Learmonth Pipeline Fabrication Facility (Assessment Number: 2208)

Attachment 1 to Response to Submissions Report:

- Table of Responses to EPA Services Comments (Table 1)
- Tables of Responses to Public Submissions (Tables 2A – 2N)
- Table of Responses to EPA Services Comments on Amended Environmental Management Plans (Table 3)

ATTACHMENT 1 (TABLE 1) - SUBSEA 7 RESPONSES TO COMMENTS FROM EPA SERVICES

	EPA Services comment	Proponent response
Benthic communities and habitats		
1.	EPA Services noted in its advice of 20 August 2019 that seagrass surveys in the deeper areas of Exmouth Gulf were not undertaken in the peak season for seagrass biomass, namely between November and March. On the recent field trip undertaken in September 2019, video footage identified potential seagrass at some locations along the tow route in an area previously surveyed and mapped by the proponent as sand. Noting the limitations experienced on the day with respect to survey method, it appears that some sites have very sparse seagrass of *Halophila* spp. (approximately 10 leaves in a 50 x 50 cm view). EPA Services notes that *Halophila* is an opportunistic colonising species with a high sexual output which recovers relatively quickly from disturbance (McMahon 2016, Vanderklift et al. 2016). The sparse and patchy cover of *H. ovalis* observed in the footage is unlikely to have high ecological significance. EPA Services notes the proponent's previous response to this issue, stating that the features observed by the EPA Services on the video are more likely to be worm tubes, seapens, sea squirts or general detritus as observed at previously by Subsea 7 at sites of a similar depth. Furthermore, based on light monitoring, the proponent's view that it was unlikely that there is adequate photosynthetic active radiation (PAR) to support seagrass communities. EPA Services recommends that the project be managed by ensuring that water quality is maintained above cumulative PAR tolerance guidelines for seagrass beyond the direct disturbance footprint. This will ensure that in the event that seagrass does grow in the vicinity of the tow route, that indirect impacts from the effects of turbidity associated with the pipeline launch are minimised. The alternative approach would be to undertake additional seagrass surveys during the anticipated period of peak season. If seagrass is not found in subsequent surveys undertaken in peak season then water quality triggers turbidity based on the 20th and 80th percentile for baseline data could be considered.	An additional survey was completed in February 2020, within the expected peak season for seagrass biomass. No seagrass was recorded at any site within the Off bottom tow area (refer Response To Submissions Report Attachment 3A, BMT 2020). An amended MOEMP is provided as an attachment to the Response to Submissions Report.
Marine and Operational Environmental Monitoring Plan (MOEMP)		
2.	The MOEMP currently does not propose Environmental Performance Outcomes or identify environmental triggers or adaptive management measures which would be implemented in the event that water quality exceeds the trigger values. It is likely that Environmental Performance Outcomes for the project will be defined in the Ministerial Conditions (where relevant and appropriate). The EPA Services recommend that the Environmental Performance Outcome should be "No impact to benthic communities and habitats in the Zone of Influence (ZOI)".	The stated purpose of MOEMP is to "*Document the monitoring measures to be undertaken to evaluate whether impacts on benthic communities and habitats (BCH) during Bundle launch are commensurate with those predicted.*" As stated in Table 5-8 of the ERD, "*It is expected that the macroalgae and filter feeders on reefs adjacent to the inshore section of tow route will be tolerant of isolated, short-term, 'pulses' of elevated turbidity (as occur naturally) and as such will not be significantly impacted.*" It is noted that given the nature of Bundle launch and tow operations, including the short duration of the activity (1-2 days), the implementation of adaptive management measures during a launch and tow is not considered realistic. Subsea 7 agrees with the recommended EPO. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
3.	Appropriate water quality indicators and triggers have not been identified in the MOEMP. Since seagrasses are likely to be the most sensitive biological receptor in the area (and in the absence of tolerance limits for macroalgae and infauna), indicators and triggers should be established at a level that will ensure no impacts to seagrasses beyond the Zone of High Influence (ZOHI). The MOEMP identifies five water quality monitoring sites located at varying distances from the ZOHI. It is recommended that the water quality monitoring sites are situated close to the ZOHI/ZOI boundary, to ensure impacts on seagrasses in the ZOI are managed appropriately and to determine if the water quality predictions are achieved at the boundary in line with the modelling predictions. It is also suggested that water quality is	No seagrass occurs in proximity to the ZoHI (refer response to Comment 1). Reef with macroalgae and Reef with macroalgae and filter feeders habitat types occur adjacent to the inshore end of the tow route. The short-term nature of the Bundle tow operations precludes adaptive management during a launch (refer response to Comment 2), although the results of monitoring will be used to inform the management of subsequent launches. Thus the intent of the water quality monitoring proposed within the MOEMP is to validate the water quality modelling predictions, as developed through the sediment fate modelling, and inform the management of future (but not the current) Bundle launches.

	EPA Services comment	Proponent response
	monitored at a range of depths along the boundary, from inshore shallow areas to deeper areas further offshore. The proponent may also wish to consider additional water quality monitoring sites which radiate out from the tow route, across the ZOI and into the unaffected waters. Whilst these sites are not essential for compliance reporting and would result in additional monitoring, they would provide useful model validation data and could provide greater confidence to the community and other stakeholders on the extent, severity and duration of the turbidity plume.	The location and number of water quality monitoring sites has been reviewed, and revised, to allow better assessment of water quality impacts adjacent to the tow route. Given the lack of sensitive receptors in proximity to the ZoHI, sites have not been located along the ZoHI/ZoI boundary (these would be vulnerable to vessel impact during a Bundle launch (if marked by surface buoys) or prawn trawling before/following a launch (if not marked by a large, illuminated buoy)). Additional sites have been added to assist in model validation and to provide greater confidence to the stakeholders, including the local community, on the extent, severity and duration of the turbidity plume associated with a Bundle launch. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
4.	The MOEMP does not clearly state the period of time the water quality loggers will be deployed prior to and after a Bundle launch. It is recommended that the loggers are deployed one week prior to the launch and remain in the water for one week afterwards, by which time turbidity should have returned to background levels.	The MOEMP has been updated to include additional details on the proposed monitoring period. Given the high potential for interaction between the loggers and third party users of Exmouth Gulf, including commercial fishing vessels, and the difficulty in predicting the timing of a Bundle launch more than 5-7 days in advance, deployment will occur from at least 3 days prior to, and for at least 5 days following, a Bundle launch. A balance needs to be struck between collecting the necessary data and the risk of the loss of equipment (and associated data) due to third party activities. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
5.	The MOEMP also states that the spatial extent of the plume will be determined using remote imagery (for example aerial photography or drone imagery). The plan needs to specifically define what type of monitoring will be undertaken, how long the imagery will be collected for and how it will be georeferenced. To provide information on the duration and extent of the plume it is recommended that the visual footage is collected until the plume is no longer visible. There may also be value to the proponent in comparing/correlating the in-situ water quality logger data with the remote imagery data to understand the relationship and develop an algorithm for monitoring TSS concentrations associated with future launches using remote sensing.	Aerial imagery will be captured via small plane flights, daily (at approximately noon), until turbidity associated with a Bundle launch and tow is no longer distinguishable from normal, regional, turbidity levels. The MOEMP has been updated accordingly. Subsea 7 understands that while work has been done in trying to develop a reliable method for the quantification of TSS from remote sensing, a more robust and transparent approach is *in situ* monitoring, as proposed. The proposed remote imagery will assist in confirming the aesthetic impact of a Bundle launch and in assessing the suitability of the water quality monitoring locations. The water quality monitoring (loggers) will be the mechanism by which modelling predictions are validated. The MOEMP has been amended to clarify the differing objectives of the water quality versus remote imagery programmes. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
6.	The MOEMP states that water quality monitoring will cover only the initial two Bundle launches. Given the conservation values of the Gulf and the level of public scrutiny the project is likely to be under, monitoring over only two launches does not seem appropriate. The potential environmental impacts are likely to increase with Bundle length and it is unlikely that a full understanding of the extent, duration and intensity of the potential impacts will be understood from just two launches, particularly if they are short lengths. Adequate monitoring data is also likely to be critical for the proponent to respond to concerns raised by the community over the operational life of the project. Consideration could be given to scaling back the monitoring program once there is sufficient information to demonstrate that the MOEMP can meet all of the Environmental Performance Outcomes, but this should only be on the approval of the regulator.	The MEOMP has been updated (new Section 5) to allow for the scaling back of monitoring following regulator approval to do so. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
7.	The EPA Services recommend a risk-based approach to determine the need for post-launch biological monitoring. If water quality remains below the water quality triggers (established to ensure no impact to sensitive seagrass communities) during a Bundle tow, then biological communities should be adequately protected, and post-launch monitoring of benthic communities is not required. In the event that water quality triggers are breached it is recommended that benthic habitat monitoring is initiated within two weeks of the Bundle launch rather than six weeks as currently proposed. A six-week time period is likely to introduce additional uncertainty through potential recovery of seagrasses or impacts from other natural disturbances such as cyclones and heat waves.	The value of the proposed risk-based approach, to determine the need for post-launch biological monitoring, is understood. Subsea 7 had proposed to undertake post-launch biological monitoring following the initial two Bundle launches to demonstrate to concerned stakeholders that the BCH of Exmouth Gulf have been adequately protected. On further review it was decided that a risk-based approach, as suggested, would be more practical and would not risk the health of BCH within Exmouth Gulf. Separately the MOEMP describes an annual, ongoing, regional BCH monitoring programme. Comparison of the median turbidity at an 'impact' site (i.e. within the ZoI) to the 80th percentile of baseline data is proposed, as this matches the approach utilized in the impact assessment and is consistent with

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	The following recommendations are made with regards to the design of the biological monitoring program. *Towed video transects* There is currently insufficient description of the monitoring program design. It is recommended that the project utilises the Before, After, Control, Impact (BACI) design. The MOEMP does not clearly describe the number of replicates and a power analysis should be undertaken using baseline data to determine the number of replicates required to detect change over and above natural variation. The monitoring plan should also state the length of each transect. The MOEMP does not state when the baseline benthic communities and habitat (BCH) data will be collected. The data collected during the habitat mapping as a part of the ERD is not suitable for monitoring for several reasons. Firstly, this information was collected for the purpose of mapping and was not specially designed for monitoring. Secondly, it is likely that the benthic communities will have changed since this data was collected in 2017/18. The EPA Services recommend that baseline data is collected at the recommended monitoring sites (discussed below) just prior to each Bundle launch to accommodate for any changes which is likely to occur between launches. The BCH monitoring sites would be best located along the ZOHI/ZOI boundary. If the communities at the boundary show no significant change in response to reduced water quality, then it is likely that the communities beyond this area will also not be affected. There may also be benefit in having sites radiating out from the ZOHI to determine the extent of any impacts should impacts be detected at the sites closest to the boundary. The MOEMP identifies that there will be a quantitative assessment of "Reef with macroalgae' and 'Reef with macroalgae and filter feeders' to characterise primary producer and filter feeder composition and cover before and after each Bundle launch. The report does not clearly identify how the percentage cover will be determined. From the current description it appears to be a more qualitative estimate based on 30 second long sections of footage. It is recommended that a quantitative software program such as CPCE (Coral Point Count Extension) is used to determine percentage cover. Note that this program is useful for quantifying any benthic habitat not just coral dominated communities. *Infauna monitoring* The MOEMP has included infauna monitoring in both the ZOHI and ZOI. An assessment of the actual impacts to benthic organisms within the ZOHI will provide important information for describing recovery from disturbance. However, the EPA Services do not consider it necessary to monitor infauna in the ZOI, given that the seagrass water quality triggers are likely to be much lower than the tolerance limits of infauna. The BACI design is again recommended and a power analysis using baseline data to determine the number of replicates. This baseline data will need to be collected prior to each launch to account for any variation between tows. Figure 7 illustrates the locations for BCH monitoring which includes grab samples and video footage of macroalgae and filter feeders. Although it would appear logical which sites are for the different types of monitoring, the EPA Services request that Figure 7 is updated clearly showing which sites will be used for infauna and which for macroalgae. Figure 7 also notes that the sites are indicative. It is recommended that the final monitoring plan include the latitude and longitude of all monitoring sites. *Assessment of the area of ZOHI* To provide confidence to the community and to the regulator that the predicted ZOHI is accurate it is recommended that the width of sediment disturbance is assessed immediately after a Bundle launch. It is recommended that these assessments are undertaken at several locations along the tow route. The width of the Bundle tow should be compared to modelling predictions, and adaptive management applied if the	the broad approach recommended for the seagrass *H. ovalis* (Lavery *et al*. 2017). In the event the threshold is exceeded, a BCH survey at the relevant site(s), and reference sites, would be triggered. A new Section 5 has been added to the MOEMP to provide for the review and revision of the plan, in consultation with the Department of Water and Environmental Regulation (DWER). Under this review and revision process, proposed changes to the monitoring programmes, including decreases in monitoring programme scope or frequency, may be assessed. The MOEMP has been updated to stipulate the timing of biological monitoring. The MOEMP has been revised to stipulate that BCH will be quantitatively surveyed at each site and analysed using CPCe, TransectMeasure, or similar programme. The MOEMP has been updated to include separate figures for each type of monitoring. The latitude and longitude of each monitoring site has not been added as this may result in these sites attracting interest from third parties. A monitoring site has been added within the seagrass community in the ZOI to the south of the development envelope. No additional areas of seagrass were recorded during subsequent survey. A timeframe for the proposed Bundle Launch Reports has been added. Separate reporting of any non-compliance or exceedance of an EPO has been included in the plan. An amended MOEMP is provided as an attachment to the Response to Submissions Report.

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	area is wider than predicted. The use of an underwater video camera would be a suitable way to assess sediment disturbance from the Bundle tow. *Seagrass monitoring* The seagrass community in the ZOI to the south of the development envelope should be included in the monitoring program. Furthermore, if seagrass meadows are observed elsewhere in the ZOI these should also be monitored. The recommendations for a BACI design and power analysis also apply here. *Reporting* The MOEMP needs to state the timeframe that the results will be reported to DWER. The report should also clearly document the monitoring results, whether the triggers were exceeded, whether the Environmental Performance Outcomes were achieved and any contingency management actions that have been (or will be) implemented. The report should also document any contingency management actions undertaken in the event of an exceedance.	
8.	Adaptive management measures also need to be specified. Whilst the EPA Services appreciate that it is likely to be difficult to manage the impacts during a Bundle launch, management could be applied on subsequent launches e.g. shorter Bundle length, launches are only undertaken during certain tides/wind speeds etc.	As stated in Section 3 of the MOEMP, at the completion of each Bundle launch, and associated monitoring program, a completion report will be prepared summarising the outcomes of the launch including the results of operational and environmental monitoring, outcomes in relation to the approved environmental performance outcomes and any issues or incidents. The MOEMP has been updated to include actions in the event of a non-compliance or exceedance of an EPO. An amended MOEMP is provided as an attachment to the Response to Submissions Report.
Marine Construction Monitoring and Management Plan (MCMMP)		
9.	The MCMMP states that water quality will be monitored visually, twice daily. It does not specify how the visual assessments will be undertaken, for example will they be taken from a boat or from the shore. It is unlikely that visual assessment can be reliably undertaken from a distance greater than 50m. The management plan needs to clearly state how monitoring will be undertaken to ensure that assessments are not made at a distance of greater than 50m.	The MCMMP has been updated to specify that the observations will be taken from the construction site (onshore) or a vessel (construction or independent) depending upon the status of the works. An amended MCMMP is provided as an attachment to the Response to Submissions Report.
10.	The MCMMP states that quantitative BCH monitoring will be undertaken to monitor the impacts of construction on BCH. Similar recommendations provided for the MOEMP apply to here. The monitoring programme should use a BACI design, a power analysis should be undertaken to determine the number of required replicates for each site, and the video footage should be analysed using quantitative software.	The MCMMP has been revised to stipulate that BCH will be quantitatively surveyed at each site and analysed using CPCe, TransectMeasure, or similar programme. The amended MCMMP provides further detail on the proposed design, and expected statistical power, of the monitoring programme. An amended MCMMP is provided as an attachment to the Response to Submissions Report.
11.	The report states that BCH monitoring will be undertaken within one year of the completion of construction. This is considered too long and it is recommended that monitoring is undertaken within two weeks of monitoring and, if impacts are observed, then repeated annually to show that recovery has occurred within 5 years.	The MCMMP has been updated to specify post-construction monitoring beyond the ZoMI (or zone of 'temporary elevated turbidity') will be completed within 1 month following completion of launchway construction. Repeat (annual) monitoring is also proposed in the event an impact associated with the Proposal is recorded. An amended MCMMP is provided as an attachment to the Response to Submissions Report.
12.	Figure 5 shows the indicative turbidity and BCH monitoring sites. There are three reference sites located to the north of the launch way, with REF 1 and REF 2 very close together. The EPA Services are unsure why the monitoring plan is designed so that there are two reference sites close together and none south of the proposed launch way. It is recommended that reference sites are situated closer to the operations and consideration be given to one reference site located south of the tow route.	The survey design in the MCMMP has been amended to include two reference sites to the north, and two to the south, of the launchway site. An amended MCMMP is provided as an attachment to the Response to Submissions Report.
13.	The MCMMP states that in the event that elevated persistent turbidity is recorded through visual monitoring that underwater light loggers will be deployed at the 50m boundary. The use of loggers requires a retrospective analysis of water quality conditions, and it is difficult to act responsively unless loggers are retrieved and downloaded and analysed daily. In recognition of this challenge the EPA Services would find it acceptable if daily PAR was monitored using a hand held monitor at the impact sites, but loggers used at the reference sites to obtain sufficient data to calculate the PAR triggers. It is recommended that PAR measurements are undertaken between 10am-2pm. A sufficient number of readings will need to be collected at the reference sites to accurately determine background levels.	The MCMMP has been updated to allow for the use of calibrated hand-held monitors to determine light (PAR) levels at 0.5 m above seabed at sites at the 50 m boundary, and at reference sites. This will be undertaken daily, between 10am and 2pm, during or immediately following any turbidity-generating works. An amended MCMMP is provided as an attachment to the Response to Submissions Report.

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14.	Table 5, pg 18 states that "In the event of threshold exceedance, turbidity generating activities will be suspended until seabed light levels beyond 50 m (from the construction footprint) has returned to background levels or does not significantly differ from un impacted reference site levels". The EPA Services assumes that 'background levels' refers to the background data collected in May/June and Nov/Dec in 2018. This is not a sufficient period of time to determine background levels. The EPA technical guidance (EPA 2016) recommend two years of reference site monitoring data for characterising baseline conditions and establishing locally relevant Environmental Quality Criteria. Therefore, it is recommended that turbidity generating activities are compared to reference site levels.	The text has been amended to clarify that 'impact site' data will be compared to 'reference site' data. An amended MCMMP is provided as an attachment to the Response to Submissions Report.
Marina Fauna		
15.	The ERD identified that potential behavioural disturbance for all mammal groups could occur up to 8 km from the lead tugs. Woodside, for its Greater Enfield Tieback proposal, provided more detail regarding the predicted the distance in which low-frequency cetaceans would have a behavioural response under different sea conditions (calm, moderate and rough sea state) in Exmouth Gulf. The EPA Services is aware that there are operational differences between the Subsea 7 proposal and the Woodside proposal, particularly as it relates to sea state and vessel characteristics. However further information is required regarding the predicted impacts regarding vessel noise and the horizontal distances from these vessels in which marine fauna would be expected to exhibit a behavioural response using the relevant criteria from Southall *et. al.* (2019). These predictions should also account for the likely sea conditions in which the proposal will be operating in order to account for the corresponding changes in noise attenuation.	As noted in Section 3.2 of the MERP, standard control measures will be in place for every launch, as identified in the site Preliminary Hazard Identification and Risk Assessment, including: • Weather forecast and seasonal data reviewed to inform launch schedule to avoid tow in adverse conditions. • Weather forecast monitored ahead of launch operations and launch window defined to avoid tow in adverse conditions. • Defined limiting weather criteria. Bundle launch and tow operations will not occur under rough sea states, or when adverse current conditions are occurring. The modelling of different weather or sea state scenarios is therefore not relevant. It is understood that the changes in modelled noise levels within the Woodside work related to differences in engine power levels, in relation to the 'work rate' of the DP system, rather than to different noise attenuation levels. It is also noted that the work undertaken for operations within Exmouth Gulf modelled operations under calm conditions only. Additional underwater noise modelling has been completed (JASCO 2020, Attachment 3C) which assessed the reasonably foreseeable lead tug noise emission levels, as follows: • Bundle launch (the phase of operations when a portion of a Bundle is on the Bundle track or launchway) – both lead tugs assumed to be operating at 20% power. • Bundle tow (Off bottom tow) (phase when Bundle has left the launchway) – both lead tugs assumed to be at 30% power. • Bundle tow (Surface tow) – both lead tugs assumed to be at 70% power. An amended MFMP is provided as an attachment to the Response to Submissions Report.
16.	The ERD states the sound pressure levels for low and mid-frequency cetaceans using the Southall (2007) criteria (p217). However the following page, the ERD uses the updated marine mammal exposure criteria from Southall *et. al.* (2019). Please confirm the sound exposure levels applied for the assessment of the proposal's impacts for temporary and permanent threshold shifts.	Southall *et al*. (2007) provides criteria for potential behavioural disturbance, as well as potential physical injury, including a temporary or permanent threshold shift (TTS/PTS). Southall *et al*. (2019) nominates revised criteria for TTS/PTS but not for potential behavioural disturbance. Thus both sets of criteria are relevant. For the JASCO (2020) work the marine mammal behavioural threshold was based on the current interim U.S. National Marine Fisheries Service (NMFS) criterion of 120 dB re 1 µPa SPL (Lp) for non-impulsive sound sources.
17.	Please provide a copy of the document SLR (2019) Subsea 7 Learmonth Bundle Fabrication Facility – Construction and Operation Underwater Noise: Screening Assessment.	Report provided in Attachment 3 of the Response to Submissions Report.
18.	It is noted that the management target in the Marine Fauna Management Plan (MFMP) is 'no behavioural response by humpback whale calves during Bundle launch and tow'. More information is required in the MFMP regarding the monitoring procedures to be undertaken by the Marine Fauna Observers to ensure that the management target will be achieved. Please relate the predicted behavioural response thresholds (as required by 15) to the current management action distance of 500 m.	The management target was related to the 'no launch' period meaning the likelihood of a non-achievement of the target is considered low. However, it is acknowledged that monitoring/observations out to the boundary of the zone of potential behavioural response would be challenging. The management target has been revised to 'no physical injury (including PTS)'. An amended MFMP is provided as an attachment to the Response to Submissions Report.

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19.	Please update the MFMP in response to changes to the MCMMP and MOEMP to ensure consistency. This particularly relates to turbidity monitoring.	The MFMP has been updated accordingly. An amended MFMP is provided as an attachment to the Response to Submissions Report.
20.	EPA Services notes that some of the management actions in the MFMP will not demonstrate compliance with the proposed management objectives. For example: • P28 – the objective is no impact beyond 50 m, however management actions do not occur until after turbidity occurs beyond 50 m. As it is currently written, to demonstrate compliance with the "no impact" provision, monitoring should occur if suspension of activities occur. EPA Services suggests reviewing. • P30 – no physical injury. Marine fauna include more than mammals and reptiles, it is likely some marine fauna will be injured by the proposal. • P34 – in order to determine that no hearing loss to marine fauna occurs, triggers (e.g. distances) are needed to determine the onset of temporary threshold shifts (TTS). While unlikely that an animal will persist in an area that long, monitoring/reporting should be sufficient to determine that no animals were in the TTS range.	The management actions are intended to prevent a significant impact to water quality, which could potentially result in an impact to BCH, beyond the 50 m mark. A triggering of management actions will occur prior to there being a perceived risk to BCH. The target of 'No physical injury or hearing loss within marine fauna due to underwater noise during construction' is considered appropriate. The risk of injury due to underwater noise from the proposed construction activities, beyond 50 m, is considered negligible. However, Subsea 7 agrees that the term 'marine fauna' could be understood to include any marine organism. Clarification has been provided. Rock dumping and shallow excavation are understood to be low risk activities with negligible risk of impact due to underwater noise. Modelling of such activities, to determine potential impact ranges, is not routinely undertaken due to the low risk. To reflect the low risk of impact, beyond 50 m, the management objective has been revised. An amended MFMP is provided as an attachment to the Response to Submissions Report.
21.	It is noted that the proponent has a range of management actions should humpback whales be within the tow route, including reduced speeds and course corrections. EPA Services also understands the ability to reduce vessel speeds within the surface tow area are more limited given the speed required to achieve Bundle buoyancy. Please provide more information regarding the practicality of implementing these management actions, for example how easy is it to institute a course correction given the length of Bundle being towed, whether any contingencies have been considered should humpback whale and calf density within the tow route prevent course corrections etc.	Subsea 7 committed to a no launch period for three months during peak Humpback whale southern migration. Following further feedback (refer Attachment 1, Table 3) this has been extended to four months (July to October, inclusive). The intent is that peak mother and calf usage periods are avoided together. In addition, MFOs will be present on the vessels to provide dedicated cover to marine mammals and a spotter plane will be used prior to and during the Surface tow (between March and June when Humpback whales and/or Whale sharks could be present). The slow speeds of the tow, together with small changes in course or speed initiated in response to advanced warning from the spotter plane and/or MFOs, will provide plenty of opportunity for avoidance measures to be implemented. An amended MFMP is provided as an attachment to the Response to Submissions Report.
22.	The MFMP propose daily visual monitoring in cases where lighting is required at night time. Any night time lighting required should conform to the *Draft National Light Pollution Guidelines for Wildlife* (Department of the Environment and Energy, September 2019). Monitoring techniques to ensure light spill is contained should also be consistent with these guidelines.	The proposed monitoring will assess the 'visibility of light (direct and sky glow) from wildlife habitat' as included within Appendix C of the guidelines. This is considered suitable for assessment against the management target of 'no fixed lights shining towards foraging or roosting sites' (i.e. provides a yes/no answer). Quantitative measures are not proposed. An amended MFMP is provided as an attachment to the Response to Submissions Report.
23.	Please confirm in the MFMP how visual monitoring will be done for each relevant management action. For example, will drones be used, will marker buoys be placed, what information will be recorded. During Bundle tows, EPA Services recommends that all potential interactions along the length of Bundle and with each ship used during the operation be logged.	The MFMP has been updated in regard to visual monitoring. The entire length of the Bundle will not be under surveillance. Each MFO will include all marine fauna observations made within the observation zone they are responsible for, and all marine fauna interactions will be logged and reported. New Section 3.4 has been added to the MFMP. An amended MFMP is provided as an attachment to the Response to Submissions Report.
24.	EPA Services recommends that the adaptive management section include an express provision regarding reviewing all marina fauna interactions following each Bundle launch. The outcomes of the reviews, and any changes to procedures following each review, should be reported annually in the Compliance Assessment Report.	MFMP updated in accordance with this suggestion. An amended MFMP is provided as an attachment to the Response to Submissions Report.
25.	Please clarify the number of support vessels and marine fauna observers that are expected to be used for each Bundle launch, including an indication of numbers for different Bundle lengths, if appropriate.	Subsea 7 can confirm the following compliment of vessels to support a Bundle tow: • Tow Fleet (4 vessels) • Guard Fleet (dependent on Bundle length however a minimum of two) MFOs will be positioned on each of the above vessels. An amended MFMP is provided as an attachment to the Response to Submissions Report.

	EPA Services comment	Proponent response
Coastal Processes		
26.	Section 5.2.6.1 proposes to institute sand bypassing should erosion cause recession line of the vegetation line by > 5m. It is noted that this trigger is not included in table 5-12. EPA Services considers this trigger value inappropriate, as not only is the vegetation key in dune stabilisation, the trigger value of > 5m could result in gradual reduction in the beach profile should vegetation not re-establish between sand bypassing events. Please review.	A revised trigger has been nominated within the Response to Submissions Report.
27.	It is noted that this section doesn't appear to address the requirements of State Coastal Planning Policy 2.6 (SPP2.6). Please address, in light of the Department of Transport comments provided in Attachment 2.	The application of State Coastal Planning Policy 2.6 (SPP2.6) is addressed in the responses to submissions #94-103.

ATTACHMENT 1 (TABLE 2A) - SUBSEA 7 RESPONSES TO GENERAL COMMENTS

No.	Submitter	Submission and/or issue	Response to comment
28.	ANON-N59M-4PRX-Q ANON-N59M-4PR2-H ANON-N59M-4PRJ-9 ANON-N59M-4PR5-M BHLF-N59M-4P8G-C BHLF-N59M-4PD2-3 ANON-N59M-4PRV-N ANON-N59M-4PRE-4 ANON-N59M-4PRF-5 BHLF-N59M-4PDE-P ANON-N59M-4PRF-5 BHLF-N59M-4PD4-5 BHLF-N59M-4PDE-P BHLF-N59M-4PD8-9 BHLF-N59M-4PD5-6 BHLF-N59M-4PJT-B BHLF-N59M-4PE1-3 ANON-N59M-4PFE-R BHLF-N59M-4P8G-C (ref provided) NON-N59M-4PHJ-Y ANON-N59M-4PWM-H BHLF-N59M-4PFN-1 ANON-N59M-4PR9-R ANON-N59M-4PKY-H ANON-N59M-4PKC-U BHLF-N59M-4PD2-3 ANON-N59M-4PKT-C ANON-N59M-4PKG-Y ANON-N59M-4PWD-8 ANON-N59M-4PK9-H ANON-N59M-4PKR-A ANON-N59M-4PKH-Z ANON-N59M-4PWP-M ANON-N59M-4PK6-E ANON-N59M-4PHY-E ANON-N59M-4PKC-U ANON-N59M-4P8C-8 ANON-N59M-4PHB-Q ANON-N59M-4PH9-E ANON-N59M-4PKT-C ANON-N59M-4PWG-B ANON-N59M-4PK6-E ANON-N59M-4PW6-T ANON-N59M-4PHE-T ANON-N59M-4PKT-C ANON-N59M-4PKR-A ANON-N59M-4PHE-T ANON-N59M-4PRJ-9 BHLF-N59M-4P8N-K BHLF-N59M-4P8H-D BHLF-N59M-4PD2-3	The submissions voiced general dissatisfaction with the proposal. Submissions raised issues concerning: • unacceptable risks to the area • environmental significance of the area • introduction of extra pressures to Ningaloo and the World Heritage area • industrialisation of pristine environment • the significant risk that this proposal will lead to further industrialisation of the Gulf • unacceptable level of risk to potential damage to World Heritage values of Ningaloo. • loss of access and wilderness values associated with this proposal.	The environmental significance of the wider region is recognised by Subsea 7. The ERD specifically highlighted the various State and Commonwealth designations, generally relating to the Cape Range or the southern and eastern shores of Exmouth Gulf (refer ERD Figures 2-11 and 2-12). Learmonth was not found to support significant environmental values with the exception of the mangrove communities within the Bay or Rest (refer ERD Figure 2-11). BCH mapping found no mangrove, seagrass or 'coral reef' habitat within or adjacent to the Development Envelope or Offshore Operations Area. The Development Envelope is located partially on Lot 233 (P219618) and Lot 1586 (P72986), which are subject to the Exmouth Gulf Pastoral Lease. As such it has been grazed (by sheep) for many years and is crossed by fences and access tracks. A gas pipeline also runs parallel to the Minilya-Exmouth Road and the area has been disturbed by a previous prawn farming proposal. It is not considered a 'relatively pristine ecosystem'. As noted in submission 116, Exmouth Gulf is subject to a range of commercial shipping activity. Up to 176 ha of native vegetation will be cleared for the development of infrastructure associated with the Proposal. The flora and vegetation within the amendment area are common and widespread, with all vegetation communities well represented outside of the amendment area. Potential impacts to the WHA are assessed in Section 7.6.1 of the ERD. Potential impacts are limited to aesthetic impacts during a Bundle tow (from vessels and turbidity) and significant impacts to the WHA are not expected. Access to the shoreline at Heron Point and the Bay of Rest will be maintained (refer ERD Figure 5-56).

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	BHLF-N59M-4PDB-K BHLF-N59M-4PDE-P BHLF-N59M-4PDN-Y BHLF-N59M-4PD4-5 BHLF-N59M-4PD8-9 BHLF-N59M-4PD5-6 BHLF-N59M-4PJT-B BHLF-N59M-4PJH-Y ANON-N59M-4PWH-C ANON-N59M-4PHC-R/EM145 ANON-N59M-4PHJ-Y BHLF-N59M-4PRQ-G ANON-N59M-4PKQ-9 ANON-N59M-4PHS-8 ANON-N59M-4PWR-P EM1 - EM20, EM22-EM140, EM146, EM147, EM142, EM143, PA1-986 PN Proforma Centre for Whale Research (WA) Rangelands NRM Recfishwest		
29.	Department of Biodiversity Conservation and Attractions	A plan for management of offshore operations should be developed in consultation with the Department of Biodiversity, Conservation and Attractions (DBCA). The plan should be finalised prior to the commencement of any Bundle tow activities. The plan should include communication procedures with DBCA prior to, and in regard to environmental incidents or emergencies during Bundle tow activities that traverse the Ningaloo Marine Park, the Ningaloo Coast World Heritage Area (NCWHA) and/or Muiron Islands Marine Management Area. During offshore operations there is the potential for impacts on the values of the marine reserves, particularly in the event of a marine incident or emergency. It is recognised that the proponent has prepared a Marine Emergency Response Plan (Appendix 3D) as part of the ERD. However, this document does not appear to recognise DBCA as a stakeholder in the event of an emergency, nor consider communication requirements with DBCA prior to and during Bundle tow activities which traverse the Ningaloo Marine Park, the NCWHA and/or Muiron Islands Marine Management Area. DBCA frequently undertakes activities within the marine reserves and World Heritage area relating to its management responsibilities, and it is therefore considered important that the proponent maintains a notification protocol for DBCA covering offshore operations including marine environmental incidents and emergencies. The proponent could consider the extension of its Marine Emergency Response Plan to consider all offshore operational matters, including ongoing communication with DBCA and other relevant stakeholders.	A Marine Fauna Management Plan (MFMP) has been prepared and was provided for stakeholder and public review alongside the ERD. This plan has been updated, based on the comments received, and is attached to the Response to Submissions Report. The following text has been added (in relation to direct impact (strike or entanglement) during Bundle launch and tow): '*Any fauna injuries and/or deaths will be reported to the Exmouth office of DBCA and a register maintained. Injured fauna will be taken to the Exmouth office of DBCA, or to Exmouth Wildlife Care Group, for assessment/ rehabilitation*'. A Marine Emergency Response Plan (MERP) has been prepared and was provided for stakeholder and public review alongside the ERD. This plan has been updated, based on the comments received, and is attached to the Response to Submissions Report. The following text has been added to the MERP: '*The Exmouth Office of the Department of Biodiversity Conservation and Attractions (DBCA) will also be notified in the event of an emergency situation or unplanned event has resulted in an exceedance of, or failure to meet, the key objective specified in this MERP*'. In addition, the DBCA has been recognised as a key stakeholder and the MERP has been updated to state that the DBCA will be notified in the event of an incident involving: • A vessel collision resulting in a discharge or probable discharge of ship oil. • A vessel grounding. • A loss of Bundle integrity during tow. • A vessel collision with Bundle during tow.

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30.	ANON-N59M-4PW2-P EM147	These Bundles should reduce the amount of pipe on the ocean floor and the amount of greenhouse gases produced by pipe laying ships.	Agree. Bundles consolidate all the communication lines, water pipes, electric cables, hydraulic systems, heating lines and oil and gas transfer pipes needed for an offshore oil and gas facility and assembles them in one safe and secure outer steel carrier pipe. Conventionally many of these lines and pipe are laid along the seabed independently, within a wide 'corridor', thus disturbing a greater area of the seabed. As outlined in Section 2.4.8.1 of the ERD, offshore vessel operations associated with offshore gas field development can be considerably reduced by the use of Bundle technology. Other advantages to a Bundle project include a reduction in fuel consumption and greenhouse gas emissions.
31.	ANON-N59M-4PRM-C ANON-N59M-4PR7-P ANON-N59M-4PRZ-S ANON-N59M-4PRU-M ANON-N59M-4P8S-R BHLF-N59M-4PDB-K ANON-N59M-4PRZ-S ANON-N59M-4PRU-M ANON-N59M-4P8S-R ANON-N59M-4PFA-M ANON-N59M-4PFP-3 ANON-N59M-4PHN-3 ANON-N59M-4PFU-8 ANON-N59M-4PWB-6 ANON-N59M-4PW7-U ANON-N59M-4PWU-S BHLF-N59M-4PDB-K ANON-N59M-4PKJ-2 ANON-N59M-4PW7-U ANON-N59M-4PWP-M ANON-N59M-4PWU-S ANON-N59M-4PRM-C ANON-N59M-4PW2-P EM21 Exmouth Chamber of Commerce	These submitters support the proposal and the avoidance, mitigation, management measures with minimal environmental impact.	Agree. It is Subsea 7's belief, based on a scientific approach as presented in the ERD, that the Proposal can be implemented with minimal environmental impact.
32.	Exmouth Chamber of Commerce	Submitter requests the launch way structure remains after end of life of project as it will provide fish habitat.	Opportunities for the launchway to remain at the end of project life can be discussed with stakeholders and regulators at a later date. The current position from Subsea 7 is that the launchway would be removed.
33.	EM147 Protect Ningaloo	The proponent has provided no evidence of a market need or desire for Bundled pipeline fabrication or justification for the length of the pipeline to be fabricated which impacts on aspects of the proposal such as track length, vessel size and the area of vegetation that requires clearing. If the manufacture of Bundles is based on customer demand, that if the oil and gas industry started to use these Bundles and demand increased, then the number of launches could be expanded in future. It would be expected that the market would have grown more rapidly and that other offshore construction contractors would have sought to develop Bundle fabrication sites elsewhere in the world over the previous 40 years.	These issues were discussed with Protect Ningaloo at a meeting in Perth on 1 March 2019. As stated by Subsea 7 at that time, the number of launches will be regulated through a Ministerial Statement. It will not be possible to expand the number of launches prior to the completion of a formal 'change to Proposal' process which would likely involve further stakeholder consultation. An increase to the number of launches (average of two, up to a maximum of three per year) is not being contemplated at this time. A 'permanent' Bundle launch site, other than Subsea 7's Wick site, has not been developed to date due to the strict physical and environmental requirements. Subsea 7 believes that Bundle technology represents significant innovation compared to standard offshore field development technology, with numerous safety, performance, cost and environmental benefits. Significant interest in Bundle technology has been identified within the WA market.

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		The proponent has clearly indicated that they do not currently have any customers for the Bundled pipelines, and to our knowledge, no oil and gas companies have publicly indicated that they would like this facility to be developed. The proponent is simply aiming to expand their currently limited global market in pipeline fabrication. This proposal should not be allowed to go ahead and cause significant environmental damage to an important area of biodiversity on the basis of a hope by a company to develop a new pipeline fabrication business in Western Australia (WA). No one, including the proponent, has ever built and towed pipelines of this length. The engineering and operational knowledge required to launch, tow and keep control of pipelines of this length and weight is significant, with a real risk of the operators losing control of the pipelines in the event of an engineering or operational error, or the onset of unfavourable weather and sea conditions.	The claim that the Proposal will result in significant environmental damage is contested. Subsea 7 is the world leader in the construction and deployment of Bundle technology, has undertaken the successful launch of over 81 Bundles.
34.	Oceanwise Australia	A full cumulative impact assessment that considers all previous losses and impacts has not been undertaken. For example, the ERD doesn't consider cumulative impacts to the environment from: • land-based impacts adjacent to Exmouth Gulf • mangrove and supratidal samphire wetland loss from Murat Navy Pier and very low frequency tower • benthic habitat impacts from the Bundegi boating area • groundwater extraction and its impacts on subterranean fauna • pollutant impacts into Exmouth Gulf from Naval Communications Station • waste/pollutant impacts to Exmouth Gulf and subterranean waterways from Exmouth townsite • construction and operational impacts from the Exmouth Marina.	The ERD considers potential cumulative impacts from the Proposal and the following nearby projects or proposals: • Exmouth Gulf Prawn Fishery. • Exmouth Artificial Reef 'King Reef'. • Exmouth Marina. • Cape Seafarms Project. • WA Limestone. • Exmouth Deepwater Port. • General Recreational and Commercial Vessel Operations. • Proposed gravel extraction by Main Roads WA (clearing permit CPS 7532/1). • Proposal by Horizon Power to rebuild a high voltage power line (clearing permit CPS 8067/1). EPA 2016 advises that the approach to determine cumulative losses to BCH within a defined 'local assessment unit' (LAU) includes determining the spatial extent of BCH: • Prior to all human induced disturbance. • Existing at the time of the proposal. • Remaining after implementation of the proposal. This approach was adopted, with impacts from the above listed projects and proposals considered. Potential impacts to BCH from other projects beyond the LAUs relevant to the Proposal were not assessed, as this was not considered warranted or required under EPA guidance. The consideration of potential cumulative impacts to flora and vegetation (Section 5.5.6.8 of the ERD) considered other projects and proposals within the area that also have a terrestrial footprint, and therefore impact on native vegetation, including the Exmouth Marina, Cape Seafarms Projects, and WA Limestone's Barge Loading Facility, the proposed clearing of up to 499 ha for gravel extraction (clearing permit CPS 7532/1 granted to Main Roads Western Australia) and an application by Horizon Power to clear up to 42 ha of native vegetation for a rebuild of a high voltage power line (clearing permit CPS 8067/1 currently under assessment). Assessment of the two vegetation units (Beard 1975, Shepherd et al. 2001) occurring across the Development Envelope, Cape Range 117 and Coastal Dunes 662, indicated that these are well represented, with 87.8% and 99.6% remaining, respectively, within the Cape Range sub-region (refer Attachment 2L). Cumulative impacts from pollution entering Exmouth Gulf were not specifically considered as the risk of pollution from the Proposal entering Exmouth Gulf is considered negligible. Thus cumulative impacts are highly unlikely. Potential cumulative impacts to stygofauna from groundwater abstraction were assessed (Section 5.6.6.5 of the ERD) but were considered unlikely given:

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			• DWER's licencing of groundwater abstraction on a sub area basis, with the Exmouth South groundwater sub area currently only 2% allocated. • The lack of any other substantial groundwater abstraction in proximity to the proposed bores. • The low abstraction rate and the minimal drawdown predicted from the Proposal.
35.	Rangelands NRM	The local Landcare groups, pastoralists and biosecurity groups, including Rangelands Natural Resources Management (NRM), have had many projects over many years to protect biodiversity and the land in this region. A proposal such as this will undo that work of many years, creating larger significant issues for all community and business in the region.	Vegetation condition within the Development Envelope ranged from Very Good to Completely Degraded. The majority was considered to be in Very Good condition. Disturbance noted during the survey consisted of grazing pressures associated with the area being a working sheep pastural lease, litter, vehicle tracks and weeds (ERD Attachment 2L). A total of eight introduced species were recorded, representing approximately 6% of the total taxa and included (ERD Attachment 2L): • *Aeva javanica.* • *Bidens subalternans* var. *simulans.* • *Cenchrus ciliaris.* • *Chenopodium murale.* • *Solanum nigrum.* • *Sonchus oleraceus.* • *Sisymbrium orientale.* • *Vachellia farnesiana.* It is not clear how the clearing of vegetation in an area subject to ongoing grazing, third party access and widespread weeds would significantly impact biodiversity. Surely an initial management response, if applied to the area, would be to remove grazing pressure and prevent third party access. Only then could meaningful biodiversity management work be undertaken. The localised loss of well-represented vegetation, over 35 km south of the Exmouth townsite, is unlikely to impact the biodiversity of the region or significantly impact the community or local businesses. Subsea 7 proposes to prevent the wider degradation of vegetation through, for example, fire or the spread of weeds, by implementing the measures outlined in the ERD. During consultation with stakeholders, including the local community, the pastoralist and the Department of Biodiversity Conservation and Attractions, no past or ongoing land management projects within the Development Envelope were identified.
36.	ANON-N59M-4PHC-R/EM145 ANON-N59M-4PRD-3 ANON-N59M-4PK1-9 ANON-N59M-4PR9-R BHLF-N59M-4PRQ-G ANON-N59M-4PK1-9 ANON-N59M-4PHC-R ANON-N59M-4PWH-C EM144, EM147, EM148 Protect Ningaloo Marine Information and Research Group (Australia) and Cetacean Research Centre (WA)	The ERD does not provide a comprehensive enough comparison of alternative options. Alternative sites should be investigated. The focus of site selection assessment is on technical feasibility, not environmental impact, including full lifecycle greenhouse gas emissions. For example, emissions from all types of vessels, freighting of components not being built at the Learmonth facility. The site selection assessment should also include more alternative technology options. These alternative options should include the conventional pipeline laying methods. It is not known what screening process was used to identify the alternative sites (beyond the Strategic Industrial Areas (SIA)) and whether there could be other available sites that are technically feasible, with lower environmental impacts - but may be potentially more expensive to develop. There is an information asymmetry that makes it difficult to know whether these other sites exist. Environmental considerations appear to be secondary to ambition of scale and considerations of budget. Costs to and imposts on the	Subsea 7 undertook an initial screening assessment to identify potential sites within the region that may be suitable for a fabrication facility. This initial screening for sites within the NWS region was based on three elements (refer ERD Attachment 2A(1)): • Maximum towing distance of a Bundle. • Open water tow operations. • Proximity to existing towns and infrastructure. This stage involved an assessment of all potential sites, with the identified ten sites listed, and mapped. No other sites met the initial screening criteria (based on the three elements listed above). As clearly identified in the site selection report (ERD Attachment 2A(1)), environmental impacts were not considered at this time. If a site was identified as not technically feasible, then an assessment of the environmental impacts associated with development was not considered relevant. As stated in the site selection report (ERD Attachment 2A(1)), '*The Department of State Development (now DJTSI) and Landcorp have designated Strategic Industrial Areas (SIAs) throughout Western Australia (Landcorp 2016). These SIAs are designed for heavy or strategic industrial use and are already connected to key infrastructure such as roads, rails and ports (Landcorp 2016). While there is no regulatory requirement to develop within SIAs, the areas were strongly regarded by DJTSI and Landcorp as being appropriate for consideration as Bundle fabrication*

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		natural environment, bound to be borne by the state and its people, seem to have been chosen over costs to the proponent. Subsea 7 ran a desk-top analysis and found that in some cases the dimensions of the SIA did not accommodate Subsea 7's needs. As the SIA system is entirely under the purview of the WA government this would not appear to be a disqualifying impediment. As an example, Ashburton North SIA, was expanded to accommodate Western Australian Planning Commission (WAPC) proposed changes to facilitate further development after an EPA consideration of that determined "no assessment required" as recently as 28 Aug 2019, promulgated on 2 Sept 2019. https://www.epa.wa.gov.au/sites/default/files/Schemes/CMS17663-Advice-020919.pdf. If SIA status was such an important criterion why were five sites without this added to the subsea 7 desk-top analysis? Brownfield sites in Pilbara should have been better considered, including sharing areas with other industrial uses, for example, Ashburton North, Anketell or Onslow. This would immediately assuage environmental and social surroundings opposition to the Learmonth site and would be hailed as very sound politically. Other submissions noted: • Learmonth is not central to the Subsea 7 potential client base • site selection should have considered proximity to military defence bases • the Subsea7 installation at Wick, Scotland includes engineering solutions, which are the proponent's specialist area. Subsea 7 has carried out major earthmoving, road relocation, and overpass construction and secondary and tertiary site modification at Wick. There is no reason that they cannot accomplish this at Ashburton. • the argument that a conventional project would require the pipelay vessel, the Toisa Proteus, and other large heavy lift vessels to spend 90.9 days in the Gulf is based on a false premise as these vessels do not need to be in the Gulf. The pipeline sections, reels and other materials could be supplied through other large industrial ports further north, or the materials could be supplied directly to the pipelay barge in the field from overseas. • it is also not clear why the 132 m primary construction vessel, the Toisa Proteus, would be used for the Bundle option. The comparison gives 3.9 days in the Gulf for this vessel (the same as for the tugs) and 9.6 days offshore. However, it is not mentioned in the project description as one of the types of vessels involved in the Bundle towing operation.	*facility sites, and consequently all SIAs occurring within the area of interest were listed as potential sites for further investigation*'. As outlined in the site selection report, the majority of the SIAs were deemed unsuitable for a range or reasons including unsuitable marine conditions, land conditions and/or issues with land tenure. The dimensions of an SIA was only one of many factors assessed. Ashburton North SIA was assessed as having: • Unsuitable marine conditions (due to unfavourable shallow water depths to 2.5 km offshore, an operational gas pipeline at the site and numerous inshore navigation hazards). • Unsuitable terrestrial conditions (insufficient area and required Bundle track alignment to fit with other SIA operations). • Unsuitable land tenure (significant risk associated with the common user area and how conflicting operations could be managed). It is assumed that the comment relating to the Toisa Proteus is suggesting that such vessels do not need to be in Exmouth Gulf. Sheltered waters are required for the safe transfer of materials between vessels, this could not be safely completed in open waters. The transfer location, which for some projects is Exmouth Gulf, is chosen on a project-by-project basis, based primarily on the location of the offshore field under development. Use of an alternative location would likely lead to a significant (weeks to months) extension in a construction programme with associated increases in project cost, fuel consumption, greenhouse gas emissions and potential for marine impacts. An offshore construction vessel with ROV and crane capabilities would be required for ROV operations, monitoring of the Bundle under tow and for the submerged weight check (within the Parking area). A large vessel such as the Toisa Proteus would be used for this purpose.

