear stress for deposition must be less than or equal to the critical shear stress for erosion.	Appendix Q1
29.59	It is agreed that adopted critical shear stress values strongly influence the simulated behaviour of dredge plumes.	Appendix Q1
29.60	Furthermore, a critical shear stress for deposition of 0.1N/m^2 can be considered to be towards the upper end of typical literature values.	Appendix Q1
29.61	In Figure F.4 of Q1, the effects of resuspension by currents and waves over a 2 month simulation period are illustrated.	Appendix Q1
29.62	With regard to the density of initial deposits of 400kg/m^3 noted above, it stated in Section 4.3.2.6 of Q1 that the value is based on the density of sediments recovered from sediment traps.	Appendix Q1
29.63	The methodology for erosion of sediment in the numerical model used should also be clarified, e.g. in terms of the type of erosion that was simulated.	Appendix Q1
29.64	Based on Section 4.3.2.3 of Q1, we understand that settling velocities for use in the modelling were derived based on "settling tube measurements in overflow samples from silty sand material with bed silt/clay content in the 10-30% range".	Appendix Q1
29.65	Overall, N3 contains a good overview of existing literature relating to the monitoring and management of dredging projects in Western Australia.	Appendix N3
29.66	The 10mg/L TSS value mentioned should be referenced (even if it refers to unpublished DHI reports).	Appendix N3
29.67	Section 2.2.1, 2nd paragraph: It is unclear on what basis the percentile values of turbidity has been calculated.	Appendix N3
29.68	Section 2.2.2: It can be noted that it is important that sedimentation rates quoted are comparable as they will vary between studies.	Appendix N3
29.69	Section 3.1.1, 2nd paragraph, 2nd sentence: Should there be a comma rather than a full stop at the start of the sentence?	Appendix N3
29.70	Section 3.1.1: A good distinction has been made between TSS and SSC but it is unclear until the bottom of p.23 in Section 5 why the distinction is made.	Appendix N3
29.71	Section 4.3: The recommended approach is sound, although the need to collect baseline water quality data should not be underestimated.	Appendix N3
29.72	Section 4.3.1 & 4.3.2: The adaptive management approach outlined at the end of Section 4.3.1 and Section 4.3.2 is considered to be sound.	Appendix N3

Item No.	Short description of comment	Chevron Response Located in
29.73	Section 5 to 9: All sections follow a similar format with a discussion of tolerance to suspended sediment and sedimentation in corals, octocorals, seagrass, macroalgae and mangroves, respectively.	Appendix N3
29.74	Much of the information in the literature review has been incorporated into the main report and appears to be satisfactory.	Appendix N3
29.76	Dredge Channel), Appendix H The laboratory sheets in Appendix H of Q4 included results for a series of samples with the prefix "MV".	Appendix Q4
29.75	Based on DEC (2009), it is considered that ANC values should not be used to reduce the level of management required for the disturbance of ASS.	9.2.5.1
29.77	It would be beneficial if the placement sites (A to E) were labelled on Figure 1-2.	Appendix Q5
29.78	In Table 2-4, the following are not consistent with the National Assessment Guidelines for Dredging 2009.	Appendix Q5
29.79	It is considered that the QA/QC samples for the Dredge Area were adequate.	Appendix Q5
29.80	In Q5, reference is made to the calculation of the 95% UCL using Procedure G of the NSW EPA (1995) Guidelines.	Appendix Q5
29.81	In Figure 3-3, zinc rather than arsenic concentrations should be shown.	Appendix Q5
29.82	Appendix Q5: Draft Sediment Quality Assessment – Wheatstone Dredging Program, Section 4.6.4.	Appendix Q5
29.83	The 95% UCL of the mean nickel concentration for the deep core samples exceeded the screening level and concentrations observed at the proposed placement areas.	Appendix Q5
29.84	Whilst the geochemical properties of the sediments of the Trunkline Route area may be similar to the other sites.	Appendix Q5
29.85	Appendix A: Clarification is required as to whether the SAP was submitted to DEWHA for review and approval prior to implementation.	Appendix Q5
29.86	It is noted that nearshore trunkline installation and pipeline dredging are not addressed within S1.	Appendix S1
29.87	Section 4.2.1 & 4.2.2: more detail is required defining the type of material proposed to be dumped at Site A.	Appendix S1