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		• the site selection process was a charade, it is merely smoke and mirrors designed to disguise that any real effort was made to consider alternatives.	
37.	ANON-N59M-4PHC-R EM145 Ningaloo Coast World Heritage Advisory Committee (NCWHAC) Rangelands NRM	Broader cumulative impacts to the NCWHA and the Outstanding Universal Value (OUV) were not sufficiently considered. While a cumulative impact assessment was undertaken for each environmental factor, a more holistic approach should be taken to prevent potential gradual detrimental effects and non-reversible damage of the OUV from multiple sources. A concerning example within the proposal is the claims the proposal will 'reduce' shipping within Exmouth Gulf and subsequently reduce 'industrialization' of Exmouth Gulf. The submitters notes the proposal is targeting seven liquid natural gas plants (LNGs) in the Northwest and has a maximum tow distance of 1,000 nautical miles. Given these conditions it is extremely unlikely that potential contracts would alternatively utilise Exmouth Gulf in any format. The submitters are concerned the opposite may occur – the presence of the proposal may facilitate additional industrialisation should the broader cumulative impacts not be addressed.	The Ningaloo Coast World Heritage Area (WHA) was inscribed on the World Heritage List on 1 November 2011 under criteria (vii) and (x), as follows: • Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. • Criterion (x): contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. The UNESCO World Heritage Committee issued a Statement of Outstanding Universal Value (OUV) referencing the striking landscapes and seascapes, the adjacent reef and limestone karst habitats, the high degree of terrestrial species endemism (including subterranean species), the high marine habitats and species diversity and the high abundance of Whale sharks aggregating in the region. The only reasonably foreseeable mechanism for impacts to the OUV is from visual impacts during a Bundle tow. The onshore Development Envelope is over 15 km from the boundary of the WHA at the closest point. The Off bottom tow and Parking area portions of the Offshore Operations Area do not intersect the WHA. No impacts to the marine or terrestrial habitats of the WHA can reasonably be expected (i.e. no cumulative impacts). Subterranean fauna values of the Cape Range are not at risk from the Proposal. Benthic marine habitats and species within the WHA will not be impacted by the Proposal. Pelagic species have the potential to be impacted during a Bundle tow (average of two, up to three, per year). Subsea 7 has therefore proposed specific management measures to address this risk. During the last 5-10 years the oil and gas industry in Western Australia has seen significant capital invested in the construction and development of offshore facilities, each with estimated field life ranging from 25 to 50 years. In order to maintain the current oil or gas production in these fields, incremental subsea infrastructure developments are required. As the initial reservoirs are depleted, new wells are required to be connected and brought online to continue the operation of the gas processing facilities. Bundle technology provides an innovative solution to this ongoing need for subsea infrastructure, and a single Bundle fabrication facility in the NWS region would be capable of servicing the majority of the NWS gas fields. In the event that a field proposed for development is located within ~1,850 km of Exmouth, then a Bundle solution may be considered by the developer. In the absence of a Bundle fabrication facility in the region, ongoing developments would be completed using conventional methods, with numerous vessels operating from the port(s) in closest proximity to the field under development. In many cases this would be Exmouth and its surrounding area. Bundle technology offers an alternative to the conventional method of Field Development and provides solution benefits across many factors that influence technology selection by prospective clients. Subsea 7 cannot confirm whether Bundle technology will or will not increase the number of projects proceeding in the region, as this can only be determined by prospective clients.
38.	Protect Ningaloo PN Proforma	The proposal cannot meet the EPA's objectives of protecting flora and vegetation, maintaining marine and terrestrial biological diversity and ecological integrity, and protecting social surroundings from significant harm.	As presented in the ERD, surveys found the flora and vegetation communities within and adjacent to the Development Envelope to be common and well represented outside of the Development Envelope. Limited removal of individuals of Priority species *Corchorus congener* (P3) will occur as a result of implementation of the Proposal. *Corchorus congener* is known to occur widely in the Development Envelope and more broadly across the Learmonth area. Impacts will be localised and minor on a regional scale, and the biological diversity and ecological integrity of the regional flora and vegetation will be maintained. Terrestrial fauna habitats and marine BCH predicted to be impacted are similarly well represented within the region. The predicted impacts to terrestrial fauna habitat will not affect any habitats of particular biological diversity. The small proportional impacts, to well represented BCH, will not impact ecosystem integrity. No impacts to mangrove, seagrass or habitat supporting significant hard coral cover, are expected.

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			Minor impacts to social surrounds may occur as a result of aesthetic impacts, though these are expected to be minor. No Aboriginal heritage sites are known within the Development Envelope. Provisions for continued, unhindered, public access to Heron Point and the Bay of Rest are in place. Impacts to the recreational use of the area surrounding the Proposal from potential noise, light or dust emissions, are expected to be negligible.
39.	ANON-N59M-4PHC-R/EM145 NCWHAC	The main mitigation proposed for decreasing impacts to the OUV of the NCWHA is the plan for a 'surface tow' to prevent contact with the seabed. The submitters note the surface tow success is proposed to be monitored by surface buoys and lights along the Bundle. Given the importance of the surface tow in reducing environmental impacts the submitters recommend further clarification around: • separation distance between buoys and lights • who will monitor surface buoys/light – from what locations and will they have other allocated duties? • will the entire Bundle length of buoys and lights be in constant visual surveillance? • absence of how many buoys and lights will trigger management response? • what will the management response be? • will the mitigation be adequate? Avoiding contact with the seabed during the surface tow would be considered a crucial mitigation to reducing environmental impacts. The submitters recommend greater clarity and commitment to ensure the 'surface-tow' mitigation is successful.	Each Bundle will have buoys and strobe lights positioned at 700-800 m intervals along the length of the Bundle to provide a visual reference on the surface. In addition, there will be sensors located along each bundle that will monitor the position and depth throughout the surface tow operations. Such remote monitoring will be performed by the Command Vessel whilst the remaining fleet will perform visual monitoring of the surface buoys. Any indication that the bundle tow is falling below surface will be responded to and acted on immediately by the Tow Master
40.	ANON-N59M-4PWP-M ANON-N59M-4PWG-B ANON-N59M-4PHB-Q ANON-N59M-4PHJ-Y ANON-N59M-4PHN-3 BHLF-N59M-4P8G-C ANON-N59M-4PHE-T ANON-N59M-4PRD-3 ANON-N59M-4PK4-C ANON-N59M-4P8C-8 ANON-N59M-4PHC-R/EM145 ANON-N59M-4PK4-C ANON-N59M-4PWR-P MG Kailis Group PN Proforma	There is inadequate knowledge available for environmental assessments regarding Exmouth Gulf. Large and negative impacts of any large scale coastal industrial developments would not be consistent with conserving its ecological and socioeconomic values. Submissions raised the following: • Insufficient surveys and scientific knowledge of the receiving environment is available to ensure the proposal can be made environmental acceptable. • Inconsistent with the 'Precautionary Principle'. • There is insufficient data on this region to develop accurate modelling software to predict impacts. • The assumptions made by proponent may not be correct. The absence of clear information in the ERD makes assessment difficult. Supplementary information on direct effects to environment are required and an appropriate time for further comment on that information is required.	Subsea 7 has completed numerous, Proposal-specific studies, in accordance with the requirements of the ESD, to understand the environmental values within and adjacent to the area of potential impact. More broadscale data from published sources has been used to develop an understanding of the wider region. This approach is considered suitable to underpin the accurate assessment of potential impacts from the Proposal. Widespread negative impacts from the Proposal, which is not considered 'large scale', are not predicted. The Precautionary Principle is as follows: '*Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by:* • *Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* • *An assessment of the risk weighted consequences of various options*'. The Proposal design has, as much as practicable, taken into account the outcomes of the environmental technical studies. No high value habitats (e.g. highly diverse or critical fauna habitats) will be impacted. Measures have been proposed to avoid impacts where possible (e.g. use of cleared areas onshore, avoidance of shoals and islands within Exmouth Gulf, 'no launch' period, provision of alternative public access to the coast, Surface tow to avoid impacts to BCH within the marine park). Serious or irreversible damage to the environment is not considered a reasonably foreseeable outcome. Opportunities for alternative options for the tow route have been explored. The modelling of turbidity associated with a Bundle launch and tow was underpinned by comprehensive bathymetry data (2 sources), water level data (2 data sources) and wind data. Validation of water level, currents and wave data and predictions was completed. Source terms associated with the passage of a Bundle chain were informed by results from a field trial. Thus the reported results are considered to be reliable. The modelling of underwater noise transmission was similarly underpinned by robust data and a robust modelling approach, with a lack of local or regional data not identified as a limitation on the reliability of the predicted outcomes. An additional underwater noise modelling study has been completed to confirm the risk of impacts to marine fauna.

No.	Submitter	Submission and/or issue	Response to comment
			The ERD was drafted to provide a scientifically robust, and transparent, assessment of the potential impacts associated with the Proposal. Where a range of potential outcomes could occur, a 'worst case' outcome was routinely presented. The impact assessment presented in the ERD was informed by data presented in the relevant technical reports (provided in Attachment 2). Where assumptions are presented in the ERD, these are supported with reference to the outcomes of studies or the outcomes recorded from other projects. Regarding physical impacts to the seabed during/following a Bundle launch, evidence (video inspection) from previous Bundle launches in Wick indicates that only surficial sediments are disturbed (refer to the Response to Submissions Report). The Department of Fisheries (DoF 2002) state, in relation to the fishery, that '*when trawling, ground chains and otter boards make contact with the sea bottom, disrupting organisms within the habitat*', and that '*the potential impact on the mud and sand habitat on Exmouth Gulf, as a result of the prawn trawling operations was considered unlikely to have even a minor consequence…..due to…..studies of actual impacts from prawn trawling suggest only minimal impacts to infaunal communities on mud/sandy bottoms*'. The third Marine Stewardship Council (MSC) surveillance report for the Exmouth Gulf Prawn Managed Fishery (MRAG Americas 2019) reported that '*Previous biodiversity studies have shown that there was no significant impact of trawling on the fish and invertebrate communities of Exmouth Gulf*'. The effects of the Bundle chains are expected to be relatively similar to those associated with trawling, though the heavy gauge of the Bundle chains may result in sediment disturbance to a greater depth. The experience from past Bundle tows is presented in the Response to Submissions Report. The direct effects of the Bundle chains on soft sediment infauna communities will be confirmed through monitoring as outlined in the MOEMP.
41.	ANON-N59M-4PHC-R/ ANON-N59M-4PK7-F EM145, EM147 Centre for Whale Research (WA) Rangelands NRM	The government should include the Exmouth Gulf in Ningaloo Marine Park or NCWHA. Protection of Exmouth Gulf has been called for since 1994. Protection of the area is important for intergenerational equity. The ERD fails to properly recognise the extent to which the Ningaloo Reef and Exmouth Gulf are connected, with both needing to be healthy functioning ecosystems. Development places World Heritage status at risk.	Subsea 7 recognises the environmental values of parts of Exmouth Gulf, as noted in Section 2.5.5 of the ERD. The nearshore waters on the eastern and south-western sides of Exmouth Gulf were recommended for reservation in the report '*A Representative Marine Reserve System for Western Australia*' by the Marine Parks and Reserves Selection Working Group, referred to as the Wilson Report (CALM 1994), '*for the protection of mangal habitat, prawn and fish nursery areas, turtle and Dugong feeding areas, and coastal marine fauna and flora generally*'. It is noted that the Proposal does not impact mangrove habitat, the designated prawn nursery area or areas (such as dense seagrass) likely to be key turtle or Dugong feeding areas. Impacts to 'coastal marine fauna and flora generally' will be localised and minor, associated with the launchway footprint and inshore end of the Off bottom tow area. The importance of Exmouth Gulf to Humpback whales is understood and impacts to resting or nursing calves and mothers will be avoided by the proposed 'no launch' period. Tenure across the region includes government owned land and conservation reserves (including Department of Defence land and Commonwealth and state marine and terrestrial protected areas), Commonwealth Heritage listed places, areas subject to Native Title claims, exploration and Pastoral Leases, and freehold land. Marine conservation reserves are vested in the Marine Parks and Reserves Authority (MPRA) under the *Conservation and Land Management Act 1984*. Management control of any areas proposed for inclusion in a reserve would need to be transferred to the relevant government department, and associated resources allocated. The integrated and complementary management of any additional areas of Exmouth Gulf would require continuity with other existing management programs, plans and planning processes, including fisheries regulations, marine fauna protection, pollution control, management of adjacent coastal lands as well as additional maritime transport and safety measures. The adopted boundary of the WHA excludes all areas under Pastoral Lease. Notwithstanding the values of Exmouth Gulf, it is considered unlikely that the area, given the historic and ongoing pressures, would satisfy the criteria under which the WHA is listed:

No.	Submitter	Submission and/or issue	Response to comment
			• Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. • Criterion (x): contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. It is noted that the environmental values, including key habitat and species, currently receive protection under various State and Commonwealth instruments. Subsea 7 is supportive of the development of a whole-of-industry approach to the management of the biologically important area for resting and nursing of Humpback whales, noting that charter operators and recreational users of the area should be required to adhere to the same approach to ensure the management of cumulative impacts.
42.	ANON-N59M-4PK6-E	Unacceptable risk of a gas pipeline explosion like that which occurred on Veranus Island.	As clearly stated within the ERD, there will be no flammable gas within a Bundle. Nitrogen gas (inert) will fill a Bundle during launch and tow.
43.	ANON-N59M-4PR5- MANON-N59M-4PFE-R ANON-N59M-4PKC-U ANON-N59M-4PKY-H ANON-N59M-4PK9-H ANON-N59M-4PKH-Z ANON-N59M-4PWP-M ANON-N59M-4PK4-C ANON-N59M-4PK6-E ANON-N59M-4PWG-B ANON-N59M-4PHY-E ANON-N59M-4PHJ-Y EM148 EM144 Protect Ningaloo MG Kailis Group	Submitters considered the mitigation and avoidance measures inadequate. They raised the following points: • No amount avoidance or mitigation actions can counteract the activity of dragging pipelines through critical habitat. • Inadequate scientific evidence to demonstrate the effectiveness of mitigation measures. • No dedicated monitoring site for the mangrove habitat adjacent to the Project envelope. • No monitoring for temporary impacts to water quality during Bundle launch and tow.	No critical habitat has been recorded, by Subsea 7 or others, within the Offshore Operations Area. The majority of the Offshore Operations Area traverses soft sediment habitat, which does not support mangroves, seagrass, filter feeders of hard coral habitat. The proposed mitigation measures were developed based on the mitigation hierarchy. The proposed measures provide for the avoidance and minimisation of impacts, based on the receiving environment and identified risks. Where possible, mitigation measures with a track record of success, have been proposed (e.g. weed hygiene system, artificial light management, silt curtains, 'ecological windows'). Specific key management plans were developed as components of the ERD, describing the rationale for the choice of management provisions. No monitoring of mangroves is proposed due to the negligible risk of impact as a result of the Proposal. The proposed northern access road is approximately 1.5 km south of the nearest mangroves, located at Wapet Creek. The nearest mangroves to the proposed Bundle track are located over 1 km to the south-east. The nearest mangroves to the launchway are located approximately 5 km along the coast to the south. No indirect impacts are predicted in proximity to the mangrove areas. The following water quality monitoring was proposed within the MOEMP, as published alongside the ERD: • Monitoring of turbidity adjacent to tow route during Bundle launch to confirm extent, severity and duration of impacts to water quality (turbidity). • Assessment of the spatial extent of turbidity along the tow route during Bundle launch. It is noted that the MOEMP has been revised in response to submissions received on the ERD.
44.	ANON-N59M-4PK4-C	No adaptive management is in place to rehabilitate if impacts are found to be worse than anticipated during monitoring.	Despite numerous claims to the contrary, significant impacts are not expected as a result of the Proposal. Where relevant, measures to rehabilitate impacts are provided in the ERD. In some instances, rehabilitation may not be feasible, and a response may involve allowing the impacted area to recover naturally and a review of management and monitoring procedures prior to any further activity associated with the Proposal being undertaken. Each of the environmental management plans includes provisions for the regular review and revision of the plan, including management measures. The ERD nominated proposed rehabilitation measures in response to a number of potential impacts including: • Changes to sediment transport leading to seabed, beach or dune erosion. • Temporary behavioural response of marine fauna due to changes in marine water quality. • Leak or spill of chemicals (including hydrocarbons) associated with launch and tow activities, accidental collisions and loss of control of pipeline Bundle during launch, laydown, towing, or ship groundings. • Indirect loss or degradation of native vegetation due to dust emissions or the introduction or spread of weeds.

No.	Submitter	Submission and/or issue	Response to comment
			• Indirect loss or degradation of native vegetation due to changes in groundwater flows or quality • Indirect impacts to native fauna as a result of introduction or increase of feral animals • Changes to surface water flow patterns due to the presence of infrastructure. • Impact to surface water quality due to exposure of soils (risk of erosion and elevated suspended solids). • Impact to surface water and groundwater quality due to leak or spill of chemicals (including hydrocarbons). • Impact to soil, surface water or groundwater quality following the exposure or disturbance of acid sulphate soils. • Impacts to soil, surface water or groundwater quality due to leaks or spills.
45.	ANON-N59M-4PRE-4 ANON-N59M-4PHC-R/EM145	No mitigation measures provided to manage oil spills.	A Bundle does not contain hydrocarbons. Mitigation measures are proposed to manage oil spills from vessels associated with Bundle launch and tow, as follows: • Each vessel equipped with a vessel specific Shipboard Oil Pollution Emergency Plan (SOPEP) or equivalent and will follow response actions to incidental pollution in accordance with the vessel's emergency plan. • Thorough clean up of environment in the event of a leak or spill. Mitigation measures are proposed to manage an onshore chemical spill, as follows: • Remediation and rehabilitation of any contaminated areas. • In the event of a leak or spill the contamination will be contained and contaminated material removed for offsite disposal at a licenced facility.

ATTACHMENT 1 (TABLE 2B) - SUBSEA 7 RESPONSES TO COMMENTS ON BENTHIC COMMUNITIES AND HABITATS

No.	Submitter	Submission and/or issue	Response to comment
46.	ANON-N59M-4PK4-C ANON-N59M-4PHC-R/EM145 EM144, EM147 Protect Ningaloo Rangelands NRM Oceanwise Australia	Submitters contend that the ERD does not have sufficient BCH mapping. They raise the following points: • There is no comprehensive habitat mapping data for the development area of the proposal, particularly of seagrass and coral habitats. The data used for seagrass habitat mapping dates back to 1994 and coral communities are not characterised as a BCH type in the provided habitat maps in the ERD. • BCH types should be categorised under one single type not a combination of three different types that sound similar. This makes the BCH habitat map misleading and unclear. All BCH types should be clearly named. The EPA requested for corals to be clearly characterised in the habitat maps due to their environmental sensitivity. The EPA also highlighted the importance of these benthic communities found in these areas and requested they be identified. • The Proponent needs a BCH survey that accurately maps the spatial extent of benthic habitats in the Local Assessment Unit (LAU) and all potential launch disturbed areas. They also require this BCH habitat map to be produced to a standard that can be used as a baseline measure for further monitoring. The characterisation should also identify any critical windows of environmental sensitivity for benthic communities in particular corals. The regional BCH mapping in Exmouth Gulf (Figure 5-1 pg 88 of ERD) does not clearly identify coral habitat accurately on the habitat map. • The ERD does not identify hard coral being present in the immediate vicinity of the launchway footprint. Coral reefs are present at Heron Point and are likely very important to the production of coral recruits for replenishment of the Gulf. These corals at this location are particularly valuable as these are likely to experience extremes in temperature and salinity far greater then at Bundegi Reef since they are located at the bottom of this hypersaline reverse estuary.	Numerous historic surveys have collected data on subtidal benthic habitats in Exmouth Gulf, including McCook *et al*. (1995), Hutchins *et al*. (1996), Loneragan *et al*. (2003), Bancroft 2003, SeaMap 2017. A comprehensive, gulf-wide, map of BCH was presented in Figure 5-1 the ERD (sourced from SeaMap 2017). The BCH classification was consistent with EPA guidance (EPA 2016) which provides <u>examples</u> of classifications as 'filter feeder communities', 'soft substrate infaunal communities' and hard and soft substrate benthic primary producer communities such as 'coral reefs', 'algal-dominated biogenic reefs', 'algal-dominated rocky reefs', 'seagrass meadows' and 'mangrove forests'. A coarser classification would misrepresent the range of BCH present. Additional intertidal and subtidal habitat surveys were completed in December 2016 (ERD Attachment 2B), May/June 2017 (ERD Attachment 2B) and September 2018 (ERD Attachment 2C). A comprehensive combined local and regional map of BCH was prepared from the above datasets and was presented in Figure 5-2 of the ERD. The classification of BCH types was rationalised to allow a comprehensive and consistent map of BCH to be prepared. Seagrass, macroalgae, filter feeders and coral habitats were included within this mapping. Subsea 7's BCH survey reports (ERD Attachment 2b, 2C) clearly identify the habitat types supporting hard corals. In addition, a semi-quantitative assessment of the abundance of hard corals along survey transects is presented. No significant hard coral cover, or any 'coral reef', was recorded at Heron Point, despite numerous survey transects across the reef habitat in this area.
47.	EM147	The proponent's survey of the Exmouth Gulf shoals is cursory and misleading, particularly with regard to the implications for fauna. They remain productive structures holding populations of tuskfish, emperors, cods and mackerel, sharks and rays. They are far more complex habitats than the proponent concedes and should not be exposed to added uncontrolled pressures.	As stated in ERD Attachment 2C, '*Six areas of interest outside the LAUs were investigated to <u>broadly categorise</u> these areas. The areas selected were the nearshore reef to the north of Heron Point, and shoals within 10 km of the Bundle tow route. Two transects were completed in an attempt to broadly define the extent of the reef with macroalgae and filter feeder habitat to the north of Heron Point, and eight transects were undertaken across five shoals (Wapet, Stewart, Bennett, Camplin, and Cooper)*'. The survey of the shoals was deliberately less intensive than that of the LAUs, as the shoals are all well removed (>5 km) from the proposed tow route, and will not be impacted by the Proposal. The survey report presents a semi-quantitative assessment of the BCH surveyed along each transect and does not attempt to map in detail each shoal. Subsea 7 makes no comment on the productivity of the shoals.
48.	Protect Ningaloo	For the 'off bottom tow', it is not clear where the value for "Direct disturbance of up to 1,450 ha of seabed (per Bundle launch)" comes from. The ERD estimates a realistic best-case disturbance footprint of 501.8 ha from the launch of a 4 km pipeline and a realistic worst case disturbance of 1,817 ha from the launch of an 8 km pipeline. But we could not find the assessment for a 10 km pipeline and 1,450 ha of disturbance. Why was the BCH direct disturbance area only	Several scenarios were assessed in the ERD to describe the range of expected seabed disturbance associated with a Bundle launch and tow, across the entire Offshore Operations Area, as follows (refer Section 5.1.6.11 of the ERD). • A 'realistic best case' (or 'most likely best case') disturbance footprint associated with a 4 km Bundle is 501.8 ha.

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		calculated with a pipeline which was only 8 km in length and not 10 km which is the proposed length for the project?	• A 'realistic worst case' (or 'most likely worst case') disturbance footprint associated with an 8 km Bundle is 1,817.7 ha. • Potential 'absolute worst case' cumulative disturbance footprint associated with six launches is 2,218 ha. The sentence referred to in the submission is taken from the key characteristics table (ERD Table 2-1) and represents the maximum disturbance within the Off bottom tow area only (as clearly shown in the table). As stated in the ERD (Section 5.1.6.6), to date Subsea 7 has not designed or built a 10 km long Bundle. A 10 km Bundle would not be launched in Exmouth Gulf prior to a much shorter Bundle (i.e. <8 km) having been launched first. The sediment fate modelling assessed the potential sediment plume associated with a long (10 km) Bundle. However, the worst-case seabed disturbance footprint was defined as that from an 8 km Bundle, launched under mean current velocity (i.e. mid-way between neaps and springs). This represents a realistic worst-case as a long Bundle (i.e. longer than 8 km) would only be launched under neap conditions, leading to lower latitudinal tidal forcing and a smaller seabed footprint.
49.	EM147	The ERD asserts its tugs will haul towheads from the beach with almost no contact with the benthos, however it is unclear how this is possible. Even at high tide, much of the launch zone is no deeper than 2 metres, and some is half that depth. If each towhead is 150-250 tonnes, i.e. the weight of a trawler, it would seem impacts on the benthos are inevitable over quite a distance.	As stated in the ERD (Section 2.3.7), to launch a Bundle, the towhead on the offshore end of the Bundle is connected to a tug (the 'Leading Tug') via a long towline. The tug then slowly (≤ 2 knots) heads offshore, pulling the Bundle along the Bundle track, along the launchway (along which the Bundle track extends) and into the ocean. Subsea 7 aims to have the towheads buoyant so they are not in contact with the seabed after leaving the end of the launchway. This is to be achieved through both the launchway and towhead design. The Bundle track extends along the launchway, which crosses the beach and extends 380 m (measured from the dune line) into Exmouth Gulf. The offshore end of the launchway is at approximately -4 m AHD (or -2.4 m 'Chart Datum' or 'lowest astronomical tide'). Under high neap conditions, an additional ~1.6 m – 2.0 m of water may be present, leading to a water depth at the end of the launchway of ~4 m. Under low tide neap conditions, an additional ~1 m of water may be present, leading to a minimum water depth at the end of the launchway of ~3.4 m. It is unlikely that a Bundle would be launched under spring tide conditions, due to the higher latitudinal forces on a Bundle. Thus a minimum water depth of ~3.5 m at the end of the launchway, during a launch, can be assumed. The required buoyancy to float the towheads will be achieved through the use of surface buoyancy units. These units will be placed on the side of the towheads such that their position and size will create the necessary displacement to provide the extra buoyancy required so the towhead will be floating before the end of the launchway.
50.	BHLF-N59M-4PRQ-G	Degrading the gulf will eventually threaten the integrity of the Ningaloo Reef.	Subsea 7 maintains that the Proposal will not lead to a degradation of Exmouth Gulf. Exmouth Gulf is a large, tidal, embayment with naturally high levels of suspended sediments (refer ERD Section 5.1.3 and 5.3.3). The Proposal is predicted to result in minor impacts to BCH adjacent to Heron Point. No impacts across the wider area are expected. The risk of contamination of marine waters or sediments is not materially increased as a result of the Proposal. A Bundle does not contain hydrocarbons and the proposed tow operations represent a negligible increase to the vessel activity currently occurring in Exmouth Gulf. The adoption of Bundle technology, as an alternative to the conventional solution, is expected to lead to a net decrease in vessel activity associated with offshore gas field developments.
51.	ANON-N59M-4PKG-Y	Dredging so close to the reef should not be allowed.	The Proposal does not involve extensive dredging. Removal of a 300 mm layer of sediment from the last 24 m length of the launchway footprint is proposed. Turbidity will be managed to ensure no impacts to BCH beyond the immediate surrounds of the construction area (refer to the MCMMP). Ningaloo Reef is located a large distance (approximately 70 km, by water, from Heron Point. The Muiron Islands are located approximately 60 km from Heron Point. No impact to Ningaloo Reef or the Muiron Islands are predicted.
52.	ANON-N59M-4PKG-Y	Wind pollutants that have come from the manufacturing process close to the coast can result in unacceptable risk and significant damage to coral, reef and sealife. These have not been considered in the ERD.	Bundle manufacture will predominantly involve the joining, by welding, of pipes and flowlines and the outer carrier pipe sections. Bundle manufacture will occur within the fabrication shed, located approximately 10 km from the coast. Air quality is unlikely to be significantly impacted and was not identified as a preliminary key environmental factor required to be addressed within the ERD.

No.	Submitter	Submission and/or issue	Response to comment
53.	ANON-N59M-4PKG-Y	The proposal should include a jetty built away from the reef and allow manufacturing to occur at a commercial manufacturing area inland.	The intent of this submission is not clear. The Proposal includes a launchway across the nearshore intertidal and subtidal macroalgae-dominated reef at Heron Point. The manufacture of Bundles will occur within the fabrication shed, to be located approximately 10 km from the coast.
54.	NCWHAC	It is noted that the ERD designates the east coast mangroves an area "recommended for the 'maximum' level of ecological protection". However, the submitter is unable to ascertain if this justifies the decision to tow through the NCWHA, one of the world's most significant protected areas, due to a lack of comparative risk assessment. The submitter recommends an environmental risk assessment comparing alternative tow route options showing the routes and environmental assets considered.	As stated in the ERD (Section 2.4.8.6) a tow route passing to the east of the Muiron Islands, and avoiding Ningaloo Marine Park and the WHA, was considered. It was determined that this option was not feasible, and presented a greater risk of a significant environmental impact, given: • The reefs and shoals south and east of the Muiron Islands are distributed such that there is no route which would be navigable by a Bundle tow fleet. • The tidal movement around these reef and shoal features is more erratic and faster moving and would cause challenging and unpredictable deflections in the Bundle under tow. • Given the shallow water depths to the east of the Muiron Islands a surface tow could not be conducted, so additional direct impacts to BCH would occur. • The area currently designated for surface tow between the tip of the North west cape and the Muiron Islands is widely used as a transit area by commercial vessels and recreational fishing vessels alike, so Subsea 7's proposed operation does not represent a change to the type of activity currently undertaken. Significant impacts to the values of the WHA are not expected (refer to responses to other submissions on this topic).
55.	NCWHAC EM147	The impact of the selected tow route and parking area on BCH remains unclear due to absence of habitat monitoring beyond the surface-tow route/parking area, although the sediment appears to enter the NCWHA on the maps supplied. The submitter recommends the BCH monitoring includes the areas of the NCWHA potentially impacted by sediment and towing activities and include critical windows of environmental sensitivity (e.g. coral spawning).	Habitat mapping confirmed that soft sediment habitat occurs along and adjacent to the tow route within the southern portion of the WHA (refer ERD Attachment 2C). During the tow through the WHA the chains hanging beneath the Bundle will not contact the seabed and therefore no impacts will occur to BCH within the WHA. Sediment fate modelling was used to predict the concentration and distribution of sediments resuspended during a Bundle launch. This modelling predicted that little suspended sediment would enter the WHA (refer ERD Figure 5-5 to 5-8). Amended maps are presented in the Response to Submissions Report (refer Figure 2-6 and 2-7). Given the low likelihood of any impact, BCH monitoring in the WHA is not proposed. Little to no coral cover was recorded within the WHA in the vicinity of the tow route (ERD Attachment 2C).
56.	ANON-N59M-4PK4-C ANON-N59M-4PWP-M EM144 Protect Ningaloo	Submitters expressed concerns regarding the impact the proposal will have on the mangrove communities within Exmouth Gulf, particularly from sediment impacts. The following comments were made: • The proposal will impact on the adjacent mangroves, which will in-turn impact costal processors and fish species using mangroves for habitat and nurseries, and therefore ultimately impacting Ningaloo Reef. • The huge importance of the massive stands of mangroves are not fully appreciated. Mangroves are one of the only organisms that can fix nitrogen in this marine environment, and many marine biologists consider that the Exmouth Gulf through the production of plankton helps sustain the Ningaloo Reef. • The south western region of the Exmouth Gulf has mangroves that are classified by the EPA's guidance statement 1 (EPA 2001) as 'Area 1: Bay of Rest' and are classified as being of 'Very High' importance. Further emphasis on this importance was required in the mangrove section as outlined by the EPA required work tasks. • The interaction between the sub-tidal flats at Heron Point and the adjacent mangrove areas are not discussed in the ERD. • The ERD has not mentioned what would happen to the mangrove systems if turbidity levels were to exceed predicted levels. The EPA has outlined in the required work to identify elements of the proposal that may potentially affect BCH, including direct and indirect and for both construction and operation. This should include impacts in the event of an accidental spill or incident; and	The Proposal does not overlap with, or pose a risk of impact to, the Bay of Rest, or any mangrove habitat (refer ERD Figure 5-2). The general importance of mangroves is well understood by Subsea 7 and has not been downplayed within the ERD. The ESD does not mention mangroves specifically, rather they are included under BCH, so this comment seems inaccurate. The importance of mangroves in Exmouth Gulf are clearly presented in Section 2.5.5 of the ERD. No impacts to mangroves or the adjacent sub-tidal flats are expected, so discussion of such impacts was not warranted. The various impacts that could potentially result from the Proposal, and were considered feasible, were listed in the ESD and all were discussed in the ERD. Mangroves are tolerant of elevated turbidity levels. Subsea 7 reiterates that no impacts to mangroves are expected, or considered at all likely or foreseeable. Thus no other impacts related to a loss of mangroves, such as secondary impacts to marine fauna, have been considered.

No.	Submitter	Submission and/or issue	Response to comment
		damage to or loss of control of the pipeline Bundle during launch and towing activities. It is unclear what impacts would be if the turbidity plumes reached the mangrove systems and how long this would affect the system. • If damage were to occur to these mangrove habitats, there would likely be implications for populations of marine fauna. The EPA highlighted assessing such impacts on marine fauna species as a work requirement, however, the implications of possible mangrove decline has not been adequately described including for species like turtles.	
57.	Protect Ningaloo	It is unlikely that the selected study sites from this study appropriately reflect the distribution and species richness of macroalgae and seagrasses that are present in the project development envelope. These surveys are not likely to reflect the range and abundance or distribution of the benthic habitats especially seagrasses both temporally and spatially due to limitations regarding timing. Further research is occurring on the seagrass and macroalgae habitats in the Exmouth Gulf (pers comms, McMahon). This should be acknowledged in the likelihood of impact, consequence and regional context.	Subsea 7 disagrees with the assertion that the surveys are not likely to reflect the range and abundance or distribution of the benthic habitats. Initial surveys off Heron Point, in water depths known to be suitable for seagrass growth, were undertaken in December 2016, during the period of expected maximum seagrass biomass (refer ERD Attachment 2B). No seagrass was recorded in the vicinity of the Proposal area. Further surveys, undertaken across the LAUs, and beyond, were undertaken in May/June 2017, September 2017 and September 2018. Sparse seagrass was recorded to the south of Heron Point during the May/June 2017 survey. Additional survey was completed in February 2020 (refer Attachment 3A of the Response to Submissions Report). No additional seagrass areas were recorded. Macroalgae was recorded as the dominant biotic component of the nearshore 'Reef with macroalgae' habitat, with percentage cover exceeding 40% in some transects (refer ERD Attachment 2B). Macroalgae cover in the broader region has been found to vary seasonally, with maximum biomass occurring over spring and summer (MScience 2008). The majority of surveys are likely to have captured the near maximum macroalgal biomass. The habitat map is considered to represent an accurate representation of the habitat types, and distributions, within the surveyed areas. It is noted that separate habitat characterisation, completed by Kailis and DPIRD (2018) and involving 129 survey sites, recorded similar habitat types and distributions to Subsea 7's mapping. The outcomes of research were referenced where known and publicly available. Ongoing research on BCH in Exmouth Gulf, and elsewhere, and the associated publication of the derived data, is supported.
58.	ANON-N59M-4PK9-H ANON-N59M-4PH9-E ANON-N59M-4PHC-R/EM145 BHLF-N59M-4P8G-C ANON-N59M-4PWP-M ANON-N59M-4PHV-B EM147 Rangelands NRM Oceanwise Australia PN Proforma	Submitters consider the proposal will have result in significant and unacceptable damage to seabed. They state that up to 18 million square metres of direct damage and disturbance to the seabed – including fragile corals, sponges, vegetation and inshore nursery environment. Submitters are not clear how this was minimised or contained.	A 'realistic worst case' (or 'most likely worst case') disturbance footprint associated with a Bundle launch (8 km Bundle) is 1,817.7 ha (or 18,177,000 m^2) (refer Section 5.1.6.5 of the ERD). Of this total, 1,816 ha (or 18,160,000 m^2, or 99.9%) is mapped as Soft Sediment habitat (refer ERD Table 5-6). As stated in Section 5.1.8 of the ERD, the periodic (on average two, maximum of three per year) Bundle launches will result in physical disturbance of the top sediment layers. This may result in a minor, short term displacement of infauna, although as no material is being removed, it is expected that the infauna community will remain relatively stable. No impact to biological diversity and ecological integrity is expected as a result of the predicted impacts to soft sediment associated with Bundle launches. Nominated management measures to avoid or minimise the impact to BCH are as follows (refer Table 5-8 of the ERD): • Surface tow operations within Ningaloo Marine Park to avoid impacts to BCH. • All launch and tow operations will occur within the nominated Offshore Operations Area to minimise cumulative impacts to BCH. • Bundle tethered to 'Leading Tug' and 'Trailing Tug' at all times, including within Parking area, to ensure minimal lateral movement of Bundle. • Chains arranged and connected to the Bundle provide lateral stability during the initial launch and off bottom tow to ensure operations remain within the Offshore Operations Area.
59.	ANON-N59M-4PK4-C ANON-N59M-4PK6-E EM144	This proposal will heavily impact seagrass beds which will in-turn impact on dugongs' nursing and feeding habitat in Exmouth Gulf. It is likely that the use of high powered tugs stirring up sediment, and the	As clearly stated, and mapped, within the ERD, no direct or indirect impacts to seagrass are predicted. The nearest seagrass habitat, sparse *Halophila ovalis* and *Halodule uninervis*, was recorded in inshore, shallow, sand habitat over 1 km to the south of Heron Point (ERD Attachment 2B). This is well beyond the areas predicted to be directly

No.	Submitter	Submission and/or issue	Response to comment
		dragging of the pipeline through this area of the Exmouth gulf will have detrimental effects on the seagrass beds on which the dugongs depend to survive.	impacted or experience significantly elevated suspended sediment concentrations during a Bundle launch (ERD Figure 5-12). A small area of this sparse seagrass habitat occurs within the Zone of Influence, where short term changes in environmental quality may occur, but where a detectible impact on benthic biota is not expected.
60.	Protect Ningaloo MG Kailis Group	Submitters questioned whether the biological diversity and ecological integrity of BCH being maintained when the potential impact is the direct loss of BCH during the launchway construction and tow operations. The following specific comments were made: • Mitigation and management measures do not provide clear explanation of how they mitigate impacts and rehabilitate BCH. Is also important to note that flow-on effects of the direct removal of intertidal habitats in the Exmouth Gulf will not be reduced or mitigated just because a similar habitat is found in another location. The biological diversity in the intertidal and alluvial reef flats will be severely impacted as this project will cause permanent loss without any consideration of rehabilitation efforts after the life of the project. • Should significant impacts from the proposal emerge, there is no clear mitigation strategy proposed in the PER. This infers Exmouth ecosystem maintenance action (including mitigation strategies and research activities) will fall on the State and others as proponent has not committed to it. A better description of assessments of significance and what standards were applied that led to the conclusion of a lack of significance is required.	'*Ecosystem integrity is considered in terms of structure (e.g. the biodiversity, biomass and abundance of biota) and function (e.g. food chains and nutrient cycles)*' (EPA 2000). Habitat structure varies from the two dimensional habitats of unvegetated soft sediment areas to the complex three dimensional habitat available on reefs, with the latter offering more ecological 'niches' for colonisation by macroalgae and fauna. Habitat function includes the following: • Primary production: a measure of the growth rates and therefore potential contribution to food webs of the main groups of aquatic plants on the seabed (benthic primary production). • Secondary production: a measure of the growth rates of invertebrates. • Water filtering capacity: a measure of the rate at which particulate organic matter (phytoplankton, zooplankton, detritus) in the water column is removed by filter feeding organisms (e.g. bivalves, sponges, soft corals). • Biogeochemical cycling: an estimate of the rate at which biologically significant materials (in this case nitrogen) are converted from inorganic forms into organic forms (nitrogen cycling by plants), or cycled within the sediments (e.g. as represented by the degree of sediment bioturbation by invertebrates, as this affects sediment oxygen levels that in turn affect nitrogen cycling within sediments). The construction of the launchway will result in loss, within the ZoHI, of: • Soft sediment (0.2 ha) (< 0.1% of that mapped within the Heron Point LAU). • Reef with macroalgae (0.3 ha) (0.1% of that mapped within the Heron Point LAU). • Pavement reef (0.1 ha) (3.2% of that mapped within the Heron Point LAU) (refer ERD Figure 5-4). The above losses are considered minor at the local (LAU) scale and negligible at a regional scale. Further, the impacted habitats are not considered to contribute significantly to local diversity or ecological integrity given: • The Soft sediment habitat is flat (low structural complexity) and does not support a high abundance or diversity of infauna (ERD Attachment 2B). • Reef with macroalgae habitat is structurally complex but it dominated by macroalgae with a low abundance and diversity of other groups (ERD Attachment 2B) • Pavement reef habitat was described as 'Unvegetated pavement reef within the upper littoral zone' (ERD Attachment 2B) and therefore impacts will not impact the biodiversity, structure or function of the local BCH. It is noted that following the construction of the launchway, the concrete panels and rock armour will provide suitable habitat for the colonisation of a range of macroalgae and invertebrates. It is expected that a community very similar to that currently occurring within the ZoHI would develop on the launchway structure. Rehabilitation of subtidal environments is generally not required given the broadcast reproduction nature of a large number of marine groups including the majority of hard corals (Negri *et al*. 2019), macroalgae (Fletcher and Callow 1992) and sponges including *Trikentrion flabelliforme* which was recorded off Heron Point (Western Australian Museum Collections 2020). Mangrove and seagrass habitats can be an exception, as in some circumstances active rehabilitation is required. It noted that no impacts to mangroves or seagrass are expected. The assessment of potential impacts to BCH included the adoption of 'realistic worst case' and 'absolute worst case' scenarios. Thus, the ERD is considered to appropriately consider the worst case outcome. In the event of such a scenario occurring, it has been demonstrated that the biological diversity and ecological integrity of BCH will be maintained at a local (LAU) and regional scale. Subsea 7 will be required to assess actual impacts against the Environmental Protection Outcomes (EPOs) to be nominated in the State and Commonwealth approvals (if granted). Non-compliance with the specified EPOs will lead to the initiation of a management response. Noting the lack of a significant long-term impact to Soft sediment habitat (refer response to submission #75, and the above text regarding the natural ability of marine environments to recovery without active 'rehabilitation', a significant burden will not fall on the State, or others.
61.	Protect Ningaloo	Coral reef, mangrove, seagrass and estuarine systems face considerable stress across the world and the wider region. Their role as critical habitats must be taken seriously in this assessment.	Coral reef, mangrove and seagrass will not be impacted by the Proposal. BCH mapping found no mangrove, seagrass or 'coral reef' habitat within or adjacent to the Development Envelope or Offshore Operations Area.

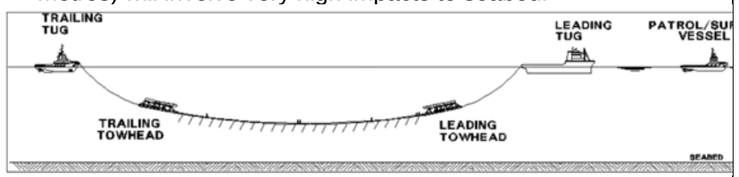
No.	Submitter	Submission and/or issue	Response to comment
		Leading scientific journals have carried analyses and assessments of all of these systems, yet these are all absent in the ERD. This means a reader of the ERD would not have this crucial frame of reference with which to consider much of the discussion.	The nearest BCH exhibiting hard corals as one of the dominant groups occurs at Bennett, Cooper and Stewart shoals, over 5 km from the tow route, and surrounding the Muiron Islands, over 3 km from the Surface tow area. Mangroves within the Bay of Rest are located over 4 km south of the proposed tow route. The entrance to Wapet Creek, in which another area of mangroves occurs, is located over 3 km north of the proposed tow route. The nearest seagrass habitat, sparse *Halophila ovalis* and *Halodule uninervis*, was recorded in inshore, shallow, sand habitat over 1 km to the south of Heron Point (ERD Attachment 2B). This is well beyond the areas predicted to be directly impacted or experience significantly elevated suspended sediment concentrations during a Bundle launch (ERD Figure 5-12). A small area of this sparse seagrass habitat occurs within the Zone of Influence, where short term changes in environmental quality may occur, but where a detectible impact on benthic biota is not expected. An estuary is a semi enclosed coastal body of water which has a free connection with the sea and within which the seawater is measurably diluted by freshwater derived from land drainage (MacDonald and Dyer 2019). The word 'estuary' is generally used to indicate the place where the river meets the sea, characterizing a coastal river discharge (Miranda *et al.* 2017). Exmouth Gulf is not considered an estuarine environment given the salinity throughout is relatively consistent (with some creek and tidal flat areas exhibiting hypersaline waters) and no significant freshwater inputs occur (except during cyclonic conditions when freshwater inputs to all coastal waters occur).
62.	Protect Ningaloo	The cumulative damage to the benthos for up to four decades could be severe. There is no way of transporting pipelines from the launchway other than up almost the entire length of the Gulf, it does not lend itself to adaptive management nor meaningful conditions thereof should impacts be greater than predicted.	The assessment of potential impacts to BCH included the adoption of 'realistic worst case' and 'absolute worst case' scenarios. Thus, the ERD is considered to appropriately consider the worst-case outcome. In the event of such a scenario occurring, it has been demonstrated that the biological diversity and ecological integrity of BCH will be maintained at a local (LAU) and regional scale. Subsea 7 will be required to assess actual impacts against the Environmental Protection Outcomes (EPOs) to be nominated in the State and Commonwealth approvals (if granted). The natural ability of marine environments to recovery without active 'rehabilitation' is noted. The findings of studies to assess the impacts from the ongoing (decades) operation of the Exmouth Gulf Prawn Fishery, suggesting little ongoing impact, are also noted (refer Sections 2.5.8.1 and 5.1.6.11 of the ERD).
63.	EM147 EM141	Coral communities that are found in the Offshore Operations Area are at risk of being damaged if loss of control of the pipeline during towing activities were to occur. This area is both a marine protected area and within the World Heritage-listed boundaries site and is also in close proximity to the Muiron Islands Marine Management Area. It is an area of importance and significance with sensitive habitats, particularly coral communities. The monitoring plan proposed in the event of loss of control of a Bundle is to conduct habitat mapping of the BCH adjacent to the sites of contact within one month. The Proponent has not suggested adequate measures to minimise this impact or rehabilitate the direct loss of the BCH. Is there an emergency plan or monitoring plan in place to avoid loss of Bundle control?	BCH mapping found no 'coral reef' habitat within or adjacent to the Development Envelope or Offshore Operations Area. The nearest BCH exhibiting hard corals as one of the dominant groups occurs at Bennett, Cooper and Stewart shoals, over 5 km from the tow route, and surrounding the Muiron Island, over 3 km from the Surface tow area. Findings from an independent BCH assessment were consistent with the findings of studies undertaken for the Proposal (Kailis and DPIRD 2018). No impacts to BCH are expected within the Ningaloo Marine Park or WHA as the Bundle will be in 'Surface tow' mode through these areas with the Bundle and chains well clear of the seabed. No impacts to BCH are expected within the Muiron Islands Marine Management Area as the Offshore Operations Area does not intersect this area (refer ERD Figure 2-11). The submitters are directed to the MERP which was attached to the ERD (an amended version is attached to the Response to Submissions Report). Comments regarding the rehabilitation of marine habitats are provided in response to submissions 60 and 62.
64.	EM147	To achieve a clean transit, the Proposal suggests an increase in towing speed will be required to "fly" the pipeline chains over the benthos. The only form of mitigation in the case of loss of control or interaction with megafauna is to reduce speed or stop – essentially, to lower the massive infrastructure to the bottom. To avoid impacts, execution of the tow must be correct every time over the life of the	Avoidance measures relevant to marine fauna may include a change to the Off bottom tow speed, delay to the start of the Surface tow component of a tow or a slight change to the tow route (within the 2 km wide Surface tow envelope) (refer to MFMP). The objective of the MFOs and 'spotter plane' is to identify the location of any Whale sharks, or other marine megafauna, ahead of the Bundle tow to allow avoidance. The low vessel and Bundle speeds during launch

No.	Submitter	Submission and/or issue	Response to comment
		proposal. The risk of loss of control or interaction with megafauna will only therefore increase over the life of the proposal and poses too great a risk to the environment.	(≤ 2 knots) and tow (≤ 8 knots), which will allow avoidance measures to be also undertaken by marine fauna, are noted. Furthermore, Subsea 7 committed to a three month no launch period to avoid the peak of the Humpback Whale Southern migrations and therefore the probability of interaction will be low. Following further feedback (refer Attachment 1, Table 3) this has been extended to four months (July to October, inclusive). The risk of interaction with marine fauna will be the same for each Bundle launch. Just because an interaction did not occur during launch #1 does not mean that there is a greater risk of interaction during launch #2. It is noted that after >80 Bundle launches at Wick, no interactions with marine fauna (including Porpoises, Humpback Whales, Minke Whales, Pilot Whales, Sperm Whales, Seals and Killer Whales) have occurred and no loss of control of a Bundle has occurred.
65.	Protect Ningaloo	In the Learmonth Marine Operational Environmental Monitoring Plan in Figure 4 is a map of the indicative BCH and Water Quality Monitoring Sites. There has not been a dedicated monitoring site for the mangrove habitat adjacent to the Project envelope. The effects of elevated turbidity and chemical runoff from the different phases of the project will therefore not be monitored and the impact will be unknown.	The purpose of the MOEMP is to '*document the monitoring measures to be undertaken to evaluate whether impacts on benthic communities and habitats (BCH) during Bundle launch are commensurate with those predicted*'. No impacts to mangroves are expected as a result of Bundle launches. The negligible risks to mangroves from turbidity and chemicals are discussed in response to submission #120.
66.	ANON-N59M-4PR9-R ANON-N59M-4PHE-T Protect Ningaloo	Direct and indirect loss of BCH due to altered water flow and sediment movement as a result of the presence of the Bundle pipeline launchway is not considered. Sand build up within the launch way site will have significant impact on the benthic communities and extend well beyond the launch way footprint. The alteration of such an area and how it will affect the currents and wave movement and therefore the ability of benthic invertebrates to maintain diversity through the region needs to be further investigated.	Direct impacts as a result of the presence (footprint) of the launchway are addressed in Section 5.1.6.3 of the ERD. Indirect loss of BCH due to altered water flows and sediment movement as a result of the presence of the launchway is addressed in Section 5.1.6.9 of the ERD. The potential spatial extent of changes to sediment accretion and erosion are presented, in relation to BCH, in ERD Figure 5-10. ERD Attachment 2E states that '*Due to its relatively small size and low elevation relative to the seabed, the launchway is not expected to have any significant impact on the local wave or current conditions at or around the site. Only very small changes would be expected in the immediate vicinity of the launchway*'. A figure showing the elevation of the launchway relative to the existing seabed level is provided in the Response to Submissions Report (refer Figure 2-3). Impacts to invertebrate communities in the intertidal and subtidal areas adjacent to the launchway are not expected.
67.	ANON-N59M-4PHE-T EM147 Protect Ningaloo Oceanwise Australia NCWHAC	There has been no comprehensive mapping throughout the Exmouth Gulf which supports the 1800 species recorded (Fitzpatrick, Davenport et al 2019) and a very high diversity of invertebrate and fish fauna which are endemic. Many of these occur in the soft sediments along the tow path and have now been impacted by trawling. This makes the unimpacted habitat that remains important for conservation and raises its significance. It includes sponges, soft corals, echinoderms, molluscs, crustaceans and more. The International Union for Conservation of Nature (IUCN) Evaluation Report (2011) notes "diverse sponge garden habitats", which "add to the significance of the area" and the 1,000 species of marine plants forming part of the OUV being part of the "high diversity of habitats". The shallow intertidal reefs, sand flats, subtidal benthic primary producer habitats, seagrasses, algal dominated reefs, soft coral and sponge communities drive the high levels of primary productivity in the gulf and support the plethora of unique rare endangered endemic species and critical life histories. The importance of these habitats to the maintenance of biodiversity has not been adequately quantified. Some of this habitat may be unique to Exmouth Gulf given that it is one of the only reverse estuaries in the North West of Australia. The water between the Northwest Cape and Muiron Islands, notably within	A comprehensive, gulf-wide, map of BCH was presented in Figure 5-1 the ERD (sourced from SeaMap 2017). In support of the Proposal, additional intertidal and subtidal habitats were surveyed in December 2016 (ERD Attachment 2B), May/June 2017 (ERD Attachment 2B) and September 2018 (ERD Attachment 2C). A comprehensive combined local and regional map of BCH was prepared from the above datasets and was presented in Figure 5-2 of the ERD. All of the BCH potentially impacted by the Proposal were found to be well represented beyond the extent of potential impacts. The highest abundance of filter feeders was recorded towards the offshore end of the Surface tow area (Figure 8 in ERD Attachment 2C) and inshore to the north of the Heron Point LAU and at Bennett Shoal (Figure 10 in ERD Attachment 2C). No BCH within the WHA (including that between the Northwest Cape and Muiron Islands and within the Surface tow area), north of the Heron Point LAU or at Bennett Shoal will be impacted as a result of the Proposal. No seagrass habitat will be impacted as a result of the Proposal.

No.	Submitter	Submission and/or issue	Response to comment
		the NCWHA, is where water bodies mix and contains a unique shallow water sponge and soft coral assemblage that takes advantage of the productivity, these species are components of the OUV of the NCWHA.	
68.	Protect Ningaloo	Further surveys are required to fully understand the spatial and temporal changes in habitats. Seasonal changes are required to fully understand the impact each phase will have on each BCH.	Subsea 7 disagrees with the assertion that further surveys are required to fully understand the spatial and temporal changes of the benthic habitats. Initial surveys off Heron Point, in water depths known to be suitable for seagrass growth, were undertaken in December 2016, during the period of expected maximum seagrass biomass (refer ERD Attachment 2B). No seagrass was recorded in the vicinity of the Proposal area. Further surveys, undertaken across the LAUs, and beyond, were undertaken in May/June 2017, September 2017 and September 2018. Sparse seagrass was recorded to the south of Heron Point during the May/June 2017 survey. Additional survey in February 2020 confirmed the absence of seagrass within the Offshore Operations Area (refer Attachment 3A of the Response to Submissions Report). Macroalgae was recorded as the dominant biotic component of the nearshore 'Reef with macroalgae' habitat, with percentage cover exceeding 40% in some transects (refer ERD Attachment 2B). Macroalgae cover in the broader region has been found to vary seasonally, with maximum biomass occurring over spring and summer (MScience 2008). The majority of surveys are likely to have captured the near maximum macroalgal biomass. The habitat map is considered to represent an accurate representation of the habitat types, and distributions, within the surveyed areas. It is noted that separate habitat characterisation, completed by Kailis and DPIRD (2018) and involving 129 survey sites, recorded similar habitat types and distributions to Subsea 7's mapping.
69.	Protect Ningaloo	No scientific evidence to support the claims that the disturbed ecosystems will only be mildly affected by turbidity and they will recover promptly. There has been inadequate consideration of the prevailing environmental conditions that transport water and sediment. Brinkman's (AIMS 2017) work on the water movement in Exmouth Gulf would have been more appropriate than information used in ERD. Therefore, it is not possible to use the information provided in the ERD to predict the direct high impact habitats, those that might be impacted only under certain conditions and those that are likely to escape impact from changed water and sediment quality conditions.	To simulate the hydrodynamics within Exmouth Gulf and the surrounding area, a three-dimensional model was developed. As the hydrodynamics in the study area are controlled primarily by tidal flows and wind forcing, these processes were explicitly included in the model. Water elevations, at hourly intervals, were obtained from the TPXO8.0 database, which is the most recent iteration of a global model of ocean tides derived from measurements of sea-surface topography by the TOPEX/Poseidon satellite-borne radar altimeters. The tidal sea level data was augmented with non-tidal sea level elevation data from the global Hybrid Coordinate Ocean Model (HYCOM). The HYCOM model is a three-dimensional model that assimilates observations of sea surface temperature, sea surface salinity and surface height, obtained by satellite instrumentation, along with atmospheric forcing conditions from atmospheric models to predict drift currents generated by such forces as wind shear, density, sea height variations and the rotation of the Earth. Model validation included the validation of water levels and currents, with predictions agreeing strongly with independent data (ERD Attachment 2H). Wave information, required for the reliable forecasting of sediment resuspension and settling, was modelled using D-WAVE. Validation was completed against measured data, with strong agreement obtained under all but very calm conditions, when the model predicted slightly higher wave energy (leading to a slight under-estimation of sediment settling following resuspension) (ERD Attachment 2H). Two discrete time periods were modelled, January 2017 (the period selected for sediment dispersion modelling on the basis that the outcomes could be representative of worst-case wind conditions in a typical year) and the months of May/June 2018 (the period in which the field trial data was available). Validation of model predictions was carried out for both periods. Subsea 7 believes that the submitter is referencing the work to investigate water movements in Exmouth Gulf undertaken between 1994 and 1996 (Massel and Brinkman 1997, Massel *et al*. 1997). The initial objective of this study was to test the hypothesis that long-term water mass balance in Exmouth Gulf is predominately governed by tidal motion and wind-induced currents and not by wind-generated waves. The modelling undertaken specifically for the Proposal assumed that the hydrodynamics in the study area are controlled primarily by tidal flows (motion) and wind forcing (meaning wind-induced currents), consistent with the referenced work. The modelling completed (ERD Attachment 2H), using field data specifically derived for the

No.	Submitter	Submission and/or issue	Response to comment
			Proposal (including weather records, current measurements and the results of the turbidity field trial), is considered robust and reliable for the prediction of indirect impacts to BCH.
70.	Protect Ningaloo	There is not enough evidence or research to claim that the coral groups in Exmouth Gulf will be able to tolerate the increasing water temperatures from climate change and heat wave events on top of added anthropogenic stress of construction activities, including elevated turbidity and the seabed disturbance of the “off bottom tow” in the Offshore operations area.	The report ‘*Impacts of Climate Change on Australian Marine Life*’ (Department of the Environment and Water Resources Australian Greenhouse Office 2006) notes that corals are likely to be under increasing risk from climate change. Recent modelling of environmental responses in the Kimberley to various climate change scenarios (Boschetti *et al*. 2020) found that corals show pronounced declines in biomass under all climate change scenarios, in some cases falling below 20% of 2015 biomass. Data from a large-scale dredging project at Barrow Island showed that suspended sediments may have both negative and positive effects on corals during periods of thermal stress (Fisher *et al*. 2019). Low-to-moderate reductions in available light from suspended sediments can reduce the incidence of coral bleaching, and may reduce overall coral mortality, particularly for branching corals. However, when sediment loads are high any reductions in bleaching incidence are outweighed by increased mortality associated with severe low light periods and high levels of sediment deposition (Fisher *et al*. 2019). The likelihood of strong positive or negative cumulative impacts associated with suspended sediments and thermal stress is considered low given: • The modelled short duration of elevated suspended sediment concentrations during and following a Bundle tow. • The significant distance between the Bundle tow route and coral habitats (e.g. Bennett, Cooper and Stewart shoals over 5 km from the tow route). • The modelled low suspended sediment concentrations in the vicinity of coral habitats during and following a Bundle tow.
71.	ANON-N59M-4PW6-T EM147 Protect Ningaloo Birdlife Australia	The ability for BCH to recover from naturally occurring cyclonic events is heavily reliant on the fact that the habitats are in an undisturbed state and have not been impacted by industrialisation. The Proponent states that as the expected sediment resuspension are short term and of a ‘pulse’ nature of the, significant losses of BCH are not expected (Volume 2, 5.1.6.4, page 99). This is not the case, as the Exmouth Gulf BCHs are not severely impacted by industrialisation but if any elevated turbidity from this project occurs, then this will likely upset the nutrient cycles and biogeochemistry of an array of sensitive habitats including seagrasses, corals, mangroves and sponges. For example, studies have shown that seagrass deprived of light, even for a week, start being impacted by changes in their physiology and morphology. There also does not seem to be any consideration in the ERD for tolerances of and impacts of turbidity and increased sedimentation on different life stages of benthic fauna, which is an important consideration for the persistence of benthic diversity.	The BCH within Exmouth Gulf is naturally tolerant to pulses of elevated turbidity, as occur naturally. This is evidenced by the baseline water quality data and the persistence of the recorded BCH. ERD Figure 5-9 indicates that any one site is likely to be subject to such elevated TSS concentrations for short periods of < 10 hours due to the predominantly N-S tidal currents. Exceedance of the 80th percentile of baseline depth-averaged turbidity was predominantly predicted over the unvegetated, Soft sediment, habitat, which is not considered sensitive to elevated TSS. Impacts to turbidity as a result of the Proposal are not expected to be greater than that occur naturally and are not expected to compromise the health of BCH, including the various life stages, or their future ability to tolerate, or recover from, cyclonic events. BCH including corals, sponges and seagrass, have been found, following extensive research (Lavery *et al*. 2017, Pineda *et al*. 2017, Jones *et al*. 2019), to be highly tolerant of short exposures (such as may occur following a Bundle launch) to elevated TSS concentrations. No indirect impact to BCH associated with a Bundle launch is expected.
72.	Protect Ningaloo Birdlife Australia MG Kailis Group	Submitters made the following comments regarding monitoring: • It is vital to know specifically what monitoring would occur during to ensure the impacts to the affected BCH types will be short-term, post construction. What management action would be triggered if the health of mangroves, for example, declines? • Visual monitoring for turbidity during construction is very subjective (p37). There should be set thresholds which trigger cessation of construction until the turbidity is cleared so to minimise impacts on benthic communities and shorebird and seabird (specifically terns) foraging habitat. • Submitters believes there needs to be a clear commitment to ongoing assessment and monitoring of impacts on the marine and	This submission seems to include comments related to both the construction phase (first 2 bullets) and the operations phase (second 2 bullets). The MCMMP provides details on the monitoring proposed during and following launchway construction, including sites, timing and parameters to be measured. An amended MCMMP is provided as an attachment to the Response to Submissions Report. Due to the negligible risk of impact to mangroves, as there is no clear mechanism for such an impact, no monitoring of mangroves is proposed. As outlined in the MCMMP, in the event that silt curtain(s) prove ineffective or cannot be deployed, mean seabed light levels (PAR) at any site at the 50 m boundary will be compared to the 20%ile of unimpacted reference site data over 3 consecutive days. This is intended to ensure the protection of BCH beyond this boundary.

No.	Submitter	Submission and/or issue	Response to comment
		tidal areas from the tow, as per best practice. The standards of 'significant' or 'significance' applied in the ERD are unclear. • Should impacts be more significant than anticipated, a long-term commitment to ongoing environmental monitoring is required.	As suggested in submission 7, the results of water quality monitoring during and following a Bundle launch will inform the need for BCH monitoring. Comparison of the median turbidity at an 'impact' site (i.e. within the ZoI) to the 80th percentile of baseline data is proposed, as this matches the approach utilized in the impact assessment and is consistent with the broad approach recommended for the seagrass *H. ovalis* (Lavery *et al*. 2017). In the event the threshold is exceeded, a BCH survey at the relevant site(s), and reference sites, would be triggered. The details of proposed monitoring are presented in the MOEMP. The MOEMP also specifies that '*in the event of a non-compliance or exceedance of an EPO additional management measures, to address that non-compliance or exceedance, will be included within a revised plan*'. The terms 'significant' and 'significance' in the ERD, the terms 'significant impact' and 'significant effect' are not defined in the *Environmental Protection Act 1986* (EPA 2018). . Therefore, the ordinary or everyday meanings of these terms apply. The EPA (2018) states that '*when considering significant impact or effect, the EPA may have regard to various matters, including the following: a. values, sensitivity and quality of the environment which is likely to be impacted b. extent (intensity, duration, magnitude and geographic footprint) of the likely impacts c. consequence of the likely impacts (or change) d. resilience of the environment to cope with the impacts or change e. cumulative impact with other existing or reasonably foreseeable activities, developments and land uses f. connections and interactions between parts of the environment to inform a holistic view of impacts to the whole environment g. level of confidence in the prediction of impacts and the success of proposed mitigation h. public interest about the likely effect of the proposal or scheme, if implemented, on the environment and public information that informs the EPA's assessment*'. Within the ERD the terms 'significant' and 'significance' relate to the matters above and to the likelihood of the relevant EPA Objective not being met. An impact would be considered significant or potentially significant if, as a result, the relevant EPA Objective may be compromised.
73.	EM147	The sediment suspension and movement modelling shows there is an unacceptable risk that the oyster reefs, corals and productive intertidal flats immediately south of Heron Point. These areas will be affected by sediment and turbidity during construction and then during operation with repeated launch and tow procedures. The sensitive flats and mangals of the Bay of Rest are shown to be within range of worst case predictions, as is the extensive coral community from the mouth of the Bay of Rest to Point Lefroy. The coral reef system extending from the Bay of Rest to Point Lefroy is the most extensive in this portion of the Gulf. There remains considerable uncertainty about the extent and movement of sediment plume. Nothing in the documentation supports the proposition that construction and launch activities pose no risk or even an acceptable risk to the Bay of Rest. Moreover, there is little in the documentation that suggests the proponent has a proper understanding of the Bay of Rest's very high conservation values.	This submission is considered inaccurate. The ERD predicted no significant impacts to turbidity during launchway construction beyond 50 m of the launchway footprint. The sediment fate modelling did not predict significant turbidity within the Bay of Rest. Intertidal sand flats and mangrove communities are not sensitive to elevated turbidity (refer to response to submission 120). Several transects targeted the inshore shallow subtidal reef habitat at Point Lefroy. The sites surveyed were found to be dominated by macroalgae with some hard corals (refer ERD Attachment 2B). BCH within the Bay of Rest are not predicted to be exposed to turbidity in exeedance of the ZoI threshold (refer ERD Figure 5-12). Nothing in the ERD or supporting studies indicates that these areas or habitats will be at risk of impact.
74.	ANON-N59M-4PHC-R/EM145	Disturbance to productive intertidal and benthic habitats as ballast chains drag through, and then continue to affect shallow marine regions within the highly productive photic zone (Sections 5.1.3.2; and 3.5 of feedback/Section 43A changes). Subsea 7 argues that the "offshore Operations Area is composed of low relief (flat) soft sediment (mud) habitat. This habitat does not represent 'biodiverse' or 'structurally complex' habitat." However, soft sediment low-relief habitat can still contain a significant amount of biodiversity and all habitat is important for the region's productivity, especially as climate change continues to create uncertainty and negatively affect some areas dramatically during cyclone or extreme warming events. Preserving areas such as these intact builds resilience into the ecosystem to recover after an unexpected environmental stress.	The BCH within the Offshore Operations Area, including all areas of seabed potentially directly impacted, have been characterised and mapped. An analysis of the soft sediment infauna community within the Heron Point LAU reported a mean species richness of 18.4 and a mean abundance of individuals of 39 (ERD Attachment 2B). This compares to samples taken within the centre of Exmouth Gulf, within or adjacent to the Parking area, with mean species richness of 20.3 and a mean abundance of individuals of 36.5. The Soft sediment habitat within the Offshore Operations Area does not support especially diverse or productive communities compared to the surrounding areas. Infauna communities living in fine mobile deposits are characterised by large populations of a restricted variety of species that are well adapted to rapid recolonization of deposits that are subject to frequent disturbance (Newell *et al*. 1998). The periodic (on average two, maximum of three per year) Bundle launches will result in physical disturbance of the top sediment layers. This may result in a minor, short term displacement of infauna, although as no material is being removed, it is expected that the infauna community will remain relatively stable (Section 5.1.8 of the ERD). No impacts to the biodiversity or productivity of the region are expected.

No.	Submitter	Submission and/or issue	Response to comment
75.	ANON-N59M-4PHC-R/EM145 EM147 MG Kailis Group Protect Ningaloo Rangelands NRM Oceanwise Australia	There is a lack of clearly presented information in the ERD on the direct physical impact of chains being dragged along the floor of Exmouth Gulf and the Prawn Nursery Area. Expected direct effects of the tow should be clearly presented. Submitters raised the following points: • The number and size of the ballast chains is significant, with alternating long and short chains. However, there is no statement in the ERD on how many chains will be attached. The ERD states that for each chain only 4-5 chain links of about 1.5 metres will touch the bottom for the 30km tow (PER, pp. 27 and 99). How this will be achieved in practice is unclear. The Proponent states that the chains are not expected to have a significant impact. If chains are a fixed length there would be expected to be more contact and greater impact on the more sensitive near shore environments, particularly on the shallow water macroalgae beds adjacent to the launch site. • Given the hundreds of ballast chains and the enormous lengths of pipeline being drawn from shore, no amount of added buoyancy is likely to prevent pipe sagging or towheads scraping and grinding through corals and sponges. Given the number of chains suspended from these pipelines, many of which will still be in contact with the benthos at a depth of 14-18m offshore, impacts and contact to the benthos in waters less than 6m (i.e. most of the launch zone) will be substantial to the point of being catastrophic. Nothing presented by the proponent contradicts the view that damage will be significant. • The Subsea 7 illustration below incorrectly showing chains of uniform length, none of which make contact with the seabed. This representation is misleading as a description of offshore operations within the deeper waters of the Gulf. Even allowing for the misrepresentation of ballast chains, this illustration suggests that launch operations in far shallower waters (depths of 1-6 metres) will involve very high impacts to seabed.  • The statement in the ERD that the ballast chains will have negligible impact is lacking confidence given that rigorous baseline information in the Offshore Operations Area is missing. Enough information isn't available to make a safe decision about likely impacts and imposts.	As presented in the Response to Submissions Report, evidence (video inspection) from previous Bundle launches in Wick supports the previous prediction (Section 5.1.8 of the ERD) that only surficial sediments are disturbed. A survey was completed of an existing subsea pipeline (in 117-118 m water depth) before, and immediately following, a Bundle tow across the pipeline. The video survey (screen grabs presented in the Response to Submissions Report) identified that no damage to the Bruce to Forties pipeline had occurred. One area of seabed scar marks created by the Bundle chains during the Bundle installation operation was observed during the post-installation survey. These images confirm that Bundle chains do not cause severe erosion or reworking of soft sediment habitat. As stated in Section 2.3.7 of the ERD, the typical chain size used is 76 mm diameter chain. Short lengths are typically 10-12 links (3-4 m) and long chain lengths are typically 18-20 links (5-6 m). The long chain lengths are typically spaced at 20 m intervals along the Bundle. The longer Bundle chain lengths will have some contact (4-5 links touching the seabed) along the length of the tow route (within the Off bottom tow area). While the Bundle is in shallow water (i.e. <5 m), before the depth at which the Bundle can 'hover', a greater number of chains will be in contact with the seabed. The launchway crosses the Reef with macroalgae habitat mapped immediately offshore of Heron Point (refer ERD Figure 5-4), so direct impacts will be limited to the area immediately adjacent to the centre of the launchway (within the overall launchway footprint). Further offshore the tow route traverses Reef with macroalgae and filter feeders habitat. Direct impacts to this habitats as a result of the Bundle chains, during numerous launches, were accounted for through the development of a cumulative impact footprint which was used to calculate 'absolute worst case' impacts as presented in ERD Table 5-7. Under this scenario, cumulative impacts to Reef with macroalgae and filter feeders habitat was calculated at 1.8% of the total mapped within the Heron Point LAU (refer ERD Table 5-7). Subsea 7 understands that the illustration reproduced by the submitters is Plate 3 from the Section 38 Referral Supporting Document for the 'original Proposal' (360 Environmental 2017), since superseded. The supporting text states '*the CTDM was developed by Subsea 7 and involves the transportation of a pipeline Bundle configuration suspended between two tow vessels (Plate 3)*'. The assertion by the submitters that this illustration represents the proposed operations within Exmouth Gulf is incorrect. Given the findings of the characterisation and mapping of BCH within the Offshore Operations Area and the evidence from Bundle launches from Wick, Subsea 7 is confident that the potential impacts are well understood.
76.	EM147	Given that ocean going tugs will be required to operate in extremely shallow waters, no realistic reference is made to prop-scouring of benthos, let alone the likely need for likely future dredging to assist tug operations. Modelling of turbidity from tug thrust and dragging infrastructure is not reassuring.	No dredging to assist tug operations will be required for the life of the Proposal. As specified within the site selection report, reasonably deep water within proximity to the shoreline was a key site requirement. The lead tugs will be stationed several kilometres offshore in approximately 10 m water depth. To mitigate the risk of seabed scour, or turbidity, associated with tug operations, an alternative methodology for the launch of heavier Bundles has been developed. This uses a combination of vessel propulsion and vessel winching to reduce thrust requirements (refer Section 2.4.8.5 of the ERD).

No.	Submitter	Submission and/or issue	Response to comment
77.	Protect Ningaloo	The language used in the ERD to describe the launching operation indicates a certain level of uncertainty. The Subsea 7 fact sheet says: "Subsea 7 has undertaken extensive engineering work aimed to make the towheads as buoyant as possible. Each launch will be different, depending on the characteristics of the pipeline Bundle. Subsea 7 is working hard to achieve consistency across all launches so that the towheads do not touch the seabed. Our target is that the towheads are floating by the end of the 350m launch track." There are concerns that the towheads would touch the seabed during the launch and damage the fragile nearshore benthic habitats.	While Subsea 7 intends that the towheads are floating and off the seabed by the end of the launchway, there may be particular circumstances which lead to the towheads taking longer (i.e. a slightly greater water depth) to leave the seabed. Therefore Subsea 7 has not committed, absolutely, to ensuring that the towheads to not touch the seabed after the end of the launchway. It is noted that the seabed adjacent to the end of the launchway consists of Soft sediment habitat, and any impacts to this habitat from the skidding of the towheads would be minimal, relating to disturbance of the surficial sediment layers only (the downwards pressure exerted by the towheads would be minor given they would be virtually neutrally buoyant). Further, any disturbance would occur within the area defined as the Zone of High Impact (ZoHI) (permanent loss) associated with the Bundle chain footprint. Thus any impacts associated with the Bundle towheads or chains are accounted for in the impact calculations.
78.	ANON-N59M-4PFA-M EM147 MG Kailis Group Oceanwise Australia	The statement that the offshore impact on the seabed is considered 'not significant' (ERD, p. 99) is not supported by clear evidence. Classification of the seabed as 'soft sediment' does not mean it is not ecologically important and further investigation is required to assess impacts. The Proponent argues that the benthos in Exmouth Gulf has been damaged by trawling and is largely soft sediment and therefore this proposal would not have significant impacts on benthic communities and habitats. Some of these may have been impacted when trawling first begun in the 1950's however have since been left undisturbed and have recovered to varying degrees. The impact of trawling on habitats throughout the eastern and southern areas of the gulf is likely to fall under this category. Areas near the launch site, that are too shallow to be trawled, show complexity and structure. The wider area includes highly productive soft sediments as well as hard corals, filter-feeders, and seagrasses (see image no pg 32 of ERD). The data relating to benthic damage does not satisfy the requisite scientific rigor that is required to determine significance under the EPA's factors. The cumulative effects, such as trawl, have therefore not been adequately addressed in the ERD. There is also no evidence cited in the ERD that clearly supports an assumption that there will be 'little to no trace of physical disturbance expected within four weeks of a Bundle launch' (ERD, 118). The cumulative effects on the Bundle launch area from trawling has not been considered and an assumption that the area will not be trawled within that 4 weeks of a Bundle launch.	The BCH within the Offshore Operations Area, including all areas of seabed potentially directly impacted, have been characterised and mapped. An analysis of the soft sediment infauna community within the Heron Point LAU reported a mean species richness of 18.4 and a mean abundance of individuals of 39 (ERD Attachment 2B). This compares to samples taken within the centre of Exmouth Gulf, within or adjacent to the Parking area, with mean species richness of 20.3 and a mean abundance of individuals of 36.5. The Soft sediment habitat within the Offshore Operations Area does not support highly diverse or productive communities. Infauna communities living in fine mobile deposits are characterised by large populations of a restricted variety of species that are well adapted to rapid recolonization of deposits that are subject to frequent disturbance (Newell *et al*. 1998). The EPA's framework for the assessment of impacts to BCH was followed, with potential worst-case and cumulative impacts within defined LAUs assessed. The assessment did not identify impacts likely to result in a loss of biodiversity or ecological integrity. The likely nature of the disturbance to Soft sediment within the Offshore Operations Area as a result of the Bundle chains is discussed in response to submission #75. The comments regarding the effects of trawling are noted. Structurally complex habitats were observed, and mapped (refer ERD Attachment 2B and 2C), in shallow waters adjacent to the shoreline and offshore shoals. Section 5.1.6.11 of the ERD states '*Disturbance would occur intermittently (nominally once every four to six months, for up to one day per launch) and restoration of the natural seabed topography would be expected to occur between events, with little to no trace of physical disturbance expected within four weeks of a Bundle launch*'. This outcome cannot be confirmed until the completion of the first Bundle launch, but is based on: • The low impact (surficial sediment reworking) as a result of the Bundle chains (refer to the response to submission #75 and the Response to Submissions Report). • The strong tidal currents (springs) occurring monthly which would tend to redistribute disturbed sediments to form a level and stable surface (due to natural erosion and deposition processes). • Any trawling activity would also assist in reversing the effects of a Bundle launch by acting to lower elevated areas of sediment and fill in holes or furrows. • Buried infauna species would be able to vertically migrate to the sediment surface. • Infauna would be expected to rapidly colonise the impact area through latitudinal migration or through the settlement of larvae. • Natural sediment bioturbation would lead to a reworking of surface sediments. • Recovery times following disturbance have been reported as shorter in warmer waters (Newell *et al*. 1998) and it is generally understood that muddy or sandy sediment communities recover more quickly than coarser sediment communities (Ferns *et al*. 2000).
79.	Protect Ningaloo	It is somewhat unclear as to what happens in the 'parking area'. The ERD defines the parking area as the "Designated area where the tow speed is zero, the chains touch down on seabed, and a full inspection	Within the Parking Area the same number of chain links will be in contact with the seabed than during the Off bottom tow phase. The Bundle itself remains slightly positively buoyant so will not touch the seabed, but rather 'hover' several metres off the seabed.

No.	Submitter	Submission and/or issue	Response to comment
		of the Bundle after the launch takes place, including the Submerged Weight Check". It also says that on arrival at the Bundle parking area, the Bundle will be stopped and various checks and reconfiguration for the surface tow completed. It is unclear as to whether the pipelines are lowered to the seabed for these checks and reconfiguration.	
80.	ANON-N59M-4P8C-8 ANON-N59M-4PHE-T Oceanwise Australia	The shallow intertidal reefs, sand flats, subtidal benthic primary producer habitats, seagrasses, algal dominated reefs, soft coral and sponge communities drive the high levels of primary productivity in the gulf and support the plethora of unique rare endangered endemic species and critical life histories. This productivity also supports commercial fisheries. The importance of these habitats to maintenance of biodiversity has not been adequately quantified. Research into the connectivity between the coastal area surrounding the site and the Bay of Rest is insufficient and therefore an accurate assessment of the impact the facility may have on the benthic communities cannot be given with the current information provided.	Potential impacts to the identified habitats, as a result of the Proposal, are as follows (refer ERD Section 5.1.6): • Shallow intertidal reefs – 3.2% loss of Pavement reef (devoid of vegetation) and 0.1% loss of Reef with macroalgae (including intertidal and subtidal habitat) under the absolute worst-case scenario. • Sand flats – no sand flats occur within the ZoHI. • Seagrasses – no seagrass occurs within the ZoHI. A small proportion of the sparse Seagrass habitat may experience minor elevated turbidity during a Bundle launch and tow but no impacts are expected. • Algal dominated reefs - 0.1% loss of Reef with macroalgae (including intertidal and subtidal habitat) under the absolute worst-case scenario • Soft coral and sponge communities – 10.3% loss of Soft sediment with filter feeders under the absolute worst-case scenario. The Soft sediment with filter feeders habitat was described as '*Soft sediment veneer overlying low relief reef. Sparse cover of filter feeders (sponges and soft corals)*' (ERD Attachment 2B). Given the absence of, or very low, loss of each BCH, and noting the sparse nature of the fauna within the Soft sediment with filter feeders habitat, a significant impact to biological diversity is not expected. The relevance of the connectivity between the coastal area surrounding the site and the Bay of Rest is not understood. The movement of tidal currents in the area, predominantly in a N-S direction, and the exposure of large intertidal areas within the Bay of Rest during low tide, suggests that a high connectivity exists between Heron Point, the Bay of Rest and waters within Exmouth Gulf to the north.
81.	MG Kailis Group	The statement by the proponent that MG Kailis see the proposal as low risk in the PER are incorrect. This statement was made in reference to the 2018 proposal concepts presented (circa July 2018). The zone of impact in the development envelope in the 2019 submission appears to extend into the Nursery Area. Reconfirmation is being sought from the proponent that the proposal will not affect the 'Nursery Area' of the Gulf.	The Offshore Operations Area overlaps the Exmouth Gulf Prawn Fishery area but does not overlap with the Nursery Area (refer to the Response to Submissions Report (refer Figure 2-11)).
82.	ANON-N59M-4P8C-8	Insufficient data used in models to predict the impact on benthic communities, of both the physical tow, the landing and launching. The value of benthic communities to nearby mangroves and coastal ecosystems should not be underestimated.	As noted in response to previous submissions, Subsea 7 believes that an appropriate level of data was available and/or collected to support the rigorous assessment of potential impacts as a result of the Proposal (all phases). The comment regarding the value of benthic communities is noted.
83.	Oceanwise Australia	Oyster beds at Heron Point have not been discussed in the Subsea 7 proposal at all. These oyster beds occur adjacent Heron point and are highly susceptible to changes in prevailing sedimentary regimes including both the oversupply of sediment leading to smothering and the starving of sediment leading to increased energy and exposure to erosion.	The term 'Oyster beds' is considered inaccurate as the features referred to are composed of Quaternary alluvial and coastal sediments that have lithified and outcrop from the surrounding sediments, and have been colonised by oysters, rather than being true biogenic reef structures (refer Figure 4-2 of Oceanwise report). Isolated intertidal rock outcrops were recorded during the intertidal zone component of the BCH survey (June 2017) but these features were not mapped as a discrete BCH feature due to their small size and distance from the potential impact area (refer to the Response to Submissions Report (refer Figure 2-5)). No impacts to these outcropping rocks, or the oysters they support, are predicted (refer to the Response to Submissions Report).
84.	Protect Ningaloo	The Proponent's boundaries of management remain focussed on the immediate Development Envelope and do not account for adjacent habitat that is likely to be impacted by the construction, launch and tow operations of this Proposal.	As stated in Section 5.1.6.1 of the ERD, a single LAU (LAU 'Heron Point') was initially developed to be broadly consistent with the general guidance presented in Section 4.2 of EPA (2016), utilising the existing mapped boundaries of the relevant 'conservation' zones. LAU 'Heron Point' was discussed with the Marine Ecosystems Branch of the EPA, and endorsed, prior to completion of habitat mapping across this area. Subsequently, following definition of the Offshore Operations Area including the Bundle Parking area and tow route, a number of additional LAUs were defined to encompass the areas within which direct or indirect impacts to BCH could occur. These were developed in consultation with the Marine Ecosystems Branch of the EPA, and

No.	Submitter	Submission and/or issue	Response to comment
			endorsed, prior to completion of habitat mapping across these areas. The LAUs were considered suitable for the characterisation and mapping of habitat that may be at risk of impact from the Proposal. The analysis presented in the ERD suggests that the occurrence of any impacts to BCH beyond the LAUs is extremely unlikely.

ATTACHMENT 1 (TABLE 2C) - SUBSEA 7 RESPONSES TO COMMENTS ON COASTAL PROCESSES

No.	Submitter	Submission and/or issue	Response to comment
85.	NCWHAC ANON-N59M-4PK7-F	The ERD states that the that Exmouth Gulf does not "significantly contribute to the productivity of Ningaloo Reef". This appears to be based on a single study of a single cycle tide. The submitters consider the evidence is insufficient, ecological processes occur over periods much longer than a single tidal cycle. Evidence disputing the ERD assertions includes: • Particle dispersion modelling shows there is connectivity between Exmouth Gulf and the western Ningaloo Reef (Feng et al) and this would contribute to exchanges in productivity and to larval supply. Movement of multiple species between Exmouth Gulf and Ningaloo Reef has been clearly identified. • At the time of the World Heritage listing, the IUCN in its recommendation to inscribe the Ningaloo Coast under natural criteria referred back to the State Party to, "Consider inclusion of the Exmouth Gulf on the grounds of ecological linkages between the Ningaloo Reef and the gulf, in particular the extensive mangrove stands and other shallow water habitats that function as nurseries and adult foraging grounds for many species" (IUCN Evaluation Report, 2011).	Hydrodynamic modelling (Massel *et al*. 1997) has shown that the tidal movement of water within Exmouth Gulf is predominantly north-south, with the tidal excursion length (the distance a parcel of water travels before the tide turns) being less than 5 km. This is too short to allow significant quantities of water to leave the Gulf on any one tide. Only a localised area of Exmouth Gulf exchanges directly with the Ningaloo region, with the remainder of the water in Exmouth Gulf tending to move north east towards the Onslow region. The above findings suggest that Exmouth Gulf does not 'drive' the productivity of Ningaloo Reef, as is being claimed. Coral reefs are highly productive ecosystems in environments that are commonly poor in nutrients, and their distribution is not dependent on proximity to highly productive coastal environments, with many productive reefs occurring well offshore. Many marine fish species are known to utilize shallow, sheltered environments, including mangrove areas if present, as nursery areas. Marine fauna including turtles also utilize such sheltered inshore areas. Adults of these species may then migrate out of the coastal areas into adjacent offshore waters. However, this migration and re-stocking of offshore environments is not considered to represent the underpinning of the productivity of Ningaloo Reef. The productivity of Ningaloo Reef is likely to be principally governed by nutrient inputs from seasonal upwelling. During summer months when southerly wind-stress increases, the Leeuwin current can be forced offshore by a wind-driven northwards coastal current (Woo *et al*. 2006). At Ningaloo, this northward flowing current is referred to as the Ningaloo Current (Taylor and Pearce 1999). The seasonal Ningaloo Current drives transient upwelling along the continental slope adjacent to Ningaloo Reef that impacts the ecology of the region through increased nutrient delivery and the lowering of water temperatures bordering the reef (Taylor and Pearce 1999, Woo *et al*. 2006). Notwithstanding the lack of evidence to support the claim by the submitters that Exmouth Gulf drives the productivity of Ningaloo Reef, the Proposal is not expected to impact the productivity of Exmouth Gulf. Given the absence of impacts to key primary producer habitats including algal mat, mangroves and seagrass, and the minor and local impact on nearshore macroalgae habitat at Heron Point, no impacts to local or regional productivity are expected.
86.	NCWHAC Oceanwise Australia	The submitters consider the assertion that the tidal movement around shoals is more erratic and generally faster is unsubstantiated. There has been very little oceanographic work done in Exmouth Gulf to predict the circulation of currents. The water movement between the North West Cape and Muiron Islands is one of the most treacherous in the region. It is the confluence of broadscale oceanic currents, tidal flows from the gulf, ground swell arriving from the Southern Ocean and short sharp wind driven waves arriving from across Exmouth Gulf. There are Department of Transport warnings about these waters, the ERD comparisons with other areas is not likely to be substantiated. In fact, the opposite is likely to be true. The oceanic conditions in the proposed tow route is much more likely to be more erratic, faster moving and unpredictable and represent far greater risk. This corresponds with a greater risk of losing control of the Bundles. The submitters recommend greater clarity around currents and the likely risk this has on unanticipated events.	While relatively strong currents can occur in the area between the North West Cape and Muiron Islands, these occur primarily in proximity to the North West Cape and South Muiron Island (as evidenced by the 'caution' notes within the marine chart). Currents along the tow route have been measured by Subsea 7, during multiple equipment deployments, and are understood. To optimise the Surface tow through the area, the timing of the tow will coincide with slack water (i.e. conditions of low tidal currents assocuiated with high or low tide). Basic physics dictates that current speeds increase when water has to flow around an obstacle. Waters surrounding islands and shoals would therefore be influenced by locally strong and unpredictable currents which would pose a risk to Bundle tow operations.
87.	Protect Ningaloo	There is a lack of clarity in the description of the launchway construction in the ERD, and how much of the beach and seabed would be excavated. The MCMMP has design drawings (Figures 2 and 3) that appear to show that 1.4 m of the beach/intertidal section would need to be excavated to install the rockfill and concrete slabs. However, it is not stated for what distance (along the 380 m	Beach and seabed excavation will be limited. The Response to Submissions Report presents Figure 2-3 which more clearly shows the profile of the proposed launchway in relation to the existing beach/seabed level.

No.	Submitter	Submission and/or issue	Response to comment
		launchway) this depth of excavation would continue, particularly for the subtidal section. The report later says that at the offshore end of the lauchway, minor excavation of seabed material is required, specifically 'along the last 24 m of the launchway footprint a trench with a mean depth of 30 cm will be excavated'.	
88.	Protect Ningaloo ANON-N59M-4PR9-R	The ERD does not provide specific examples or scenarios on how the construction or operational phases of the project will alter coastal processes in Exmouth Gulf. Launchway construction and cutting through the dune system is likely to cause increased flooding, which will be exacerbated by sea level rise changing coastal processes. This may result in damage to the existing coral reefs, seagrass and mangrove systems. There is also no mention on the effect of changes of hydrology to intertidal habitats that are living at their physiological limits of salinity tolerance.	The potential impacts to coastal processes are described in ERD Attachment 2E and in Section 5.2.6 of the ERD. ERD Attachment 2E outlines the extent of changes to the shoreline that are possible following the construction of the launchway. Details are provided regarding the potential for the launchway to trap sediment and the potential requirements for ongoing management of the shoreline. The requirement for management will be informed by monitoring of the shoreline, in accordance with the program outlined within the report. The potential for flooding and inundation at the seaward end of the facility, including an allowance for sea level rise, was assessed as part of the coastal hazard risk assessment presented in Section 5.10 of ERD Attachment 2E. ERD Attachment 2E states, in relation to inundation following extreme weather events, that '*the construction of the launchway will locally cut through the dune, reducing the elevation in this area from approximately 5 mAHD down to an elevation of around 2.5 mAHD at the foundation level. Such a reduction in the elevation of the dune, which would generally form a barrier to wave attack and inundation of adjacent low-lying areas may result in a localised increase in erosion risk and inundation vulnerability. Given the absence of detailed survey information over the broader area, it is difficult to determine the extent of any potential impact, especially from inundation. However, review of aerial photography shows that the presence of the creek system to the north of the site (Wapet Creek), and the connection of this system to the salt flats inland from the site already provides an avenue for ingress of inundation during extreme events*'……and…..*'The elevation of this inundation pathway appears to be lower than 2.5 mAHD, which is supported by rainfall and runoff modelling completed by Hyd2o (2014), meaning it could be expected that this area would be at least partially inundated prior to any breach of the launchway cut*'. Thus under an extreme event it is likely that the broader area would be inundated as a result of flows from Wapet Creek, whether or not the launchway cut was in place. Thus the risk of inundation of the coastal area as a result of the Proposal is considered to be low. The potential indirect loss of BCH due to altered water flows and sediment movement as a result of the presence of the launchway was addressed in Section 5.1.6.9 of the ERD. It is anticipated that, in the absence of any mitigation measures, sediment accretion may occur across existing beach sands and across intertidal, unvegetated, pavement reef habitat to the north of the launchway. Temporary impacts to the south of the launchway are likely to be limited to a narrowing or possible loss of the small perched beach formations that exist seaward of the onshore rock platforms and bluffs (Attachment 2E), which occur above sea level and do not support BCH (ERD Figure 5-10). It is noted that over the proposed life of the facility the potential increase in sea level is little more than 0.2m (based on the 'Sea Level Change in WA – Application to Coastal Planning' report (DoT 2010)). Such a moderate increase in sea level rise is unlikely to cause any significant change to the local inundation pathways.
89.	Birdlife Australia ANON-N59M-4PR9-R ANON-N59M-4PWG-B ANON-N59M-4PHE-T Protect Ningaloo	Construction of the launchway will reduce the elevation of the coastal dune and expose the area to increase risk of erosion. While the mitigation strategy is to "reinstate the dune following any significant re-profiling following an extreme weather event" (p36), this does not account for cumulative smaller erosion impacts, which could potentially interfere with high tide roost sites for migratory shorebirds.	Any event that impacts the dune through the launchway cut is likely to be reasonably severe (given the water level elevation would need to be greater than around 2.5 mAHD) and, given this severity, would likely result in some degree of change to the profile, requiring the area to be surveyed. High tide roosts recorded during studies completed in October 2018 and January 2019 were generally significantly separated from the Bundle track/launchway footprint. Several roosts within 1 km south of the launchway location could potentially be impacted in the event the perched beaches are impacted by erosion due to a reduced sediment supply from the north (refer to Figure 2-4 in Response to Submissions Report). However, the surveyor noted that of the roosts recorded in this area, several were on the rock platform, so would not be affected by beach erosion or accretion. The proposed monitoring, including the survey of beach profiles adjacent to launchway (annual), inspections, including photographic monitoring of shoreline adjacent to launchway (annual) and shoreline mapping (every 3-6 years), will assist in identifying impacts and triggering a management response.

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90.	Birdlife Australia Protect Ningaloo	The proposed monitoring plan is not considered adequate and the timeframes in which any coastal erosion will be rectified is not specified. For example: • Annual surveys and inspections monitoring changes to the shoreline is considered too infrequent. • Shoreline mapping every 3-6 years for monitoring significant changes in beach profiling is considered too infrequent. • Beach profile monitoring should be considered on a weekly to monthly basis to ensure shoreline and coastal processes changes are not ignored or permanent. • The proponent has not clearly stated their emergency procedure for monitoring or managing the impacts of flooding due to cyclonic events. An annual monitoring program will not be sufficient to detect these impacts. • The monitoring schedule of "Inspections, including photographic monitoring, of the shoreline and dunes adjacent to the launchway will be undertaken annually" (p36) suggests coastal erosion events and accumulation may not be promptly identified and rectified.	The proposed monitoring plan has been prepared to provide an appropriate level of monitoring that is fitting with the level of shoreline change that is expected. The extent of monitoring that is proposed is consistent with many other projects that have been completed around the state. As outlined within the Coastal Processes Monitoring and Management Report the rate of sediment transport along the coastline is relatively small (net transport rates of less than 5,000 m^3 per year). Given these small volumes, a significant impact to coastal processes is not expected. The launchway is a low profile structure (refer Figure 2-3 in the Response to Submissions Report) and the area exhibits minimal shoreline movement (ERD Attachment 2E). In the event of any significant re-profiling of the dune system following an extreme event, which would be recorded though visual inspection of the whole site following such an event, the commitment to reinstate the dune structure will apply. The ERD does not mean to imply that such reinstatement would only occur following formal coastal monitoring.
91.	Protect Ningaloo	Despite sand by-pass plans, the obstruction of natural sand movement and the resulting impacts should be fully understood before this amendment is approved.	The rate of sediment transport along the coastline is relatively small (net transport rates of less than 5,000 m^3 per year) and large or rapid shoreline changes are not expected. The nearby Learmonth Jetty provides an indication of the type of shoreline change that is expected, noting that the impacts at the Learmonth Jetty are not mitigated, as the launchway impacts would be. A significant impact to coastal processes is not expected, as the launchway is a low profile structure (refer Figure 2-3 in the Response to Submissions Report) and the area exhibits low sediment transport rates and minimal shoreline movement (ERD Attachment 2E). Subsea 7 considers that the potential impacts to sediment transport are appropriately understood and that suitable monitoring and management actions will be in place.
92.	Protect Ningaloo	The only proposed measure stated by the Proponent to avoid "Permanent change to water flows and sediment movement as a result of the presence of the launchway post closure" is the "Full removal of the launchway". There are no established emergency plans, monitoring programs or rehabilitation programs if there were to be permanent changes from the proposal. The ERD states that upon decommissioning of the facility it is anticipated that the shoreline would revert to pre-construction state following removal of the launchway. There is no scientific research to suggest this will occur.	Following full removal of the launchway, current (baseline) sediment transport processes would be expected to prevail, given the infrastructure would be removed and natural water flows and wave action would be reinstated. There is no clear reason provided as to why sediment transport patterns would not return to those occurring prior to the development. Sediment transport patterns are currently dictated by shoreline controls, predominantly the local rock outcrops. Annual monitoring of the shoreline position for a period of three years is proposed, to monitor recovery of the pre-development beach alignment. Appropriate management actions would be undertaken, in consultation with the DoT, in the event that the pre-development beach alignment did not return.
93.	ANON-N59M-4PHE-T	Storage and management of wastewater and the inherent risk of inundation in the event of a flood or storm surge appears a significant risk. The information presented does not provide sufficient evidence to suggest the measures being undertaken will be sufficient.	No storage of treated wastewater is proposed. As stated in Section 5.8.6.5 of the ERD, under cyclonic conditions the hydrotest pond (if industrial water bladders are not used) could potentially overflow following heavy rain. However, it is noted that the hydrotest water is fresh, would infiltrate into the ground on the inland (west) side of the dunes, and that substantial volumes of rainwater would be flowing across the wider landscape. The hydrotest water will be treated with either Hydrosure O 3670R or Roemex RX 5254, dissolved at a concentration of 500 ppm. These are the same chemicals that will be present in the carrier pipe for the Bundle tow and final installation and pose a low risk to the environment. Thus an environmental impact following such a scenario would not be expected.

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			The location of the hydrotest pond has been selected to ensure that it is behind the 100 year coastal erosion hazard line, even through the design life of the facility is only 35 years.
94.	Department of Transport	The one-month wave and current data is severely insufficient to predict long-term sediment transport rate quantitively. It is expected that at least 12 months wave and current record should be collected to enable a detailed analysis of existing long-shore sediment movements over 20 years as requested by the Environmental Scoping Document (ESD).	ERD Attachment 2E presents information regarding the site setting, including winds, waves, tides and water levels, currents, etc to provide an indication of the types of conditions within the Exmouth Gulf. Many other studies have also been completed within the Exmouth Gulf that explain the local conditions and seasonal regimes, as referenced within the report. In initial discussions with the Department of Transport following review of the initial ESD requirements, it was agreed that detailed coastal modelling would not be required to inform the coastal processes assessment for this development. This was on the basis that there was enough information available to enable an assessment of the sediment transport pathways and likely rates. As a result, the peer reviewed assessment of the sediment transport pathways, rates and launchway impacts were made without specific reference to detailed wave time histories. In this regard, a one month period of wave and current data is considered sufficient to validate the information within the previous studies and confirm the relative calmness of the local metocean environment. Furthermore, it is noted that a “quantitative” assessment of sediment transport is not directly possible from wave and current data alone. The only way to truly quantify sediment transport rates is to directly measure the sediment transport rate itself. As measuring sediment transport rates is exceedingly difficult, the observed trapping volumes at the Learmonth Jetty have been used to quantify the local sediment transport rates as outlined in Section 4 of ERD Attachment 2E.
95.	Department of Transport	Sediment transport during cyclone events need to be assessed appropriately. Analysis of extreme conditions using the design storms approach potentially requires greater consideration of transfer from the reference point (Exmouth) to the location of interest (Heron point). This is likely to have the greatest importance for evaluation of alongshore sediment transport rates during a severe storm.	The assessment of potential longshore transport during a severe event has been completed in accordance with the requirements of SPP2.6 for consideration of the S1 allowance. The event modelled to determine the S1 allowance was selected using the recommendations of the Design Storm for Western Australian Coastal Planning: Tropical Cyclones report. The recommended event for Exmouth was used for the assessment given the close proximity of Heron Point to Exmouth (less than 35 km) in the context of cyclone scale, as well as the fact that the design event track, as shown in 5.3, tracks similarly to Exmouth as it does to Heron Point. It is recognised that the event recommended by the Design Storm for Western Australian Coastal Planning: Tropical Cyclones report was selected predominately for the potential impact on cross shore erosion, rather than longshore transport (however the event was still a severe event, which resulted in large significant wave heights at the site and exhibited a reasonable directional distribution). It is for this reason that the raw results from the modelling were not taken on their own, but rather as an order of magnitude of potential change. In fact, sediment transport rates up to 5 times higher than those estimated by the modelling were considered in the assessment.
96.	Department of Transport	It is not considered appropriate to conduct a detailed analysis of existing long-shore sediment movements and variability over 20 years primarily using the SPP2.6 simple methodology developed for a time scale of 100 years. The required ESD level of understanding of the long-shore sediment movements and variability hasn’t been achieved.	It is not clear exactly which section of the report this comment is referring to. The S2 allowance for the coastal hazard assessment was considered in accordance with the requirements of SPP2.6 and utilised aerial imagery dating back to 1949, where possible, to develop an understanding of the historical shoreline movement at the site. The assessment of the net sediment transport rate (Section 4.1.1 of ERD Attachment 2E) also utilised shoreline movement plans dating back to 1949, coupled with cross-sectional surveys adjacent to the Learmonth Jetty, to provide an indication of the volumes of sediment trapped by the structure. The presence of this structure provides unequivocal information for the assessment of the sediment transport rates along the coastline due to the perched nature of the beaches in this area (therefore minimising the potential for bypassing around the toe of the structure initially), as outlined and presented in the report. In this instance a 20 year period was used in the calculation of the sediment transport rate, as the information presented within the report suggested that this was approximately the period at which the erosion south of the Learmonth Jetty structure peaked, before the sediment began to bypass. Therefore, while the assessment was actually completed over a period from 1949 to 2013, the calculation of the sediment transport rate was completed over the most relevant period before the structure appeared to begin to bypass sediment – approximately 20 years post construction. It is noted that estimates of sediment transport rates based on actual observations at a nearby structure are far more accurate than any other means of calculating transport rates by indirect (numerical or empirical) means.