29.88	Section 4.2.3: If required to minimise environmental impacts, an impermeable bund could be constructed around the entire perimeter of the onshore placement area.	Appendix S1
29.89	Section 4.4: In general, Section 4.4 (and subsections) of S1 would benefit from a summary table detailing dredging location, material type, quantities and placement destinations.	Appendix S1
29.90	Section 5.1, 5.4, 5.5, 5.6 It is noted that details on key roles and responsibilities, performance reporting, auditing and management review are to be provided in a future revision of S1.	Appendix S1
29.91	Section 7 It is noted that Section 7 of S1 is based on draft preliminary modelling results, will require updating, and the results presented should not be taken as complete or correct.	Appendix S1

Item No.	Short description of comment	Chevron Response Located in
29.92	Section 8.1.2 It is noted that some species of seagrass are extremely sensitive to reduced levels of incident light on the seabed.	Appendix S1
29.93	Details regarding the type of diffuser specified for use to minimise turbidity should be provided.	Appendix S1
29.94	Section 8.1.2 More detail needs to be provided to explain how the 'Restricted Overflow Areas' will be defined in practice.	Appendix S1
29.95	Section 8.1.2 Preventative management measures should include setting the alignment of the sunken dredge pipeline to avoid sensitive areas of the seabed.	Appendix S1
29.96	Section 8.1.2 A freeboard should be nominated for the water levels within the bunded onshore placement area.	Appendix S1
29.97	Section 8.1.2 Water quality monitoring locations should be defined on a figure.	Appendix S1
29.98	Frequency of data collection from water quality loggers should be specified to ensure that timely management responses during the works are possible.	Appendix S1
29.99	Section 8.1.2 The number and location of coral health monitoring sites should be defined on a figure and a monitoring frequency should be nominated.	Appendix S1
29.100	Section 8.1.2 Silt curtains installed around turbidity producing operations (where practicable) should be listed as a possible responsive management measure.	Appendix S1
29.101	Section 8.1.2.1 Water quality early warning criteria are stated as being based on baseline monitoring, but the method used to define these criteria should be clearly outlined in the narrative.	Appendix S1
29.102	Section 8.1.2.1 it is evident that the Coral Health and Water Quality management trigger criteria are not yet fully defined.	Appendix S1
29.103	Section 8.1.2.1 if no management triggers for gross sedimentation are established.	Appendix S1
29.104	Section 8.1.2.2 Given that the percentage loss of seagrass and macroalgae has been estimated in previous sections of S1.	Appendix S1
29.105	Section 8.1.3 In Section 8.1.3 of S1, it is stated that monitoring is to be undertaken on a quarterly basis.	Appendix S1
29.106	Section 8.4.2 In Section 8.4.2 of S1, the frequency of pH monitoring within the placement area material.	Appendix S1
29.107	Section 8.5.2 In relation to Section 8.5.2 of S1, it is considered that periodic progress surveys of placement areas.	Appendix S1

Item No.	Short description of comment	Chevron Response Located in
29.108	Section 9.1 It is noted that a table detailing approved losses of BPPH is to be included in Section 9.1 of S1.	Appendix S1
29.109	Section 9.2 The location of background and near-field water quality monitoring stations should be clearly defined on a figure.	Appendix S1
29.110	Water quality exceedance criteria should be defined using baseline data, and the procedure used to derive the trigger values should be outlined.	Appendix S1
29.111	Section 9.2 Frequency of data collection, analysis and internal reporting should be defined.	Appendix S1
29.112	Section 9.2 The reporting timeframe for exceedances should be defined.	Appendix S1
29.113	In Section 9.2.2.2 of S1, the location of proposed sediment traps should be clearly defined on a figure.	Appendix S1
29.114	It is also stated in Section 9.2.2.2 of S1 that "if instruments become available during the dredging program that accurately measure net sedimentation rates.	Appendix S1
29.115	Section 9.2.3 The location of coral health monitoring sites should be clearly defined on a figure.	Appendix S1
29.116	Section 9.2.3 The monitoring frequency should be defined.	Appendix S1