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			This method of assessment incorporates all the variability that has occurred in the natural system over the assessment period. We contend that a more meaningful assessment approach would not be possible for this location.
97.	Department of Transport	The methodology outlined in Schedule one of SPP2.6 neglects or simplifies several processes and therefore lacks the capacity that is necessary to effectively attribute the potential coastal impacts of the launch-way. For example, as SPP2.6 methodology does not predict longshore transport rate, the key element pf coastal impact and future sand bypassing volume were not considered.	The methodology outlined in Schedule One of SPP2.6 was only used for the assessment of the coastal hazard risks as part of the Coastal Hazard Risk Assessment (Section 5 of ERD Attachment 2E). The assessment of the potential impacts of the launchway are outlined in Section 6 of ERD Attachment 2E, predominately based on the results of the coastal processes assessment presented in Section 4 of ERD Attachment 2E. The methodology outlined in SPP2.6 was not used in either of these sections.
98.	Department of Transport	Coastal dynamics at Learmonth Jetty abutment are not considered a suitable equivalent for the expected response to the proposed launch-way. Typically, the scale of response can be related to the offshore extent of the structure relative to the mean sea level contour. The proposed launch-way structure extends appropriately 300 m from the MSL contour, compared to Learmonth Jetty abutment, which extends approximately 20 m – 40 m. The expected actual impact is expected to be significantly different.	As outlined within ERD Attachment 2E, in particular in Section 3.1 and Section 4, the shorelines along this stretch of coastline consist of a perched sandy beach on a basement hard substrate/platform. Based on this morphology, the behaviour of the Learmonth Jetty structure and the proposed launchway will be quite similar in the early phases post construction. This is because the mobile, perched section of the beach is so heavily constrained along the shoreline (refer Figure 4.2 of ERD Attachment 2E) that any structure that extends beyond the beach and over the hard substrate/platform will entirely restrict longshore sediment transport along the coastline. In this respect, the construction of the Learmonth Jetty and the launchway will have very similar impacts on the longshore sediment transport rates initially following construction, as both structures would entirely prevent sediment transport. Differences in sediment transport post construction will eventually arise, as the launchway extends further offshore, but is at such a low elevation relative to the seabed that the material can bypass over the launchway, rather than around it, as occurs at Learmonth Jetty. Further details regarding the potential trapping at the launchway are provided in Section 6 of ERD Attachment 2E, with particular reference to Figure 6.1, which shows the possible extent of shoreline profile advancement prior to sediment naturally bypassing the structure. In summary, given the perched nature of the beaches in the region, the Learmonth Jetty would have almost completely blocked sediment transport along the coastline post construction. Post construction details have been used to assess the sediment transport rates along the coastline. These sediment transport rates will be similar to those at the launchway site, however the behaviour of the shoreline adjacent to the launchway will be different given it is at a lower elevation but extends further offshore. Section 6 of ERD Attachment 2E outlines how the shoreline adjacent to the Launchway may respond to the construction.
99.	Department of Transport	The facility is expected to capture material on the updrift (northern) side of the facility. As noted above, the expected “storage volume” is substantially larger than that at Learmonth Jetty, by approximately an order of magnitude. The rate of infill is likely to locally enhance sediment transport rates, although across the wider area, volume change is limited to supply from “outside”, which is expected to be alongshore supply from the north. The difference between external supply and local transport causes erosion adjacent to the new storage area, termed “nearfield erosion”. This effect is proportionate to the storage volume and its time scale is determined by the relative external supply rate. Based on the behaviour reported for Learmonth Jetty abutment, and the relative “storage volumes”, nearfield erosion may occur at the proposed launch-way for 20 – 40 years before it is offset by external supply. This behaviour is more like coastal dynamics experienced at Exmouth Boat Harbour than behaviour at Learmonth Jetty.	Refer to previous comment about the catchment volume of the launchway. Given its low elevation and the constrained nature of the perched beach along the coastline, the trapping characteristics of the launchway may not be that different to the Learmonth Jetty. This is explained further in ERD Attachment 2E (Section 6 and Figure 6.1). The potential timing of shoreline change could also be similar; however, the monitoring and mitigation strategy would trigger management actions before changes of this extent were experienced.
100.	Department of Transport	Monitoring should extend further into Wapet Creek and the ridges to the southeast, as change to these features, particularly the creek, may affect the site. It is appropriate for the monitoring program to have the ability to attribute this cause of change.	Section 7.1.1 of ERD Attachment 2E explains the rationale for not including monitoring within Wapet Creek and the ridges to the southeast. Essentially, these variable landforms are expected to change significantly over time regardless of whether the launchway is constructed. Monitoring features that are so dynamic is not a preferred approach given the management triggers that have been set for this development.

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			As a compromise two additional monitoring profiles (one to the north within Wapet Creek and one to the southeast covering the ridges) will be added to the monitoring profile, however management triggers are not proposed to be added for these profiles. This is on the basis that monitoring of these profiles may help to identify reasons for coastal change, but would be too remote from the launchway to be impacted.
101.	Department of Transport	It is noted that the proposed type of edge stabilisation for the launch-way itself had had a history of poor performance in Western Australian applications. Equivalent structures to the Coast-mat have been highly susceptible to short-term fluctuations in bed levels and have typically failed within around 5-10 years after installation.	The mattress was specified as the preferred option as it provides a relatively lower profile than rock armour protection (layer thickness for the same performance). The final design will ensure that a stable, reliable, solution is presented and an appropriate monitoring and maintenance period specified.
102.	Department of Transport	The details of the proposed launch-way are unknown. The resolution of Figures 2.3 and 4.9 is poor, the former being illegible.	It is acknowledged that the details in these figures are small, though it is noted that details of the cross section of the launchway are also provided in Figure 6.1, which shows the cross sections of the launchway together with the potential for shoreline change. The Response to Submissions Report presents a more detailed figure (Figure 2-3) presenting the launchway level in relation to the level of the existing beach/seabed.
103.	Department of Transport	There is very limited information regarding the management of impacts due to cutting through the dune. Based upon previous observations of breakouts along the Exmouth coast, a greater challenge may be to ensure that the cutting remains stable for Aeolian processes (I.e. infilling). This may have implications for stability of the adjacent areas of primary dune.	Please refer to previous responses regarding the dune cutting. The note regarding the potential for aeolian processes is acknowledged. The batters of the cutting will be stabilised to prevent windblown sand issues from the batters themselves. Sand transported from the beach will need to be managed. This will likely occur immediately prior to a launch event, when it is expected that sand would need to be removed from the rails on the beach in any case.

ATTACHMENT 1 (TABLE 2D) - SUBSEA 7 RESPONSES TO COMMENTS ON FLORA AND VEGETATION

No.	Submitter	Submission and/or issue	Response to comment
104.	EM149 Protect Ningaloo	The conservation value of the flora and vegetation of the area is higher than identified in the proposal. The flora values of the Subsea 7 survey area and particularly for the Exmouth Peninsula have not been properly understood. The geological history, whereby the Cape Range and the Exmouth Peninsula were geographically isolated and were islands, combined with changes towards aridity, resulted in species divergence. Subsequent barriers include arid landscape and geomorphic variation. Consequently, many accepted species are complexes of taxa. As such, the conservation values for flora in the proposal area are greater than suggested in the 360 Environmental (2018) survey report. The conservation values for vegetation are subsequently also considered to be higher than reported in the Subsea 7 proposal. This inadequate knowledge of the flora (the 360 Environmental (2018) report) does not allow for proper environmental impact assessment, not unique to this assessment. A significant flaw in the flora and vegetation survey is comparisons of communities are on a local scale, resulting in high similarity. Our view is that a regional analysis, based on the Cape Range sub-bioregion, should have been carried out. Quadrats locations to provide a regional context for the Subsea 7 proposal, were too close to the proposal area, most only 2.5 km in distance. Given the distance from Exmouth Gulf to the southern section of the sandplain area, greater variation was expected. In terms of regional context for the assessment, the Carnarvon Bioregion is considered too large. The size of the geomorphic range (latitudinally) would result in too varied a vegetation. The use of the Cape Range Sub-region is considered a more appropriately defined region for context. An assessment framework utilising biogeographic methods is provided in the Protect Ningaloo submission as an alternative. The methods address the issues of using appropriate areas with a large number of disjunct populations separated from other parts of the Pilbara by existing barriers, indicating taxonomic distinction. The Protect Ningaloo submission notes the Subsea 7 proposal would be an inappropriate entry of industrial development into an area of high flora, vegetation and associated values (i.e. fauna), recognising that the proposal should not be assessed only on its immediate impacts on the development area. The proposal would set a precedent that would mitigate against rejection of further inappropriate industrial development on the Exmouth Peninsula. The Subsea 7 proposal adds to the already over-developed coastal features of the Pilbara such as the capes and peninsulas. The proposed impact area should be considered as part of an enlarged World Heritage area, justified by the very high flora and high vegetation values identified in the area surrounding the proposal. The submission considers that a moratorium on further development in the survey area is required until the flora, vegetation and other	The literature review for the Proposal referred to information within five separate reports for past studies in the region, as well as all available database and related information, specific to the Proposal site. The results of database searches for Threatened and Priority flora and ecological communities constitute the known flora and vegetation of conservation significance for the Proposal area. The field studies (ERD Attachment 2L) were undertaken over three separate periods, by experienced botanists, in accordance with methodologies as outlined in the Technical Guide for flora and vegetation surveys (EPA 2016). Results, including those relating to the conservation value of recorded flora and vegetation, are considered to have met requirements and standards of the EPA for environmental impact assessment purposes. It is acknowledged the Cape Range peninsula is an area of high conservation significance (Keighery and Gibson 1993, Department of Environment and Conservation 2010). However much of the floristic diversity is situated on limestone hills, ranges or calcarenite outcrops (Keighery and Gibson 1993, Department of Environment and Conservation 2010, Meissner 2010), none of which occur within the Development Envelope. No results from the study suggest any of the vegetation units identified are of conservation significance compared with current literature or other studies (Meissner 2010, Ecoscape 2018). Furthermore, no TECs or PECs are known to occur or were identified from the study. Statistical comparison of vegetation sample sites is carried out to determine how similar (or dissimilar) sample sites are at a floristic level. This analysis assists in the determination of which sites represent the same vegetation community/type, for the purposes of site classification and vegetation mapping. This analysis uses statistical software to measure the similarity of sites based on species-by-site data, either presence/absence data or foliage cover data. Once sites of similarity are determined and grouped, the vegetation can be mapped based on the identified vegetation units at each site and extrapolation of the extent of these vegetation units based on characteristics identified in the field and the appearance of aerial imagery. The same methodology and theory can then be applied to compare recorded site data with regional data, in particular, that of ecological communities of conservation significance, if such data is available. Similarity analysis of recorded sites does not determine conservation significance of vegetation units, unless compared to data known to be recorded from vegetation of conservation significance. While the floristic composition of the study area is not able to be compared with regional data, since floristic data for regional sites is not available, the regional significance of recorded vegetation units can be assessed based on: • Presence of Threatened flora. • Extents limited to specific landform types. • Regionally uncommon or restricted plant community types. • Extent remaining in comparison to pre-European extent. No Threatened flora species were recorded within the survey area, and therefore, none of the vegetation units are considered regionally significant. The vegetation units recorded for the Proposal represent mostly hummock grasslands, some in combination with some *Acacia* shrubs, as well as a samphire unit (*Tecticornia* shrubland). The grassland/shrubland units are not restricted to any certain landforms, typically being associated with sandy and/or stony plains which are widespread in the region. Samphire vegetation is associated with salt lakes or waterways and/or fringes, which are considered a specific (and somewhat regionally limited) landform. The Development Envelope traverses three Land systems, the Cardabia, the Learmonth and the Littoral Land Systems. All of these Land Systems are considered to be well represented within the Cape Range sub-region and are not considered to be regionally significant based on Land Systems (refer to the Response to Submissions Report). A small proportion (<1%) of each Land System within the Development Envelope and the Development Footprint within this envelope will be impacted (refer to the Response to Submissions Report). Within the Cape Range sub-region one vegetation association (Cape Range 117 Grass Steppe – Hummock grassland *Triodia* sp.) comprises 12,424 ha which equates to less than 0.52% of the Pre-European extent of vegetation within the sub-region (refer to the Response to Submissions Report). Site specific vegetation

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		environmental values of the area are properly defined by a larger and more appropriate biological survey.	surveys have identified 92.5 ha within the Development Envelope with about 11.8 ha proposed to be cleared. This equates to about 0.095% of the known presence of this association within the Cape Range sub region. The EPA's current objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained (EPA 2016) was identified in EPA Guidance Statement 33, as achievable by ensuring that ecological communities are maintained above certain threshold levels. These levels are considered to be 30% of the original extent in unconstrained areas and 10% in constrained areas, such as urban zones. The survey area is considered to be an unconstrained area and as such the minimum retention target of 30% of the original vegetation extent is considered appropriate. All of the regional vegetation associations of the study area are represented by more than 30% of their pre-European extent within the Cape Range IBRA sub-region. Therefore, none of the vegetation units of the study area are considered to be regionally significant due to limited current extent in comparison to their pre-European extent. The EPA guidelines (EPA 2016) require regional sampling (quadrats) of vegetation outside of the impact area to provide context and assess the significance of vegetation within the impact area. No minimum distance from the impact area for regional sampling is specified. Typically, any sampling of vegetation outside the proposed impact area is considered regional sampling. Regional vegetation sampling for any project can be limited by time and budget and efforts are best invested into assessing values within the proposed impact area. Analysis of regional context reveals three vegetation associations relevant to the proposal area. Of these, the Cape Range 117 system/association is considered to be naturally represented by a limited extent in the sub-region (less than 1%). For any region that is not well-surveyed, such as Cape Range and much of the Carnarvon Bioregion, there is justification for further investigation into floristic values, particularly where impacts are expected. Adequate data and literature provide for robust environmental impact assessment. The Cape Range sub-region consists of unique climatic, geological and geographical conditions. Assuming the gaps between disjunct populations noted in the submission are actual and not a deficit in survey effort, it is likely that the Cape Range sub-region will be floristically of conservation significance. However, as discussed in the submission, DNA studies would likely be required to confirm any taxonomic distinctions given morphological similarities between disjunct populations. Collection of data has followed accepted methodologies of assessing flora and vegetation significance, using available data. It is considered that assessments have been conducted in accordance with EPA guidance and will therefore provide the regulator with appropriate information upon which to base advice to the Minister. Subsea 7 considered that a moratorium on further development in the survey area would only be relevant in the event that flora or vegetation of particular conservation value, or not represented elsewhere, occur. Survey data suggests that neither of these scenarios apply.
105.	ANON-N59M-4PHV-B ANON-N59M-4PHC-R/EM145 ANON-N59M-4PK7-F PN Proforma Protect Ningaloo Rangelands NRM	Submitters raised concerns about largescale clearing of native vegetation and habitat for mammals, reptiles and birds from the construction of the pipeline fabrication facility, access roads and two 10km railway lines.	The Response to Submissions Report demonstrates that the proportionate area of each of the vegetation associations for the Cape Range Sub-Region, within the Development Envelope and the Development Footprint, is low. This proportion is less than 1% in all instances, with the exception of Cape Range 117 representative vegetation within the Development Envelope (6.873%). However, within the footprint, this proportion is much lower (0.878%), which demonstrates that actual impacts to the majority of this vegetation association will be minimal. The Proposal footprint, while extensive in length, will be narrow. The linear nature of the footprint increases the likelihood of successful rehabilitation following closure, because existing vegetation can readily self-propagate into adjacent areas, with assistance from any active revegetation efforts.
106.	ANON-N59M-4PHC-R/EM145 Protect Ningaloo	The volume of groundwater to be abstracted – up to 12 ML/year will substantially reduce the groundwater for other users, including the environment, given the extremely low annual rainfall in this region (~2.5 cm, BOM http://www.bom.gov.au/climate/averages/tables/cw_005007.shtml).	As presented in the ERD, the extent of groundwater drawdown from water bore extraction will be limited. Water extraction will be at relatively low volumes, during sporadic timeframes (not consistent and ongoing). The vegetation of the study area is primarily spinifex grasses which would not utilise groundwater at depths between 22 to 32 m (at which groundwater was intersected in the proposed borefield). It is also highly unlikely

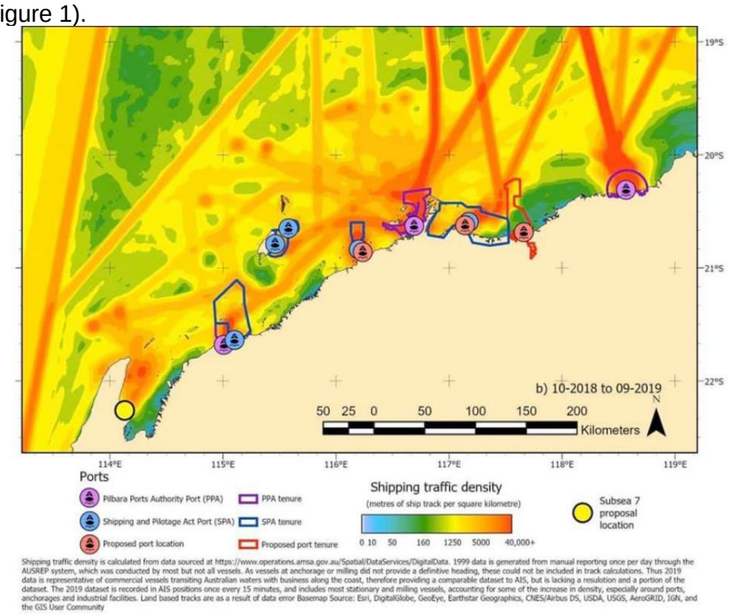
No.	Submitter	Submission and/or issue	Response to comment
		The proposal states that “it is not expected that changes in groundwater levels that may result from abstraction of groundwater will impact flora and vegetation”. How is it possible that flora and vegetation would not be impacted in an area with such low annual rainfall? Where is the scientific evidence to support this statement? With the significantly reduced water from rainfall events occurring across this region, there is every probability that longer periods of drought will occur into the future thus making the vegetation even more susceptible to changes in water regimes.	the *Acacia* shrubs identified in the study area would be capable of utilising the groundwater given they are all relatively small and shallow rooted. Furthermore, groundwater modelling suggests any drop in ground water level would be highly localised, and relatively minor. Worst-case predictions suggest a drop by 3.5 m at the bore site, but at depths of more than 20 m, it is unlikely to change any abiotic conditions for the surface vegetation. Groundwater monitoring commitments will detect if extraction results in drawdown that exceeds predictions, allowing for preventative measures and adaptive management to be implemented.
107.	ANON-N59M-4PWP-M	Inundation of inland areas is identified by Subsea 7 in the ERD as a potential impact resulting from the removal of dunes in order to facilitate construction of the launch-way. If this occurs it will cause damage to flora and vegetation inland, change the inland water flows and presents a serious problem in the event of an extreme weather event.	ERD Attachment 2E states, in relation to inundation following extreme weather events, that ‘*the construction of the launchway will locally cut through the dune, reducing the elevation in this area from approximately 5 mAHD down to an elevation of around 2.5 mAHD at the foundation level. Such a reduction in the elevation of the dune, which would generally form a barrier to wave attack and inundation of adjacent low-lying areas may result in a localised increase in erosion risk and inundation vulnerability. Given the absence of detailed survey information over the broader area, it is difficult to determine the extent of any potential impact, especially from inundation. However, review of aerial photography shows that the presence of the creek system to the north of the site (Wapet Creek), and the connection of this system to the salt flats inland from the site already provides an avenue for ingress of inundation during extreme events*’……and…..’*The elevation of this inundation pathway appears to be lower than 2.5 mAHD, which is supported by rainfall and runoff modelling completed by Hyd2o (2014), meaning it could be expected that this area would be at least partially inundated prior to any breach of the launchway cut*’. Thus under an extreme event it is likely that the broader area would be inundated as a result of flows from Wapet Creek, whether or not the launchway cut was in place. Thus the risk of inundation of the coastal area as a result of the Proposal is considered to be low.
108.	Protect Ningaloo	The ERD states that the project design has considered the use of existing disturbed areas and these will be used. However, the document does not identify what is meant by meant by "disturbed areas", noting that this could be construed to mean any vegetation, as all vegetation has had some form of disturbance such as fire.	The term ‘disturbed areas’ is taken from ERD Attachment 2L and refers to tracks and other cleared areas (including previously cleared areas showing some regrowth).
109.	Protect Ningaloo	The ERD states that “The proposed clearing is of communities that are common and widespread with all 10 vegetation communities directly impacted by the Proposal being well represented outside of the Development Envelope”. However, commonness of plant communities and species is an extremely poor evidence base on which to base land clearing. Common species are those which hold and strengthen ecological communities, particularly in periods of rapid climatic change (Scholes et al 2018; IPCC Climate and Land Report 2019; Winfree et al 2015).	The study undertaken by 360 Environmental (ERD Attachment 2L) was in accordance with the EPA guidelines (EPA 2016), which includes identification of conservation or regionally significant vegetation. The EPA's environmental objective for the factor ‘Flora and Vegetation’ is: “To protect flora and vegetation so that biological diversity and ecological integrity are maintained”. Therefore, it is preferable to remove vegetation that is common to an area rather than vegetation that is of conservation significance, or is unique or restricted. Clearing of vegetation of conservation or regional significance, rather than vegetation considered common, would pose a greater risk of compromising the EPA’s objective. The proportion of vegetation proposed to be cleared is minimal compared to the remaining extent. Within the Carnarvon Bioregion, the proposed clearing footprint (176 ha) would constitute 0.04% of existing Land System vegetation, according to the Department of Agriculture and Food WA (2012) mapping.
110.	Protect Ningaloo	The ERD states numerous times that the potential impacts to flora and vegetation can be managed such that there are no significant residual impacts to flora and vegetation and the biological diversity and ecological integrity of the present flora and vegetation will be maintained. However, there is limited evidence provided for this. In addition, our view is that there will be impacts to flora and vegetation from the clearing and disturbance of such a large area of land (up to 176 ha of vegetation within a 452 ha development envelope).	The flora and vegetation assessment conducted in accordance with the EPA guidelines (EPA 2016) did not determine any flora species or vegetation communities of conservation or regional significance to be present within the Development Envelope or Development Footprint. The proportion of vegetation proposed to be cleared is minimal compared to the remaining extent. The Response to Submissions Report demonstrates that the proportionate area of each of the vegetation associations for the Cape Range Sub-Region, within the Development Envelope and the Development Footprint, is low. This proportion is less than 1% in all instances, with the exception of Cape Range 117 representative vegetation within the Development Envelope (6.873%). However, within the footprint, this proportion is much lower (0.878%), which demonstrates that actual impacts to the majority of this vegetation association will be minimal. These proportions are considered extremely low. Some actions proposed to mitigate impacts to flora and vegetation values include:

No.	Submitter	Submission and/or issue	Response to comment
			• Project design has considered use of existing disturbed areas and these will be used where possible to minimise total ground disturbance. • Land disturbances will be kept to the minimum necessary for development of the project. • Ground disturbance procedures and a permitting system will be implemented. • Where practicable, land clearing will be undertaken progressively with the amount of active disturbance minimised. • The site induction program will provide written and verbal information on protection of vegetation, conservation significant flora and ground disturbance authorisation procedures. • Rehabilitation measures will be implemented on disturbed construction areas, as they become available. The entire list of proposed mitigation measures associated with flora and vegetation are presented in the ERD.
111.	Protect Ningaloo	The proposed mitigation measure to develop a weed hygiene system is a standard, minimal approach, and would not ensure a limited impact both at the site and across the wider landscape.	A weed hygiene plan is a tool to minimise the risk of introducing, establishing and spreading weeds into the project (Department of Primary Industries, Parks, Water and Environment 2015). While measures described in the ERD are rudimentary, they are widely considered to be effective. Vehicle hygiene (cleaning on entry and exit, inspections) is standard weed management procedure because it is effective at preventing the introduction of weeds (Moerkerk 2006). Using "clean" (weed free) soil, mulch and fill is also a simple but effective method of reducing the risk of weed establishment.
112.	Protect Ningaloo	The ERD states that it is not expected that changes in groundwater levels that may result from abstraction of groundwater will impact flora and vegetation. The ERD also states that no groundwater dependent ecosystem communities have been identified in the Development Envelope. It is not clear what the evidence is for this statement. All flora species rely to some extent on the status of the groundwater and changes to groundwater levels may have offsite impacts on vegetation.	As presented in the ERD, the extent of groundwater drawdown from water bore extraction will be limited. Water extraction will be at relatively low volumes, during sporadic timeframes (not consistent and ongoing). The vegetation of the study area is primarily spinifex grasses which would not utilise groundwater given their shallow root systems. It is also highly unlikely the *Acacia* shrubs identified in the study area would be capable of utilising the groundwater given they are all relatively small and shallow rooted. Furthermore, groundwater modelling suggests any drop in ground water level would be highly localised, and relatively minor. Worst-case predictions suggest a drop by 3.5 m at the bore site, but at depths of more than 20 m, it is unlikely to change any abiotic conditions for the surface vegetation. Groundwater monitoring commitments will detect if extraction results in drawdown that exceeds predictions, allowing for preventative measures and adaptive management to be implemented.
113.	Protect Ningaloo	The ERD states that 'mitigation measures will minimise the risk of proposal related fires. The proposal-specific impacts on local fire regimes are not anticipated to adversely impact the environment given the open structure of the vegetation and locally and regionally common nature of fauna habitats within the Development Envelope.' The reference to the open structure and regionally common nature of the vegetation is not supported by evidence. It is the frequency of fire which has the greatest impacts. As much of the vegetation in this region appears visually to have received frequent fires, any additional fires would have an even greater degradation impact on both the vegetation on which the fauna depends and on the fauna itself. Commonness is not a reason to further degrade landscapes. (Fisher et al., 2009a; Fisher et al., 2009b).	Fire frequency varies depending on the area, type of vegetation and previous rainfall (vegetative production/fuel load) (Bastin 2014). The current fire frequency in the area would likely be high given the fire prone spinifex (*Triodia* species) hummock grasslands (Ladbrook *et al*. 2018) present through a large proportion of the study area. This is because of the high fuel loads produced in relatively short periods by these dry grasses. Spinifex vegetation has the potential to burn every 5 to 7 years following periods of substantial rainfall (Ladbrook *et al*. 2018). The occurrence of weedy grasses, such as *Cenchrus ciliaris* (buffel grass), as recorded within the study area, can also generate substantial fuel loads in short periods and can increase fire frequency (Bastin 2014). In contrast, fire frequency in *Acacia* shrublands (which are also present in the study area, but mostly as sparse shrublands over Spinifex (*Triodia*) hummock grasslands (360 Environmental 2018), as identified within the study area, are likely to be lower and linked to high rainfall events, as the suite of grasses and forbs typically present in such communities do not accumulate as much fuel as (denser) grasslands (Ladbrook *et al*. 2018). The natural fire regime prior to human intervention (frequency, intensity, size, season) no longer exists and it is difficult to determine what the 'normal' fire frequency for the area should be given past human disturbance. Both indigenous and non-indigenous people have used fire to manage the land, changing vegetation by favouring some species to the exclusion of others (Department of Environment and Conservation 2010). Altering of the natural fire regime began with aboriginal people burning, likely more frequently than natural fire events (Ladbrook *et al*. 2018) for hunting, followed by fire management following European settlement using prescribed burning. Regular prescribed burning reduces the fuel load and limits wildfire. It is difficult to determine if fire scars evident in aerial imagery are from wildfires or prescribed burns. The presence of infrastructure (Learmonth RAAF Base) adjacent to the study area suggests fire risk management plans would be in effect, to prevent loss of life or infrastructure from wildfire. This suggests that the current fire frequency

No.	Submitter	Submission and/or issue	Response to comment
			may be relatively high (from prescribed burns to manage fuel loads and protect infrastructure) compared to the natural regime. While there is an increased risk introducing human activities into the area, given the likely current fire management (by DBCA) using prescribed burns, any unintentional fire is considered unlikely to significantly impact the current vegetation, given that it is already adapted to frequent fires.

ATTACHMENT 1 (TABLE 2E) - SUBSEA 7 RESPONSES TO COMMENTS ON MARINE ENVIRONMENTAL QUALITY

No.	Submitter	Submission and/or issue	Response to comment
114.	NCWHAC Protect Ningaloo	The sediment modelling appears to indicate the intrusion of sediment into the NCWHA. The property was listed under Criterion (vii): Superlative natural phenomena or natural beauty which includes the "lush and colourful underwater scenery". The reef and soft corals within the Exmouth Gulf segment of the property are great examples of assets which meet both inscription criterion (the other being Criterion (x): Biodiversity and threatened species) and contribute to the OUV of the property. Accordingly, consideration of sediments is not restricted to the sea surface and the expected sediment on, or near, the seabed is of high interest when considering the impacts on the OUV. The NCWHA boundary and the distance to the parking area is not included in predicted modelling maps, therefore making it difficult to ascertain the extent of potential intrusion of sediment into the World Heritage property. Greater scrutiny of the sediment intrusion into the NCWHA is required including: • Clarity around contact with the seabed at the parking area with clear restrictions on the extent of approved contact with the seabed. • Modelling examples of sediment dispersion in locations within the surface-tow zone from any situation where the Bundle has to be lowered (e.g. vessel breakdown, marine mammal avoidance collision, vessel collision, loss of Bundle integrity) and there is subsequent contact between chains and seabed. • Modelling the sediment dispersal from the Bundle utilising the western edge of the parking area for the full disturbance timeframe including: o all seasonal weather conditions o full range of tides o all potential chain sizes, lengths and configurations o committed minimal time window between launches o using the particle size of the site being modelling o confirmed current movements for the site	The ERD considered all potential impacts arising from the short-term generation of suspended sediment within Exmouth Gulf during a Bundle launch and tow. Sediment fate modelling was used to predict the concentration and distribution of sediments resuspended during a Bundle launch. This modelling predicted that little suspended sediment would enter the WHA (refer ERD Figure 5-5 to 5-8) and following comparison to relevant criteria (refer ERD Section 5.1.6.6) it was determined that this would not pose a risk to BCH. It is also noted that little to no coral cover was recorded within the WHA in the vicinity of the tow route (ERD Attachment 2C). Modelling was also used to predict the extent of visible turbidity during and immediately following a Bundle launch (refer ERD Section 5.9.6.7). Under both flood tide and ebb tide launch cases, the threshold for aesthetic quality was forecast to be exceeded only in isolated patches near the launch site, with no exceedances within or in proximity to the WHA. It is noted that the modelling scenarios commenced just after the midpoint of a spring tide period, so represent worst cases compared to neap tide period scenarios. The latter would be the preferred tidal state for a Bundle launch. It is acknowledged that ERD Figure 5-5 and ERD Figure 5-8 do not include the WHA boundary, due to the lack of exceedance of the nominated TSS thresholds in the area within or adjacent to the WHA. The WHA boundary, shown as a green line (labelled ESSA for 'Environmentally Sensitive Sea Area'), appears in the ebb tide modelling scenarios presented in ERD Figure 5-6 and ERD Figure 5-7. Updated figures are provided in the Response to Submissions Report (refer Figure 2-6 and 2-7). ERD Figure 5-4 and ERD Figure 5-12 clearly show a 'realistic worst case' for the chain footprint within the Parking area. Contact with the seabed within the Surface tow area is not considered a realistic possibility given the many management measures to be in place including: • High specification tow vessels used for launch operations. • System confirmation check completed prior to departing Parking area. • Tow vessels to be equipped with 'Dynamic Positioning' (DP) systems, with a suitable level of system redundancy. • Full tow vessel position monitoring system verification prior to leaving Bundle Parking area. • Secondary tow vessel position keeping system in place for passage through Ningaloo Marine Park. • Vessel Assurance Suitability Surveys conducted prior to commencement of operations. • Vessel intervention if required (as described in guard vessel procedure for engaging 3rd party vessels). • Visual monitoring of Bundle on surface (surface buoys and lights). • Timing of Surface tow through Ningaloo Marine Park chosen to coincide with benign sea, tidal and weather conditions. The comment requesting the modelling of all possible launch scenarios is not considered valid. As stated in numerous places throughout the ERD, a Bundle launch will only be undertaken under suitably benign weather and tide conditions. To account for a realistic worst case scenario, the modelling, which was validated against measured site conditions, assumed: • Chains located at approximately 20 m intervals along a 10 km Bundle length. • Chains of 76 mm diameter with a link length of 304 mm. • The PSDs measured during the nearshore chain tow field trial, dominated by clays and fine silts, are representative of the entire tow route. The modelling of this realistic worst case did not predict any impacts within the WHA. Therefore, further modelling is not deemed necessary as the level of risk is considered negligible.
115.	Protect Ningaloo	Silt curtains are a management action to ensure environmental objectives are achieved. However, there was not a study conducted in the Exmouth Gulf with silt curtains that confirm they will reduce the effects of turbidity. Do the projected turbidity levels in the Learmonth Sediment Dispersion Modelling Report include the use of silt curtains?	Silt curtains are widely used throughout the world to control suspended sediment/turbidity concentrations adjacent to coastal works. The proposed monitoring, as outlined in the MCMMP, will assess the effectiveness of the silt curtain and lead to the implementation of additional management controls, if required.

No.	Submitter	Submission and/or issue	Response to comment
			The use of a silt curtain is proposed in relation to the construction of the launchway, not the launch and tow of Bundles to which the referenced report relates.
116.	NCWHAC ANON-N59M-4PHC-R/ EM145	The IUCN has identified “oil spill” and “associated shipping” as the greatest threat to the NCWHA (IUCN World Heritage Outlook, 2017). As such it is prudent due regard is given to activities which may increase these risks. Exmouth Gulf has been used as a defacto port, at some of the highest densities in the region, by commercial vessels despite no formal recognition as a port area under the relevant government Acts (refer to Figure 1).  Figure 1: Shipping densities, Pilbara Region This is in a region that contains the highest concentration of ports in Australia. Unlike other ports, this means that current impacts have not been adequately assessed and no spatial management of these impacts have been implemented. The preferred shipping route exiting the gulf transverses the NCWHA and overlaps with the proposed tow route between the North West Cape and the Murion Islands and is currently frequently used by industrial vessels. There is no indication that shipping will decrease in the region and in all likelihood will increase in the future. The proposed activity involves a ‘surface-tow’ of a pipeline up to 10 kilometres long with no scope for vessels of any draft to safely navigate across - greatly increasing the likelihood of collision. The submitters notes there is an additional measure in place during the surface tow – implementation of “guard vessel procedure for engaging with 3rd party vessels”. How will the entire Bundle will be viewed and the 2 guard vessels will be able to respond in a timely manner to prevent collision with the pipeline whilst at the surface.	The IUCN World Heritage Outlook 2 report (IUCN 2017) reports (page 32) that at a global scale, invasive species and climate change now represent the two most significant current threats to natural World Heritage. These are followed by tourism impacts, legal and illegal fishing and hunting, fires, water pollution and dams. Climate change is identified as the most widespread significant potential threat, with road construction the second most widespread potential threat. Other infrastructure projects (dams and tourism facilities), mining and oil and gas development are also listed among the top potential threats. The terms ‘oil spill’ and ‘associated shipping’ could not be found within the IUCN World Heritage Outlook 2 report (IUCN 2017). The management plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area notes the following as existing and potential uses and/or pressures: • Toxicant inputs from the accidental spillage of fuel and oils. • Antifouling paints used on boat hulls. • Oil spills from passing ships. • Nutrient and pathogen inputs from sewage discharge from vessels. • Litter from commercial and recreational boating/fishing activities. Oil spill and associated shipping are not identified as key existing or potential pressures. Section 5.3.6.4 of the ERD presents an assessment of the risk of a chemical spill to the marine environment during a Bundle launch and tow. A vessel collision could potentially result in impacts to marine environment quality due to a spill of ship oil. It was noted that a major spill (e.g. due to the rupture of a fuel tank) is very unlikely to occur during a Bundle tow operation, and is no more likely to occur than in other normal tug marine operations due to the nature of the Bundle operations. A number of control measures were identified and the residual risk (after the adoption of control measures) was assessed as a ‘C’ during Bundle launch preparations and Off bottom tow mode, and a ‘B’ during Surface tow (ERD Attachment 3D). A ‘C’ risk is defined as ‘Acceptable: Medium Technical Risk (moderate consequences), Work can proceed with HSE Risk Assessment L1 (HIRA)’. The suggestion that Exmouth Gulf is subject to a high number of commercial vessel movements, with a ‘preferred shipping route’, seems at odds to the claims, made in numerous other submissions, that Exmouth Gulf represents a ‘pristine wilderness’ area with no ‘industrialisation’. Subsea 7 notes that a number of commercial (for example oil and gas, fishing, tourism, cruise, research) shipping operations occur in Exmouth Gulf. Despite this activity, the environmental quality within the area is understood to be high. The claim that commercial shipping densities in Exmouth Gulf are some of the highest in the region is not supported by the data presented. Measures proposed to eliminate the risk of collision include (as specified in the ERD): • Notice to mariners supporting information issued prior to tow to inform local vessels of operations. • Guard vessel to monitor/enforce exclusion zones. • Each vessel operating in adherence to International Regulations for Preventing Collisions at Sea (COLREGs). • Vessel intervention if required (as described in guard vessel procedure for engaging 3rd party vessels). • Community engagement and announcements locally. • Broadcasting on VHF as required. • Visual monitoring of Bundle on surface (surface buoys and lights). It is noted that the Bundle does not contain hydrocarbons. Furthermore, Subsea 7 is not dependant on marine transportation of materials to construct its Bundles and the majority of marine vessels used during operations are locally sourced and therefore do not increase the volume of marine traffic significantly.

No.	Submitter	Submission and/or issue	Response to comment
117.	NCWHAC	The ERD predictions for impacts are restricted to a single Bundle launch of unknown length using “likely” aerial visual assessment. Seabed plumes are unlikely to be seen using aerial surveillance. On-going seabed monitoring within the NCWHA for the length of the tow, and at key environmental assets, should be put in place and include clear acceptable limits and responses to breaches.	Subsea 7 understands that this comment relates to the monitoring of impacts rather than the prediction of impacts. The MOEMP has been updated to include additional details regarding the monitoring proposed. Habitat mapping confirmed that soft sediment habitat occurs along and adjacent to the tow route within the southern portion of the WHA (refer ERD Attachment 2C). During the tow through the WHA the chains hanging beneath the Bundle will not contact the seabed and therefore no impacts will occur to BCH within the WHA. Sediment fate modelling was used to predict the concentration and distribution of sediments resuspended during a Bundle launch. This modelling predicted that little suspended sediment would enter the WHA (refer ERD Figure 5-5 to 5-8 and figures presented in the Response to Submissions Report). Given the low likelihood of any impact, BCH monitoring in the WHA is not proposed.
118.	Oceanwise Australia Protect Ningaloo EM147	Water circulation in the gulf is complicated and driven by a combination of tides, wind waves, broadscale oceanographic conditions such as temperature and salinity and oceanic groundswell. These forces contribute to the broadscale circulation of water in the Gulf, most have been ignored in the modelling and these processes are essential to the maintenance of ecosystems. Ocean current modelling for Exmouth Gulf is limited to two tidal cycles were monitored in May-June 2018 in two locations. Sediment Fate Modelling also appears to have predicated on the assumption that currents within Exmouth Gulf have no complexity. Brinkman’s (AIMS 2017) work on the water movement in Exmouth Gulf would have provided a more in-depth understanding of hydrological complexities of the area. This is inadequate for understanding the complexity of currents, and influences of wind and tide at different times of the year and in different areas within the Gulf. A more comprehensive understanding about the likely scenarios and impacts of sediment disturbance throughout the Gulf during launch and towing and resuspension operations is required.	Subsea 7 believes that the submitter is referencing the work to investigate water movements in Exmouth Gulf undertaken by the Australian Institute of Marine Science (AIMS) between 1994 and 1996 (Massel and Brinkman 1997, Massel *et al*. 1997). The initial objective of the AIMS study was to test the hypothesis that long-term water mass balance in Exmouth Gulf is predominately governed by tidal motion and wind-induced currents and not by wind-generated waves. A preliminary computational hydrodynamic model of the Gulf was developed and used to run a particle tracking exercise, with the particles initiated throughout the Gulf. The model was run for 28 days, from 6 October to 3 November 1994. The work showed that water movement in Exmouth Gulf is due to tidal motion and wind-induced currents. It was also shown that the tidal movement of water within Exmouth Gulf is predominantly north-south, with the tidal excursion length (the distance a parcel of water travels before the tide turns) being less than 5 km. Large surface waves are only generated during tropical cyclones but their development is limited by water depth and bottom friction. It was found that outside of cyclone episodes, wind-generated waves are only important at the northern parts of Exmouth Gulf. The modelling completed for the Proposal took into account the outcomes of the AIMS work, with all key wiater circulation drivers considered (refer below). For the Proposal, a three-dimensional model was developed to simulate the hydrodynamics within Exmouth Gulf and the surrounding area. As the hydrodynamics in the study area are controlled primarily by tidal flows and wind forcing (as found by the AIMS work), these processes were explicitly included in the model. Water elevations, at hourly intervals, were obtained from the TPXO8.0 database, which is the most recent iteration of a global model of ocean tides derived from measurements of sea-surface topography by the TOPEX/Poseidon satellite-borne radar altimeters. The tidal sea level data was augmented with non-tidal sea level elevation data from the global Hybrid Coordinate Ocean Model (HYCOM). The HYCOM model is a three-dimensional model that assimilates observations of sea surface temperature, sea surface salinity and surface height, obtained by satellite instrumentation, along with atmospheric forcing conditions from atmospheric models to predict drift currents generated by such forces as wind shear, density, sea height variations and the rotation of the Earth. Model validation included the validation of water levels and currents, with predictions agreeing strongly with independent data (ERD Attachment 2H). Two discrete time periods were modelled, January 2017 (the period selected for sediment dispersion modelling on the basis that the outcomes could be representative of worst-case wind conditions in a typical year) and the months of May/June 2018 (the period in which the field trial data was available). Validation of model predictions was carried out for both periods. Once the physical representation of a model domain is established and the internal parameters are tuned to achieve good correlations between modelled outputs and measured data, model data can be generated for any time period as long as the appropriate forcing conditions at the model boundaries (water elevations or swells) and across the model domains (winds) are used. There would have been no additional benefit in producing, for example, 18 months of data (e.g. from January 2017 through to June 2018) to use only 2-3 months of the data. For the referenced AIMS work a model was run for a 28 day period, not 365 days. It is noted that the sediment fate modelling assessed the potential sediment plume associated with a Bundle launch under mean current velocity (i.e. mid-way between neaps and springs). This represents a worst case

No.	Submitter	Submission and/or issue	Response to comment
			as a long Bundle (i.e. longer than 8 km) would only be launched under neap conditions, leading to lower latitudinal tidal forcing and less latitudinal spread of suspended sediments.
119.	ANON-N59M-4PH9-E PN Proforma	Unacceptable risks of accidental release of chemicals and hydrocarbons during tow and launch activities.	A Bundle does not contain hydrocarbons. Mitigation measures are proposed to manage oil spills from vessels associated with Bundle launch and tow, as follows: • Each vessel equipped with a vessel specific Shipboard Oil Pollution Emergency Plan (SOPEP) or equivalent and will follow response actions to incidental pollution in accordance with the vessel's emergency plan. • Thorough clean up of environment in the event of a leak or spill. Numerous measures will be in place to prevent an offshore incident, such as vessel collision, which could potentially lead to an accidental release of fuel: • Notice to mariners supporting information issued prior to tow to inform local vessels of operations. • Guard vessel to monitor/enforce exclusion zones. • Each vessel operating in adherence to International Regulations for Preventing Collisions at Sea (COLREGs) • Vessel intervention if required (as described in guard vessel procedure for engaging 3rd party vessels). • Community engagement and announcements locally. • Broadcasting on VHF as required. • Visual monitoring of Bundle on surface (surface buoys and lights).
120.	Protect Ningaloo	Elevated turbidity from the Bundle tow construction and launch activities will result in increasing turbidity levels which may damage the root systems of mangrove systems through smothering. The chemical spills/ pollution from both the construction and operational phases of the Learmonth Pipeline Fabrication Facility may affect adjacent mangroves and this is not considered in the ERD.	Sediment accretion, or 'smothering', is not considered a likely potential cause of impacts to mangroves in the Bay of Rest or in Wapet Creek given: • Mangroves within the Bay of Rest are located over 4 km south of the proposed tow route. • The entrance to Wapet Creek, in which another area of mangroves occurs, is located over 3 km north of the proposed tow route. • Mangroves are typically found in depositional environments (Woodroffe, 1992; Saenger, 2002) so would be tolerant to low levels of sediment accretion. • Excessive sediment accretion (i.e. rates in the order of 10's of centimetres over several months) could potentially cause indirect impacts on mangroves, but levels of potential sediment accretion associated with the Proposal will be negligible (modelled 95th percentile values of 0.1 mm following a Bundle launch limited to the immediate vicinity of the tow route, and not in proximity to any mangrove areas (ERD Attachment 2H)). During operations, a number of different fuels and chemicals are likely to be stored within the Proposal area, as outlined in ERD Table 5-44. During the construction phase diesel and petrol will be the principal chemicals stored on site. Chemical and hydrocarbons will be stored in facilities designed and constructed in accordance with relevant Australian Standards. Refuelling to occur on concrete or HDPE lined pads to contain any drips and spills and spill kits will be located at strategic locations throughout the project area. As stated in Section 6.1.6.2 of the ERD, all chemical storage, with the exception of smaller volumes of diesel for mobile plant, will be located adjacent to the fabrication shed at the western (inland) end of the Development Envelope. The likelihood of chemical spills is considered low. In the event of a spill, the likelihood of a chemical reaching the groundwater prior to remediation is low, given that in the main fabrication area, where chemical storage will occur, groundwater is found to occur at a depth of between 12 and 17 mbgl depending on location. In the event that a chemical does reach the groundwater, significant dilution would be expected to occur as it travels the >5 km to the nearest mangroves located in the direction of groundwater flow (east-southeast).
121.	Protect Ningaloo	The silt in Exmouth Gulf remains largely undisturbed. The proposed Bundle pipeline will have about 500 long chains and 500 short chains hanging from it when in tow. The towing constitutes a rolling disturbance, not an instantaneous plume. The Proponent states (albeit some of this important detail is difficult to discern in the ERD) that 1.5m of chain will be in contact with the seabed out to the Parking Area.	Section 2.3.7 of the ERD states '*Typically, the ballast chains that hang beneath the Bundle vary between short and long lengths, alternating in a short long short long configuration. The typical chain size used is 76 mm diameter chain. Short lengths are typically 10-12 links (3-4 m) and long chain lengths are typically 18-20 links (5-6 m). The long chain lengths are typically spaced at 20 m intervals along the Bundle. The longer Bundle chain lengths will have some contact (4-5 links touching the seabed) along the length of the tow route out to the Bundle Parking area (approximately 30 km)*'.

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		However, sediment flux rate along the tow route has been modelled for only 2 links in the outermost section, including the laydown area where the whole structure will be lowered to the sea floor and all chains will be in contact during that period. Given the currently unexamined influence of the currents within Exmouth Gulf the modelling is unlikely to show the true impact of sediment fate.	Within the Parking Area the same number of chain links will be in contact with the seabed than during the Off bottom tow phase. The Bundle itself remains slightly positively buoyant so will not touch the seabed, but rather 'hover' several metres off the seabed. While the Bundle is in shallow water (i.e. <5 m), before the depth at which the Bundle can 'hover', a greater number of chains will be in contact with the seabed. As stated in Section 4.6.2 of ERD Attachment 2H, to represent the change in seabed disturbance with depth within the sediment fate modelling, the number of chain links assumed to be in contact with the seabed was varied. In the innermost section (nearshore), it was assumed that six chain links would usually be in contact and in the outermost section, it was assumed that two chain links would be in contact. The former assumption represents a slight overestimate, and the latter assumption represents a slight underestimate, of the number of chain links likely to be in contact with the seabed (as stated above it is likely that 4-5 links may be in contact with the seabed). It could be argued that this could have led to an associated under-estimate of volume of material disturbed by each chain. However, the scenario modelled included a range of conservative assumptions such that it is considered an appropriate worst-case. The conservative assumptions included: • A Bundle length of 10 km (this is longer than any Bundle made to date and longer than the first Bundle that would be launched at Learmonth). • A long chain separation of 20 m (it is often 30 m, leading to a significant reduction in the number touching the seabed). • The modelled scenario covered spring tides when currents are stronger and therefore material is more easily mobilised and would remain in suspension longer than during neap tides when lower current speeds prevail. It is also highly unlikely that a Bundle launch would occur during spring tides. • The PSD measured during the nearshore chain tow field trial was used for the entire tow route. The sediment at this inshore location was dominated by clay and fine silts (~80%) compared to the 'fine sand with shell grit' and 'muddy fine sand with shell grit' recorded further offshore along the tow route. Given these conservative assumptions, the resulting modelling predictions are considered to be conservative (worst case) and are expected to be within the realistic range that would be generated from a Bundle tow operation.
122.	ANON-N59M-4PWG-B Birdlife Australia Protect Ningaloo	Submitters made the following comments regarding construction related impacts: • Direct and indirect impacts on marine environmental quality are likely given that construction continues for six months. Repeated elevations in turbidity over 6 months is not short-term and should not be likened to natural storm related turbidity events, which would occur much less frequently over this time. • Tides and surface winds will influence the footprint of turbidity impacts (dispersing sediments south into Bay of Rest) and these should be appropriately modelled rather than just stating that ''turbidity is expected to be limited to the immediate surrounds (<50m).'' • The likelihood of the sediment relating to launchway construction dissipating between daylight construction shifts is going to be dependent on a range of environmental factors including tides and weather conditions. What further mitigation or management actions will be put in place to reduce turbidity levels? • The ERD discusses the construction impacts on water quality only in the vicinity of the Development Envelope. • Rockfill and the release of fines, nutrients or contaminants is likely to occur during launchway construction. There is the potential for	Subsea 7 notes that evidence from several other similar construction programmes indicates that significant impacts beyond the immediate surrounds of the construction footprint do not occur. Section 5.1.6.4 of the ERD describes, as an example, the absence of observable impacts within sensitive coral communities beyond 50 m from the footprint of the Coral Bay Boating Facility. Turbidity-generating activities will be a small sub-set of the activities undertaken during the up to six month construction period, and turbidity management measures will be in place, as outlined in the ERD (refer ERD Table 5-8) and the MCMMP. Water quality monitoring is proposed, with turbidity-generating activities to be suspended if the relevant water quality criteria are exceeded. The offshore end of the launchway will overlie, and is surrounded by, soft sediment habitat. A significant impact to adjacent habitats is not expected as a result of the minor excavation of material along a 24 m section of the launchway footprint and subsequent placement in adjacent Soft sediment habitat. There is no known source of contamination (refer ERD Attachment 2F) or acid sulphate soils within or adjacent to the offshore end of the launchway footprint.

No.	Submitter	Submission and/or issue	Response to comment
		damage to occur across intertidal reef, coral, sponge and benthic habitats within the rest of the Development Envelope (250m wide), despite the modelling for a total of 100m impact zone. This is of serious concern in relation to marine environmental quality impacts to benthic habitats adjacent or proximate to the construction area. • Volume 2, Section 5.3.6.1, page 155: states that "Disturbance of the seabed by construction equipment, including when an approximately 300 mm layer of sediment is removed from the last 24m length of the launchway footprint." The wording 'removal of sediment' appears to correlate with 'dredging'. This implies that there is an area of 24m x 0.3m x 15m = 108m3 of soil that is planned to be placed at the northern side of the launchway during construction. Turbidity caused by removal and dumping of this sediment is a serious concern with regard to adjacent benthic habitats being impacted, further resuspension, suspension of pollutants. because this is within an area considered highly likely to disturb acid sulphate soils.	
123.	Protect Ningaloo	'Short-term-pulses, periodic, superficial disturbance of the top sediment layer' does not adequately describe the 40 hour sediment suspension that is modelled to occur in coastal waters. This turbidity is largely closer to the seabed in the lower 1m of the water column. Persistent biotic turbidity along the tow route is likely to impact all benthic habitat along it for unacceptably long periods (13-40 hours per operation) (ERD Figure 5-5). There is a likelihood of resuspension of the silt once it has been disturbed, through wind and wave and current forcing. This is likely to be redistributed across habitats and smother BCH, with most impact across coastal habitats.	Exmouth Gulf is a naturally turbid environment. As stated in Section 5.3.3 of the ERD, a comprehensive analysis of Subsea 7's water quality data was completed, with observed turbidity peaks compared to available wave, wind and tidal data. No clear trend against any of these datasets was found. It is likely that the occurrences of elevated turbidity are related to a number of factors, including wind speed and direction, tidal state (both range and state during periods of strong wind) and potentially adjacent prawn trawling activity. It has been suggested, anecdotally, that elevated turbidity can occur a few days following the peak of a spring tide cycle, though such a trend was not clearly apparent from the available data. The turbidity predicted to occur during and following a Bundle launch is not significant against the backdrop of naturally high turbidity and the BCH that have adapted to such an environment. For physical stressors, such as turbidity or TSS, the approach for determining if a significant and unacceptable change will or has occurred, within a high ecological protection area (the majority of Exmouth Gulf), is to compare the median of the test site data (or modelled impact data) with the 80th percentile of the unimpacted reference distribution (EPA 2017). Under both the flood tide and ebb tide launch cases, the threshold (or EQG) was forecast to be exceeded in a zone mainly confined to the shallowest half of the Bundle tow route and its surroundings (ERD Figure 5-17). These elevated concentrations were only predicted during the launch for a period of six hours (flood tide) and two hours (ebb tide) (ERD Figure 5-9). No impacts to BCH are expected as a result of this short-term turbidity (refer Section 5.1.6.6 of the ERD). Negligible sediment settlement (or 'smothering') is predicted to occur as a result of the relatively low levels of sediment resuspended during a Bundle launch (ERD Attachment 2H).
124.	Protect Ningaloo	The Proponent submits that in the modelling for the lower, deeper water areas of the Launchway and Parking Area, it will have an elevated turbidity equivalent of >= 10mg/L. According to the Sediment Dispersion Modelling Report, coastal waters have a natural turbidity mean of 1.1 NTU. The modelling therefore suggests that during launch and towing operations turbidity levels could possibly be three times higher than normal for extended periods (up to 40 hours in some areas). Launch and tow operations may only occur a few times each year, but these extreme and recurring changes repeatedly damage benthic habitat so that repair is not likely, and such environmental turbidity is unlikely to be 'tolerated' by marine species or benthic communities.	Measurement of near-seabed TSS during the field trial recorded values ranging from 2 mg/L to 30 mg/L (ERD Attachment 2H). Monitoring between 22 May and 21 June 2018 recorded an average turbidity at the launchway location of 4.3 NTU (or approximately 7.5 mg/L) and in the vicinity of the Parking area of 3.6 NTU (or approximately 6.3 mg/L) (ERD Figure 5-15). ERD Figure 5-6 presents the modelled distribution of maximum (i.e. near seabed) water column turbidity (as TSS) during a Bundle launch. Concentrations greater than 10 mg/L were predicted within the Offshore Operations Area and adjacent to the inshore portion of the Off bottom tow area. ERD Figure 5-9 indicates that any one site is likely to be subject to such elevated TSS concentrations for short periods of < 10 hours due to the predominantly N-S tidal currents. Exceedance of the 80th percentile of baseline depth-averaged turbidity was predominantly predicted over the unvegetated, Soft sediment, habitat, which is not considered sensitive to elevated TSS.

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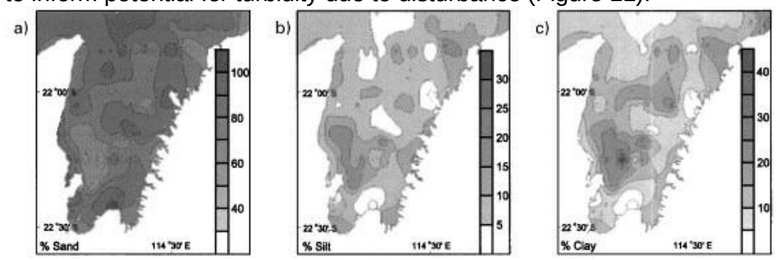
			BCH including corals, sponges and seagrass, have been found, following extensive research (Lavery *et al.* 2017, Pineda *et al*. 2017, Jones *et al*. 2019), to be highly tolerant of such short exposures to elevated TSS concentrations. As such no impact to BCH is expected.
125.	Protect Ningaloo	Sponges and corals in adjacent habitat to the launch and towing envelope are likely to be impacted by the turbidity and reduced water quality that directly results from the Bundle towing operation. Tolerance of these animals to turbidity has been given inadequate consideration.	BCH including corals, sponges and seagrass, have been found, following extensive research (Lavery *et al.* 2017, Pineda *et al*. 2017, Jones *et al*. 2019), to be highly tolerant of such short exposures to elevated TSS concentrations. As such no impact to BCH is expected.
126.	Protect Ningaloo	The possible disturbance of other unknown elements that may be contained within the silt sediment that could act as pollutants once disturbed. This could seafood health, dependent on the elements contained in suspended sediments and the length of time suspended.	An assessment of baseline sediment quality offshore of Heron Point recorded no contamination (ERD Attachment 2F). A Pilbara-wide assessment of sediment quality, including sites in Exmouth Gulf, similarly recorded low concentrations of contaminants (DEC 2006). No impacts to marine environmental quality are expected.
127.	Protect Ningaloo	Monitoring and management proposed in the ERD and management plans is not adequate: • There is no baseline assessment of the spatial and temporal variation in habitat values including soft and hard substrates supporting hard and soft corals, sponges, macroalgae, oyster beds, mangroves, seagrasses and more. Therefore, it is not possible to assess the impact of water quality and sediment disturbance changes. This includes habitats of the NCWHA, Bundegi Sanctuary Zone and Wapet Creek. • There are references in the ERD to an Environmental Quality Plan and Environmental Quality Objectives for Levels of Ecological Protection but no specific management actions or monitoring. • Mitigation of marine water quality impacts associated with construction is limited to twice daily visual monitoring at the launchway site. This does not satisfy the EPA's requirement that mitigation efforts have been addressed fully. • Monitoring and mapping of water quality adjacent to launchway is inadequate, being only prior to construction and one year after. • Marine Construction and Monitoring Plan does not detail the predicted losses in the context of objectives and targets. • Monitoring of impacts to marine water quality are not dealt with in relation to launch and tow operations. These impacts will be recurring. • Direct and indirect impacts on marine environmental quality are likely given that construction continues for six months.	Subsea 7 considers that the assessment of BCH has been comprehensive. Publicly available datasets were used to map BCH at a regional scale (i.e. the whole of Exmouth Gulf), with Proposal-specific studies then undertaken to characterise and map BCH within the defined LAUs. Studies were completed in several seasons to assist in understanding any significant temporal variations. The monitoring and management actions relevant to the designated EQOs are described in ERD Table 5-17 and in the MCMMP and MOEMP. The mitigation measures proposed in relation to the construction of the launchway, as outlined in ERD Table 5-17, are as follows: • Launchway designed to minimise footprint (including extent of rock fill) thus reducing seabed disturbance and duration of construction. • Use of pre-cast concrete panels will reduce seabed disturbance and duration of construction. • Construction material to be screened and washed to remove 'fines' (particles <63 µm in diameter). • Silt curtains deployed during turbidity-generating construction activities (refer MCMMP).. • Suspension of turbidity generating construction activity in the event elevated turbidity is recorded beyond the ZoMI (refer MCMMP). As stated in the ERD and MCMMP, twice daily (during works: approximately 10am and 2pm) visual monitoring will occur during launchway construction. In the event of persistent turbidity, additional assessment of water quality will occur at the 50 m boundary. The MCMMP includes the protocols and procedures for monitoring of key environmental quality indicators and management of environmental quality to ensure that the construction of the proposal achieves the proposed Environmental Quality Objectives and Levels of Ecological Protection. The ERD presents the predicted impacts to water quality and BCH. The monitoring of water quality during a Bundle launch is addressed within the MOEMP. The ERD (Section 5.3.6.1) assesses the potential impacts to marine environmental quality during launchway construction.
128.	Protect Ningaloo	There is a lack of consideration of cumulative impacts on water quality and turbidity from the proposal and existing impacts. For example, prawn trawling, climate change, anchor damage, shipping and recreational fishing and vessel usage.	Section 5.3.6.5 of the ERD discusses the potential cumulative impacts to water quality associated with the Proposal and third party operations, which include mariculture and commercial fishing operations. Climate change is not considered a 'third party operation' and impacts to marine environmental quality from general commercial and recreational shipping activities are considered to be negligible.
129.	Oceanwise Australia	The deeper waters have been demonstrated to contain sediments high in silts and clays which are likely to remain in suspension for extended periods and be transported to sensitive coral reefs, subtidal filter feeding communities, seagrasses, intertidal sand flats, oyster beds and other habitats not adequately considered in the Subsea 7 documentation. These habitats and sediment are not likely to be the same as found in other	The modelling undertaken for the Proposal took into account the measured particle size distribution of sediments adjacent to the inshore end of the proposed tow route and the results from a field trial completed to understand the behaviour of these sediments when disturbed by a Bundle chain. Subsea 7 has not claimed that the sediments in the centre of Exmouth Gulf are composed of coarse sand.

No.	Submitter	Submission and/or issue	Response to comment
		locations in the region given the unique reverse estuary environment of Exmouth Gulf. As a result, impacts from water and sediment quality on habitats that elsewhere might not be considered critical may be those habitats that generate significant amounts of primary productivity in Exmouth Gulf. Brunskill et al (2001) characterized surficial sediment throughout the Gulf which provides some indication of habitat heterogeneity and can be used to inform potential for turbidity due to disturbance (Figure 11).  Figure 11. Sand, Silt and Clay distribution across the Exmouth gulf (source: Brunskill et al 2001). The main assertion by Subsea 7 that the ground trawled in Exmouth Gulf is coarse sand and resulting turbidity issues will disappear within 40 hours is not consistent with the scientific literature. In fact some of the highest concentrations of silt and clay are found within the tow route immediately adjacent heron point at the base of the gulf, suggesting disturbance of these sediments will create persistent turbidity problems (Figure 12). 	The text '*the ground trawled in Exmouth Gulf is typically comprised of coarse sediments that do not readily 'silt'…*' was reproduced from a Department of Fisheries report (Kangas *et al*. 2006) assessing the risk of environmental impacts due to turbidity generated by prawn trawling activities, and was presented in this context. The likely persistence of broadscale turbidity for 'days if not weeks' is contested, based on the scientific evidence presented in the ERD, and it is noted that 'thousands' of Bundle chains are not proposed.

No.	Submitter	Submission and/or issue	Response to comment
		Figure 12. Showing the turbid water left behind after trawlers have moved through the proposed towpath. Such plumes drive declines in water quality and visibility long after the event to such an extent that scuba diving at the Navy Pier can be disrupted. These are caused by relatively small objects being towed along the seafloor. Alternatively, the towing of a 10km long pipeline through the gulf with thousands of chains dragging on the seafloor will create plumes orders of magnitude greater and result in broadscale declines in turbidity and water quality that will persist for days if not weeks given the silty clay sediment types characterizing the towpath.	

ATTACHMENT 1 (TABLE 2F) - SUBSEA 7 RESPONSES TO COMMENTS ON MARINE FAUNA

No.	Submitter	Submission and/or issue	Response to comment
130.	ANON-N59M-4PRF-5 ANON-N59M-4PFE-R BHLF-N59M-4P8G-C BHLF-N59M-4P8N-K ANON-N59M-4PR9-R ANON-N59M-4PK9-H ANON-N59M-4PWP-M ANON-N59M-4PWG-B ANON-N59M-4PK6-E ANON-N59M-4PHE-T ANON-N59M-4PHB-Q ANON-N59M-4PHC-R/EM145 ANON-N59M-4PHV-B ANON-N59M-4PHS-8 ANON-N59M-4PK7-F ANON-N59M-4PWR-P ANON-N59M-4PRX-Q ANON-N59M-4PRE-4 EM11, EM147 PN Proforma Protect Ningaloo Centre for Whale Research (WA) Rangelands NRM Oceanwise Australia PA1-986	Submitters consider the proposal poses an unacceptable risk and disturbance to marine fauna in the Exmouth Gulf Bay of Rest and Ningaloo, and the interconnectedness of the Gulf and Ningaloo Reef. Key issues include underwater noise, vessel strike, water pollution, light spill, water quality and sediment disturbance, all of which will result in additional pressures on wildlife. Submitters recognised that Exmouth Gulf provides significant year-round habitat for a range of threatened marine species, including dugongs, manta rays, whales and dolphins, hawksbill turtles, short-nosed sea snakes, migratory shorebirds and more. Exmouth Gulf provides nursery and critical habitat for species that are important to nearby Ningaloo Reef including mangrove jacks and shovelnose rays. The Gulf is a critical resting area and nursing ground for the world's largest humpback whale population. Exmouth Gulf contains globally significant habitats including an extensive undisturbed arid zone mangrove ecosystem and ancient fossil coral reefs as well as extensive coral communities, seagrass meadows and sponge gardens. Submitters recognised that the UNESCO World Heritage Committee recommended for the Gulf to be included in the NCWHA. Submitters consider that the assertions that this structure and this industrial operation will cause minimal disturbance and little or no contact with fauna are not plausible. Insufficient scientific evidence was presented to ensure no threat to marine fauna.	The Proposal will not affect marine fauna in the Bay of Rest or on Ningaloo Reef, as no activities are proposed in these areas. The interconnectedness of Exmouth Gulf and Ningaloo Reef will not be affected. The Proposal involves the periodic towing of a sealed pipeline Bundle from Heron Point out through Exmouth Gulf. Regional water, nutrient or species movements will not be affected. The values of the wider Exmouth Gulf are well recognised and were noted within the ERD (e.g. refer Section 2.5.5). The potential threats (impacts) to marine fauna from the Proposal, as identified in the ESD, have each been separately addressed in the ERD. The assessment of each threat took into account existing scientific knowledge on each species potentially affected, based on published research and additional studies commissioned by Subsea 7. Where a threat was identified as needing additional controls, specific management measures were developed to address the inherent risks. The submissions received on the ERD did not identify significant additional scientific knowledge not taken into account during the completion of the ERD. The potential impacts to marine fauna associated with the launchway have been clearly described, and are expected to be negligible. The only 'industrial' activity proposed is that of Bundle manufacture, which will occur approximately 10 km from the coast. Bundle launches are periodic (maximum of three per year) and short-term (1-2 days). Management measures to minimise the risk of impact to marine fauna are described within the ERD.
131.	ANON-N59M-4PFA-M ANON-N59M-4PRM-C ANON-N59M-4PRZ-S ANON-N59M-4P8S-R ANON-N59M-4PFA-M ANON-N59M-4PFP-3 ANON-N59M-4PF5-8 ANON-N59M-4PFU-8 ANON-N59M-4PW2-P ANON-N59M-4PWB-6 ANON-N59M-4PW7-U ANON-N59M-4PWU-S ANON-N59M-4PKY-H ANON-N59M-4PKC-U	Submitters are supportive of the avoidance, management and mitigation measures proposed to reduce potential impacts to whales and marine fauna. This includes to stop operations during whale migration, slow tow speeds, limited launches per year etc. The proponent is sensitive to the whale migration peak times, and from my experience with whales in the Exmouth gulf, there will be less impact from this proposal than the tourism industry.	Agree It is Subsea 7's belief, based on a scientific approach as presented in the ERD and management plans, that the Proposal can be implemented with minimal environmental impact.
132.	Protect Ningaloo	The population and spatial variability of mud crab species and other crustaceans, which are a crucial benthic organism for the mangrove ecosystems, need to be fully understood by conducting further research on these species in the Exmouth Gulf.	As discussed above, no impacts to the mangroves, or the adjacent mudflats, are expected. The crustacean fauna of the Bay of Rest mangroves, and adjacent areas, will not be affected by the Proposal.
133.	Birdlife Australia	More evidence should be provided for the effectiveness of silt curtains around construction area at mitigating impacts to marine fauna.	The silt curtains are proposed to mitigate impacts to water quality (turbidity) which could lead to indirect impacts to BCH. The ERD notes (ERD Table 5-22) that deployment of silt curtains around active construction areas will '*assist in preventing marine fauna from entering these areas*' (as they will represent a physical barrier around the work area.

No.	Submitter	Submission and/or issue	Response to comment
			However, the use of a Marine Fauna Observer (MFO) during marine construction activities is the primary measure to ensure that no listed marine fauna enter within a 'marine fauna exclusion zone' of 50 m surrounding active construction (e.g. placement of rock fill, placement of pre cast slabs). The ERD stipulates that such works will be suspended in the event an animal enters this zone during active construction.
134.	Department of Biodiversity, Conservation and Attractions Protect Ningaloo	There is the potential for direct or indirect impacts on threatened or specially protected under the *Biodiversity Conservation Act 2016* (BC Act) species as a result of implementing the proposal, which require specific management. The proponent has developed a MFMP (Appendix 3B) as part of the ERD to mitigate potential impacts on marine fauna identified by the proponent "as a result of construction of the launchway at Heron Point, or during the proposed Bundle launch and tow operations through Exmouth Gulf (on average two, and up to three, per year)" (page 11, Appendix 3B). DBCA is of the view that the Marine Fauna Management Plan (should arguably be titled as a 'marine fauna impact avoidance and management plan') requires further information to confirm that potential impacts on conservation significant species would be suitably avoided or mitigated if the proposal is implemented. Recommended additional matters to be addressed in the plan include, but may not be limited to: a) inclusion of potential impacts on migratory shorebirds and proposed management; b) vessel strike and entanglement management during all stages of offshore operations; c) management decisions and actions in response to Marine Fauna Observer input; d) identification of humpback and other whale species, particularly females with calves, by spotter planes from March to June prior to the 'no launch period', and avoidance measures to be implemented; and e) measures for avoidance of impacts of artificial light on fauna consistent with the Draft National Light Pollution Guidelines for Wildlife (Department of the Environment and Energy, September 2019). The plan for the management of potential impacts on marine fauna to be developed in consultation with the DBCA. The plan should be finalised prior to the commencement of any development activities and consider monitoring and management during construction, operation and decommissioning.	The potential impacts to migratory birds are assessed in detail in the ERD (refer Sections 5.4.6.2, 5.4.6.6, 5.4.6.9, 5.4.6.11 and 7.6.2). Overall the risk of impact is considered low given Heron Point did not appear to be a key foraging or roosting site, and that impacts to habitat will be restricted to the footprint and immediately adjacent areas only. Management measures relevant to migratory birds, as outlined in the ERD, include: • Lighting design during Bundle launches will be a continuation of lighting management measures implemented during fabrication operations and will take account of measures proven to reduce the risk of impact on marine fauna such as shrouded or directional lighting. • Design of launchway to minimise height of structure above surrounding beach or seabed. • Management of onshore sediment accretion via monitoring and sand bypassing. Notwithstanding the above, the MFMP has been updated to include migratory birds. Additional detail is provided in Table 10 of the MFMP regarding entanglement management actions and reporting, including potential actions in response to MFO input. Whales have been included in the species to be monitored from the spotter plane. Measures for the avoidance of impacts from artificial light have been updated in accord with the draft guidelines. The DBCA has been invited to discuss the Proposal on several occasions since 2017. Subsea 7 considers the review of the ERD and MFMP, and provision of comments, to represent a suitable level of consultation.
135.	Department of Biodiversity, Conservation and Attractions	The proponent is proposing a three month 'no launch period' from August to October each year. This should be expanded to a four month 'no launch period' from July to October (inclusive) each year during operations, to reduce the risk of adverse impacts on humpback whales within and near Exmouth Gulf, particularly pregnant females and neonate calves. While the surveys to inform the ERD noted that humpback whales were first observed in late July, DBCA is aware of a recent study undertaken by Irvine et al., 2018 that is not referred to in the ERD. this study provides evidence of a greater number of humpback whale calves (approximately 20 per cent of the annual calf production of the breeding stock) born along North West Cape during the northern migration in June and July.	Subsea 7 initially proposed to maintain the currently proposed 'no launch period' between August and October (inclusive). While is it acknowledged that some early calving has been recorded to the west of the North West Cape in July, relatively low numbers of Humpback whale individuals have been recorded in Exmouth Gulf prior to August (and even into early August). The risk of impact to Humpback whales from a Bundle launch, should one occur in July, was considered low given: • The low numbers of Humpback whales expected in Exmouth Gulf in July could be readily monitored and the Bundle launch and tow operation adjusted to avoid identified animals. • The spotter plane would be deployed for all July launches, to undertake observations for Whale sharks and Humpback whales. • The low tow speeds. • The presence of MFOs onboard all support vessels.

No.	Submitter	Submission and/or issue	Response to comment
		In addition to pregnant females and neonate calves traversing the proposed Bundle tow route during June and July, it is also possible that Exmouth Gulf is utilised as a nursing and resting area during these months by northbound females and neonate calves, as well as southbound females and older calves (Irvine et al., 2018). Further, recently published information indicates that females and calves using Exmouth Gulf as a resting area spend a significant amount of time resting at shallow depths and thus out of immediate view from the surface and are therefore vulnerable to vessel strike (Bejder et al., 2019). On this basis, DBCA considers that an August to October no launch period appears unlikely to fully address the temporal extent (including natural variability) of humpback whale use of Exmouth Gulf and surrounds, or adequately prevent potential impacts on cetaceans associated with the proposed Bundle tow activities. Taking into account the biological importance of Exmouth Gulf to the breeding stock of humpback whales migrating along the Western Australian coast and the likely occurrence of pregnant females and neonate calves along North West Cape and within Exmouth Gulf during July, traversing the proposed Bundle tow route, DBCA considers a precautionary approach is appropriate and therefore recommends that the proposed no launch period be extended to include the month of July.	It is noted that beyond the immediate vicinity of Heron Point the tow route traversed deep water which would be unlikely to meet the description of 'the shallow areas preferred by the mother-calf pairs' (Bejder *et al*. 2019). It is understood that '*whilst in Exmouth Gulf, lactating females spend 53% of their time within 3 m of the water surface, where they are at risk of vessel strike*' (Bejder *et al*., 2019 cited in ERD Attachment 2J). At such shallow depths they are likely to be highly visible from the spotter plane, such they can be readily identified and appropriate management measures undertaken. Following further feedback (refer Attachment 1, Table 3) the 'no launch' period has been extended to four months (July to October, inclusive).
136.	Protect Ningaloo NCWHAC	Table 7 (Attachment 3B, page 31) only provides the implementation of a 'no Bundle launch' period August to October; 2-8 knot vessel speeds; and trained Marine Mammal Observers and avoidance training. There is no detailed information for humpback whale mitigation measures provided. Submitters expressed concern regarding the marine fauna observer's ability to observe the entire Bundle at all times and likelihood of success for the proposed mitigation measures.	Table 7 relates to the temporary behavioural response of marine fauna due to changes in marine water quality. The mitigation measure in relation to the exposure of Humpback whale calves to elevated turbidity during launchway construction is to deploy a silt curtain in the event visual monitoring reports turbidity beyond 50 m from the construction site. The mitigation measure in relation to the exposure of Humpback whale calves to elevated turbidity during a Bundle launch is to not undertake a Bundle launch during the peak of the southern migration period. During a Bundle launch and tow, MFOs will be onboard the lead tow/support vessels and will have visibility immediately ahead of the Bundle tow. Additional MFOs will be onboard all other support vessels so will have some, but not complete, visibility on either side of the Bundle. The slow speed of the tow and ability of marine fauna to implement avoidance action is noted.
137.	ANON-N59M-4PK4-C EM147 EM141 Oceanwise Australia Protect Ningaloo	Submitters consider that the marine fauna surveys are inadequate, particularly for species other than humpback whales. Further surveys regarding species' distribution and the impacts of the launch, tow and related infrastructure need to be carried out in order to properly assess the impacts to other species throughout the year, both in and around the project envelope. Specific examples provided are: • Modelling of impacts from the launch and tow of a Bundle and the infrastructure and vessels associated with it is required for marine mammals, sea snakes, turtles and whale species other than humpbacks. • The direct and indirect impacts on marine turtles particularly juveniles found throughout the LAU are not well understood and the presence of this juvenile habitat is not acknowledged in the ERD, neither are the increasing occurrence of shipping strikes impacting these animals. • No dedicated studies were undertaken on seahorses and pipefish nor fish inhabiting the soft sediments found in Exmouth Gulf. Their	As stated in ERD Attachment 2J, the aerial surveys were conducted to '*inform and improve the management of potential impacts associated with the pipeline bundle project*'…and...*.'to determine the spatial and temporal distribution of humpback whales within Exmouth Gulf. Opportunistic sightings of other species of marine mega-fauna inhabiting Exmouth Gulf were also recorded*'. Subsea 7 submits that the level of information available for other marine fauna species, gained from previous studies (including those identified in ERD Table 5-19), was sufficient for the appropriate assessment of potential impacts from the Proposal. Subsea 7 notes that the abundance of marine fauna species, as recorded from regional and Proposal-specific studies, was generally greatest within the southern and eastern parts of Exmouth Gulf, a significant distance from the Offshore Operations Area, which support extensive mangrove and seagrass habitats. Despite the broadscale mapping of Biologically Important Areas for a number of species occurring within Exmouth Gulf (refer ERD Figures 2-13, 5-18, 5-24, 5-27), the Offshore Operations Area does not intersect habitat known to be of particular importance to any marine fauna species.

No.	Submitter	Submission and/or issue	Response to comment
		small home ranges make them particularly susceptible to habitat loss, while their low reproductive rates mean many populations cannot replenish and are now Endangered or Vulnerable to extinction. • A research study should have been conducted to evaluate the extent to which dugongs and sea turtles utilise the local mangrove system.	ERD Table 7-7 presents an assessment of potential impacts to 'critical habitat' in relation to the Humpback whale, Whale shark, Green Turtle, Hawksbill Turtle and Grey Nurse Shark. No impacts to critical habitat are predicted. ERD Table 7-8 and 7-9 present an assessment of potential impacts to 'critical habitat' in relation to the Loggerhead turtle, Australian humpback dolphin, Indo-Pacific bottlenose dolphin, Dugong, Giant manta ray and Reef manta ray. No impacts to critical habitat are predicted. Dolphins, turtles and sharks were relatively evenly distributed throughout Exmouth Gulf during the aerial surveys undertaken for Humpback whales. Sea snakes abundance was highest in the north-western area of Exmouth Gulf (ERD Attachment 2J). Turtles had a broad distribution throughout Exmouth Gulf, with the highest numbers in the shallow waters in the southern and eastern areas of Exmouth Gulf (ERD Attachment 2J). This aligns with previous findings for Green turtles, the most abundant species (Oceanwise 2005, Oceanica 2006). Dugongs were distributed in shallow waters mainly along the eastern and southern areas of Exmouth Gulf (ERD Attachment 2J). No impact to seagrass or mangrove habitat is predicted as a result of the Proposal.
138.	ANON-N59M-4PHV-B ANON-N59M-4PHC-R/EM145 BHLF-N59M-4P8N-K EM147 Oceanwise Australia Protect Ningaloo NCWHAC	Submitters consider that the impact of noise on species in Exmouth Gulf has not been adequately considered. Submitters noted that the "soundscape in Exmouth Gulf is mainly dominated by biological sounds from wave action, humpback whales and snapping shrimp, with a low noise contribution from shipping, boating and other anthropogenic activities (Bejder et al. 2019). Increased development within or adjacent to Exmouth Gulf would see an increase in marine traffic and a concomitant increase in anthropogenic noise within humpback whale breeding/resting habitat, with the potential for increased risk of ship strikes and acoustic disturbance to resting and nursing mother and calf whales (Bejder et al. 2019)". Current impacts from unregulated commercial vessel traffic has never been quantified. It is of equal intensity to many other official ports in the Pilbara. Submitters consider that this proposal, in addition to the existing shipping, including service vessels and tugs, present in Exmouth Gulf is a particular threat to cetaceans that rely on acoustics for feeding, navigating, communicating with calves and whale's ability to rest. Submitters consider that the ERD is very vague and does not contain any credible or detailed data about marine mammal hearing sensitivities. Whilst the ERD characterises the source levels of the construction noise (which is very high), it does not characterise the frequency range. There is therefore not enough data presented in the ERD to make the claim "Other hearing groups (high-frequency cetaceans, very high-frequency cetaceans, sirenians and marine turtles) are less sensitive and are considered unlikely to experience permanent threshold shift (PTS) or temporary threshold shift (TTS) impacts (SLR 2019)." Submitters noted that the cited SLR 2019 report (Subsea 7 Learmonth Bundle Fabrication Facility - Construction and Operational Underwater Noise: Screening Assessment) was not made available. Therefore, it is impossible to assess whether the various marine mammal species will experience TTS or permanent threshold shifts in response to these construction noises.	As noted in the first paragraph of the submission, recent studies have found that currently a low noise contribution is made by shipping, boating and other anthropogenic activities within Exmouth Gulf (Bejder *et al*. 2019). Therefore, it is considered that currently cetaceans are not threatened by underwater noise in Exmouth Gulf. Given that Bundle launch will not occur during the peak of the Humpback whale southern migration, this activity poses a low risk of impact to this species. The risk to other species is mitigated through: • The infrequent and short duration of proposed offshore activities. • The limited range of underwater noise from offshore operations with the potential to cause physical impacts. Marine mammal hearing sensitivities are well documented and relevant, scientifically derived, thresholds available. These have been referred to within the ERD. The construction noise levels will be very low (associated with rock dumping and general barge operations) compared to those from sources generally considered to be of potentially significant risk to marine fauna, such as piling and blasting. The noise from excavation and rock dumping is expected to be in the range of 12 to 12,000 Hz (based on an assumption that it will be broadly similar to dredging noise) and therefore within the auditable range for the majority of marine fauna. However, the noise source level is expected to be significantly lower than the levels associated with larger dredgers (which have noise source levels of up to 182 dB re 1µPa @ 1m) (Wyatt 2008). Previous assessment of the potential for impacts to turtles, cetaceans and dugongs from capital dredging using a large trailer suction hopper dredge (TSHD) recommended that an exclusion zone was not required (SVT 2010). An Underwater Noise Screening Assessment completed for the Proposal (SLR 2019) predicted the following impact zones for low frequency cetaceans (the most sensitive hearing group) surrounding rock dumping operations during launchway construction, based on a 30 minute exposure (fauna would be expected to move away within this period if disturbed): • PTS onset zone of < 10 m. • TTS onset zone of < 20 m. To adopt a precautionary approach, and prevent physical injury and underwater noise related impacts (including TTS) to marine fauna during launchway construction, a 'marine fauna exclusion zone' of 50 m surrounding active construction (e.g. placement of rock fill, placement of pre-cast slabs) is proposed. Works will be suspended in the event an animal enters this zone during active construction. The screening assessment (SLR 2019) is attached to the Response to Submission Report. An additional underwater noise study has also been completed to determine, in more detail, the risk of physical or behavioural response during a Bundle launch and tow (JASCO 2020). Given the current low noise contribution is made by shipping, boating and other anthropogenic activities within Exmouth Gulf, as noted above, the outcomes of a cumulative impact assessment would not differ from the impact assessment undertaken for the Proposal. It is understood that an Exmouth Gulf Management Plan has been developed by a key operator to '*reduce the risk*

No.	Submitter	Submission and/or issue	Response to comment
		Submitters consider the inclusion of quantitative information, including modelling of expected increases in anthropogenic noise as a result of the proposal, and a cumulative impact assessment from other foreseeable shipping increases, is required. Submitters consider that adopting an exclusion zone as a mitigation measure for underwater noise is not considered feasible as it is not possible to exclude animals from an area. It was also noted that the associated underwater noise could be intense and likely to cause behavioural response of marine mammals over quite a large area. The ERD has not indicated the potential noise levels of towing operations under various scenarios. Submitters considers that noise, even outside the 'no-launch' period during whale season, will prevent humpback whales from coming into the gulf to rest and nurse young. Recent studies by Bejder et al (2019) suggest added noise, shipping pressure, increased boat strike are likely to reduce survival rates of resting humpbacks and may cause them to no longer recognise Exmouth Gulf as a safe refuge.	*of vessel strike and potential negative impacts on the behaviour of humpback whales resting within the Gulf, from either vessel transit or lifting operations (cargo transfer)*'. Given that offshore operations associated with the Proposal will not occur during the peak Humpback whale southern migration period, significant impacts to Humpback whales are not expected. It is noted, as discussed in Section 2.4.8.1 of the ERD, that Bundle technology is expected to lead to a decrease in vessel operations in Exmouth Gulf.
139.	ANON-N59M-4PK4-C EM144 ANON-N59M-4PHC-R/EM145 Protect Ningaloo	The ERD states that Exmouth Gulf is not a nursery for dugongs but this is incorrect. Dugongs are resident throughout the year, feeding on the seagrass beds and any development which might impact on dugong survival is to be deplored. Further research is required as a priority to confirm dugongs' preferred habitat in the Exmouth Gulf as the habitat use in this area has potentially changed. This ERD also didn't specifically highlight the importance of seagrass BCH type to the dugongs, only that dugongs have been associated with the shallow seagrass habitat in that area. For example, there are more studies in Shark Bay of North western Australia that reveal the significance and importance of seagrasses that dugong's population but have not been added into the ERD. The timing of calving for dugongs has also not been mentioned or assessed in the ERD. These are critical times for mothers and their calves, and any disturbance should be avoided.	The ERD (Section 5.4.3.2) states that '*Exmouth Gulf and Ningaloo Reef have been identified as biologically important areas, year round, for Dugong breeding, calving and nursing*'….and…*.'Dugong activity is thought to be focused on the east coast of the Gulf associated with the shallow seagrass habitat in this area (Figure 5-25), but there is a lack of understanding regarding fine scale movements and the importance of various habitats for resting, breeding or feeding (Oceanwise 2005)*'. During the aerial surveys completed for the Proposal (focussing on Humpback whales) Dugongs were distributed in shallow waters mainly along the eastern and southern areas of Exmouth Gulf (ERD Attachment 2J). No impacts to breeding, feeding or resting (and nursing) behaviour will occur given the separation distance of over 15 km between the Offshore Operations Area and the key habitat adjacent to the south and east coasts of Exmouth Gulf (ERD Figure 5- 25, ERD Figure 5-26). No impact to seagrass habitat is predicted as a result of the Proposal.
140.	ANON-N59M-4PK7-F	It is unclear from the ERD when the construction period of 6 months will occur, with no restrictions in place for construction during the resting season of the humpback whale. Clarification is required.	The timing of the launchway construction period has not been specified, as it is not known. Avoidance of the Humpback whale southern migration period is not proposed as it is considered that the works pose a low to negligible risk of impact to Humpback whales. This assessment considers the intermittent nature and low underwater noise levels, and the local and intermittent nature of elevated turbidity, expected during the works.
141.	Oceanwise Australia	The ERD does not contain an assessment on ecological linkages between marina fauna, habitats and the possible impacts the proposal may have on them.	The ERD has considered impacts to both BCH and marine fauna, and specifically considers habitat of known value to marine fauna (refer, for example, Sections 5.4.6.1 and 5.4.6.5).
142.	ANON-N59M-4PRF-5 ANON-N59M-4PFE-R ANON-N59M-4PWP-M ANON-N59M-4PRE-4 EM147 EM144 Oceanwise Australia Protect Ningaloo	Submitters made the following comments regarding the 'no launch' period: • The proposed three month 'no launch' period from August to October is not sufficient to avoid impacts on humpback whales, as they have been recorded as occupying the Gulf from mid-July to mid-November. The 'no launch' period should therefore be extended to include the whole migration resting period from July to mid-	Subsea 7 initially proposed to maintain the currently proposed 'no launch period' between August and October (inclusive). While is it acknowledged that some early calving has been recorded to the west of the North West Cape in July, relatively low numbers of Humpback whale individuals have been recorded in Exmouth Gulf prior to August (and even into early August). The risk of impact to Humpback whales from a Bundle launch, should one occur in July, was considered low given: • The low numbers of Humpback whales expected in Exmouth Gulf in July could be readily monitored and the Bundle launch and tow operation adjusted to avoid identified animals. • The spotter plane would be deployed for all July launches, to undertake observations for Whale sharks and Humpback whales.

No.	Submitter	Submission and/or issue	Response to comment
		November as mother and calves are likely to be present for this period. • The 'no launch' period is grossly inadequate and will fail to protect wildlife from harm. • Restricting operations to outside whale-season does not mitigate risk to other marine fauna such as dugongs, dolphins, turtles. • How will the proponent's avoidance of towing pipelines during whale-migration be regulated/ policed?	• The low tow speeds. • The presence of MFOs onboard all support vessels. It is noted that beyond the immediate vicinity of Heron Point the tow route traversed deep water which would be unlikely to meet the description of 'the shallow areas preferred by the mother-calf pairs' (Bejder *et al*. 2019). It is understood that '*whilst in Exmouth Gulf, lactating females spend 53% of their time within 3 m of the water surface, where they are at risk of vessel strike*' (Bejder *et al*., 2019 cited in ERD Attachment 2J). At such shallow depths they are likely to be highly visible from the spotter plane, such they can be readily identified and appropriate management measures undertaken. Following further feedback (refer Attachment 1, Table 3) the 'no launch' period has been extended to four months (July to October, inclusive). Other management measures have been proposed to address the risk to other species, including: • A maximum of three launches per year, for a duration of up to two days per launch. • Specific training on marine fauna observation and avoidance provided to vessel crews. • MFO on board all support vessels, to identify marine fauna within 500 m ahead of tow, to allow avoidance measures to be implemented. Avoidance measures may include a change to the Off bottom tow speed, delay to the start of the Surface tow component of a tow or a slight change to the tow route (within the 2 km wide Surface tow envelope). • Adherence to Marine Fauna Management Plan (MFMP). • Ability to suspend transit if required to avoid collision. • Tow vessels and Bundle launch speeds low during launch (≤ 2 knots) and tow (≤ 8 knots). • Use of a 'spotter plane' during any Bundle launches undertaken between March and June to identify location of any Whale sharks within Ningaloo Marine Park and allow avoidance.
143.	Protect Ningaloo	The Department of Environment and Energy (2017) recommends that at least four surveys are undertaken during the months that the majority of shorebirds are present, plus a survey for immature or overwintering birds in the breeding season. The Migratory Bird Survey Report comprised four surveys only.	Department of Environment and Energy (2017) recommends that at least four surveys are undertaken during the months that the majority of shorebirds are present. The surveys targeted the southern migration (October) and the non-breeding season (January) as this is when the highest numbers of birds have historically been recorded in Exmouth Gulf. The relative importance of the Bay of Rest North during the breeding season, when much smaller numbers of birds are expected, was confirmed from surveys undertaken previously during May and June 2017, under the Shorebird 2020 surveys programme (refer ERD Attachment 2K Section 2.7 and Table 5).
144.	Birdlife Australia	Recent studies by BirdLife Australia (unpublished) have shown migratory shorebirds to be very sensitive to disturbance and with repeated disturbance will select to discontinue to utilise otherwise suitable sites, likely due to the energetic costs associated with disrupted feeding and frequent bursts of flight. Birds rely on a suite of sites to rest and feed and it should never be assumed that disturbance at one site is acceptable because they can use other areas.	The potential effects of repeated disturbance during the operations phase of the Proposal are assessed in Section 5.4.6.6 of the ERD. As noted in Section 3.2.2 of ERD Attachment 2K, the survey area '*lacked the fine intertidal muds that many shorebirds favour for foraging*' and as stated in Section 5.4.3.7 of the ERD (refer also Figure 5-36) all major roosts were located over 1 km from the proposed launchway location. Heron Point was not found to support significant roosting or foraging by migratory birds, when compared to other areas to the south and further afield within Exmouth Gulf. Notwithstanding, repeat disturbance of birds using the area adjacent to Heron Point is not expected given: • Bundle launch activities will occur infrequently (up to three times a year). • Lighting at the launchway will take account of measures proven to reduce the likelihood of impact on marine fauna including the use of shrouded or directional lighting and the placement of lights to minimise offshore light spill. • Bundle launch activities will generate relatively low sound levels; no blasting, piling or similar significant noise-generating activities are proposed. Bundle launch will cause a low level of ongoing noise, as the Bundle travels along the Bundle track, for the duration of a launch (approximately 2 hours for the launch of an ~7 km Bundle). Such noise is considered comparable to the noise associated with routine port operational noise (tug operations, ship loading/unloading) and it is noted that significant numbers of

No.	Submitter	Submission and/or issue	Response to comment
			migratory birds occur within the immediate proximity of operational port areas (e.g. Darwin Harbour, Port of Brisbane) and seem to have become acclimated to such low level noise disturbance.
145.	Birdlife Australia	Shorebird surveys insufficient as two surveys during low and high tides over two days is insufficient to discount Heron Point as roosting and foraging habitat for shorebirds. The Migratory Bird Survey Report has under-represented the number of migratory birds roosting within and adjacent to the development envelope. Listed Threatened species and Critically Endangered shorebirds for Exmouth Gulf have been missed in the survey and report. There are also resident and migratory shorebirds that are responsible for Exmouth Gulf's being a place of International Significance (grey-tailed tattler, pied oystercatcher, the eastern curlew (Critically Endangered), ruddy turnstones, sanderling and sooty oystercatcher. While the survey report refers to BirdLife Australia's shorebird data, the ERD has been restrictive in the geographical area or surveys included. Analysis of the larger dataset clearly indicates the significance of the area in: • Supporting internationally significant numbers of 4 migratory shorebirds (being greater than 1% of the flyway population), including the 'Critically Endangered' eastern curlew and the 'Endangered' greater sand-plover and 2 resident shorebirds, the Australian pied oystercatcher and sooty oystercatcher. • Supporting nationally significant numbers of an additional 6 migratory species (being greater than 0.1% of the flyway population), including the 'Critically Endangered' bar-tailed godwit and great knot and the 'Endangered' red knot. • Providing high tide roost habitat regularly used by 7 migratory shorebird species and 1 resident species, with one roost only 300m from Herron Point. • Providing foraging habitat for thousands of shorebirds.	The surveys were designed to provide a snapshot of the usage of the Bay of Rest North area during the southern migration (October) and the non-breeding season (January). Spring tides were targeted, when maximum foraging habitat becomes available and roosting sites most limited, to try to capture the maximum usage of the area. Heron Point has not been 'discounted' but has been shown to be of lower value, in terms of foraging and roosting sites, than adjacent areas. Shorebird 2020 data was referenced to provide data from different years and seasons. These data confirm that the areas immediately adjacent to the proposed launchway location do not represent key foraging habitat, or represent key roosting sites. Figure 5-34 and Figure 5-35 of the ERD present migratory bird counts from the whole of Exmouth Gulf, to illustrate the relative importance of different sites around the region. Section 5.4.3.7 of the ERD highlights the International and National significance of Exmouth Gulf for a number of migratory bird species. Across surveys undertaken between 2008 and 2018, the highest abundance of the Bar-tailed godwit within the Bay of Rest North survey area was 494, exceeding the criterion for National significance, recorded on 11 February 2018 (Shorebird2020). The abundance of the Eastern curlew, Greater sand plover and Great knot within the Bay of Rest North survey area did not exceed the National or International criteria during any survey (Shorebird2020). It is understood that the 1% and 0.1% thresholds to not apply to the Australian pied oystercatcher and Sooty oystercatcher, these being resident species (ERD Attachment 2K). The value of the wider Exmouth Gulf shoreline to migratory birds is recognised (refer ERD Figure 5-34, 5-35). However, Subsea 7 maintains that the data indicates that the shoreline at Heron Point, adjacent to the proposed launchway location, does not represent key foraging or roosting habitat.
146.	ANON-N59M-4PHE-T Birdlife Australia Protect Ningaloo	Submitters considers that further assessment to migratory shorebirds habitat is warranted. They make the following comments: • Further assessment of any changes to mudflat habitat and high tide roost sites is warranted. This includes both direct and cumulative impacts, including sedimentation of habitat and loss of suitable habitat for foraging or roosting sites, causing serious disruption to their lifecycle (feeding, migration or resting behaviour). The conclusions presented down-play the impacts to mudflats and benthic communities that are core habitat for shorebirds. • Drift and accumulation of sediments resulting from the proposed development and activities, could potentially impact the benthic communities of these intertidal mudflats and the food supply for migratory shorebirds. • The risk to critical shorebird and mangrove communities within the area as a result of the construction of this launch-way requires further investigation.	High tide roosts recorded during studies completed in October 2018 and January 2019 were generally significantly separated from the Bundle track/launchway footprint and are unlikely to be directly impacted. Several roosts within 1 km south of the launchway location could potentially be impacted in the event the perched beaches are impacted by erosion due to a reduced sediment supply from the north (refer to figure in Response to Submissions Report). The proposed monitoring, including the survey of beach profiles adjacent to launchway (annual), inspections, including photographic monitoring of shoreline adjacent to launchway (annual) and shoreline mapping (every 3-6 years), will assist in identifying impacts and triggering a management response to prevent a significant impact. No impacts to any intertidal mudflats, representing potential foraging habitat, are expected. This includes from local changes to coastal processes (ERD Attachment 2E) or from sediments resuspended during a Bundle launch (ERD Attachment 2H).
147.	Protect Ningaloo	There has been no robust research conducted on the three dolphin species in Exmouth Gulf, including their distribution, abundance, home range, preferred habitat and biology (i.e. peak in calving). The possible	The Snub-fin dolphin is not expected to be present in or adjacent to the Proposal area, although it has previously been reported from the region (ERD Attachment 2A). In WA the species is found along the coast from Cape Londonderry south to Roebuck Bay, with records of vagrants as far south as Exmouth Gulf. Therefore Exmouth Gulf is not considered to represent critical habitat and the likelihood of impact is considered to the low to negligible.