29.117	Section 9.2.3 The reporting frequency should be defined.	Appendix S1
29.118	Section 9.3.3 The sites nominated for predictive links monitoring should be clearly defined on a figure.	Appendix S1
29.119	Section 9.3.3 The frequency of data collection to develop predictive links should be defined.	Appendix S1
29.120	Section 9.5 Baseline and near-field monitoring sites should be clearly defined on a figure.	Appendix S1
29.121	Section 9.5 The frequency of monitoring and reporting should be defined.	Appendix S1
29.122	Section 9.6 In Section 9.6 of S1, it is noted that the risk assessment form for IMP inspections needs to be developed.	Appendix S1
29.123	Section 10 It is noted that procedures to review and update the management plan throughout the works need to be developed.	Appendix S1
29.124	Given that the EIS has been completed, it is considered that the proponent should resubmit a completed Sea Dumping Permit Application Form.	Appendix S1
29.125	However, as set out in Sections 4.1 and 4.3 of the NAGD, the following key information is required to support a Sea Dumping Permit Application.	Appendix S1
29.126	Notwithstanding the other requirements in completing a Sea Dumping Permit Application Form, it is highlighted that there is a need for the proponent to...	Appendix S1

Item No.	Short description of comment	Chevron Response Located in
29.127	Further review of mechanisms in place to prevent and respond to spills will be required, including the availability of baseline data should a spill occur and environmental monitoring be required.	8.2.5.12
29.128	Section 8.3.5.14 - meets DSEWPaC requirements for the Draft EIS/ERMP.	8.3.5.14
29.129	Section 8.3.5.14 - meets DSEWPaC requirements for the Draft EIS/ERMP.	8.3.5.14
29.130	Submission Numbers refer to DSEWPaC instructions for navigating through the submission.	n/a
29.131	Submission Numbers refer to DSEWPaC instructions for navigating through the submission.	n/a
29.132	DSEWPaC is satisfied with the text put forward for the draft EIS/ERMP. DSEWPaC supports the continuing collection of baseline information.	8.4.2
29.133	Submission Numbers refer to DSEWPaC instructions for navigating through the submission.	n/a
29.134	Table 8.47 and App O6 meet DSEWPaC requirements for the draft Draft EIS/ ERMP.	Appendix O6
29.135	Dwarf Desert Spike-rush It is noted that Chevron does not anticipate having an impact on the species, however the Supplementary EIS must outline the contingency measures in place in the event that the species is identified within the pipeline footprint.	9.5.6
29.136	Section 8.4.5.8 (p591) meets DSEWPaC requirements for the Draft EIS.	8.4.5.8
29.137	Additional text on blasting was included by Chevron at the end of the table. DSEWPaC comments are located there.	n/a
29.138	Section 8.4.5.8 (p592) and Appendix O9 meets DSEWPaC requirements for publication of the Draft EIS.	8.4.5.8
29.139	App O6 meets DSEWPaC requirements for publication of the Draft EIS.	Appendix O6
29.140	DSEWPaC notes the information included within Section 8.3.5.1, which is predominantly a description of the activity, rather than a discussion of potential impacts.	8.3.5.1
29.141	Submission Numbers refer to DSEWPaC instructions for navigating through the submission.	n/a
29.142	In addition to these comments and associated requests for further information/ clarification, DSEWPaC expects that an examination of the viability of a sand transfer system will be included in the Supplementary EIS.	8.5
29.143	DSEWPaC notes the additional information provided in Draft EIS/ERMP regarding microtunneling.	2.3.2
29.144	DSEWPaC notes Chevron's commitment and expects Chevron will provide a revised DSDMP and Marine Fauna Management Plan (MFMP) as part of the Supplementary EIS/ERMP.	Appendix O6
29.145	While social and economic considerations are not driving the assessment at this point, the Minister will need to consider these aspects in making an approval decision.	10

Item No.	Short description of comment	Chevron Response Located in
29.146	The revised text (provided by Chevron in an email dated 13/07/10, and agreed, with minor changes, by DSEWPaC on the same date) meets DSEWPaC requirements for the Draft EIS/ERMP.	4.8
29.147	Section 2.6 (p69) The text regarding decommissioning does not commit to ensuring that infrastructure will be designed such that it will be technically and economically feasible.	2.6
29.148	DSEWPaC notes the addition of the agreed text in the Draft EIS/ERMP and that Chevron has committed to developing a draft BEMP for inclusion within the Supplementary EIS.	Appendix O6
29.149	The revised text (provided by Chevron in an email dated 13/07/10, and agreed, with minor changes, by DSEWPaC on the same date) meets DSEWPaC requirements for the Draft EIS/ERMP.	4.8.3.2
29.150	Chevron to include within the Supplementary EIS justification for why spoil disposal – particularly of larger material - does not increase the likelihood of marine pest colonisation.	8.2.5.3
29.151	Chevron to explain how the dredge campaign has been optimised to ensure best practice dredging methodology and minimisation of impacts.	8.2.5.3
29.152	Chevron to provide SEWPaC with further reasoning regarding the acceptability of the impact on seagrass habitat in the area.	8.2.5
30.1	The survey of some parts of the study area (OEC 2008) was conducted during dry periods, which is not consistent with Guidance 51.	6.4.8
30.2	Not all of the study area was systematically searched for rare flora.	6.4.8.5
30.3	Vegetation and Flora - Eleocharis papillose conservation status.	Appendix I1
30.4	Vegetation and Flora - Three vegetation sub-associations of High conservation significance and two units of Moderate significance were identified.	9.5.5.1
30.5	Fauna - The fauna survey reports contained in Appendices J1, K1, L1 and M1 used appropriate survey methodology and generally provide adequate information to determine the respective fauna values present or expected to be present at the site.	9.6
30.6	Fauna - A few minor errors or questionable identifications and omissions were noted in the vertebrate fauna report.	Appendix G1
30.7	Trunkline corridor.	2.2.1.3
30.8	Laybarge Activities and Impacts (associated with the construction of the trunkline).	2.2.1.3
30.9	Onshore dredge spoil disposal management.	9.4.5.2
30.10	The proponent is requested to explain the suitability of the figure of 250mg/l TSS proposed in the Draft EIS/ERMP as the "turbidity limit" applied to seawater returned to the sea (Volume 2 page 471).	8.3.5.4
30.11	The OEPA requests that the proponent provide the following data provided in the ERMP, in a suitable GIS format.	8.0
30.12	It is noted that the assessment of BPPH loss presented in the ERMP is a compilation of loss after a multiyear dredging campaign.	8.3.5.2

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30.13	It is noted that the assignment of some of the Local Assessment Unit boundaries are inconsistent with the intent of Environmental Guidance Statement 3.	8.3.3.1
30.14	The draft Dredging and Spoil Disposal Management Plan [DSDMP] (Appendix S1) is incomplete.	Appendix S1
30.15	The DSDMP proposes the development of sensitivity criteria on an empirical basis in situ during the dredging program.	Appendix S1
30.16	The "Response to Independent Peer Review, 8 June 2010" by DHI, addresses issues raised in the 10 May Review by Dr Des Mills.	Appendix Q1
30.17	The Draft EIS/ERMP notes (on page 452) that several streams of waste water will be generated from onshore infrastructure, co-mingled and discharged at -5m CD at an outlet in the port.	8.2.8
30.18	Impacts to Ashburton Island and Brewis Reef and other shoals and reefs from pipeline laying to corals and turtle nesting. How will these be managed?	8.3.5.6
30.19	Trenching or microtunneling for shore crossing – when will this be decided?	2.3.2
30.20	Depth of near shore outfall – 5m is shallow, normally 10m is needed to get reasonable dilution. Initial dilution currently predicted to be about 1:28. Will this be met? Would the initial dilution increase if the outfall was in deeper water given the negative buoyancy of the plume?	8.3.5.6
30.21	Note that bio-accumulants will need to meet Anzecc guidelines on discharge. Is this criteria met?	8.4.5.6
30.22	What impacts are expected from the elevated salinity of discharge?	8.2.5.6
30.23	EAG 3 – Development areas for inner port areas. Rest of area (outside of Ashburton mangrove guideline 1 area) would be non-designated areas, with an acceptable five per cent loss. Is this guideline met?	8.3.3.1
30.24	Dredge area: there are unconsolidated sediments 0.4m or less with hard substrate beneath (clay, shelly reef, coral bed). What is the implication of the hard substrate for dredging, will blasting be required? Trunkline route has not been cored. How accurate is the dredge modelling for the trunkline?	8.2.5.1