No.	Submitter	Submission and/or issue	Response to comment
		impact of the proposal on the calving for dolphins has not been discussed.	The majority of sightings of the Australian humpback dolphins in WA waters have been obtained within 5 km of the coast. The species has been recorded from Ningaloo Reef and in Exmouth Gulf. The analysis of stomach contents of six Australian humpback dolphins stranded in Queensland suggested they are opportunistic generalist feeders, preying on a wide variety of fishes including both bottom dwelling species as well as pelagic species. While likely to be present within Exmouth Gulf, the risk of impact is considered low as: • The species is known to occupy relatively large home ranges. • Impacts to prey items (e.g. fish, squid, invertebrates) are expected to be negligible. • The productivity of Exmouth Gulf will not be impacted by the relatively small proportional local losses of BCH. • Dolphins are able to detect and avoid (or seek out) vessels travelling much faster than the proposed Bundle launch speeds. • Dolphins are known to forage in turbid waters using echo-location, so impacts to foraging during periodic increases in turbidity associated with a Bundle launch would not be expected. The Indo Pacific bottlenose dolphin (or Spotted bottlenose dolphin) is restricted to inshore areas such as bays and estuaries, nearshore waters, open coast environments, and shallow offshore waters including coastal areas around oceanic islands. The species has been recorded from Ningaloo Reef and Exmouth Gulf, with the North West Cape represents the south western limit of the species' Australian distribution. Based on the assessment presented above in relation to the Australian humpback dolphin, the risk of impact is considered low. Subsea 7 considers that additional research is not required to support the assessment of potential impacts to these species.
148.	Protect Ningaloo	A potential impact that has not been addressed is that whilst the 10 km of pipeline Bundle is being towed, it is effectively creating a barrier to marine mammals passing, particularly in shallow areas. Although they could potentially pass above or below, they are likely to be wary of the moving pipeline and try to avoid it. However, it is an extremely long 'moving vessel' that would take a lot of effort for them to swim around. In trying to navigate their way around the pipeline they would potentially be exposed to the noise of the vessels for longer that the proponents have predicted. There would also be chains below the pipeline which could strike an animal whilst the pipeline is being moved.	The additional underwater noise modelling has adopted a different approach whereby marine fauna are not assumed to be exposed for only a short period of time. During vessel transit, new sound energy is constantly being introduced to the environment, and the criteria include an assessment of the total acoustic energy marine fauna could be exposed to over a specified duration, defined as 24 hours for each of the Off bottom tow and Surface tow scenarios (JASCO 2020). The Bundle could represent a temporary 'barrier' to marine fauna movements E-W across the tow route. However, this would only occur for a relatively short period of time, as follows: • Off bottom tow area - ~6 hours per launch. • Parking area - ~12 hours per launch. • Surface tow area (through the WHA) - ~6 hours per launch. A significant impact to marine fauna, due to the potential short-term behavioural responses during a Bundle launch, is not expected. The MFMP outlines management actions to be implemented to minimise the risk of the strike during a Bundle launch and tow.
149.	NCWHAC Protect Ningaloo Oceanwise Australia	The OUV of the NCWHA places a great significance on the "high marine species diversity and abundance" The critical window for majority of species has never been quantified for the Exmouth Gulf, (Fitzpatrick et al, 2019) which includes a portion of the NCWHA: • There has been no targeted research on sawfish or sea-snakes. Sawfish are critically endangered due to human impacts to juvenile and adult habitat (Fitzpatrick et al, 2019). The ICUN in their inscription report marine reptiles including the Olive Sea Snake. Since this report the knowledge of sea snake biodiversity has been found to be increasingly important. From a total of 21 sea-snake species found in WA there are 15 species found in the Exmouth Gulf – this biodiversity makes it a hotspot for the species (Fitzpatrick et al, 2019). Many are of conservation significance, many are endemic to the area, many are data deficient and many are likely cryptic species and possibly to be new species. The ERD has no consideration of	Fifteen of Australia's 35 species of sea snake have been recorded in Exmouth Gulf. These include the Short-nosed seasnake (*Aipysurus apraefrontalis*), the Leaf-scaled seasnake (*Aipysurus foliosquama*), (*Emydocephalus* sp. indet) and the North-western mangrove seasnake (*Ephalophis greyi*) (Fitzpatrick *et al*. 2019). Recently, populations of *A. foliosquama* and *A. apraefrontalis* were identified in coastal Western Australia, in the Exmouth Gulf and Shark Bay, resulting in substantial range expansions (Fitzpatrick *et al*. 2019). A total of 41 sea snakes were sighted in Exmouth Gulf during the nine aerial surveys conducted between August and November 2018, with abundance ranging from 0 to 15 sea snakes per survey. Sea snakes were distributed mainly in the north-western sector of Exmouth Gulf, within the WHA. None were observed immediately off Heron Point (ERD Attachment 2J). Commercial prawn trawling is noted as the likely biggest threat to sea snakes in the region, though it is also noted that the small numbers caught within Exmouth Gulf is considered to represent a negligible impact on populations (DAWE 2020b). Sea snakes, sawfish and occasionally turtles are encountered in the Exmouth Gulf Prawn Fishery trawl catches. During 2016 a total of 1,529 sea snakes were recorded as bycatch in Exmouth Gulf (the majority were returned alive), suggesting they do occur near the seabed over Soft sediment habitat (Gaughan and Santoro 2018).

No.	Submitter	Submission and/or issue	Response to comment
		shovelnose rays and very little consideration of sawfish. The ERD suggests the area Adjacent Heron point and the surrounding LAU is not thought to be significant habitat. This is despite the fact that there have never been specific studies to quantify sawfish and shovelnose ray movement patterns, habitat usage or critical life history stages in Exmouth Gulf. • Sea snakes have a small home range and are found in relatively high abundance directly adjacent Heron point. No specific studies have been conducted on the spatial and temporal distribution of sea snakes in Exmouth Gulf and the critical life history stages and habitats. Key issues not addressed include loss of habitat, increased turbidity, loss of breeding or nursery grounds, loss of foraging areas, limited range of dispersal which can impact breeding and population rebuilding; water quality degradation, turbidity, noise pollution, increased stress, chain and vessel risks. • There is no consideration of the feeding habitat of manta rays in the towing route as another example. The submitters recommend additional studies to ascertain the abundance and distribution of sawfish and sea snakes in the NCWHA and presence of critical habitats for manta rays and other species within the tow route and areas impacted by sediments. The submitters notes the explicit link between the Exmouth Gulf and the NCWHA, species found in the Exmouth Gulf are not constrained by jurisdictional boundaries and share the both the Exmouth Gulf and the marine portion of the NCWHA.	Major threats to sawfish include commercial fishing and habitat degradation (the latter particularly along the east coast of Australia (DAWE 2020a). A total of 20 sawfish were recorded as bycatch in Exmouth Gulf in 2016, suggesting they do occur within Exmouth Gulf over Soft sediment habitat (Gaughan and Santoro 2018). Impacts to both groups could potentially occur through impacts to foraging habitat or direct impacts during launch and tow operations. Given the relative absence of data on the distribution and behaviour of sea snakes and sawfish within Exmouth Gulf, it must be assumed, by taking a precautionary approach, that individuals from both groups will sometimes occur within the Offshore Operations Area. Both groups are carnivorous, with fish and crustaceans known to be key prey items (DAWE 2020a, b). Given the low proportional impacts to any BCH type, the Proposal is not expected to significantly impact foraging habitat, whether that be reef or soft sediment habitat. Potential prey items, such as fish species and prawns, are expected to avoid the Bundle chains so an impact to food abundance is not expected (prawn trawling involves the disturbance of prawns from the sediment so they can be caught in the nets, which demonstrates their avoidance behaviour). Sea snakes and sawfish are expected to be able to readily avoid Bundle chains. The recommended survey technique for sea snakes involves traversing transects in a small boat at a speed of ~4 knots and observing sea snakes immediately ahead of the boat (DAWE 2020b). This speed is greater than or approximately equal to the proposed Off bottom tow speed of 2-3 knots (up to a maximum of 5 knots), so it is inferred that sea snakes are able to avoid objects travelling at such a speed. Sea snakes are also likely to be able to avoid the Bundle and chains during the Surface tow (speed of 5-6 knots, up to a possible maximum of 8 knots) though the risk of an interaction will be slightly greater. The average trawl speed within the prawn fishery is 3.5 to 4 knots (Kangas *et al*. 2006). The rate of sea snake bycatch suggests that sea snakes are less able to avoid a wide object (i.e. net) than a vessel or chain. A significant impact on sea snakes is not expected. Sawfish are also expected to be able to avoid Bundle chains, given the low tow speeds and relative ease of lateral avoidance (compared to avoiding a trawl net). A significant impact on sawfish is not expected. Manta rays are pelagic feeders (i.e. foraging is not related to BCH) so no impact to 'feeding habitat' will occur. Short-term displacement of individuals may occur during a Bundle launch. A significant impact is not expected.
150.	EM141 Oceanwise Australia Protect Ningaloo	Very little concentrated research has been conducted in this region for manta rays. Using opportunistic citizen scientist and researcher focused photo-ID efforts, 189 different individual rays have been identified in the Gulf, with 216 sightings between 2004 and 2018. The majority of these sightings were of foraging events, however courtship and cleaning station attendance has also been observed. Most sightings are seasonal, but have spanned between the months of April to October. In addition, satellite tagging of manta rays conducted in Bateman Bay in Ningaloo Reef in May 2016 and in Exmouth Gulf in October 2016, confirmed links between Exmouth gulf and the world heritage listed areas of Ningaloo Reef Marine Park and Shark Bay Marine Park. This connectivity and long-distance movements by this species suggests Exmouth Gulf may be an important regional aggregation site for this species. Manta rays were recorded during the nine humpback whale aerial surveys that were conducted in Exmouth Gulf between August and November 2018. A considerable number of manta rays were sighted during this survey window (n=329), however the report itself noted that this was likely an underestimation of their abundance given the plane height and the survey design being optimised for humpback whale sightings. Hence, the report recommended further surveys designed specifically for other marine megafauna using the region, this would also allow abundance to be quantified throughout the year, rather than just	The Ningaloo manta ray interaction industry operates year-round within the waters of the Ningaloo Marine Park. Commercial tour vessels depart daily, taking tourists to participate in snorkelling interactions with manta rays. The industry has experienced significant growth since its inception in the early 1990s, with five dedicated manta ray tourist vessels now operating from Coral Bay, with the combined potential to accommodate a maximum of 139 passengers each day. Bateman Bay is a known aggregation site for manta rays, which predominantly use the waters for feeding and visiting reef cleaning stations. During the months of June to November, mating chains and courtship interactions are observed and large feeding aggregations of up to 70 individuals occur between March and May (McGregor *et al*. 2008). A core resident population consisting of ~40–50 individuals, mostly mature females, has been identified (McGregor *et al*. 2008). Tour operators can choose to adhere to a voluntary code of conduct for manta ray interactions, developed to minimise impacts on manta ray behaviour. This suggests that vessel speeds should not exceed 8 knots within 100 m, or 5 knots within 30 m, of a manta ray (Venables *et al*. 2016). This suggests that at speeds of up to 5 knots, vessels are not considered to pose a risk of injury to manta rays. Manta rays are pelagic feeders (i.e. foraging is not related to BCH) so no impact to foraging behaviour is expected. Short-term displacement of individuals may occur during a Bundle launch. Cleaning stations are predominantly associated with reef outcrops where cleaner wrasse can find shelter and protection. No reef outcrops have been recorded within or in proximity to the Offshore Operations Area. A significant impact on manta rays as a result of the Proposal is not expected.

No.	Submitter	Submission and/or issue	Response to comment
		during the peak humpback whale season. The mitigation strategy of excluding certain months of the year from Bundle towing (e.g. the "Ecological Window") fails to address the seasonal use of the Gulf region by other species where the data is not available. Construction may impact important habitat sites such as cleaning stations and foraging areas. It may also interfere with the species migration along the coast in this region, and subsequently impact important aspects of its life history, such as foraging potential and reproduction. The potential for vessel strike is also very real, as manta rays have been observed surface feeding in this region and during this activity they are often less responsive or cautious towards external disturbance. None of required work for manta rays, which are listed as Vulnerable to Extinction as stated in the ESD is evident in the ERD, which are listed as Vulnerable to Extinction. The proponent has also failed to identify potential impacts and consequent mitigation strategies for the migratory manta rays accessing these waters.	
151.	EM141 EM144 NCWHAC Rangelands NRM Oceanwise Australia	Submitters were concerned about impacts to marine fauna as a result of shipping impacts in Exmouth Gulf, including to humpback whales, turtles, dugongs, manta rays and other marine fauna. These marine fauna are all key components of the OUV. In addition, these are the species on which tourism for the Ningaloo area depends on. Submitters note the regard given to the peak of the humpback whale resting period but note with concern the impacts which may occur on large numbers outside the Aug-Nov exclusion period. The submitters note the proposed tow route overlaps with the humpback whale exit route out of Exmouth Gulf on their southern migration. Furthermore, recent research has shown a minimum of 20% of calves are born near North West Cape, these are shown to hug the coast and Exmouth Gulf could be a nursing for both northbound and southbound calves (Irvine, 2018). Submitters stated that no cumulative impact of vessel activity impacts on wildlife within Exmouth Gulf to place additional pressures into context and to inform acceptability was provided.	Section 7.6.1 of the ERD assesses the potential impacts from the Proposal on the heritage-listing criteria for the WHA (which are the same as the OUV values), as follows: • Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. • Criterion (x): contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. Potential impacts to listed marine fauna, including within the WHA, are addressed in Section 7.6.2 of the ERD. As stated, and justified, significant impacts to any listed species are not expected. Subsea 7 initially proposed to maintain the 'no launch period' between August and October (inclusive). While is it acknowledged that some early calving has been recorded to the west of the North West Cape in July, relatively low numbers of Humpback whale individuals have been recorded in Exmouth Gulf prior to August (and even into early August). The risk of impact to Humpback whales from a Bundle launch, should one occur in July, was considered low given: • The low numbers of Humpback whales expected in Exmouth Gulf in July could be readily monitored and the Bundle launch and tow operation adjusted to avoid identified animals. • The spotter plane would be deployed for all July launches, to undertake observations for Whale sharks and Humpback whales. • The low tow speeds. • The presence of MFOs onboard all support vessels. Following further feedback (refer Attachment 1, Table 3) the 'no launch' period has been extended to four months (July to October, inclusive). Potential cumulative impacts from vessel activity are discussed in Section 5.4.6.11 of the ERD.
152.	EM147	The inshore shallows of Heron Point are a nursery habitat for a number of species, including key targeted recreational species like spangled emperor, coral trout, spanish flag, estuary cod and tuskfish. The proponent's continued assertion that Heron Point, and the Gulf more broadly, have no significant nursery function is not credible. Its role as a nursery habitat for fish and crustaceans is borne out by a recent survey	The occurrence of fish, including juveniles, within the shallow waters of Exmouth Gulf is not questioned. However, there is no evidence that the nearshore habitats at Heron Point provide more important or higher quality nursery habitat than adjacent areas. The Proposal will impact a relatively small proportion of Reef with macroalgae habitat (0.1%) and Soft sediment habitat (10% under the absolute worst-case scenario) at a local level (i.e. Heron Point LAU). Therefore significant impacts on BCH, or associated fish species, are not expected.

No.	Submitter	Submission and/or issue	Response to comment
		of one section of the site by Aqua Research and Monitoring Services (November 2019).	
153.	ANON-N59M-4P8C-8 ANON-N59M-4P8C-8 EM147 Protect Ningaloo	The ability of the tow to be effectively manoeuvred at short notice upon a sighting of marine fauna by the observer or spotter plane, is not achievable given the length of pipe, restricted speed of travel and planned course for tow.	Refer to response to submission #21.
154.	ANON-N59M-4PRE-4	The impact statement is insufficient/inappropriate as it includes mitigation measures which contain any number of large mammal deaths. These apex predators are crucial to the replenishment and continuity of our eco systems.	The proposed mitigation measures have been developed to minimise the risk of impact to marine fauna. However, the death of an animal cannot be completely ruled out. As noted in the ERD, and in response to other submissions, impacts to marine fauna, including mortality, currently occur as a result of commercial (e.g. bycatch) and recreational (e.g. vessel strike) vessel activity in the region.
155.	ANON-N59M-4P8C-8	The proponent's assessment of impact on migratory species (dugong, manta etc) is hypothetical at best. Stating 'no significant impacts' is worrying as they are therefore not mitigating a possible impact.	The potential impacts to listed and migratory species are assessed, in relation to the listing criteria, in Section 7.6.2 of the ERD (refer Tables 7-7, 7-8, 7-9).

ATTACHMENT 1 (TABLE 2G) - SUBSEA 7 RESPONSES TO COMMENTS ON SUBTERRANEAN FAUNA

No.	Submitter	Submission and/or issue	Response to comment
156.	• Protect Ningaloo	The ERD risk assessment shows a moderate to high likelihood of impacts to subterranean fauna community inland/low toward the coast. Given the proposed vegetation and dune removal, railway track construction and operation across existing subterranean waterways, this seems an understatement of the reality –which is that stygofauna have been found within the development envelope and may potentially be impacted by this proposal. The suggestion that the Development Envelope is unlikely to impact stygofauna, or the subterranean waterways, fails to acknowledge the complexity of the system from the Cape Range down and across the coastal plain. Mitigation measures to minimise land disturbance do not acknowledge the complexity of the system, nor the likely impacts from this proposal to the subterranean waterways within the proposal and Development Envelope. The proponent states that "subterranean fauna habitat was not recorded in proximity to the fabrication shed, sprayfield or the majority of the Bundle tracks… no impact expected". However, the ERD stygofauna survey recorded stygofauna in the development envelope and the proposed borefield area.	The 'preliminary risk assessment', as presented in ERD Attachment 2M, considered 'each of the three development options for the proposed Project' (Section 4 of Attachment 2M). The three development options related to different tiers of development (Tier 1 – basic, Tier 2 – Medium, Tier 3 – Advanced) as at that stage (August 2017) details of the Proposal were not known. The development, as described in the ERD, roughly equates to a Tier 2 level. The report provides useful contextual information and a review of publicly available information, and was therefore published alongside the ERD. The report states, in relation to the Cape Range Subterranean Waterways, that '*with appropriate management to ensure no discharge of petroleum products or other contaminants into the shallow groundwater below the track and road, which are surface developments, there should be little risk to the subterranean fauna values of the wetland. Ground excavation in association with the Bundle track is expected to be limited to the foredunes and beach*'. It is noted that the report does not present the findings of subterranean fauna surveys within and surrounding the Development Envelope (which occurred more recently than August 2017) or a detailed assessment of the potential impacts from the Proposal as defined in the ERD. A contemporary assessment of the risks posed by the Proposal to subterranean fauna is presented in the ERD. No significant impacts are expected. As stated in Section 5.6.3 of the ERD, during surveys stygofauna were collected from the proposed borefield area and the coastal bores but not from any of the bores in the sand plain adjacent to the proposed fabrication shed and sprayfield locations. Eight bores were sampled in or adjacent to the mapped Directory of Important Wetlands 'Cape Range Subterranean Waterways (WA006). Of the three bores within the Development Envelope, only one, SO4, yielded stygofauna (refer Attachment 2O which clearly describes the locations of bores found to support stygofauna and those found not to support stygofauna). The surveys undertaken by Subsea 7 have provided an understanding of the geology, hydrology and subterranean fauna values of the Development Envelope. The absence of stygofauna in the vicinity of the fabrication shed and sprayfield locations, together with a lack of deep excavation or other loss of potential stygofauna habitat, suggests that the risk of significant impacts to stygofauna is negligible. Notwithstanding, Subsea 7 has nominated several management measures to further reduce the risk, including: • Land disturbance will be kept to the minimum necessary for development of the project. • Ground excavation will be kept to a minimum (expected to be limited to cuts through the tops of dunes and minor excavations during the construction of surface water drainage infrastructure). • Hazardous materials will be stored, in or adjacent to the fabrication shed, in accordance with relevant Australian Standards and Dangerous Goods Storage regulations. • Chemical storage and handling procedures to prevent leaks or spills. • Where necessary, suitable floodways, drains and culverts will be installed to maintain, as much as possible, natural flow patterns. • Project design has considered the location of drainage lines with the aim of minimising changes to natural flows. • Minimise water abstraction through the storage and re use of hydrotest water. • Water storages will be lined to minimise seepage. • Low abstraction rates to reduce the likelihood of groundwater drawdown.
157.	Protect Ningaloo	Most of the survey work for stygofauna was focussed on the Development Envelope, with only a few areas outside of it surveyed for stygofauna, which is considered insufficient reference sites for survey. With only 70% of stygofauna at the site being documented, it is significant that there were six species collected within the Development Envelope that were represented by only one individual, and this despite the sites being sampled three times each. This creates an anomaly and represents a significant knowledge gap regarding these species, populations and distribution across the coastal plain.	The survey design was completed to meet the following objectives (refer ERD Attachment 2O): • 'To compile a list of species that occur, or are likely to occur, within the borefield and project envelope. • To assess the conservation significance of any possible changes in stygofauna communities associated with the potential project impacts on stygofauna habitat (albeit these impacts will be small)'. Sampling effort for stygofauna matched the level of effort recommended in the EPA Technical Guidance '*Sampling methods for subterranean fauna*' for impacted areas. While not all bores sampled were within the Proposal footprint, results were treated as indicative of the wider area in which the Proposal is located. As such, sampling occurred in two distinct areas, the freshwater drawdown area associated with abstraction and the saline/coastal area that is potentially influenced by infrastructure development and operations, including

No.	Submitter	Submission and/or issue	Response to comment
		The consideration of subterranean fauna only within the narrow proximity of the development envelope does not address the extent of the subterranean fauna habitat in relation to the proposal and species distributions.	by the potential spread of a nutrient and freshwater plume from the treated greywater spray field (although this impact is likely to be very small). The sites located outside of the Development Envelope were not intended as 'reference' sites, but rather to provide some context to the data obtained from within the Development Envelope. The capture of an estimated 70% of the species likely to be present was considered to be within the normal range of capture from such sampling programmes, and was not considered a significant limitation to the survey. The survey design is considered appropriate for the description of stygofauna habitats and communities potentially impacted by the Proposal, noting the small scale of potential impacts. Description of regional habitat or species distributions is not necessary for the completion of the impact assessment and would add little. It is noted that, where relevant, data from other locations were referenced to provide a regional context.
158.	Protect Ningaloo	Conservation action is needed with regard to data deficient species like the blind cave eel and the blind gudgeon, and also raises concerns *Stygiocaris stylifera* which is vulnerable (IUCN) and lacks information about its population trend. Four of the species collected are of specific scientific interest, and two of these require further identification: • *Ameira* (BHA250) – the closest record of this species is from Lake MacLeod. • *Ectinosoma* (BHA244) – it has only been collected from wells in Florida. • *Apodopsyllus* (BHA255) – stygobiont species occur in Italy. • *Speleophria* (BCA002) – closely related to the Critically Endangered *Speleophria bunderae* which is know from the Bundara Sinkhole on the western side of the Exmouth peninsula. The ecological significance of the record of *Speleophria* at the bore S03 is unclear.	Neither the Blind cave eel nor Blind gudgeon has been collected near the Proposal area. While *Stygiocaris stylifera* was collected in the borefield, it is listed as P4 (rare but not threatened, near threatened, or removed from list of threatened species in last 5 years) by DBCA. The species is widespread on the Exmouth peninsula and Barrow Island. The Project will not threaten the conservation status of these three species. While four of the species collected are of scientific interest, this does not mean they are of conservation significance. In all four cases there is doubt about the ecological niche of the species and their habitat. Consideration of them as stygofauna is precautionary and it is considered likely that 'availability of apparently suitable habitat north and south of the Proposal means that the proposed development and operations are unlikely to threaten any species'. It is unclear which two species are considered to require further identification.
159.	Protect Ningaloo	The submitter raises the following issues in regards stygofauna and to the subterranean waterways as a result of implementation of the proposal: • The ERD does not address the reduction in the quality and availability of organic inputs due to removal of vegetation and sealed surfaces. • The risk assessment shows a moderate to high likelihood of disturbance to the subterranean waterways, and the potential to be disturbed from vibration disturbances or fragmentation during construction and operational activities. This may cause impacts to subterranean fauna. • Disturbance of the subterranean waters that provide a narrow lens of freshwater in which stygofauna inhabit is of serious concern and doesn't appear adequately considered. • Exposure of subterranean habitat may occur during construction or operation, resulting in habitat degradation. • Habitat loss may occur due to over abstraction of groundwater. The modelling of the potential groundwater drawdown was based on a total period of approximately 27 years (Attachment 2R). Under a worst-case scenario, the maximum drawdown in the immediate location of the bores was estimated to be up to 2.5 m after 10 years of continuous abstraction. The ERD states that the small reduction in stygofauna habitat as a result of the borefield drawdown is considered highly unlikely to be biologically meaningful, but the subterranean waterways must be considered in the light of *Environment Protection and Biodiversity Conservation Act*	The 'preliminary risk assessment', as presented in ERD Attachment 2M, considered 'each of the three development options for the proposed Project' (Section 4 of Attachment 2M). The three development options related to different tiers of development (Tier 1 – basic, Tier 2 – Medium, Tier 3 – Advanced) as at that stage (August 2017) details of the Proposal were not known. The development, as described in the ERD, roughly equates to a Tier 2 level. The report provides useful contextual information and a review of publicly available information. The report states, in relation to the Cape Range Subterranean Waterways, that '*with appropriate management to ensure no discharge of petroleum products or other contaminants into the shallow groundwater below the track and road, which are surface developments, there should be little risk to the subterranean fauna values of the wetland. Ground excavation in association with the Bundle track is expected to be limited to the foredunes and beach*'. It is noted that the report does not present the findings of subterranean fauna surveys within and surrounding the Development Envelope (which occurred more recently than August 2017) or a detailed assessment of the potential impacts from the Proposal as defined in the ERD. A contemporary assessment of the risks posed by the Proposal to subterranean fauna is presented in the ERD. No significant impacts are expected. As stated in Section 5.6.3 of the ERD, during surveys stygofauna were collected from the proposed borefield area and the coastal bores but not from any of the bores in the sand plain adjacent to the proposed fabrication shed and sprayfield locations. Eight bores were sampled in or adjacent to the mapped Directory of Important Wetlands 'Cape Range Subterranean Waterways (WA006). Of the three bores within the Development Envelope, only one, SO4, yielded stygofauna (refer Attachment 2O which clearly describes the locations of bores found to support stygofauna and those found not to support stygofauna).

No.	Submitter	Submission and/or issue	Response to comment
		*1999 (*EPBC Act) protection which considers any impacts to the health of the system of significance. • The incorporation of suitable floodways, drains and culverts raise questions about the alteration of inland water flows. These proposed installations in and of themselves create changes in the inland flows, and there is not enough information provided to understand how this will impact the subterranean waterways. This concern might also include the potential inundation noted by the proponent as a result of the dune removal. These factors suggest changes to inland water flows that raise serious concerns about the direct and indirect impacts to stygofauna and subterranean waterways. • The Cape Range Subterranean waterways are under pressure from nutrient enrichment (Hamilton-Smith et al., 1998), and despite assurances from the proponent about the sprayfield, there is still the potential for an increase in nutrient enrichment from grey water. • Freshening of groundwater is also mentioned by the proponent and this poses potential impacts to the disturbance or imbalance of waterways which is noted by Hamilton-Smith et al. (1998) to be a potential impact to the system's health.	Notwithstanding, impacts to sub-surface 'habitat' within the main part of the Development Envelope will be negligible given: • The absence of deep excavations. • Proposed chemical storage and handling procedures. • Management of surface water flows. Impacts associated with changes to organic inputs are expected to be negligible, were not included in the ESD and were therefore not considered in detail in the ERD, given: • The lack of stygofauna beneath the majority of the proposed infrastructure footprint. • Clearing will predominantly occur along narrow corridors associated with the proposed linear infrastructure (Bundle tracks, access roads). • The lack of extensive sealing of the ground surface (surface water infiltration will be largely unaffected except directly beneath the fabrication shed). It is noted that within and adjacent to the main part of the Development Envelope the stygofauna recorded were all found within brackish water (salinity (as total dissolved solids, TDS) of 48,800mg/L to 51,900 mg/L, refer ERD Attachment 2O). Within and adjacent to the proposed production bores, freshwater (TDS ≤ 1,004 mg/L) was found to extend for at least 12 m (ERD Attachment 2R). Excavations during the construction phase will be shallow and above the water table, thus exposure of stygofauna habitat will not occur. The geology within the Development Envelope in the vicinity of the fabrication shed and Bundle track is considered not prospective for troglofauna, lacking karstic and fractured rock habitats, and being '*fine, shifting sand with a high salt content*' in the foredunes and beach (ERD Attachment 2N). As stated in the submission, under a worst-case scenario, the maximum drawdown in the immediate location of the bores was estimated to be up to 2.5 m after 10 years of continuous abstraction. As presented in ERD Figure 5-46, the modelled drawdown decreases quickly with distance from the proposed production bores. The nearest mapped 'subterranean waterway' is located over 1 km to the west of the borefield (refer ERD Figure 2-12) where predicted maximum drawdown is approximately 0.3 m (considered a negligible risk in the context of >12 m depth of freshwater aquifer). The alteration of inland water flows is assessed in detail in Section 5.8.6 of the ERD. The ephemeral watercourses in the area are expected to flow only during, and for short period following, significant rainfall events (ERD Section 5.8.3.5). To assist in the management of surface water associated with larger flood events, two management measures are proposed: • A culvert beneath the Bundle track to allow surface water to flow north east to south west beneath the track, along the existing flow path. • An open drain running to the north east, and adjacent to, the Bundle track, to convey surface flows to a natural depression. These measures are not expected to significantly alter surface water infiltration patterns, and would only divert large volumes of water following a significant rain event, when the wider landscape would be wet and sheetflow widespread. The construction of the launchway will necessitate a cut through the dune system and the elevation of the coastal dune in this area will be reduced from approximately 5 mAHD down to an elevation of around 2.5 mAHD at the foundation level. Such a reduction in the elevation could result in a localised increase in erosion risk and inundation vulnerability to the land side of the dune (ERD Section 5.2.6.3). It is noted that no stygofauna were recorded in this area, and the Cape Range Subterranean waterways are not mapped in proximity to the coast in this area.

No.	Submitter	Submission and/or issue	Response to comment
			Nutrient loads from the proposed sprayfield will be very low (refer ERD Section 5.8.6.3) and no stygofauna were recorded, or subterranean waterways mapped, in the vicinity of the sprayfield location. No other discharges of freshwater, with the potential to alter groundwater salinity, are proposed or reasonably foreseeable as a result of the Proposal.
160.	Oceanwise Australia Protect Ningaloo	Cumulative impacts (past and future) to the subterranean fauna and waterways was not considered. It has been previously impacted from pollutants, changing hydrology, water extraction, infill and sedimentation and invasive species. These impacts, including impacts from ongoing industrial operations, have not been quantified and the impacts of this proposal has not been assessed against them.	Historic impacts to subterranean fauna and/or subterranean waterways are not clearly defined. Little large-scale development has occurred in the surrounding area with the exception of RAAF Learmonth, which was developed from a basic landing field in the 1950s. Potential cumulative impacts from the Proposal and from RAAF Learmonth were considered in relation to groundwater quality (ERD Section 5.6.6.5). Given the predicted flow of groundwater from RAAF Learmonth to the north of the Development Envelope, and lack of impacts to groundwater quality in the vicinity of subterranean fauna habitat as a result of the Proposal, no cumulative impacts are expected. No signs of previous contamination were recorded within bores across the Development Envelope during water sampling undertaken for the Proposal. It is difficult for Subsea 7 to comment on potential future cumulative impacts, other than to reiterate that impacts as a result of the Proposal are considered highly unlikely.
161.	NCWHAC Protect Ningaloo	The submitters note an integral part of the OUV of the NCWHA is the high diversity of the subterranean fauna – noted to be some of the highest cave fauna (troglomorphic) diversity in the world (IUCN Evaluation Report (2011). The submitters note with concern the presence of at least eight species within the development envelope and surrounds – some in very shallow depths (under 2 m). Given the excavations would be up to 1 m depth this creates concern around the reduced buffer protecting these species from contamination or disturbance. The submitters recommends greater analysis of the value these species, locally and in the larger context, be undertaken to ascertain greater certainty of protection.	Desktop reviews identified that the presence of troglofauna within the Development Envelope was unlikely (ERD Attachment 2M, ERD Attachment 2N) and it was determined unlikely that the subterranean fauna ecological communities recognised as Threatened Ecological Communities (TECs), such as the 'Bundera Cenote Anchialine community on Cape Range' or 'Cameron's Cave' near the townsite of Exmouth, occur in proximity to the Proposal area (ERD Attachment 2N). Troglofauna within the Development Envelope were not specifically sampled due to the lack of habitat to the east of the Minilya-Exmouth Road and lack of impact to habitat within and adjacent to the proposed borefield to the west of the Minilya-Exmouth Road (ERD Attachment 2O). Eight species of stygofauna were collected from the Development Envelope and surrounds east of the Minilya-Exmouth Road, while three species were collected from the borefield area to the west of the Minilya-Exmouth Road (ERD Attachment 2O). Stygofauna were not collected from any of the bores in the sandplain and were only recorded from a single bore (S03) within the Development Envelope (to the east of the Minilya-Exmouth Road) (refer ERD Figure 5-45). Impacts to stygofauna as a result of the proposed excavations for the Bundle track (through elevated sand dunes) are therefore unlikely. Excavations will reduce the soil (sand) buffer above the potential stygofauna habitat (Exmouth sandstone and Bundera calcarenite) but will not result in direct impacts to stygofauna habitat. This buffer reduction, over such a small section of habitat, is unlikely to pose a significant risk to species or habitat quality.
162.	NCWHAC	The submitter notes Map/Fig 1 (360 Environmental Pty Ltd) shows the head of the project to lie over an area marked as Cape Range Subterranean Waterways. Surface compaction and/or covering will impede infiltration of rainwater and may channel surface flow. The submitter notes the potential for direct and indirect loss of individuals or habitat due to changes to groundwater levels, flows or quality (including from groundwater abstraction, or discharge of treated wastewater). This would be a significant impact on the OUV of the NCWHA. The submitter is concerned that any mitigation measures put in place would not be adequate to avoid impact to the OUV of the NCWHA.	As stated in Section 5.6.3 of the ERD, during surveys stygofauna were collected from the proposed borefield area and the coastal bores but not from any of the bores in the sand plain adjacent to the proposed fabrication shed and sprayfield locations. Eight bores were sampled in or adjacent to the mapped Directory of Important Wetlands 'Cape Range Subterranean Waterways (WA006). Of the three bores within the Development Envelope, only one, SO4, yielded stygofauna (refer Attachment 2O which clearly describes the locations of bores found to support stygofauna and those found not to support stygofauna). Impacts associated with changes to freshwater/organic inputs are expected to be negligible, given: • The lack of stygofauna beneath the majority of the proposed infrastructure footprint. • Clearing will predominantly occur along narrow corridors associated with the proposed linear infrastructure (Bundle tracks, access roads). • The lack of extensive sealing of the ground surface (surface water infiltration will be largely unaffected except directly beneath the fabrication shed). To assist in the management of surface water associated with larger flood events, two management measures are proposed: • A culvert beneath the Bundle track to allow surface water to flow north east to south west beneath the track, along the existing flow path.

No.	Submitter	Submission and/or issue	Response to comment
			• An open drain running to the north east, and adjacent to, the Bundle track, to convey surface flows to a natural depression. These measures are not expected to significantly alter surface water infiltration patterns and would only divert large volumes of water following a significant rain event, when the wider landscape would be wet and sheetflow widespread. Impacts to the subterranean fauna values of the WHA, which is located >12 km west of the proposed borefield, are not expected.
163.	NCWHAC	The submitter notes that stygofauna are present in the area of the proposed borefield [as this includes the blind shrimp *Stygiocaris* sp. then the matrix of the habitat is suitable for macroinvertebrates] but states that no troglofauna habitat is present within the envelope (PER p. 248). However, as the borefield will intercept sedimentary rocks 5 m bgl (p 270) and the groundwater table is 22-32 m bgl, the potential for troglofauna cannot be dismissed a priority. Further justification needed for this assertion.	It was considered that '*in general troglofauna are unlikely to occur at the project east of Minilya-Exmouth Road (although a depauperate community may occur near the fabrication facility, and possibly some troglofauna occur nearby in outcropping calcrete)*' (ERD Attachment 2O). Troglofauna may be present in the vicinity of the proposed borefield, if karstic habitat occurs above the watertable (ERD Attachment 2N). However, proposed activities at the borefield are limited to water abstraction, which is unlikely to affect troglofauna living above the water table. ERD Attachment 2O noted that '*More pertinently, it was considered that project development would not remove troglofaunal habitat even if troglofauna are present*'.
164.	NCWHAC	The submitter notes that distinct stygofauna containing *Remipedia* occurs on the Cape Range peninsula associated with anchialine habitats. The submitter recommends that this is explicitly treated in the analysis.	The stygofaunal Cape Range Remipede Community (Bundera Sinkhole) was specifically considered. It was concluded that '*while listed stygofauna, and perhaps troglofauna, species may occur in the Project area, it is considered unlikely that either of the two Threatened Ecological Communities (TECs) – the stygofaunal Cape Range Remipede Community (Bundera Sinkhole) and the troglofaunal Camerons Cave Troglobitic Community – are well represented there*' and '*the stygofauna TEC occurs on the western side of Cape Range in an anchialine situation, which is unlikely to be replicated on the wider coastal plain east of the range*' (ERD Attachment 2N).
165.	ANON-N59M-4PK1-9 ANON-N59M-4PWP-M ANON-N59M-4PK4-C ANON-N59M-4PWG-B	Little work appears to have been done on stygofauna. Many species are probably undescribed. There is not enough evidence to support the assumption that the subterranean waterways are not going to be impacted by this development. More work is required on subterranean waterways and the potential impacts of chemical spills.	Sampling effort for stygofauna matched the level of effort recommended in the EPA Technical Guidance '*Sampling methods for subterranean fauna*' for impacted areas. While not all bores sampled were within the Development Envelope (including borefield), results were treated as indicative of the wider area in which the Proposal occurs. Conclusions about the lack of impacts on the Cape Range Subterranean Waterways are based on a consideration of the carefully calculated size of disturbances to the area (which are negligible), rather than sampling results. No significant stygofauna were recorded from the sand plain in proximity to the proposed chemical storage areas. Notwithstanding the lack of stygofauna, management measures proposed to minimise the risk of a chemical spill are presented in the ERD (refer Section 5.8.7).
166.	ANON-N59M-4PW6-T ANON-N59M-4PHE-T ANON-N59M-4P8C-8	There does not appear to be a means for monitoring the impact of abstraction of groundwater on subterranean fauna.	Table 5-33 of the ERD specifies that regular (quarterly) monitoring of groundwater quality (including salinity) and levels will be undertaken, in accordance with abstraction licence conditions.
167.	ANON-N59M-4PFA-M	The ERD confirms there is minimal impact to subterranean fauna.	Agree. Subsea 7 is confident that the Proposal will not result in a significant impact to subterranean fauna.

ATTACHMENT 1 (TABLE 2H) - SUBSEA 7 RESPONSES TO COMMENTS ON TERRESTRIAL ENVIRONMENTAL QUALITY

No.	Submitter	Submission and/or issue	Response to comment
168.	Protect Ningaloo	The ERD concludes that the proposed development envelope contained no acid sulfate soils (ASS), therefore the proposal will have no impact on the disturbance of ASS. The submitter has stated portions of the development envelope are located in Class 1 High to Moderate ASS risk areas. The concerns with the ASS survey are: • The proposed construction of a 10 km railway should have triggered a linear project investigation under the WA Government's guidelines, with sample sites at 50m intervals. • The investigation only sampled eight sites, with is not sufficient to provide evidence of the presence or otherwise of ASS. • There were no sample sites in the area of the launch site, despite this area being identified as being as a Class 1 risk area, where ground disturbance is expected during the construction of the launchway. • Not all sites were sampled to sufficient depth, as the requirement is for sampling to be at least one metre below the maximum depth of disturbance. The ERD does not provide any details of excavation depths, only to say that they would be less than one metre. This therefore required sampling to at least one, if not two, metres. However, most of the sites were only sampled to 0.25m – 0.5m. • Design drawings appear to show excavation depths of 1.4 m in the beach/intertidal section and 1.15 m in the subtidal section, indicating sampling depths were not deep enough. This would suggest that sampling should have been carried out at the site of the launchway to a depth of 2.15-2.4 m. • Only two sites achieving sampling depths of greater than one metre (ASS6 = 1.25m and ASS8 = 1.8m), and neither of these reached two metres. • Sample site ASS8 showed indications of possible ASS presence, and while this site is just outside the development envelope, it is close enough to raise concerns about whether ASS is present where excavation would take place. The wording 'removal of sediment' appears to correlate with 'dredging'. This implies that there is an area of 24m x 0.3m x 15m = 108m^3 of soil that is planned to be placed at the northern side of the launchway during construction. This is within an area considered highly likely to disturb ASS.	The railway referred to (referred to by Subsea 7 as the Bundle track) and most areas of disturbance are not within an ASS risk and do not require assessment under the guidelines for this or trigger 'linear disturbance'. Test pits for logging/sampling were targeted towards high risk zones (mapped in red on Figure 1 in ERD Attachment 2U) as indicated by ASS risk mapping (DWER 2016 – dataset DWER-053). The approximate area of material to be excavated (< 1 ha) within high risk areas dictated a minimum of four locations according to "Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes" (DER 2015). The MBS ASS investigation included eight locations and fulfills this requirement. Sampling encountered refusal at the depths indicated by hard-setting calcareous layers or underlying limestone (calcrete, limestone or calcareous sandstone) (i.e. excavator could not break through). Despite not reaching the desired 2 m below ground level (m BGL), the groundwater monitoring bore installation logs for holes in close proximity to those of the ASS investigation indicated continuation of these calcareous layers well below 2 m BGL. These calcareous layers by their nature do not contain any actual or potential ASS (AASS/PASS) and pose no risk of ASS. Two geotechnical survey drill holes were located within and adjacent to the launchway footprint, one located close to the shoreline (G01 – 0 m RL) and the other approximately 100 m inland from the shoreline (G02 – 3.2 m RL) (refer to Figure 4 of ERD Attachment 2U). Review of geotechnical drilling down-hole descriptions from these (GHD 2018) indicated: • G01: surface to 3 m BGL (equal to -3 m RL) comprised of calcrete ("calcarenite rocks"), which does not represent an ASS risk. • G02: surface to 10 m BGL (equal to -6.8 m RL) comprised sands and gravels which are unlikely to contain any ASS. ASS is normally associated with fine grained particles like clays and presence of organic matter such as mangroves/wetlands. • The descriptions of the logs are consistent with pit investigations and monitoring installation logs in the inland areas and indicate a continuous occurrence of calcareous sands/limestone throughout the area. Based on the above descriptions and logs there is no considered risk of encountering ASS by development of the launchway. MBS notes the comment 'indications of possible ASS' relates only to observed field colouration. Clays by their nature can have various colour grades and come in various types which is why visual assessment is only one aspect of assessment. Field logging noted potential ASS based only on this colour (e.g. mottling as potential signs of ASS), but subsequent laboratory testing over 0.25 m intervals (according to guidance) over the entire depth to 1.8 m BGL at this location showed no net acidity (< 0.005 %) and absence of any reduced sulfur (SCR < 0.005 %) (ERD Attachment 2U). This confirms that location ASS8 has no AASS/PASS and that colouration was clay derived only.
169.	Protect Ningaloo	If ASS are disturbed and exposed to air through drainage or excavation, this may cause the iron sulfides in the soil to react with oxygen and water to produce iron compounds and sulfuric acid. This acid can release other substances, including heavy metals, from the soil and into the surrounding environment and waterways. This could have serious and irreversible consequences for the sensitive marine and terrestrial environment of Exmouth Gulf.	No AASS or PASS potential was identified within the survey areas to depths beyond the proposed depths of excavation. It is noted that ASS risk maps are generically derived from relative height to sea level only and do not account for particular conditions at the site. Field assessment and testing has shown no potential for AASS or PASS exists in the disturbance proposed.
170.	Protect Ningaloo	The ERD does not discuss the cumulative impacts from other proposed projects, such as the proposed expansion to the Wapet Creek limestone screening plant which is adjacent to this proposal.	For the purpose of EIA, the EPA defines Terrestrial Environmental Quality as '*The chemical, physical, biological and aesthetic characteristics of soils*'. Soils are the layer of organic and inorganic weathered material that accumulates at the Earth's surface. Potential impacts, as stated in the ESD, were:

No.	Submitter	Submission and/or issue	Response to comment
			• Impact to soil quality following the exposure or disturbance of acid sulphate soils (Construction phase). • Impacts to soil quality due to leaks or spills (Construction and Operations phase). As stated in the ERD (Section 6.1.5), given the absence of acid sulphate soils within the Development Envelope, no cumulative impacts to terrestrial environmental quality are likely to occur. Neither the Proposal or the potential barge loading facility south of Mowbowra Creek (refer Section 2.5.8.5 of the ERD) are likely to result in the disturbance of ASS. No cumulative impacts are expected.

ATTACHMENT 1 (TABLE 2I) - SUBSEA 7 RESPONSES TO COMMENTS ON TERRESTRIAL FAUNA

<table>
<tr><th>No.</th><th>Submitter</th><th>Submission and/or issue</th><th>Response to comment</th></tr>
<tr><td>171.</td><td>EM149
Protect Ningaloo</td><td>The proposal poses risks to fauna, including invertebrates. Flora and vegetation values are proxy indicators of other values. A significant implication of the biogeographic assessment for flora is that the isolation history of the Cape Range (island origins) is also likely to have implication for fauna with many species represented on Cape Range by isolated populations, as stated by Kendrick (1993).

The taxonomic status of the fauna populations referred to in the proposal need clarification so their conservation value can be properly addressed. The invertebrate fauna should also be considered. They are poorly documented and valued, given some may be host specific.</td><td>The Level 1 fauna report (ERD Attachment 2P) was prepared in accordance with the requirements of the Guidance for the Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, Guidance Statement No. 56 (EPA 2004). Taxonomy and nomenclature in this report follows the accepted listing of published terrestrial vertebrate species.

Invertebrate fauna were considered in Sections 5.6 and 5.7.3.3 of the PER and this information is reproduced in the table below. The limited presence of invertebrate fauna in the Proposal area and low likelihood of impacts to these species, make the resultant risk to receiving environment very low.

<table>
<tr><th>Invertebrate Category</th><th>Section in PER</th><th>Comment</th></tr>
<tr><td>Troglofauna</td><td>5.6.3, 5.6.6 & 5.6.7</td><td>The shallow depth to groundwater, small pore spaces within the substrate and salinity concentrations mean that it is unlikely that a significant troglofauna community occurs within the project envelope. Furthermore, the limited excavation within the project envelope (less than 1 m in depth) is highly unlikely to affect the persistence of troglofauna that may be present (Bennelongia 2019).</td></tr>
<tr><td>Stygofauna</td><td>5.6.3, 5.6.6 & 5.6.7</td><td>Bennelongia (2019) concluded that stygofauna species would not be adversely affect by the project because:
The depth of drawdown associated with borefield operations will be small and the widespread distributions of the stygofauna species collected in the borefield.
There is a lack of stygofauna species on the sand plain and the small size of the greywater spray field, small volume of water being disposed of and various factors likely to minimise changes to groundwater conditions resulting from this addition of nutrients fresh water</td></tr>
<tr><td>SREs</td><td>5.7.3.3 & 5.7.6.6</td><td>A desktop assessment of Short Range Endemic (SRE) species was undertaken by Invertebrate Solutions (2017) and identified that nine confirmed SRE species of land snails occur within the region. The majority of these species are restricted to the central Cape Range Peninsula and are not likely to occur within the Development Envelope (Invertebrate Solutions 2017). Based on habitat preferences, there is potential for two species of land snail, Plectorhagaha sp. 1 and Quistrachia sp. 1 to occur within the coastal plain area of the Development Envelope. However, given the absence of limestone outcropping, there is a low likelihood of these species being present.</td></tr>
</table>
</td></tr>
<tr><td>172.</td><td>Protect Ningaloo</td><td>The ERD states that ‘it is not considered likely that development and operation of the Proposal will result in the introduction of new feral animal species to the area or an increase in abundance of feral animals. It is anticipated that the proposed controls will be effective and will prevent an increase in diversity and abundance of feral animals.’ The ERD does not indicate what would be done regarding invasive ants, whether they are being monitored and eradicated (Fisher et al., 2014). The disturbances proposed by this project would provide high opportunity for their rapid expansion across the landscape.</td><td>The Fisher et al. study referenced was conducted on monsoon vine thicket patches on the coast of the Dampier Peninsula in the Kimberley region. This habitat makes up less than 0.01% of the Dampier Peninsula, is not present at Learmonth, and the findings of this study are not considered to be relevant to habitats within the Proposal area. Fisher et al. (2014) did identify two invasive ant species in more open habitat of the Dampier Peninsula (Paratrechina longicornis and Monomorium destructor) but neither of these species are listed as key threatening processes under the EPBC Act or as high priority invasive ants in the National Invasive Ant Biosecurity Plan 2018 - 2028 (Environment and Invasives Committee 2019).

Proposal activities present a low risk of the introduction of invasive ant species because of the limited import of materials to the site from overseas or interstate. Bundle materials, representing the majority of materials to be imported, will come through the Port of Dampier and be subject to standard biosecurity measures.

The following measures will also limit impacts to the abundance of any invasive species in the Proposal area:
Standard vehicle and equipment hygiene practices.</td></tr>
</table>

No.	Submitter	Submission and/or issue	Response to comment
			• Appropriate disposal of food wastes.
173.	ANON-N59M-4PHC-R/ EM145 EM144 PA1-986 Rangelands NRM PN Proforma	The proposal threatens important habitats and species in Exmouth Gulf, including habitat for mammals, reptiles and birds. Submitters expressed concern for rare fauna including Rock Wallabies and cave dwelling fauna. Clearing of native vegetation means a reduction in habitat for mammals, reptiles and birds both in the cleared development "footprint" and in adjacent areas, which may affect their feeding or breeding.	The DBCA threatened fauna database returned 18 records of the Black-flanked Rock-wallaby in the Exmouth area, all from nearby gorges. This habitat type is not present in the Development Envelope and this species is therefore considered as Unlikely to occur within the Development Envelope (ERD Attachment 2P). The resultant risk to this species is considered to be low. Caves were not recorded across any of the 15 fauna habitats mapped in the survey area and the risk of impacts to cave dwelling fauna is considered to be negligible. There will be no clearing in areas adjacent to the Development Envelope. All habitat types identified in the Development Envelope were considered to be widespread and common in the Exmouth region. The majority of clearing (approximately 91%) will occur within the hummock grassland habitat which, overall, was assessed as providing limited vegetation structure and hence limited fauna habitat for birds and mammals (ERD Attachment 2P). The only habitat type within the Development Envelope that may provide roosting and nesting opportunities for birds was the 'minor drainage line' habitat. Approximately 4.4 ha of this habitat lies within the Development Envelope but it continues beyond the survey area extent. This habitat is considered unlikely to represent critical habitat to any fauna species (ERD Attachment 2P).
174.	Protect Ningaloo	We believe a level 2 assessment should have been conducted for an area of this importance and given its distinctive floristic and vegetation values (see further information in the flora section). The lack of this assessment means that there is not sufficient data provided in the ERD for a sufficiently thorough assessment and review by respondents. The proponent has not demonstrated that the proposal would not have negative impacts on terrestrial fauna, particularly from the large-scale clearing of native habitat.	The work required under ESD Task 51 has been completed. The Level 1 terrestrial fauna survey also included nocturnal spotlighting and the deployment of eight motion cameras and bat acoustic recording units. The information collected in a Level 1 survey helps to determine if a Level 2 survey will be required and/or whether it should target a particular species or group of species. Based on the habitat identified and likelihood of occurrence for conservation significant species, it was determined that a targeted or Level 2 survey was not required. In accordance with the EPA Technical Guidance on Terrestrial Fauna Surveys (EPA 2016), the scale and nature of Proposal impacts are considered to be low to moderate based on the following: • Extents of the broad vegetation types present within the Development Envelope remain at >85% of the pre-European extents. • Vegetation and landforms present are widespread in the broader region. • Vegetation and area characteristics indicate significant habitats are unlikely to occur. • Refugia are not known from the area. • The area does not appear to support a large population/seasonal concentration of species. • The habitat and faunal assemblage is not more intact than that in the district. • The area is not part of an ecological linkage at the regional or local scale. • The area and its surrounds have a similar range of habitats and faunal assemblages.

ATTACHMENT 1 (TABLE 2J) - SUBSEA 7 RESPONSES TO COMMENTS ON INLAND WATERS

No.	Submitter	Submission and/or issue	Response to comment
175.	Protect Ningaloo	Submitter considers the impacts to natural surface water flows, contamination of surface water and the drainage infrastructure of proposed drain and single culvert would not be sufficient to prevent impacts. The impact of the proposed 10 km Bundle railway tracks and roads on this natural drainage are concerning, particularly as the area is at high risk of flooding. Furthermore, there is no reference to potential impacts of flooding and inundation from rising sea levels, cyclone risks and other impacts from climate change.	The ephemeral watercourses adjacent to the Development Envelope are expected to flow only during, and for a short period following, significant rainfall events. Thus under 'average' conditions no surface water flows occur within the area. Modelling was completed to determine the likely flow patterns before and following the implementation of the Proposal, under various rainfall scenarios (refer Section 5.8.6.1 of the ERD). This work also assisted in the design of appropriate surface water management infrastructure (drains and culverts) adjacent to the Bundle track. A comparison of the existing and future case modelling for a 100-year ARI event was presented in ERD Figure 5-50 (refer also ERD Attachment 2R). Under a larger event, such as a 50 year ARI event or 100 year ARI event, flooding would be expected across the wider landscape. Changes or impacts associated with the presence of the proposed infrastructure, as predicted through modelling (ERD Attachment 2R), would be minimal. The risk of surface water contamination following flooding will be negligible as the 100-year ARI event was used to design flood damage protection measures, to ensure damage to infrastructure and discharge of chemicals does not occur. The potential for flooding and inundation at the seaward end of the facility, including an allowance for sea level rise, was assessed as part of the coastal hazard risk assessment presented in Section 5.10 of ERD Attachment 2E. It was noted that the area of the access road, which is relatively low lying, may experience more frequent inundation and could be subject to erosion decades in the future. Impacts to other infrastructure is not expected. ERD Attachment 2E states, in relation to inundation following extreme weather events, that '*the construction of the launchway will locally cut through the dune, reducing the elevation in this area from approximately 5 mAHD down to an elevation of around 2.5 mAHD at the foundation level. Such a reduction in the elevation of the dune, which would generally form a barrier to wave attack and inundation of adjacent low-lying areas may result in a localised increase in erosion risk and inundation vulnerability. Given the absence of detailed survey information over the broader area, it is difficult to determine the extent of any potential impact, especially from inundation. However, review of aerial photography shows that the presence of the creek system to the north of the site (Wapet Creek), and the connection of this system to the salt flats inland from the site already provides an avenue for ingress of inundation during extreme events*'……and…..*'The elevation of this inundation pathway appears to be lower than 2.5 mAHD, which is supported by rainfall and runoff modelling completed by Hyd2o (2014), meaning it could be expected that this area would be at least partially inundated prior to any breach of the launchway cut*'. Thus under an extreme event it is likely that the broader area would be inundated as a result of flows from Wapet Creek, whether or not the launchway cut was in place. The risk of inundation of the coastal area as a result of the Proposal is considered to be low.
176.	Protect Ningaloo	Infiltration of the hydrotest water into groundwater is a serious concern. Insufficient information provided in the ERD.	The hydrotest water pond will be lined and covered to provide for the storage and re-use of the water. Subsea 7 does not propose to infiltrate the water into the ground. Under cyclonic conditions the pond (if industrial water bladders are not used) could potentially overflow following heavy rain. Under such a scenario the hydrotest water, which is fresh, would infiltrate into the ground on the inland (west) side of the dunes.
177.	Protect Ningaloo	Changes to groundwater flows may impact the arid-zone marine environment, which is dependent on irregular rainfall from weather events to boost nutrient flows into the system.	Significant changes to groundwater flows are not expected. The abstraction of up to 12 ML/annum (12,000 kL/annum) for potable and hydrotest water is proposed. This is considered a minor volume. For context, a number of abstraction licences held for bores to the north (adjacent to Exmouth townsite) allow for the abstraction of two to 70 times this volume on an annual basis. The concentrations of nutrients in groundwater samples from bores within and adjacent to the proposed borefield were low (lower than those in seawater) (ERD Attachment 2R).

No.	Submitter	Submission and/or issue	Response to comment
178.	ANON-N59M-4PWP-M Protect Ningaloo	Inundation of inland areas is identified by Subsea 7 as a potential impact resulting from the removal of dunes in order to facilitate construction of the launch-way. If this occurs it will cause damage to flora and vegetation inland, change the inland water flows and presents a serious problem in the event of an extreme weather event.	ERD Attachment 2E states, in relation to inundation following extreme weather events, that '*the construction of the launchway will locally cut through the dune, reducing the elevation in this area from approximately 5 mAHD down to an elevation of around 2.5 mAHD at the foundation level. Such a reduction in the elevation of the dune, which would generally form a barrier to wave attack and inundation of adjacent low-lying areas may result in a localised increase in erosion risk and inundation vulnerability. Given the absence of detailed survey information over the broader area, it is difficult to determine the extent of any potential impact, especially from inundation. However, review of aerial photography shows that the presence of the creek system to the north of the site (Wapet Creek), and the connection of this system to the salt flats inland from the site already provides an avenue for ingress of inundation during extreme events*'……and…..'*The elevation of this inundation pathway appears to be lower than 2.5 mAHD, which is supported by rainfall and runoff modelling completed by Hyd2o (2014), meaning it could be expected that this area would be at least partially inundated prior to any breach of the launchway cut*'. As stated in Section 5.2.6.3 of the ERD, '*for more severe events, or those that cause more rapid fluctuations in sea level, the ingress of seawater through the launchway cut could occur'*. Thus under an extreme event it is likely that the broader area would be inundated as a result of flows from Wapet Creek, whether or not the launchway cut was in place. The risk of significant impacts to flora and vegetation as a result of the launchway cut, is considered to be low.
179.	ANON-N59M-4PHC-R/EM145 Protect Ningaloo	The volume of groundwater to be abstracted will substantially reduce the groundwater for other uses, including the environment. The proposal states that "it is not expected that changes in groundwater levels that may result from abstraction of groundwater will impact flora and vegetation". How is it possible that flora and vegetation would not be impacted in an area with such low annual rainfall? Where is the scientific evidence to support this statement?	The abstraction of up to 12 ML/annum (12,000 kL/annum) for potable and hydrotest water is proposed. This is considered a minor volume. For context, a number of abstraction licences held for bores to the north (adjacent to Exmouth townsite) allow for the abstraction of two to 70 times this volume. The Development Envelope is located within the Exmouth South groundwater sub area (ERD Figure 5-48), with the relevant aquifer being the Cape Range Limestone aquifer. The Exmouth South groundwater sub area is currently only 2% allocated with a small number of abstraction licences currently held (Refer Section 3.4.1 of ERD Attachment 2R). The pastoralist is also able to abstract minor volumes of water for stock purposes, under the pastoral lease. No additional future groundwater users can be identified at this time. The small abstraction volumes, leading to minimal drawdown in the immediate vicinity of the bores, and negligible drawdown at distance from the bores, means that the risk of impacts to environmental values, including flora and vegetation, is minimal. The vegetation communities in the area surrounding the abstraction bores are not considered to be dependent on groundwater. Shallow rooted species will not currently be accessing groundwater while deep rooted species, which are currently utilizing groundwater in the area (which is encountered at between 22 and 32 mbgl (ERD Section 5.5.6.6), will still be able to access groundwater. Monitoring of groundwater levels and quality is proposed to ensure no significant impacts on flora and vegetation (refer ERD Table 5-45).
180.	ANON-N59M-4PHS-8 Oceanwise Australia	The extraction of subterranean water and interference with surface flow, (both which currently flow towards the Bay of Rest mangroves immediately adjacent the proposed building site) will have unknown impacts upon the mangroves situated in the Bay of Rest. Of the mangrove species found here, *Avicenia marina* are tolerant to the hypersaline reverse estuary waters characterizing Exmouth gulf. In comparison the existence of *Rhizophora* mangroves species in the Bay of Rest indicate the presence of hyposaline waters that are below the concentration of seawater since they require access to brackish water to exist. Since there is net negative rainfall in the area it is likely these mangroves access brackish water fresher then seawater from below ground, but work is needed to confirm this. Regardless the risk of impacts from groundwater extraction and interference with surface runoff that could impact on one of the least disturbed mangrove ecosystems along this stretch of coast has not been adequately considered.	A simple mangrove vegetation classification has been developed (Paling *et al*. 2003) which describes the associations that generally occur across the Pilbara region: • *Avicennia marina* (closed canopy, seaward edge). • *Rhizophora stylosa* (closed canopy). • *Rhizophora stylosa/Avicennia marina* (closed canopy). • *Avicennia marina* (closed canopy, landward edge). • *Avicennia marina* (scattered). Zonation of mangroves in the Bay of Rest was consistent with the pattern typically observed elsewhere in the region. Tidal exchange and flows are the dominant and prevailing processes that maintain the Pilbara mangroves as they regulate many of the physical, chemical and biological functions. Inundation by seawater during flood tides is the main recharge mechanism that regulates the intertidal zone. Lower salinities occur in mangrove areas of lower tidal elevation (e.g. lower reaches of tidal creeks and more seaward locations) where tidal inundation is frequent (daily) and higher salinities are recorded from the more landward closed canopy and open shrubland zones that receive less frequent tidal inundation. The salinity gradients influence both the occurrence of the different mangrove species (due to differing salinity tolerance limits) and the mangrove community structure (PPA 2020).

No.	Submitter	Submission and/or issue	Response to comment
			Some species, including *Avicennia marina*, have mechanisms to eliminate the abundance of salt. Other species, known as non-secretor or ultrafiltration species, including *Rhizophora stylosa*, do not possess such mechanisms for the removal of extra salt (Basyuni *et al*. 2019). *Rhizophora stylosa* does not rely on access brackish water. Given that the mangroves do not depend on access to brackish water (it is noted that the groundwater adjacent to the coast was found to be saline, refer ERD Attachment 2R) and the lack of impact to groundwater or surface water flows to the Bay of Rest, impacts to mangroves are not expected.
181.	Oceanwise Australia	Very little consideration of the impact of the 10 km long facility hard stand on surface and subsurface water flow during cyclone, storm surge and flooding events. This elevated hardstand will also severely impact upon surface water flows both from the ocean during spring high tide inundation of supratidal samphire wetlands cutoff from the ocean, and the drowning of these wetlands during rainfall events that bank up the water against the landward side of this barrier.	The Bundle Track is described (ERD Section 11) as '*standard rail track that allows the Bundle to move along the site*'. The Bundle track will not be a 'hard stand' area and impacts on surface water infiltration will be minimal. Surface water flows 'from the ocean during spring tides' are not expected – the cut through the dune remains at around 2.5 mAHD at the foundation level. The low lying samphire areas will continue to be influenced by saline water during spring tides, as this water rises up through underlying soils. The proposed Bundle track, lacking deep excavations or foundations, will not influence the subsurface movement of saline water across the coastal area. The results for a 100-year ARI event are shown in ERD Figure 5-50. It is expected that vegetation within the Development Envelope could be impacted to some degree following a change to surface water flow patterns associated with development of the proposed Bundle track. It is predicted that a general increase in flood levels and velocities will occur on the western side of the Bundle track, and a general decrease in flood levels will occur on the eastern side of the Bundle track due to a proposed open drain. It was concluded that samphire (*Tecticornia*) species, which are often located near tidal landforms frequently exposed to tidal/flooding events, and survive in highly saline and waterlogged soil conditions, are unlikely to be significantly impacted. Notwithstanding the low risk of mortality due to changes in flood levels, the risk of impact was assessed as minor based on the alteration or disturbance to less than 5% of a habitat, species or ecosystem (refer ERD Table 5-28).

ATTACHMENT 1 (TABLE 2K) - SUBSEA 7 RESPONSES TO COMMENTS ON SOCIAL SURROUNDINGS

No.	Submitter	Submission and/or issue	Response to comment
182.	EM148 Protect Ningaloo	Avoidance and mitigation measures proposed by Subsea 7 for Social Surroundings are unacceptable. Subsea 7 has dismissed impacts on Social Surroundings because access to the Bay of Rest and Heron Point is being maintained and they are not carrying out site construction during the night. The proponent has not provided correct information to EPA on social surroundings and no mitigation has been proposed.	Subsea 7 has conducted extensive public consultation on the proposal and the potential social impacts. Throughout this consultation, four key areas of social impacts were identified; • Access to camping and along the beach at heron point – The proponent notes that camping is currently not permitted at Heron point, but has also stated that the proposal would not effect camping in its current form except for the footprint of the launchway. The proponent has also stated that access across the launchway would be maintained outside of launch times. • Access to the Bay of Rest – there is currently one 4wd access track across the proposed facility which Subsea 7 has committed to maintaining access over the track except for during launch times which will be well publicised • Visual impact – Subsea 7 has carried out extensive visual impact assessment included in the ERD. The track and launchway have minimal visual impact and Subsea 7 has suggested a mitigation strategy for the fabrication shop at the road end of the facility using spoil from construction to construct a false dune in keeping with the visual amenity of the surroundings. • Traditional owners – Subsea 7 has carried out an extensive survey of the development envelope with the traditional owners which has been well documented in the ERD. The Fabrication facility will also be subject to Shire Planning approvals which will govern the final facility design.
183.	NCWHAC	The OUV of the NCWHA was not given due acknowledgement in the ERD. For example, it was incorrectly referred to in maps and in text and the north/west portion of the Exmouth Gulf did not receive due consideration as part of the NCWHA. Whilst the proposal is predominately based in Exmouth Gulf, the submitter recommends the impact on the OUV of the NWCHA from activities within Exmouth Gulf are considered and addressed ensuring protection of the OUV before the proposal proceeds. Should there be areas of unknown quantities the submitter recommends no assumptions are made and the precautionary principle is employed in due diligence in line with the Ningaloo Coast Regional Strategy and the EPBC Act as required to meet international obligations to protect the OUV.	Section 7.6.1 of the ERD assesses the potential impacts from the Proposal on the heritage-listing criteria for the WHA (which are the same as the OUV values). The Ningaloo Coast World Heritage Area (WHA) was inscribed on the World Heritage List on 1 November 2011 under criteria (vii) and (x), as follows: • Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. • Criterion (x): contain the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. The UNESCO World Heritage Committee issued a Statement of Outstanding Universal Value (OUV) referencing the striking landscapes and seascapes, the adjacent reef and limestone karst habitats, the high degree of terrestrial species endemism (including subterranean species), the high marine habitats and species diversity and the high abundance of Whale sharks aggregating in the region. The only reasonably foreseeable mechanism for impacts to the OUV is from visual impacts during a Bundle tow. This is because: • The onshore Development Envelope is over 15 km from the boundary of the WHA at the closest point. • The Off bottom tow and Parking area portions of the Offshore Operations Area do not intersect the WHA. • No impacts to the marine or terrestrial habitats of the WHA can reasonably be expected (as the Bundle will be in Surface tow mode through the WHA with no seabed contact). • Significant impacts to listed marine fauna species during Bundle tow are not expected. • Subterranean fauna values of the Cape Range are not at risk from the Proposal. Visual impacts will only occur during a Bundle tow, up to a maximum of three times a year. It is expected that the flotilla of tugs, support vessels and the Bundle itself will enter and exit the WHA and Ningaloo Coast National Heritage Place within 3 hours 48 mins per launch. Given this low frequency and short duration of tow operations, and the presence of other commercial and recreational vessels in the area year-round, a significant impact to the current aesthetic values of the WHA are not expected.
184.	NCWHAC	The submitter notes the change in land use zoning from 'Rural' and 'Foreshore Reserve' to 'Special Use 10' to facilitate the development proposal is a direct contradiction to the Shire of Exmouth Local Planning Strategy (LPS) 4: strategy 10 (April 2019) Industrial Strategies-Industrial Land Outside Townsite, which states 'limit the expansion of industrial	**Local Planning Strategy** The Local Planning Strategy was initially prepared in 2013 and was endorsed by the Western Australian Planning Commission on 5 April 2019. This is the Shire's first local planning strategy, there was no local planning strategy prepared by the local government before that time. Figure 3 of the Local Planning Strategy recognises the World Heritage area boundary. The amendment area is not within the World Heritage area. It

No.	Submitter	Submission and/or issue	Response to comment
		development outside the industrial nodes identified by the strategy, acknowledging the community values for retaining and protecting important viewsheds and areas of natural or ecological importance'. The submitter notes amendments for development proposals highlights the 'ad hoc' nature of decision making around the future of the region and the need for a consensus around long term vision for it. Amending LPS 4 (for the specific reason of development proposals) has the potential to significantly impact the aesthetic value of the NCWHA for criterion (vii) - superlative natural phenomena or natural beauty. The cumulative impact from individual developments/operations over time and space and its potentially detrimental effect on the OUV of the NCWHA should be considered. The submitter recommends the proponent consider the cumulative impacts of the amendment to land use zoning to accommodate the development proposal. The application of the precautionary principle should be inherently considered. This recommendation is in line with the Ningaloo Coast Regional Strategy Carnarvon to Exmouth (2004) (NCRS), as the overarching strategy for guiding planning and development proposals along the Ningaloo Coast in support of an integrated approach to the 'protection, conservation, management and presentation' of the OUV of the NCWHA. The NCRS was described by the IUCN as 'critical' in ensuring the multiple management plans effective protect the OUV, so grave consideration needs to be taken to ensure its integrity is maintained when considering proposals not in alignment. The WAPC Statement of Planning Policy No. 6.3 Ningaloo Coast (2004) (SPP 6.3) is inherently linked to the NCRS and essential for assessment of land-use planning effects on the OUV of the NCWHA i.e. through the application of: • the precautionary principle 'where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation…' • the assessment of cumulative impacts 'all planning and development must consider its cumulative impact. … The ad hoc establishment of developments along the Ningaloo coast has the potential to erode the remote and environmental values of the area over time .... If there is an unacceptable cumulative impact, the development should not go ahead.'	is also recognised that within proximity to the project are significant man-made facilities including the RAAF Base Learmonth, Naval Communications Station Harold E. Holt Area C, and Learmonth Solar Observatory. Further west and closer to Ningaloo reef, within the World Heritage Area, is the Learmonth Air Weapons Range. **Amendments inconsistent with Local Planning Strategy** Having regard to the chronology of events, the Local Planning Strategy had been advertised at the time that the Scheme Amendment 32 was initiated by the Shire of Exmouth. The Strategy was a 'seriously considered' planning proposal. The Shire and Western Australian Planning Commission had regard to it as part of considering Subsea 7's scheme amendment request and in initiating the Scheme Amendment 32. The Local Planning Strategy was endorsed and the new Local Planning Scheme No. 4 was gazetted, at the time that the Shire initiated Scheme Amendment 1. Again, the Shire and Western Australian Planning Commission had regard to the Strategy as part of considering and initiating the Scheme Amendment 1. **Categorisation of Scheme Amendments** Scheme amendments are categorised as 'basic', 'standard' or 'complex'. A complex amendment is defined under regulation 35 of the Planning and Development (Local Planning Schemes) Regulations 2015 as follows: ***complex amendment*** *means any of the following amendments to a local planning scheme —* *(a) an amendment that is not consistent with a local planning strategy for the scheme that has been endorsed by the Commission;* *(b) an amendment that is not addressed by any local planning strategy;* *(c) an amendment relating to development that is of a scale, or will have an impact, that is significant relative to development in the locality;* *(d) an amendment made to comply with an order made by the Minister under section 76 or 77A of the Act;* *(e) an amendment to identify or amend a development contribution area or to prepare or amend a development contribution plan;* Scheme Amendment 32 was initiated by Council in 2017 as a 'complex amendment' as, at that time, there was no endorsed Local Planning Strategy (the Local Planning Strategy was endorsed in 2019) pursuant to regulation 35, paragraph (a). It was a seriously considered planning proposal as it had been advertised. Scheme Amendment 1 was initiated by Council in 2019 as it was not consistent with the endorsed Local Planning Strategy pursuant to regulation 35, paragraph (b). Again, the Local Planning Strategy had been given regard and was documented in the scheme amendment report. The Scheme Amendment was prepared having regard to very unique development, with only one other such facility in the world, and the deliberate proposition of a Special Use zone to ensure that the area is not exposed to a broadly defined industrial zoning. A Special Use zone provides the opportunity for the land use and works to proceed in an orderly and proper manner, with specific provisions and development conditions in the Scheme to guide future development. The Special Use zone only contemplates three land uses, 'marine support facility', 'pipeline fabrication facility' and 'telecommunications' facility, and includes conditions for addressing including setbacks to Minilya-Exmouth Road, fencing, and development requirements to address heritage assessment processes, water supply, waste water treatment, stormwater management, access to Minilya-Exmouth Road, construction management, and coastal management. **Cumulative impacts and precautionary principle** The construction of the zone for a very limited set of three land uses with statutory development conditions to be addressed, effectively address the concerns regarding 'cumulative impact' and address the 'precautionary principle'.

No.	Submitter	Submission and/or issue	Response to comment
			The cumulative impacts and precautionary principle have been considered as part of the scheme amendment and environmental review. These were embedded within the EPA's Environmental Scoping Document (EPA, 2019). The environmental review for the Scheme Amendment 1 considered the precautionary principle and cumulative impact of the proposal. The submitter paraphrased the two guiding principles. The NCRS guiding principle 7 'precautionary principle' is replicated in SPP 6.3 (WAPC 2004) quoted in full: "*Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation. In applying this principle in planning and development, the following steps must be followed.* • *The onus is on any proponent to show that development does not pose any likelihood of serious or irreversible harm of the environment.* • *If the proponent cannot demonstrate there is no likelihood of such harm, the onus is on the development proponent to show that the harm can be managed.* • *If the proponent cannot demonstrate the harm will be managed, the development should not go ahead."* The NCRS guiding principle 8 'cumulative impact' is replicated in SPP 6.3 (WAPC 2004) quoted in full: "*All planning and development must consider its cumulative impact. The demand for and subsequent provision of tourism or recreational development along the coast may result in cumulative impacts as each new development proposal is added to existing development. The ad hoc establishment of developments along the coast has the potential to erode the remote and environmental values of the area over time and also may affect the economic viability of the individual development projects. If there is an unacceptable cumulative impact, the development should not go ahead*." Section 3 of the Scheme Amendment report documented the consideration of the State and local planning framework, including relevant State Planning Policies (such as SPP 6.3 Ningaloo Coast). The NCRS established guiding principles for development and these are contained in SPP 6.3 Ningaloo Coast. The Scheme Amendment 1 took into consideration the guiding principles of SPP 6.3 Ningaloo Coast.
185.	ANON-N59M-4PRM-C ANON-N59M-4PRZ-S ANON-N59M-4PRU-M ANON-N59M-4PFA-M ANON-N59M-4PF5-8 ANON-N59M-4PWB-6 ANON-N59M-4PW7-U	Supportive of the proposal due to social and economic benefits.	Agree. Subsea 7's vision is that the Proposal would result in significant, local and regional, social and economic benefits. This has been the case for the only operating Bundle site, located in Wick, Scotland.
186.	ANON-N59M-4PRM-C ANON-N59M-4PK7-F PA1-986	The proponent is sensitive to the unique community and environment of Exmouth, Ningaloo and the region and its significance to tourism.	Agree. Subsea 7's vision is that the Proposal would not result in significant impacts to the environment or tourism but instead would lead to local and regional, social and economic benefits. This has been the case for the only operating Bundle site, located in Wick, Scotland.
187.	ANON-N59M-4PRE-4 ANON-N59M-4PFU-8 ANON-N59M-4PWG-B ANON-N59M-4P8C-8 EM147 EM11 Recfishwest Protect Ningaloo	Submissions relate to public access of the proposal area and surrounding beaches for recreational activities. Submissions include: • Access of the public or tourism operators to any public asset via boat or car should not be impeded by the exclusion zone during operations. The proponent will understandably seek to undertake tow operations during optimum weather and sea conditions, essentially competing with recreational and tourism users for whom those same weather windows are at a premium.	Access by the public or tourism operators to any public asset via boat or car will not be prevented during operations. However, for safety reasons, public notification (local media and signage), and an exclusion zone, will be in place immediately prior to, and during, a Bundle launch. An exclusion zone will be enforced immediately surrounding the launchway, and adjacent to a (moving) section of the tow route during a launch. This would be comparable to the use of safety signage and barriers surrounding public works. The submitters are correct that Subsea 7 would target good (calm) weather conditions for a Bundle launch, which would also represent good conditions for charter and recreational activities. However the proposed exclusion zones would be in place for a minor amount of time (approximately 1 day at the launchway and up

No.	Submitter	Submission and/or issue	Response to comment
		• Erosion of the beaches will make access to the Bay of Rest from the proposed Bundle launch area impractical and an important and popular experience will have been lost irrespective of whether there is a launch way crossing or not. • Fig.5-56, p.346 clearly shows that access to Heron Point and Bay of Rest will be within the development envelope. Users of those places will need to pass through the site. Therefore, access to Heron Point and the Bay of Rest will be constrained, controlled and monitored, notably those 'members of the public or other groups that are not appropriately inducted, escorted, or trained to be onsite'. Partial, contingent access is not acceptable. • Volume 1, p.334 of the ERD states that: 'boating, fishing, diving, whale-watching and snorkelling are popular recreational activities in Exmouth Gulf but are not understood to be focussed on areas within or adjacent to the Offshore Operations Area'. This is not true. It also contradicts data presented in Figure 5-31 (p.195). All these activities focus on the wider Gulf (within and adjacent to the proposed Offshore Operations Area) and within the vicinity of the launch site. • Rezoning from rural-use will disallow any camping activities	to 2 days within Exmouth Gulf, up to three times per year) and would not prevent access to Heron Point, the Bay of Rest, the Muiron Islands or the eastern or southern shores of Exmouth Gulf. <u>During launch operations, access to the Bay of Rest will be maintained via an alternative access route that runs from Minilya-Exmouth Road to the intersection of the existing track and the Bundle tracks, running parallel to the Proposal site (refer ERD Figure 5-56)</u>. Section 7 of ERD Attachment 2E outlines the triggers for the management of the shoreline. These triggers outline that if more than 5 m of erosion occurs as a result of the launchway, then sand bypassing works will be completed to remedy the erosion. As a result, the maximum impact that the launchway could have is a 5 m erosion of the shoreline. This should not adversely impact the recreational value of the area. Subsea 7 will not 'police' this access track and no induction would be required to use this access option. It is predicted that sand would accumulate along the northern side of the launchway, above the low tide mark, until sediment on the beach berm starts to move across the structure. Due to the temporary reduction in sand migrating to the shoreline to the south, some narrowing or possible loss of the small perched beach formations to the south of the launchway could occur. The shoreline in this area is naturally rocky (refer photograph below taken from ERD Attachment 2E).  The magnitude of coastal change will be small, and will be monitored and managed appropriately (as outlined in the ERD). Therefore impacts to access to Heron Point and the Bay of Rest are extremely unlikely. **Camping activities** The Special Use zone is proposed for three land uses, 'marine support facility', 'pipeline fabrication facility' and 'telecommunications infrastructure'. The zone is not proposed to include tourism uses. Subsea 7 understands that tourism land uses are listed in the zoning table for the 'Rural' zone in the Shire of Exmouth Local Planning Scheme No. 4. Examples include 'camping ground', 'holiday accommodation' and 'nature based park'. Tourism land uses in the 'Rural' zone require development approval. Development and use of land for tourism proposals would have regard to the guiding principles of the Ningaloo Coast Regional Strategy (WAPC 2004) as per State Planning Policy 6.3 Ningaloo Coast (WAPC 2004).

No.	Submitter	Submission and/or issue	Response to comment
			The surrounding 'Rural' zoned land is within the Exmouth Gulf pastoral lease. It is understood that pastoral-related tourism can occur with a permit pursuant to the *Land Administration Act 1997*. Once tourism goes beyond pastoral-related tourism, a general lease would be required and it would need to be separated from the pastoral lease. Consideration of Native Title would be necessary as part of a general lease arrangement. Subsea 7 does not have responsibility or authority for controlling camping activities, and Subsea 7 is not a landowner in the area. Subsea 7 is not aware of any approved camping activities under the pastoral lease or under general leases in proximity to the Proposal area. Potentially, the submitters are referring to unregulated camping activities by various community members, whether on the beach (which is vacant Crown land) or within the pastoral lease area. We are not aware of intentions of the local government or state government intentions in respect to the formal approval of camping activities in the broader Learmonth or Bay of Rest area. It is noted that Subsea 7 infrastructure and/or activities will not affect the current uses of the beach other than in the ways previously outlined.
188.	ANON-N59M-4PK9-H EM147 Protect Ningaloo	Submitters raised concerns about the consideration of the cumulative losses of amenity. Submissions included: • Visual costs, losses of access, added social pressures and the increased ecological pressures on ecosystems should be addressed as a broader social cost arising from this proposed activity. • For users of public environmental assets, diminution of biodiversity (biodiversity experienced as richness or plenty, pleasure, wellbeing and sustenance) are accumulated and felt as costs to wellbeing, costs to faith in public institutions, depletions that are at once personal and communal. These cumulative inter-related impacts are almost never accounted for or properly acknowledged in commercial proposals. • Many environmental costs are measurable. But there is no metric for humans experiencing a process of diminution as more and more of the natural world is lost. They are rarely experienced in discrete units and categories of the kind that fit neatly into an EPA document. I think it should be considered by our regulatory agencies when considering industrial proposals with significant environmental impacts.	• The visual impact of the proposal has been well documented in the Visual impact assessment and is considered to be low. • Subsea 7 has committed to maintaining available access tracks outside of launch times. • Clarification would be required on specific social pressures, not already included in the social impact assessment. • Subsea 7 considers the launch way once constructed will create habitat and therefore add to the biodiversity. As the proposed area is surrounded by other users such as RAAF Learmonth, the solar observatory, communications station and the proposed facility footprint is to be excised from current pastoral lease, it is felt that the proposal is in keeping with other uses of the immediate surroundings. In addition, the benefits outlined to the community in terms of employment and wider growth for the community should be considered as a cumulative inter-related benefit. • Subsea 7 has faith in and welcomes the EPA process in assessing the benefits against the impacts of this assessment. Subsea 7 has committed to continuing to work with and engage with all stakeholders into the future to ensure the impact is as minimal as possible.
189.	Protect Ningaloo	There is limited content in the ERD related to local communities which will be impacted. Points raised by the submitter include: • Local tourism businesses will be impacted, which are not adequately covered in the Stakeholder Engagement Register. • Section 3.3 – tourism is noted as the largest industry and major economic contributor to the local economy. However, there are no numbers provided for the number or percentage of residents employed in tourism. • Section 4.3 – the ERD refers to the local economy being heavily reliant on seasonal tourism. While there is a main tourist season from March to October, tourism continues to be steady for most of the year. • Section 4.6.3 – The ERD minimises how much locals and tourists use and enjoy Exmouth Gulf for recreational activities. The Gulf is utilised when it is windy on the west side, which is also likely to coincide with launches. Locals will have to detour during launches, which would result in extra fuel costs. • The ERD suggests tour operators and recreational boat users wanting to visit the Murion Islands would (only) be able to launch	Subsea 7 feels that there has been extensive consultation with all available stakeholders. Those times where impacts will occur, have been identified and mitigation strategies outlined. Subsea 7 notes that the population of Exmouth fluctuates drastically throughout the year and therefore the percentage of residents employed in tourism also fluctuates drastically throughout the year. It is widely accepted that tourism in Exmouth is seasonal and while Subsea 7 acknowledges that tourists are present year-round, tourism would not be considered steady throughout the year which is highlighted by the fact that most tourism related businesses shutdown during the summer months. Subsea 7 has widely accepted the importance of the Exmouth Gulf to users in the area. Subsea 7 feels that the short duration and low number of launches per year (maximum 3) as well as the wide publicity of launch times will enable other users of the gulf to plan their use so as to minimise disruption. Bundegi boat ramp is not affected by any exclusion zones established around the Launch area. Bundegi Boat ramp is approximately 25nm North of the launch way. Impacts from Bundegi boat ramp would only be experienced by vessels wishing to transit across the tow exclusion zone from Bundegi boat ramp. These times would be well publicised and minimal.

No.	Submitter	Submission and/or issue	Response to comment
		from the Marina. There is no clear statement about the use of Bundegi Boat Ramp, which is likely to be within the exclusion zone during launching • Camping at Heron Point – Figure 5 does not include this as a camping area but this area is regularly used by many local residents. Launches will mean a 36 hour exclusion from this area. • Section 5.3 – The Proponent is under-representing that concerns that the local community has about the project. • Section 6 – the report says impacts and opportunities will be managed through the mitigation hierarchy. The mitigation hierarchy is highly complex and there is no discussion in the assessment of how the Proponent proposes to adhere to this hierarchy.	Heron point is not a designated camping area and there is no authorised camping in the shire of Exmouth other than in designated camping areas. However, Subsea 7 will maintain a small exclusion zone on the beach either side of the launch way for safety of the public during launch operations. This will preclude people from crossing the launch way, but this is for a minimal well publicised time during every launch. Access will still be available for the all areas outside of this and access to the Bay of rest can be available, only closed for 1 or 2 20-minute intervals per launch. Subsea 7 feels it has correctly understood the concerns of some members of the local community but also remains open to further engagement with concerned parties should they wish to make themselves available & known. Subsea 7 feels that adherence to this hierarchy is adequately discussed as each section of the ERD discusses strategies for Mitigation, Monitoring and predicted outcomes.
190.	ANON-N59M-4PRE-4 ANON-N59M-4PK1-9 ANON-N59M-4PWG-B ANON-N59M-4P8C-8 EM147, EM148 EM90, EM116 PN Proforma Protect Ningaloo Rangelands NRM	Submitters state the proposal will have unacceptable visual impacts to people's visitation experiences. Submissions note the following: • The beaches from Wapet Creek to Heron Point, and the wetlands of the Bay of Rest, are important areas of recreation and respite. They are highly prized for their seclusion and quiet. There are few peaceful, estuarine waterways with vistas of this grandeur and unmodified nature, and this helps to explain the site's high social value. • The proposal will constitute a significant loss of visual and aesthetic amenity, visible from multiple locations and diminish the distinct sense of place. • Not only used only by a small cohort of locals; they are widely used by tourists and residents alike. • Visual impact comparisons to the Learmonth jetty are inappropriate – the Learmonth jetty is not 10.5 km long. The forward manifold will be the first thing constructed and will be there for the life of each fabrication. It is bulky and many times more intrusive than Learmonth Jetty.	Subsea 7 feels that the visual impacts have been well discussed in the Visual impact assessment. The visual impact of the track and launch way is considered to be low. The track would not be visible from the Bay of rest. Subsea 7 feels it has demonstrated the minimalistic nature of the launch way and track through the visual impact assessment. Subsea 7 feels it understands the usage of Heron point and surrounds. This usage will be widely unaffected by the development other than at launch times, where some restrictions will need to be in place for public safety. The visual impact of the launch way is comparable to the Learmonth Jetty. The Launch way is shown to be of extremely low profile when compared to Learmonth jetty, although longer to 350m. The track extends back from the beach and would not be visible from the beach. The 'forward Manifold" or Towhead, is manufactured off site and is the last part to be added to the Bundle prior to testing and launch. Time on site is minimal. Further, for Bundles shorter than 10km, this would be completed further back from the beach and then moved to the launch way closer to launch time.
191.	BHLF-N59M-4PJR-9 BHLF-N59M-4PEH-T ANON-N59M-4PR9-R ANON-N59M-4PWP-M ANON-N59M-4PWG-B ANON-N59M-4PHX-D ANON-N59M-4P8C-8 ANON-N59M-4PHB-Q ANON-N59M-4PK1-9 ANON-N59M-4PW6-T ANON-N59M-4PHE-T ANON-N59M-4PK7-F EM147, EM11, EM144 Recfishwest Protect Ningaloo	The submitters raised concerns about the unacceptable impacts to a "wilderness area" and the related economic impacts. Submissions include: • Ningaloo Coast Visitor Statistics states that 1323 out of 1496 respondents (88%) noted the number one important or very important trip element on their visit to Ningaloo Coast as the "natural environment". Of the 1496 respondents, 46.4% rated going to view points as important. • The gulf represents a truly wilderness experience - its remoteness and lack of commercial boating or industry is what makes this special. • The adverse impact this proposal will have on this precious area will be significant and not in keeping with a true wilderness area. • Heron Point in particular is prized because it is free of the very visual pressures the proponent seeks to impose on the site. • Towing operations will constrain and reduce access for all other users in the NCWHA. • Subsea 7 proposal will reduce access to this area and adversely impact the highly valued wilderness experiences the area currently provides.	The lack of commercial boating or industry within Exmouth Gulf, and the 'wilderness' of the area, are contested. Commercial vessels, fishing charter boats and industry 'support' vessels are routinely present in Exmouth Gulf. Further the western shoreline is commonly used for recreational vessel launching, unofficial camping and off road driving. The LVIA completed by Subsea 7 for the Proposal followed methods consistent with contemporary guidance (WAPC 2007, Landscape Institute 2013). Vantage points and potential sensitive receptors were identified using desktop analysis, a review of local topography and input from stakeholders. Eight vantage points were assessed, following endorsement by the EPA (ER Attachment 2R(1)). The results of the LVIA (photomontages and viewshed analysis) suggest that the Proposal's fabrication facility will be visible from along the Minilya-Exmouth Road (ER Attachment 2R). The Proposal's launchway will be visible from adjacent beach areas, but is expected to blend in with the regional landscape in the same way as the current Learmonth Jetty which is a significantly higher structure (ER Attachment 2R). To maintain the current accessibility to this area of Heron Point, Subsea 7 proposes that no access restrictions to the launchway area will be in force for the large majority of the site operation. However, Subsea 7 nominates that during a Bundle launch (up to 3 per year, lasting for 1-2 days each, a rolling exclusion zone will be in operation around a Bundle as it leaves Exmouth Gulf, including through the NCWHA. Notices regarding any upcoming launches will be well publicised and communicated to ensure that this closure is well understood.

No.	Submitter	Submission and/or issue	Response to comment
192.	BHLF-N59M-4PEG-S ANON-N59M-4PR9-R ANON-N59M-4PK1-9 ANON-N59M-4PK1-9 ANON-N59M-4PWP-M ANON-N59M-4PK4-C ANON-N59M-4PWG-B ANON-N59M-4PW6-T ANON-N59M-4PHX-D ANON-N59M-4PH9-E ANON-N59M-4PHJ-Y BHLF-N59M-4P8G-C ANON-N59M-4PHV-B ANON-N59M-4PHE-T ANON-N59M-4PHC-R/ EM145 EM148, EM144 EM11, EM94 EM147 PN Proforma Protect Ningaloo Rangelands NRM Oceanwise Australia	The submitters raise concern about the 'industrialisation' of Exmouth Gulf. Submissions include: • Unacceptable visual impacts and impacts to the eco-tourism industry. • This Proposal is likely to lead to greater social impacts, such as higher crime rates, more violence and animosity in the community, and diminish World Heritage values. • Approval of Subsea 7's Proposal is highly likely to have the effect of enabling similar industrial proposals in the Exmouth Gulf. Approval of this Proposal will enable a process of industrialisation and negative transformation that will degrade this ecosystem, stress its fauna, damage existing World Heritage Values and forestall the prospect of achieving higher levels of conservation status for Exmouth Gulf. • The proposal will impact on the mental health of local residents, both adults and children, through concerns about the expected negative impacts on their local environment.	Subsea 7 has acknowledged in the visual impact assessment that there will be some visual impact, however this is considered to be minimal. Impacts to ecotourism would also be minimal considering the low profile nature of the facility and the set back from the beach of the main infrastructure of 10.5km In Wick, it is not uncommon for tourists to stop and view the facility from the bridge (A9) which crosses the track near the beach end and ask workers questions. Subsea 7 would argue that like the VLF towers, this would become another point of interest as it is 1 of only two facilities of its kind in the world which produces the worlds longest moveable man made object. Subsea 7 has proven itself in Wick over 40 years of operation to be a responsible employer. The affect of having this facility in Wick has in fact lowered crime rates, decreased violence and provided opportunities for locals that may have otherwise left. There is no evidence to support the contention that 'this Proposal is likely to lead to greater social impacts, such as higher crime rates, more violence and animosity in the community'. Subsea 7 has also demonstrated how there will be no impact to the NWHA or values. It is understood that any proposal, industrial or otherwise, is required to undergo the rigorous assessment process. If the proposal was approved, this would in fact be one more factor to be considered when viewing another proposal. Subsea 7 will continue to work closely with the local community through consultation, collaboration and ongoing environmental monitoring to ensure they are properly informed. Subsea 7 believes through this openness and transparency any potential negative mental health impacts can be managed.
193.	ANON-N59M-4PK9-H ANON-N59M-4PHX-D ANON-N59M-4PWG-B ANON-N59M-4PWG-B ANON-N59M-4PW6-T ANON-N59M-4PKX-G EM148, EM147 EM90, EM94, EM100, EM116, EM119, EM141 PN Proforma Ningaloo Fly Fishing Recfishwest Oceanwise Australia Protect Ningaloo	The submitters raise concerns about potential impacts on commercial and recreational fishing. Submissions include: • Fishing activity is a major focus within the operations area and within the launch site. Commercial and recreational fishing charters that utilise Heron Point will be affected. • Recreational fishers contribute over $2.4 billion each year into the WA economy with interstate and international visitors also injecting a considerable amount of additional money in important tourism areas such as Exmouth. • Ningaloo Fly Fishing will be worst impacted business in Exmouth. • Subsea 7 have misrepresented data on permit captures from Department of Primary Industries and Regional Development records and other information to the EPA. • The intertidal flats at Heron Point support several sustainable catch-and-release fly-fishing tourism businesses that target trophy-sized permit, giant trevally, cobia, queenfish and blue bastards. Those flats are also used by recreational fly-fishers. • Exmouth Gulf is the only area in WA that is able to offer catch and release fly fishing. Catch and release fly fishing charter companies are utilised because they provide a unique, restful, and benign activity for interstate and international visitors. They currently use the flats and intertidal zone off Heron Point as a prime Permit fishing ground to embrace the peace, tranquillity and untouched character of this region. • Marine aquarium collectors utilize this area for their trade. One operator has identified Heron Point filter feeder habitat as important to its business.	It is believed that the launch facility itself will become a haven for marine species, improving local fishing. The impact to commercial and recreational fishers would be limited to launch times when the rolling exclusion zone would be in place up to a maximum of three times per year for 1-2 days per launch. These times will be well publicised in advance, allowing other users of the area to plan around the operation. The $2.4 billion figure is taken from the Recfishwest report '*Economic Dimension of Recreational Fishing in Western Australia*' (2018). Direct expenditure by recreational fishers in the Gascoyne Coast bioregion was estimated to be in the order of $50 million per annum in 2011 (OzCoasts 2001). Impacts to this expenditure are not expected as environmental quality will be maintained and access to fishing areas will not be significantly affected. Intertidal flats are located to the south of Heron Point and will not be affected by Proposal. The proposed launchway, to be located at Heron Point, intersects intertidal and subtidal Reef with macroalgae habitat which extends offshore to along the offshore extent of the launchway (refer to ERD Figure 5-4). Thus fishing on the 'intertidal flats' will not be directly impacted. Elevated turbidity immediately adjacent to the launchway may occur during the construction phase. Water quality will be monitored, and construction activities managed, to prevent a significant impact to water quality beyond 50 m from the construction footprint (refer to the MCMMP). It is contested that the Exmouth Gulf is the only area in WA to offer Catch and release fly fishing. Catch and release fly fishing is conducted in many places around WA including Ningaloo and Pemberton to name a few. It has been demonstrated that access to the flats south of Heron point will not be restricted outside of launch times. The identified marine aquarium collector has been consulted with and it was noted that the operations could viably continue if only a small proportion of the population was affected (refer Section 5.4.6.4 of the ERD). A significant impact on the current recreational fishing, or future growth of this sector, is not expected as a result of the Proposal.

No.	Submitter	Submission and/or issue	Response to comment
194.	Protect Ningaloo	The following statements are incorrect in the ERD according to the submitter: • *Albula Vulpes* is incorrectly listed as a key species. These are in Florida (Florida Museum 2019), not Exmouth Gulf. • Barramundi has also been incorrectly associated with the Bay of Rest and Heron Point. • Contrary to the statement that there has been only one reported permit specimen caught in Exmouth Gulf, there are records for the snubnose dart (the same species) between 2010 and 2018 showing that 184 were caught and released in Exmouth Gulf (Wolf 2019). • Bonefish are fished in Exmouth Gulf (True Blue Bonefish 2019) • Queenfish (*Scomberoides* sp) and longtail tuna (*Thunnus tonggol*), Spanish mackerel (*Scomberomorini*), giant herring (*Elops machnata*) were omitted from the key species list. • The target fish for flyfishers in Exmouth Gulf include common snubnose dart or permit (*Trachinotus botla*), queenfish, bonefish (*Albula oligolepis*), giant trevally (*Caranx ignobilis*), golden trevally, blue trevally, goldspot trevally, spangled emperor, milkfish, tarpon, cobia, blue bastards and northern long-tail tuna (*Thunnus tonggol*) around the Bay of Rest and Heron Point area (Wolf 2019).	Subsea 7 notes the correct species name is *Albula oligolepis*, the Smallscale bonefish. Catch data returned by licenced fishers between 2013 and 2107, provided by DPIRD (2018), show barramundi records from the Bay of Rest, and the southeast portion of Exmouth Gulf. Subsea 7 understands that the common names 'Snubnose dart' and 'Permit' refer to the same species, *Trachinotus Blochii*. Additional interrogation of records from 2013 to 2017 suggest that 53 catches of this species have been reported to DPIRD during that period. The data may not identify occurrences of multiple catches within the same block, by the same licenced operator, on the same day. The DPIRD (2018) data do not include any records of Bonefish being caught within Exmouth Gulf, but it is acknowledged that this may be the case. The areas for which catch records have been submitted to DPIRD, in relation to Queenfish (*Scomberoides* sp), Longtail tuna (*Thunnus tonggol*), Spanish mackerel (*Scomberomorus commerson*) and Giant herring (*Elops machnata*) are presented in the Response to Submissions Report (refer Figure 2-12). Fishing effort for these species seems to be widespread throughout Exmouth Gulf. The DPIRD (2018) data do not include any records of catches of Milkfish, Tarpon, Blue bastards, Blue trevally or Goldspotted trevally. It is noted that Subsea 7 attempted to meet with the owner of Ningaloo Fly Fishing, but the proposed meeting did not occur.
195.	ANON-N59M-4PK1-9 EM148	There is no mitigation for noise, dust, and visual pollution. Charter operators using the area would be subjected to noise, dust, the visual pollution of a hulking tow head and a 10.5 km long factory the other 362 days of the year.	Noise, Dust and visual impacts are discussed extensively in the ERD. Noise will be generated during the construction phase by the various plant and vehicles operating. No loud noise sources, such as piling or blasting, are proposed. Further, construction activities will occur during daylight hours (12 hour shifts), limiting the risk of impacts to social values. activities will comply with Australian Standard 2436-2010 '*Guide to noise and vibration control on construction, demolition and maintenance sites*' and Noise Regulations. Activities that may create dust include the clearing of vegetation and vehicle movements on unsealed roads. Given the temporary and intermittent nature of potential dust and noise emissions, and the absence of nearby sensitive receptors, the potential impacts are not considered significant. The visual impact of the facility is discussed in the ERD and has been demonstrated to be minimal. Towheads would only be in close proximity to the beach directly before launch.
196.	ANON-N59M-4PR9-R ANON-N59M-4PK6-E ANON-N59M-4PHB-Q EM147 Protect Ningaloo	There are concerns about the impacts on Aboriginal heritage. Submissions include: • The ERD states that overall impacts to Aboriginal heritage is considered low. It is important that the heritage values of this area, although as yet little known, are not underestimated. • Data provided on Aboriginal heritage should reflect information of greater relevance to the project area (Kendrick and Morse 1982; 1990, Morse 1993, 1996, Morse and Jackson 2000) rather than on excavated cave sites. The data should be assessed in the context of recent and relevant ongoing archaeological research on the north west coast (Veth 2017; Ditchfield et al. 2018; Dortch et al 2019). • No access has been provided to either of the SJC Consultants reports referenced in the ERD. • Very little is known about Aboriginal and cultural heritage values of the eastern margin of the Cape Range Peninsula and of Exmouth Gulf itself. • The presence of buried human skeletal material at Exmouth Gulf station (DLPH AHIS Site ID 17192) some 10 km southeast of Subsea	Agree it is important that the heritage values of this area are not underestimated. There is no practical way to determine if there are any subsurface archaeological deposits without excavation. The potential for discoveries during earthworks is noted, and appropriate mitigation strategies are provided in the ERD (refer ERD Table 5-53). Most of Dr Morse's work deals with excavated rock shelter sites on the Western side of Cape Range, including the excavated cave site at Mandu Mandu Creek Rockshelter. The only directly relevant report by Dr Morse is the survey report for Cape Sea-farms (Morse and Jackson 2000). The report describes the survey by Kate Morse and Rachel Fry over the proposed Cape Seafarms Prawn hatchery, which covered a much larger area than is impacted by the Proposal. No sites were found by Morse and Fry, in the Development Area. The "sites" which were recorded by Morse consisted of *Terebralia* (mangrove whelk), a species of mangrove snail, which are assumed to have been collected by Aboriginal People from stands of mangrove trees along the adjacent Wapet Creek. Archaeological evidence does suggest that there is a long-standing tradition of harvesting *Terebralia*, and several of the Gnulli representatives on the Subsea 7 heritage surveys stated they still harvest *Terebralia*, particularly for bait for attracting fish and mud-crabs. Other than Dr Morse's *Terebralia* "middens" located alongside Wapet Creek, there is no other relevant archaeological data.