30.25	A combination of hopper and cutter suction dredge (CSD) will be used for all capital dredging in the MOF, main access channel and in the turning basin. Has the proportion of time the CSD will be needed been accurately estimate and included in the dredge modelling scenarios?	8.2.5.1
30.26	The main sources of light during installation and dredging will be various vessels, drilling mobile offshore drilling units (MODUs) and installation platforms.	8.4.5.9
30.27	Operational flaring is expected 10 x per year. What is the likely duration of flaring events?	4.4
30.28	Sea water intakes – what provision will be made to prevent marine fauna entrainment e.g. seahorses? What impacts to water quality is expected from the use of biocides, anti-scalants, etc?	8.4.5.3
30.29	Please provide further information in relation to the possibility of a whale resting area off Onslow.	8.4.5

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30.30	As the spill of fuel and oils in the near shore environment may be catastrophic to Ashburton mangroves, a plan for spill management for near shore spills is needed for the assessment.	8.3.5.14
30.31	A complete Marine Fauna Management plan is required for the assessment.	Appendix O6
30.32	Noise impacts to marine fauna: consider the draft Guidelines for the Conduct of Noise-Intensive Marine Activities Along the Western Australian Coast (URS 2008) and explain how proposed management compares with the guidelines.	Appendix O6
30.33	Will the flora survey of borrow hill 4 be done before the end of the assessment and this information provided and impact included?	9.5
30.34	Undescribed taxa recorded during the vegetation and flora studies, other than those listed in Table 6.21.	6.4.8.5
30.35	"Samphire specimens from survey area were identified as far as possible by the WA Herbarium…"	Appendix I1
30.36	Other undescribed species except Aenictophyton are illustrated as in the Project area only.	6.4.8.5
30.37	The location of all priority species are shown as either in the Project site or within the industrial estate and therefore under threat.	6.4.8.5
30.38	The location of all priority species are shown as either in the Project site or within the industrial estate and therefore under threat.	9.5.5.1
30.39	The width of the pipeline corridor should be restricted in the proposed Cane River park extension.	9.5.5.1
30.40	What off-sets are proposed – particularly for proposed park, but generally due to large area of clearing?	Appendix S1
30.41	What areas of vegetation will be affected by changes to surface water patterns?	9.4.5.4
30.42	How will vegetation be impacted from changes in salinity in different areas due to changes in surface water flow and changes in tidal inundation?	9.4.5.4
30.43	Trigger values, what ecosystems do these apply to?	9.3.5
30.44	What vegetation loss will occur from changes of flow at west Hooley Creek and at east Hooley Creek from additional flows? What impact to vegetation will the loss of storage areas and loss of west arm have?	8.3.5.8
30.45	Dust suppression on roads, tracks and hardstand – will saline water be used? How will run-off from roads be managed (particularly in non-saline environments)?	9.5.5.7
30.46	Has the loss of vegetation from fill removal areas been included in the overall loss assessment?	9.5.5.1
30.47	It is noted that due to the isolated location of the Project site, an incinerator has been considered as a potential waste management option.	4.7.5
30.48	What is the source of rock armouring for pipeline and MOF and terrestrial elevation armouring material?	2.2
30.49	Is dredging of the Ashburton River mouth anticipated in future to prevent changes to flow path of the River? If not, how will it be ensured that the River does not alter course through the Project site as the mouth of the River silts up over time?	8.5.5

Item No.	Short description of comment	Chevron Response Located in
30.50	Considering that Pluto LNG has a GHG efficiency of 0.32 tonnes of CO_{2e}/tonne of LNG and Tangguh LNG (Indonesia) has a GHG efficiency of less than 0.3, is there a reason why Wheatstone could not achieve 0.3?	4.2
30.51	CO_2 content of gas at "yet to be determined gas-fields". How will this affect GHG emission levels?	4.2