No.	Submitter	Submission and/or issue	Response to comment
		7's proposed development area should be noted. Aboriginal burial sites have been identified in dunes in at least five other locations within the Ningaloo region. There is therefore the possibility of uncovering further buried skeletal material during any ground surface disturbance particularly in coastal dunes. • Traditional Owners need to be present during all ground disturbing work undertaken as part of the Proposal, with protocols in place for the finding of any archaeological material. • the four sites lodged on the Aboriginal Heritage Register do not appear to have been located during the Aboriginal Heritage surveys and the ERD says that an assessment has not been completed to determine if the information about the sites meets Section 5 of the *Aboriginal Heritage Act 1972.* • More detailed discussion is required about the significance of the area to cultural heritage of the Traditional Owners / Gnulli people.	Veth (2017) describes research concerning Barrow Island, in country traditionally occupied by entirely different cultural language groups, and primarily describes the results of excavations in Boodie Cave rock-shelter. Likewise, Ditchfield et al (2018), is specifically an analysis of an excavated rock-shelter on Barrow Island. Dortch et al 2019 is a useful general summary of recently dated sites across Western Australia, which are almost exclusively drawn from rock-shelter sites. The survey reports are subject to confidentiality under the Yamatji Regional Heritage Agreement. There is very little knowledge about Aboriginal cultural heritage values of Exmouth Gulf. This is reflected in the precautionary approach for all excavation and earthworks to be subject to monitoring. The "Ningaloo Region" is a very large area, extending south of Coral Bay to Point Edgar and Ningaloo Station. Several salvage excavations and reburials of eroding unmarked graves have occurred within the Gnulli Claim area, always under the direction of Traditional Owners and in compliance with permits issued by the Registrar of Aboriginal Sites under Section 16 of the Aboriginal Heritage Act. Stephen Corsini's involvement in these projects is the principal reason why the Gnulli Claimants expressly requested he undertake the survey work for the Proposal. In all documented cases remains were found eroding from white calcareous beachside dunes of Holocene age. The remains discovered at Exmouth Gulf Station were likewise found eroding from coastal dunes in an area where freshwater might be obtained after storms. The ERD notes the potential for burials, particularly in the vicinity of the coastal dunes at Heron Point, and nominates management of the potential impacts by monitoring of excavations and earthworks. Despite the very low potential for archaeology, monitoring has been a request of the Gnulli. One of the sites, CFF -FS01, reported by Morse and Fry (Morse and Jackson 2000) was actually relocated. Based on Morse's maps and data, two of the sites appear to have been destroyed by land clearing or track construction for the Cape Seafarms Project. One site, consisting of a handful of *Terebralia*, appears to have been buried by the movement, through wind action, of the adjacent linear red sand dune. None of the four sites reported by Morse would be impacted by the Proposal. The Gnulli have not provided any information on the cultural heritage significance of the area.
197.	MG Kailis Group	It appears that this consultant has made the assumption that these areas will be left untouched to recover in this four week period (see ERD, pg 118). A no trawl area for four weeks would have a significant economic and social impact on the fishery. Trawl patterns require uninterrupted 'runs' and to split the fishery in half would be a major disruption. With no mitigation strategy in the PER, responsibility for any mitigation would fall on others, principally the commercial fishing fleet. Upgraded consultation commitments, including but not limited to, relevant consultation to avoid undermining long term fisheries and environmental research in Exmouth Gulf. The Proponent should commit to work in with fishery operators to minimise disruption. Options include scheduling tows only when not fishing (off season and in season closures) plus notice periods relevant to the timing and planning of commercial operations.	The effects of the Bundle chains on the Soft sediment habitat is expected to be minimal. A survey was completed of an existing subsea pipeline (in 117-118 m water depth) before, and immediately following, a Bundle tow across the pipeline. The video survey (screen grabs presented in the Response to Submissions Report) identified that no damage to the Bruce to Forties pipeline had occurred. One area of seabed scar marks created by the Bundle chains during the Bundle installation operation was observed during the post - installation survey. These images confirm that Bundle chains do not cause severe erosion or reworking of soft sediment habitat. To underpin the turbidity modelling the volume of material on the seabed likely to be disturbed by each chain was estimated based on the cross-section of each chain link, multiplied by the length of the tow route, multiplied further by the number of chain links in contact with the seabed. Based on the visible wear on the chain links following the completion of the field trial (paint was missing from up to half of the circumference of each link), it was assumed that half of each chain may have contact with the seabed. While a significant volume of soft sediment material will be reworked by the Bundle chains during a launch, the excavation of furrows or trenches is not expected. This is based on the observed wear of the field trial chain, and observations from subsea and onshore experience (refer to the Response to Submissions Report for additional detail). Section 5.1.6.11 of the ERD states '*In the event that six different Bundles (ranging from 4 km to 8 km in length) are launched under differing tidal conditions (neap, mean and spring), over a period of several years, a total of 2,120 ha of soft sediment habitat could be disturbed. Disturbance would occur intermittently (nominally once every four to six months, for up to one day per launch) and restoration of the natural seabed topography would be expected to occur between events, with little to no trace of physical disturbance expected within four weeks*

No.	Submitter	Submission and/or issue	Response to comment
			of a Bundle launch'….and….*'However, to quantify the potential (but highly unlikely) 'absolute worst case' outcome following multiple Bundle launches, and assuming no recovery of BCH between Bundle launches, calculations have been completed based on the total area potentially impacted by all six scenarios as outlined in Table 5 5 and Figure 5 11. This area has been designated a potential ZoHI*'. Thus while rapid recovery is expected (≤ 4 weeks) calculations have included a worst-case of no recovery between Bundle launches. Subsea 7 is not suggesting that no trawling should occur within 4 weeks of a Bundle launch to promote recovery. Subsea 7 subsequently met with MG Kailis Group in February 2020 to discuss ongoing consultation, including prior to and during Bundle launches.
198.	Protect Ningaloo	There is insufficient detail in the ERD to justify the claims Bundle technology represents an opportunity to realise significantly increased local content and a net overall reduction in environmental impact. While the Proposal would involve the local assembly of Bundled pipelines, it is still expected that a large proportion of the components, particularly the pipeline sections, would be manufactured overseas and freighted to site. The ERD provides estimates of the local and regional benefits of the Proposal, for example that the Proposal would directly contribute $4.5 million per annum to the State income. However, the ACIL Allen report referenced has not been made publicly available, so it is not possible to review the numbers or the assumptions underlying them. In any event, tourism provides a significantly greater economic benefit to the region than this. There is a lack of clarity and certainty around some of the stated jobs numbers. The Social Impact Assessment of the ERD has the following statements: • 'The construction phase will take approximately 9 - 12 months with an estimated average of 50 personnel (75 at peak) required to undertake the work.' • 'During a Bundle build (operations phase), the average number of personnel required on site will be in the vicinity of 70-80. During peak periods of a Bundle build, up to 120 people may be required.' • 'ACIL Allen estimates that the Project will directly support an average of 40 full time equivalent (FTE) employees (58 in upside scenario) per year over the study period.' However, it is not clear how long the 'peak periods' are for either for the construction phase or the Bundle build operations phase. While the Proponent indicates their commitment to training and upskilling the local workforce, this is a significant undertaking and there is no guarantee that jobs will be filled by local people.	Subsea 7 has repeatedly committed to utilising a local workforce. Subsea 7's goal is for the Learmonth site to become a long-term facility that can continue to operate on an ongoing basis. Subsea 7 has engaged extensively with the Exmouth business community, including the shire, the Exmouth Chamber of Commerce and Industry, and the GDC to ensure local businesses and enterprise can maximise this opportunity. Subsea 7's fabrication facility in Wick, Scotland – the only other pipeline Bundle facility in the world - uses up to 218 local businesses and the benefits flow through to local suppliers including cafes, butchers, bakers, hotels and guesthouses and a range of contractors. It is expected that the Learmonth facility will generate similar direct and indirect opportunities for Exmouth. Section 2.4.8.1 of the ERD presents the shift in offshore jobs to onshore jobs as a result of the adoption of Bundle technology. The reduced offshore workload translates to an increased onshore workload, which would result in more jobs available for local people. As all Bundles vary in their design and specification, it is therefore not possible to set defined 'peak periods' of operations as they will vary.
199.	Oceanwise Australia	Turbidity impacts from trawling impact on diving and tourism operations currently, for example at Exmouth Navy Pier. These turbidity plumes do	Subsea 7 is unable to comment directly on the turbidity impacts from trawling, but notes the following: • The settlement of resuspended sediment is principally governed by the sediment particle size and the velocity of water flow (including currents and wave action).

No.	Submitter	Submission and/or issue	Response to comment
		not dissipate within 40 hours as claimed by the ERD. Turbidity impacts to tourism activities has not been considered.	• During slack water (periods of low tidal movement occurring at approximately high tide and low tide) suspended sediments will sink. A proportion of the suspended sediments will reach the seabed and integrate with the sediment. • During the following flood or ebb tide period a proportion of the original suspended sediment load will remain in the water column. • A proportion of the water within Exmouth Gulf will exchange with water from outside of the Gulf. Thus, over time, a turbidity plume will dissipate. This effect is clearly demonstrated by the modelling completed for the Proposal (refer graphs presented in ERD Figure 5-9). Section 5.9.6.7 of the ERD specifically address potential impacts to tourism activities as a result of turbidity during and immediately following a Bundle launch. It was found that '*In both the flood tide and ebb tide launch cases, the threshold (or EQG) for aesthetic quality was forecast to be exceeded only in isolated patches near the launch site, with the location of the exceedances dependent on the tidal state at the time of launch (Figure 5-58). Thus a significant impact to recreational users of Exmouth Gulf, from an aesthetic point of view, is not expected*'. Section 5.9.6.8 of the ERD states that '*The most prominent SCUBA location within Exmouth Gulf is the Exmouth Navy Pier, with the Muiron Islands another popular diving, and snorkelling, location. The Bundle tow route is (at its closest) > 8 km from the Exmouth Navy Pier and > 5.5 km from the most south-west point of the Muiron Islands*'. Predicted depth-averaged water column turbidity during a Bundle launch and tow (95th percentile values) is presented in ERD Figure 5-7. Elevated turbidity is not predicted in proximity to identified key recreational sites, as identified above and as presented in ERD Figure 5-55. The monitoring proposed within the MOEMP will confirm the extent, magnitude and persistence of elevated turbidity during and following a Bundle launch.

Human health

No.	Submitter	Submission and/or issue	Response to comment
200.	ANON-N59M-4PKY-H	Submitter attests there may be an increase in road deaths due to an increase in semitrailers into the area.	Concerns were raised by the local community regarding impacts to traffic during material trucking campaigns during an early local stakeholder consultation session. Subsea 7 requested GHD analyse the impact of project generated traffic, specifically truck movements, forecast for the nominated campaign period when Bundle materials are trucked to site from the Port of Dampier. It is predicted a Bundle project would result in 26 vehicle movements per day on the proposed transport route. This comprises of 4 double roads trains, 6 extendable trailers and 3 pilot vehicles each way to the facility (GHD 2017). In addition to existing traffic volumes this equates to an increase of only: • 1% more vehicles per day on NWCH. • 5% more vehicles per day on Minilya-Exmouth Road. • 1% more vehicles per day on Burkett Road. In a 5-year period between 2012 -2016, twenty-one crashes occurred along the proposed transport route. Of 10 crashes occurring on Burkett Road, one involved a truck and one resulted in a fatality. Of eleven crashes occurring on Minilya-Exmouth Road, one involved a truck and one resulted in a fatality. Most crashes involved vehicles leaving the carriage way and none were a result of overtaking manoeuvres (GHD 2017). No deaths have occurred along the proposed transport route since 2015 (DITRDC 2020). Current and predicted traffic volumes were compared to MRWA Policy and Guidelines for Overtaking Lanes and did not justify the need for overtaking lanes for the proposed transport route due to the short duration of truck movements for a Bundle project (<32 days) and the reasonable number of existing overtaking opportunities on the roads.

ATTACHMENT 1 (TABLE 2L) - SUBSEA 7 RESPONSES TO COMMENTS ON CONSULTATION

No.	Submitter	Submission and/or issue	Response to comment
201.	ANON-N59M-4PFA-M	EPA needs to consider changes to how stakeholders are engaged in referral and assessment processes.	The perceived faults with the stakeholder engagement undertaken for the Proposal are not clear. As outlined in Section 3.3 of the ERD, Subsea 7 has undertaken extensive stakeholder consultation through a number of approaches depending on the forum, subject matter and purpose. The main forms of communication can be categorised as: • Broad project briefings and presentations. • Stakeholder workshops. • Stakeholder meetings and discussions, including those undertaken on Subsea 7's behalf by consultants (e.g. specific environmental technical study methods and approach). Meetings have been undertaken with stakeholders in Perth and in Exmouth. • Written communications and the distribution of project updates. • Telephone discussions. At all times Subsea 7 has been open and transparent with stakeholders regarding the Proposal and the results of environmental investigations. For example, at an open community briefing session in Exmouth in October 2018, Subsea 7 provided several 'fact sheets' documenting different aspects of the Proposal and how it would likely affect the local social and environmental values. At the same session, the environmental consultant displayed recently captured towed video footage from different locations within the Offshore Operations Area. Videos of a Bundle launch at Wick were also presented. In addition to Subsea 7-led stakeholder engagement, formal public consultation processes have occurred associated with the State and Commonwealth environmental assessment processes including: • Subsea 7's initial referral of the original Proposal to the EPA under Section 38 of the EP Act was advertised for public consultation between 14 and 28 February 2018. • Subsea 7's referral to the DoEE was advertised for public consultation on 31 October 2018, in accordance with the EPBC Act. • The Native Vegetation Clearing Permit required for the minimal land clearing associated with the commencement of the subterranean fauna investigations, required under the ESD, was issued for public comment between 7 and 28 February 2018. This consultation included the provision of all contemporary flora and vegetation survey reports, thus representing another form of public consultation in connection with the Proposal. • The release of the ESD for public comment, for a two week period between 14 and 28 February 2018, provided opportunity for public input on the scope of the technical studies required to support the environmental impact assessment (as presented within this document). • The request to change the Proposal under Section 43A of the EP Act was advertised for public review between 1 and 15 March 2019. • Subsea 7's referral of the amended Proposal to the EPA under Section 38 of the EP Act was advertised for public consultation between 20 and 26 May 2019. • The public release of this ERD, for an eight week period, will provide a further opportunity for stakeholder review and involvement in planning for the Proposal. It is noted that a number of these consultation periods are not legislative or mandatory, but have been conducted to ensure the fullness of public consultation is maintained for this Proposal. The submission may be suggesting that the number of meeting, briefings and consultation periods was excessive? It is noted that, due to the level of interest in the Proposal from some parties, the level of both formal and informal consultation was increased.
202.	ANON-N59M-4PWH-C ANON-N59M-4PKV-E EM148	Submitters raised concerns about the relationship between the Shire of Exmouth and Subsea 7. Submissions include: • The Shire of Exmouth and Subsea 7 relationship is inappropriate and has no regard for due process. • Lack of integrity and misleading display in Shire office.	The Shire's information handouts encourage discussing proposals at an early stage to avoid unnecessary delays. It is standard for proponents to meet with decision making authorities and stakeholders, and in this context the relationship between the Shire and Subsea 7 is necessary and appropriate. Section 8 'Consultation' of the Scheme amendment report very clearly outlines the dates of meetings, their purpose, and with which stakeholders. This demonstrates that discussions for the scheme amendment

		• The EPA should find that the Commissioner of the Shire of Exmouth exceeded his authority as a caretaker administrator and the matter should have been handled by the full Council after the local election. • Information provided by Subsea 7 to community and EPA has been extremely misleading and deceptive. • Promise of job creation is flimsy with no recognition of job losses to the tourism industry. There will be limited skilled opportunities for Exmouth employees beyond basic welding.	process were held with the Shire, the Department of Planning, Lands and Heritage, and the Environmental Protection Authority. It is worth noting that section 75 of the *Planning and Development Act 2005* provides for a local government to adopt an amendment to a local planning scheme. Pursuant to regulation 35 of the *Planning and Development (Local Planning Schemes) Regulations 2015*, a resolution of the local government to prepare or adopt an amendment to a local planning scheme must be in a form approved by the Western Australian Planning Commission. Scheme Amendment 32 was initiated by the Shire of Exmouth at its ordinary council meeting held on 10 October 2017, and Scheme Amendment 1 was initiated by the Shire of Exmouth at its ordinary council meeting held on 28 March 2019. Both meetings were open to the public. Scheme Amendment 1 is a 'complex amendment' and required consent to advertise from the Western Australian Planning Commission and the Environmental Protection Authority. The Shire referred Scheme Amendment 1 to the Environmental Protection Authority for assessment under section 48A of the *Environmental Protection Act 1986*, and the Western Australian Planning Commission pursuant to the *Planning and Development Act 2005* and *Planning and Development (Local Planning Schemes) Regulations 2015.* Consent from both agencies was given, and advertising was carried out. This demonstrates that due process was followed. It is noted that the Shire of Exmouth has responsibility for the implementation and management of LPS4. As such, the Shire of Exmouth had an obligation to refer the Scheme Amendment to the EPA. It rests with the EPA to assess the potential environmental impacts associated with the proposed amendment and provide recommendations, in an EPA Report, to the Minister for Planning. Thus the Shire of Exmouth has followed due process. In turn the EPA was responsible for reviewing what information was publicly advertised as part of its own processes. As discussed in the row above, Subsea 7 has been open and transparent with stakeholders regarding the Proposal, the results of environmental investigations and the assessment process. Subsea 7 has always made it clear that constructive feedback from stakeholders is welcome, and such feedback has led to several changes to the development and/or management of the Proposal (for example the incorporation of a crossing over the launchway). Subsea 7 does not foresee any job losses as a result of the Proposal, given the negligible impacts to the environmental values of the region. Further, Subsea 7 has been transparent regarding the likely direct (refer Section 2.3.5 of the ERD) and indirect employment opportunities as a result of the Proposal. Subsea 7 has engaged extensively with the Exmouth business community, including the shire, the Exmouth Chamber of Commerce and Industry, and the GDC to ensure local businesses and enterprise can maximise this opportunity. Subsea 7's fabrication facility in Wick, Scotland – the only other pipeline Bundle facility in the world - uses up to 218 local businesses and the benefits flow through to local suppliers including cafes, butchers, bakers, hotels and guesthouses and a range of contractors. It is expected that the Learmonth facility will generate similar direct and indirect opportunities for Exmouth.
203.	EM147	The state's peak recreational fishing body, Recfishwest, does not appear as a key stakeholder in proponent's documents.	On 7 November 2017, Subsea 7 met with Matt Gillett from Recfishwest to introduce the Proposal. As the peak body for recreational fishing in Western Australia, Recfishwest represent the interests of the local fishing community in Exmouth, some of whom had been very vocal about the Proposal. The meeting was very productive with an overview of the development presented, and discussion held around the potential impacts to fishing in the area. Subsea 7 communicated the relative infrequency of the marine operations associated with the development, which was well received. Subsea 7 and Recfishwest agreed for Subsea 7 to share new information on the project as it is available to allow Recfishwest to communicate correct and factual information to its members. On 12 December 2018 Subsea 7 invited Recfishwest to meet and provide an update to the Proposal, following previous initial introductory meeting. Subsea 7 provides updates in the following areas:

			• General overview of the PER content and process. • Particular focus was given to the launch and tow operation, to explain how this would work and any impacts to users of the Exmouth Gulf. • Update of the whale migration survey and the proposed no-launch period. • Visual impact assessment. • Subterranean fauna investigations. • General update on stakeholder engagement status. The parties also discussed the potential of the launchway structure becoming a habitat for recreational fishing. Recfishwest explained that they would continue to maintain a watching brief over the project. With regard to the launchway and the potential for this to become a similar habitat to that such as Kings Reef, Recfishwest explained that there was potential to discuss this at a later date following further progress on the project. No commitment was made on this topic, but it was agreed it is a discussion point for the future. The parties discussed any restrictions to marine activities in Exmouth Gulf associated with the launch and tow operations. Subsea 7 explained the low frequency of operations, and also explained the proposal would include safety exclusion zones around the Bundle during towing, and that this was necessary for the safety of all personnel and vessels, as well as ensuring no damage to the Bundle. It was confirmed though, that access to the Muiron Islands would be maintained at all times. The parties discussed the need for notices and communication regarding launch activities to ensure all users of the Gulf were aware. Subsea 7 acknowledged that this was planned and there would be wide scale notices issued in advance of these operations, highlighting again their very infrequency nature. While not listed as a key stakeholder in the ERD, Recfishwest has been consulted with throughout the assessment processes.
204.	ANON-N59M-4PH9-E	Agencies involved need to consider that this proposal is not consistent with their custodian responsibilities.	Subsea 7 does not understand the intent of this comment and as such is unable to respond. It is understood that each government agency involved in the assessment of the Proposal will act in accordance with their charter or regulatory functions.
205.	MG Kailis Group	The proponent does not propose any consultation over the timing of the launches (PER, 393-4). Given earlier consultation with MG Kailis Group over our concerns this may be an unfortunate oversight. A tow launch effectively splits Exmouth Gulf into two with significant areas excluded. The Proponent and their consultants appear to assume that all the Exmouth Gulf fishery is open to trawling at any one time. Only small portions may be open. Information on the management of Exmouth Gulf fishery is in the public domain and our general patterns of operation were discussed with Subsea 7. The Proponent should commit to work in with fishery operators to minimise disruption. Options include scheduling tows only when not fishing (off season and in season closures) plus notice periods relevant to the timing and planning of commercial operations. Notification is not consultation. Disruption to marine research programs is an <u>environmental issue and risk</u>, not only a commercial one. Avoiding disruption requires both a commitment to consultation as well as ongoing monitoring. Habitat research validation sites required for Marine Stewardship Council fishery certification appear to fall within or near the tow path. A lack of consultation and ongoing commitment to monitoring by Subsea 7 will make it difficult to interpret any habitat changes observed during this research.	It was understood from previous (2018) discussions with MG Kailis Group (refer ERD Section 5.9.6.8) that the Proposal was considered to represent a low risk to the prawn fishery given: • The small area of seabed disturbance during a Bundle launch (comparative to the fished area). • The absence of impacts to the prawn nursery habitat. • The low frequency of offshore operations. It was noted in ERD Table 5-53 that '*Commercial fishing operators will have advanced notice of a Bundle launch and will be able to schedule activities to avoid the Bundle tow route (as required). The Exmouth Gulf prawn fishery occurs across approximately 300 square nautical miles, so the area affected during a Bundle launch is negligible*'. Through close consultation between Subsea 7 and MG Kailis Group, working patterns will be established that meet both parties' operational constraints. Subsea 7 has reviewed the most recent MSC Surveillance Report (#3) (MRAG Americas 2019) and acknowledges that several of the long-term habitat monitoring sites lie in proximity to the Offshore Operations Area, though none occur inshore off Heron Point. Monitoring of these sites could not be undertaken during a Bundle launch. It is understood that monitoring trawls are also undertaken annually by MG Kailis Group, prior to the prawn fishing 'season', to assist in setting sustainable catch limits. It is understood that the timing of these monitoring trawls (usually in March) are set months in advance, based on moon phase. Subsea 7 commits to maintaining open communications with MG Kailis Group, and planning of Bundle launch operations to ensure the completion of these trawls is not compromised. A further meeting was held in February 2020 to discuss the submissions on the ERD.

ATTACHMENT 1 (TABLE 2M) - SUBSEA 7 RESPONSES TO COMMENTS ON PEER REVIEW

No.	Submitter	Submission and/or issue	Response to comment
206.	Protect Ningaloo	While noting that the peer review of the assessment by Dr Bruce Hegge was signed off, the review report states: • 'the Site Selection Report is strongly biased towards the facility requirements with limited consideration of the environmental aspects of the proposal. A more comprehensive approach to the required scope would be to adopt a site selection process which clearly and separately addressed the site requirements and environmental issues. The structure of the Site Selection Report does not appear to emphasise the environmental issues (when compared with the site requirements) and many of the identified preliminary key environmental factors are presented with limited detail or, for several sites, not addressed.' • (Site Inspection stage), the peer review states 'it is understood that this stage would draw on additional information, stakeholder input and site visit that was not previously obtained for the Desktop Assessment. However, very little supporting information is referenced throughout this section hence the extent and source of this additional information cannot easily be determined.' • (Site Investigation) the peer review states 'the only on ground investigation work undertaken during this assessment stage was the capture of hydrographic survey data (which was not successful at Anketell Point due to the metocean conditions prevailing during the time of the survey). This section would be improved with the inclusion of additional site-specific investigations (for example land surveys, mapping pathways to obtain required planning approvals, analysis of metocean data for operability windows, navigation route planning, vessel traffic analysis, benthic habitat observations, review of coastal processes, and flora and vegetation mapping) which could enhance the discussion of the environmental impacts against the preliminary key environmental factors listed in the ESD.' The proponent's response to these comments have not addressed these criticisms.	Comment 1: This comment, from the original site selection peer review report, was addressed, as specified in the comment sheet attached to the peer review close out report, as follows: '*We acknowledge the suggestion and suggested format, however as clarified above (see response to Comment #3), the site selection process occurred prior to key environmental factors being identified by the EPA. Additional text in this regard has been added to Section 2.3 regarding assessment of environmental values vs assessment of environmental factors. If a site was assessed as being technically suitable, the site selection process then included assessments of environmental values based on information that was available at the time; this is as per the text in the overview of the Desktop Assessment (Section 4.1). It was not considered warranted to undertake heritage and environmental value assessments on sites that could not technically support a Bundle facility*' and '*As a separate 'add-on' to the site selection report, Appendix A has been prepared and provides a qualitative assessment of likely key environmental factors and ability to meet the EPA objectives*'. Comment 2: This comment, from the original site selection peer review report, was addressed, as specified in the comment sheet attached to the peer review close out report, as follows: '*A data sources table has now been included in Section 2 of the report. We note again that this is focussed on work only completed during the second-half of 2016, and as such this table doesn't include the detailed studies completed for the PER*'. Comment 3: This comment, from the original site selection peer review report, was addressed, as specified in the comment sheet attached to the peer review close out report, as follows: '*As noted above, the site selection occurred prior to the end of 2016; much of the information noted in your comment was part of studies and assessments completed after this time. However, we have added an additional report (and results) to Section 6: a benthic habitat survey was also undertaken during the same mobilisation for the hydrographic survey. Specific metocean condition analyses were not performed as part of the site selection process; Subsea 7 is familiar with operating within the Exmouth Gulf and this was not considered necessary as part of the site selection process. Further information has been added to Section 6.3.1 to capture this*'. ESD item 1 stated: '*Provide information regarding the selection process for the proposal site and tow route, including an examination of the alternative options considered and the environmental constraints and values at risk for each alternative option, to demonstrate that the proposal site and tow route has been selected to avoid and minimise impacts*'. The peer review close out report considered that these requirements had been met. It is noted that the approach taken in the site selection was that sites excluded on 'physical' grounds did not progress to the more detailed assessment stages.

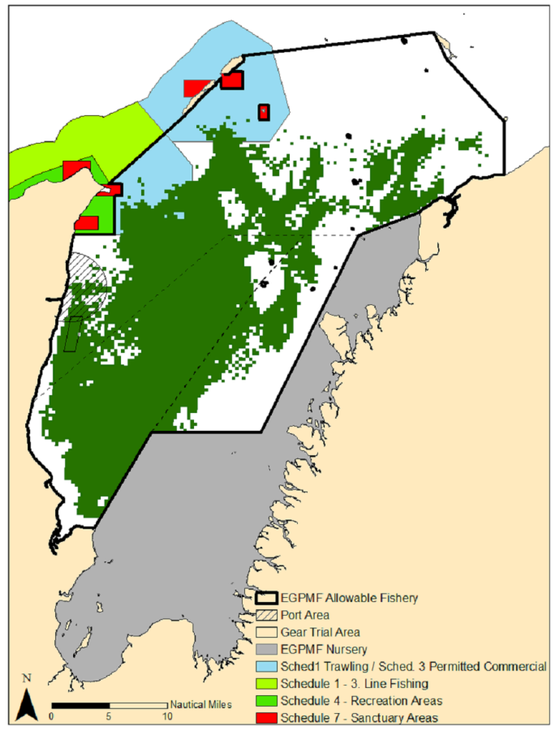
ATTACHMENT 1 (TABLE 2N) - SUBSEA 7 RESPONSES TO COMMENTS ON OTHER MATTERS

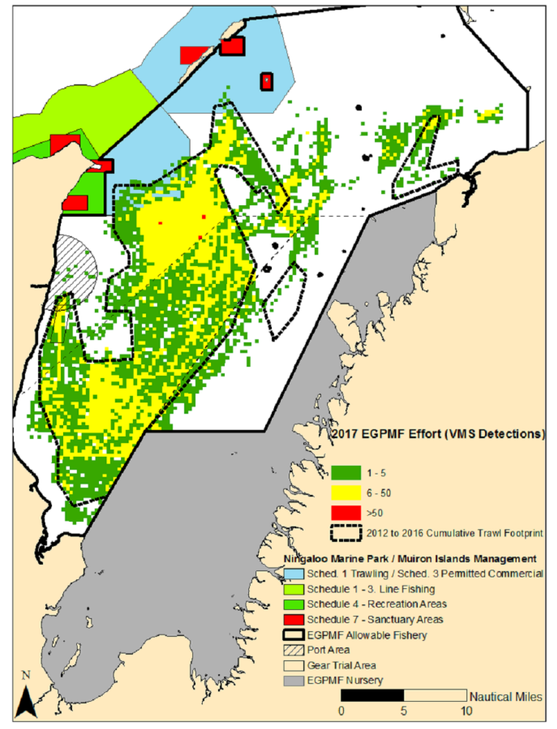
No.	Submitter	Submission and/or issue	Response to comment
207.	Protect Ningaloo EM147 ANON-N59M-4PK7-F	Climate change – No consideration of this proposal 'on the receiving environmental values in the context of climate change'. The project will contribute to nation's emissions, and should be scrutinised over these impacts. Climate impacts should be offset The area will already face increase stressors from the impacts of climate change, additional anthropogenic stressors will reduce the ecosystem's resilience.	The report '*Impacts of Climate Change on Australian Marine Life*' (Department of the Environment and Water Resources Australian Greenhouse Office 2006) was reviewed during the preparation of the ERD. It is noted that seagrass and mangroves may benefit from increased carbon dioxide concentrations, if other factors do not negate that effect. The greatest threats were considered to be anthropogenic factors. Corals were noted as being under increasing risk from climate change while soft sediment communities were noted as being reliant on changes in the overlying water column production. Overall no clear changes in the environmental values of Exmouth Gulf could be readily predicted. The Proposal will result in a negligible increase in the generation of greenhouse gasses (GHG) adjacent to Exmouth Gulf, as a result of the use of diesel and petrol on site. Subsea 7 has amended the site basis of design to propose that general site power for activities such as general lighting, office and ablutions power and general power outlets will all be supplied by solar power (when available) (refer ERD Table 3-1). A net decrease in GHG produced through offshore activities is expected as a result of the Proposal (refer Section 2.4.8.1). Increasing anthropogenic stressors can reduce an ecosystem's resilience to other stressors. However, the construction and operation of the Proposal will cause very limited pressure on the surrounding ecosystems, all of which are well represented locally and regionally. No areas of sensitive habitat (mangroves, coral 'reef' or seagrass 'meadows') will be impacted.
208.	EM146	WA should take advantage of things which are relatively easy to source without environmental destruction, such as solar power and wind power and we should develop these resources rather than destroy something which brings tourists.	Subsea 7 considers this comment sits outside the scope of the assessment of this proposal and does not consider a response is warranted. Subsea 7 can confirm the Proposal will utilise solar power (refer ERD Table 3-1).
209.	ANON-N59M-4PWP-M ANON-N59M-4PHN-3 EM145	The impact of climate change on mangroves, benthic habitats, marine life, migratory birds should have been taken into consideration. The Gulf's heat-resistant corals are likely to become increasingly important as sea temperature rise and could represent a resilient example to be studied for further understanding of bleached or damaged corals throughout the world.	The report *'Impacts of Climate Change on Australian Marine Life*' (Department of the Environment and Water Resources Australian Greenhouse Office 2006) was reviewed during the preparation of the ERD. It is noted that seagrass and mangroves may benefit from increased carbon dioxide concentrations, if other factors do not negate that effect. The greatest threats were considered to be anthropogenic factors. Corals were noted as being under increasing risk from climate change while soft sediment communities were noted as being reliant on changes in the overlying water column production. Climate change may alter the distribution, reproductive success, nesting season and foraging of migratory birds. The Proposal will not create significant additional stress to sensitive habitat (mangroves, coral 'reef' or seagrass 'meadows'), nor will it prevent natural responses to climate change (e.g. a landward migration of mangroves in response to sea level rise). The corals of Exmouth Gulf will not be significantly impacted by the Proposal, and will be available for ongoing studies as needed.
210.	ANON-N59M-4PKR-A	Big business can't be trusted, and the process is corrupt.	WAs environmental approvals process is comprehensive. Subsea 7 has complete faith in the integrity of the process. It provides the correct forum to examine all aspects of such a significant project. It is noted that the Environmental Protection Authority operates as an independent board providing recommendations to the Minister.
211.	ANON-N59M-4P8C-8 ANON-N59M-4PHC-R/EM145 Protect Ningaloo	The EPA should use the Precautionary Principle when making a decision regarding town planning scheme amendments that will impact the environment. Concern on the myriad of 'estimated impacts' used by Subsea 7 in response to questions regarding the impact.	As stated in the ERD (Section 4.1), Subsea 7 has undertaken comprehensive environmental studies on aspects of the Proposal that may impact the environment. Where uncertainty in impact prediction has occurred, a 'worst-case' approach has been adopted to describe the reasonably foreseeable environmental impacts. The mitigation hierarchy of avoid, minimise, rehabilitate and offset has been adopted in response to the identified inherent impacts. Specific key management plans were developed as components of the ERD to ensure the prevention of serious or irreversible damage to the environment.
212.	ANON-N59M-4PHC-R/ EM145 Protect Ningaloo Oceanwise Australia	The World Heritage Committee recommended in 2011 that Exmouth Gulf be considered for inclusion in the Ningaloo World Heritage area. This was on the grounds of ecological linkages between the Ningaloo Reef and the Gulf, in particular the extensive mangrove stands and other shallow water habitats that function as nurseries and adult	As outlined in the ERD (Section 2.5.5) the values of Exmouth Gulf are well recognised in various Stage and Commonwealth documents. Further, many of the key environmental assets are currently afforded protection, as follows: • The 'Exmouth East Shore' and 'Bay of Rest' mangroves are classified as being of 'Very High' importance and the EPA expects that 'no development should take place that would adversely affect the mangrove

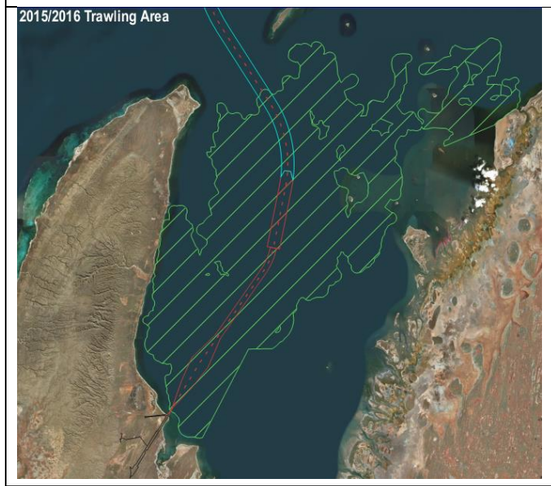
		foraging grounds for many species. The clear global importance of the Gulf must be a lens through which all the values and likely impacts raised in this submission should be viewed. Considering these cumulative impacts throughout the rest of the Pilbara, and the ad hoc use of Exmouth Gulf as an unofficial port, limits need to be set on any further expansion into Exmouth Gulf and these fauna and their habitats need protection under a spatial management plan. There should be ongoing management of the area given its high environmental values.	habitat, the ecological function of these areas and the maintenance of ecological processes which sustain the mangrove habitats' (EPA 2001). • The coastal waters along the east and south coast of Exmouth Gulf have been attributed a 'maximum' level of ecological protection. The stated objectives for 'maximum' water quality protection are that there be no contamination and no detectable change from natural variation in water quality. • Whales, marine turtles, dolphins and Whale sharks and migratory birds are listed under the EPBC Act. Commercial operations within Exmouth Gulf are currently regulated. Commercial fisheries are managed through DPIRD while offshore operations associated with oil and gas development/operations are regulated by NOPSEMA. Onshore and coastal development are regulated by DWER. Commercial groups regularly undertaking operations in Exmouth Gulf hold regular meetings with key local stakeholders under the framework of the Exmouth Community Reference Group. Environmental studies and management plans are discussed. Industry funds many environmental research initiatives to increase our understanding of the region's ecosystems and species.
213.	Protect Ningaloo	Exmouth Gulf contains a significant number of threatened and migratory species listed under the EPBC Act, which are further threatened by the proposed Bundle track and road construction and the pipeline launch and towing activities including dolphin, ray, dugong and bird species. A number of these species are also listed by the IUCN.	An assessment has been completed to determine the potential impacts, from all components of the Proposal, on the species listed under the EPBC Act and likely or known to be present within Exmouth Gulf (refer Section 7 of the ERD). The assessment considered each of the significant impact criteria relevant to the listing category. It was determined, with supporting evidence provided, that the Proposal was unlikely to affect the status of any listed species.
214.	Protect Ningaloo	The environmental impact assessment (EIA) process of the proposal has been complex. The complicated history of the proposal has made public participation in the EIA process more difficult.	The public has had numerous opportunities to participate in the EIA process, more than is usual given the publication, for public comment, of the request for amendment of the Proposal under Section 43a and two referrals under Section 38. The large number of submissions at each stage has shown that many people have taken the opportunity to participate in the process.
215.	Protect Ningaloo	The long term impact to tourism at a regional, state and international level have not been addressed. This should address the loss of humpback whale tourism should the proposal cause the population to abandon this refuge because it no longer serves its purpose.	As stated in the ERD (Section 5.9.6.6) the Proposal will have very limited visual impacts to visitors in the local area. The results of the LVIA (photomontages and viewshed analysis) suggest that the Proposal's fabrication facility will be visible from along the Minilya-Exmouth Road (ER Attachment 2R). The Proposal's launchway will be visible from adjacent beach areas, but is expected to blend in with the regional landscape in the same way as the current Learmonth Jetty which is a significantly higher structure (ER Attachment 2R). Subsea 7's proposed fabrication shed (and associated laydown area and offices) and Bundle track and launchway will be visible from the air. The fabrication shed will be located 10 km from the Exmouth Gulf shoreline, in proximity to (approximately 2.5 km to the south east) of Royal Australian Air Force (RAAF) base Learmonth. The Bundle track corridor will look like a train line. The launchway will look similar to, though longer than, the existing Learmonth jetty, located 6 km to the north of the amendment area. Given the infrequent and short-term nature of the proposed Bundle launch operations, outside of the peak period of Humpback whale usage of Exmouth Gulf, no change to the usage of the region by Humpback whales is likely. An associated impact on tourism is therefore not expected.
216.	Protect Ningaloo	The economic loss of tourism businesses currently operating in Exmouth Gulf is a concern. From April to November these businesses provide local income and jobs at a local, regional and state level. Examples of the times of companies that may experience economic loss are: • fishing charters • whale-watching charters	Subsea 7 has sought to understand the mechanism by which such economic loss could occur. Despite the claims that Heron Point is of great value to tourism operators, this has not been evidenced from observations during the many technical studies undertaken for the Proposal, or through specific information provided by local businesses (who have been consulted extensively). A significant impact to local tourism business is not expected, based on the following: • Impacts at the shoreline at Heron Point will be limited to a low profile (<1 m) groyne-like structure (the launchway) crossing the beach and disappearing below the sea surface a short distance offshore. This is predicted to lead to minimal changes to the aesthetic values of the area or to the natural coastal processes that occur. • A Bundle launch will be an infrequent and short-term event unlikely to significantly impact legitimate businesses (for example, under a worst-case scenario of three launches per year, for a duration of two days each, impacts to operations adjacent to Heron Point or within the western portion of Exmouth Gulf could occur for 1.6% of the time.

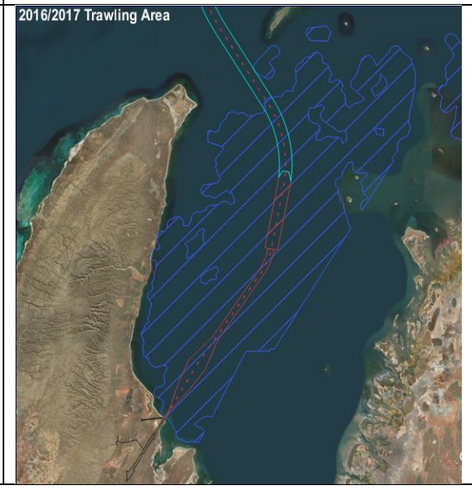
			• Fishing charters operate around Exmouth Gulf and the western side of the North West Cape, with areas potentially affected representing a low proportion of those available, and visited, by operators. • Whale-watching charters predominantly occur out from Exmouth Marina (over 35 km north of Heron Point) or out from Tantabiddi Boat Ramp on the western side of the North West Cape. They also occur during the peak of the southern migration period for Humpback whales, during which time Subsea 7 will not be undertaking Bundle launch operations.
217.	Protect Ningaloo	The ERD also makes note of the EPBC Act referral (EPBC 2017/8079), which the proponent states was varied to accommodate the new and current proposal on 1 July 2019. We are unable to find a record of this decision and remain concerned that the accredited assessment decision on 24 February 2018 did not take into account the proposal as varied. While we recognise that the general administration of the EPBC Act process is outside the EPA's control, the identified matters of national environmental significance may be affected in additional and different ways compared to the original proposal. The EPA should take this into account in its assessment and may wish to draw the Commonwealth's attention to this issue in the accredited assessment report. The ERD fails to adequately address the following matters, under the bilateral agreement of the EPBC Act: • no information on the demand for pipeline technology or how the pipelines will be utilised when operational • no information as to the consequences of not proceeding with the proposal • no evidence of industry support has been provided in the ERD and the industry currently appears to be satisfactorily serviced by conventional pipe laying methods • the proponent should be required to carry out a proper consideration of alternatives • uncertainty and lack of knowledge is not adequately stated by the proponent in the ERD • providing an outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts, including any provisions for independent environmental auditing; the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program and the cost of the mitigation measures • no detail is provided in the ERD as to the proponent's environmental record nor its corporate environmental policies	A decision to accept a variation to the Proposal under section 156B of the EPBC Act was made on 1 July 2019. A revised ESD for the Proposal was published, following input from the DoEE, on 4 July 2019. The revised ESD was considered, by the EPA and DoEE, to effectively address matters relevant to the Proposal and the assessment process. Subsea 7 would not have made the significant expenditure to date to progress the Proposal if it did not foresee a demand for Bundle technology. Bundles would be used in the development (including expansion) of offshore gas fields off the North West Shelf. As explained in Section 2.4 of the ERD, Bundle technology offers several benefits including: • A net overall reduction in environmental impact. • A reduction in the development cost. • A reduction in the execution risk. • Increased opportunities to implement technology improvements. • Significantly increased local content and local industry participation. • Benefits to regional WA. In the event the Proposal does not proceed, these benefits will not be realised and conventional solutions will continue to be used. Conventional methods would generally require more offshore activity, higher costs, higher overseas spend, and result in reduced financial benefits to WA. There has been significant industry interest in the Proposal and the success of the Wick site indicates the viability of, and demand for, Bundle technology. Subsea 7 considers that the site selection, as presented in Attachment 2A to the ERD, provides a robust consideration of alternatives. As stated in ERD Table 4-1, Subsea 7 has undertaken comprehensive environmental studies on aspects of the Proposal that may impact the environment, including BCH, terrestrial flora and fauna, coastal processes and marine fauna. In many instances throughout the ERD a 'worst case' scenario has been adopted, to allow for uncertainties in the baseline data and/or impact assessment. A set of detailed Environmental Management Plans were provided within Attachment 3 of the ERD. Each plan includes a section on reporting requirements, including the type and frequency of reporting and assessing agency/agencies. Section 2.2 of the ERD provides information on Subsea 7's operational site in Wick, Scotland, and confirms that, following a total of 81 Bundle launches between 1978 and 2018, no significant environmental incidents have occurred. Subsea 7's Health, Safety, Environment and Quality Policy Statement was provided in Attachment 5 of the ERD.
218.	Protect Ningaloo	The ERD relates primarily to the construction and transport of the pipeline Bundles, rather than their use and operation. While it is recognised that the proponent is not an offshore oil and gas operator and the actual use of the pipelines may be considered part of a separate State proposal or Commonwealth action, it is unclear what "downstream" impacts may be caused and what is intended to occur when the pipeline Bundles reach the Proposal boundary. It is difficult to see how the EPA can assess the environmental impacts of the proposal	The installation and operation of subsea infrastructure is legislated by Acts that falls outside this assessment and will be considered separately.

		when such a significant extent of the operations involved are unknown. We consider that the ERD is deficient in this regard, and that further information will be required for a proper assessment. The boundary of the project stops artificially with the towing of the pipelines 30 km into Commonwealth territorial waters. As outlined above, this is only part of a project as the pipelines would clearly need to be towed further to a gas field.	
219.	Protect Ningaloo	Based on a comparison of the ESD with the ERD, the Proponent has failed to identify some further approvals properly, e.g. a jetty licence under the *Jetties Act 1926* (WA) (given that the Bundle launchway would be a fixed platform structure erected in or over water).	Subsea 7 agrees that a Jetty Licence under the *Jetties Act 1926* is likely to be required prior to construction of the launchway.
220.	Protect Ningaloo	The ERD does not provide any discussion of the decommissioning of a pipeline Bundle at the end of the life of depleted oil and gas field (as required in Australia). Decommissioning of a pipeline Bundle presents different challenges compared to decommissioning a pipeline. For example: • the large pipe diameter generally rules out burial for the pipeline • refloating Bundles for recovery poses significant engineering and operational challenges • cutting the Bundles into sections for recovery would involve an extensive subsea intervention campaign and multi-handling of abnormal loads The proponent should be required to demonstrate the feasibility of decommissioning and removing a long pipeline Bundle. While the decommissioning of pipeline Bundles may carried out by third parties, in our view this is a relevant consideration for the assessment of this proposal as if it is not implemented, conventional offshore pipeline construction and decommissioning methods will continue to be used without the novel aspect of requirements to decommission unusually large Bundles. Therefore the potential environmental impacts associated with the decommissioning of Bundles are clearly impacts of this proposal.	Decommissioning of any subsea infrastructure is the responsibility of the Operator. Such activities are legislated by Acts that fall outside this assessment and will be considered separately.
221.	MG Kailis Group	There are technical issues relating to the information presented in the ERD on the prawn fishery. The trawl maps used are outdated and overstate the extent of Exmouth Gulf fished by trawlers. Accurate maps by the Department of Primary Industries and Regional Development are accessible on the Marine Stewardship Council website https://fisheries.msc.org/en/fisheries/exmouth-gulf-prawns/@@assessments. Any assessment of near shore environment should not be biased by an assumption the area is regularly disturbed by trawling. Reference to RPS Bowman Bishaw Gorham (RPS) (2004) raises concern that the proponent has an erroneous view that the marine environment is so significantly modified it does not warrant significant environmental protection. The report recounts an apocryphal story regarding fishing techniques and has not been substantiated. Any contrary reports/approaches should be reconciled. It is acknowledged that past impacts are more appropriately addressed on p. 116 of ERD.	Subsea 7 was unable to source detailed maps or spatial data but noted the following maps presented in Surveillance Report #3 providing the areas fished between 2012 and 2016 (top row, left), and in 2017 (top row, right). These areas are compared below (bottom row) to the trawl maps presented in the ERD.









The Surveillance report maps indicate that trawling does not occur within 2 km of the coastline at Heron Point.

Subsea 7, as required to meet EPA guidance, included a discussion in the ERD of potential historic and cumulative impacts to BCH. It was intended to provide an open and transparent discussion and consideration of impacts associated with the Exmouth Gulf Prawn Fishery. Subsea 7 did not intend to reproduce unsubstantiated material.

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