30.52	What groundwater mounding is predicted from the placement of all fill for the elevation of the site (not only marine fill) and what are the potential impacts from the groundwater mounding?	9.3
30.53	What turbines will be used for which purposes is not clear.	4.3
30.54	There is no mention of what NO_X emission levels will be from turbines. Please provide this information.	4.3
30.55	EPA Comment: It needs to be shown that EPA public risk criteria are met. Please explain the treatment of risk in the common user areas, which will be used and ultimately controlled by 3rd parties and, therefore, will not be part of the Wheatstone site.	10.7.4.3
30.56	Dust – PM_{10} and $PM_{2.5}$ results are given from Site 1 and 2, was there monitoring at the other 3 sites?	6.4.2.1
30.57	Completed statutory EMPs should be provided for assessment.	Appendix S1
30.58	Please provide a discussion of how best practice has been incorporated into the proposal.	4.2
30.59	The OEPA requests that the proponent provide the all environmental survey data provided in the ERMP and site layout data, in a suitable GIS format.	8.0
31.1	It must be highlighted that it has been extremely difficult to respond to the EIS, in the level of detail that is required, within the required timeframe.	10.4
31.2	Of most concern, is the expected impact to the Onslow Prawn Fishery.	8.4.5.2
31.3	We also expect there will be a significant impact on the viability of the Pilbara Wetline Fishery.	10.4.7.1
31.4	There has already been a direct impact on the fishermen operating in this area as a result of this proposal.	10.4.7.1
31.5	There are a range of other impacts, some of which have been highlighted in the PPA's submission.	10.4.7.1
31.6	We also note the comments made by the NBPFA about the installation of moorings by Chevron in Mangrove Passage, within the fishing boundaries of the Onslow Prawn Fishery without consultation with the fishing industry.	10.4
31.7	While these fisheries are small when considering the number of licence holders, they are significant in terms of the supply of seafood to Pilbara and Perth markets.	10.4.7.1
31.8	The report states that "The Project will affect only a small proportion of the available commercial and recreational fishing areas in the region."	10.4.7.1
31.9	The report states that "There is potential for recreational fishing by the Project workforce to impact on commercial and recreational fishing in the area".	10.4.5.1
31.10	Some options to address this issue could be to support Government introducing the necessary legislation to restrict on-board recreational fishing.	10.4.5.1

Item No.	Short description of comment	Chevron Response Located in
31.11	The report states that "It is possible there will be some impacts on commercial fishing. "	10.4.7.1
31.12	The report suggests a number of measures to reduce the potential for over fishing occurring in the Project area from increasing recreational fishing.	10.4.9
31.13	Exclusion zones during dredging will be temporary and impacts will only affect a small proportion of fishing areas.	10.4.7.1
32.1	The ERMP states that water source options for the Project are still being investigated, and DoW supports the case for a desalination reverse osmosis.	2.0.
32.2	The DoW considers the proposed measures for hydrocarbon and dangerous goods management sufficient as in the Draft Construction Environmental Management Plan.	4.8
32.3	The Department of Water in carrying out its role in floodplain management provides advice and recommends guidelines for development on floodplains.	9.4.5.4
32.4	The hydrologic and hydraulic modelling methodology (for storm surge, riverine flooding and sea level rise Implications) is considered acceptable by the DoW.	9.4.5.4
32.5	For proposed habitable areas, a minimum floor level of 0.50 metres above the 100 year ARI flood level is generally recommended.	9.4.5.4
32.6	For the proposed industrial facilities and shared infrastructure corridor it is proponent's decision to define their acceptable level of risk when establishing fill levels for adequate flood protection.	9.4.5.4
32.7	Flood protection levees are not considered best practice as they require ongoing management/maintenance and may fail during extreme flood events.	9.4.5.4
32.8	An appropriate emergency response management plan for the site must consider the accommodation village being isolated from the Onslow Road during extreme flood events.	10.4.7.1

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