Close Out of Peer Review of Pipeline Bundle Fabrication Facility Site Selection Process

Subsea 7 propose to construct and operate a pipeline fabrication facility at Lots 233 and 1586 on the east of Minilya-Exmouth Road, Learmonth. The Learmonth Pipeline Fabrication Facility will be used to manufacture pipeline bundles which incorporate, into a single product, all the necessary structures, valve work, pipeline and control systems required to operate in an offshore oil and gas development field. Once fabricated, the pipeline bundles are launched and towed offshore at a controlled depth to a bundle parking area where they are temporarily lowered to the seabed to enable tow reconfiguration before the bundle is transferred offshore to the client's oil and gas development field. The fabricated bundles may be up to 10 km in length and it is anticipated that up to three bundles may be launched per year with each launch and tow operation expected to take two to three days to complete.

In October 2017 Subsea 7 referred the proposal to the Western Australian Environmental Protection Authority (EPA) for assessment under Section 38 of the Environmental Protection Act 1986 and the Commonwealth Department of Environment and Energy for assessment under the Environmental Protection and Biodiversity Conservation Act 1999. In November 2017 the EPA set the level of assessment as Public Environmental Review (PER) and in February 2018 the Department of Environment and Energy determined that the proposal was a controlled action and that the assessment be undertaken by accredited assessment under the Western Australian Environmental Protection Act 1986.

In April 2018 the EPA approved and issued an Environmental Scoping Document (ESD) for the project which outlined the form, content, timing and procedure for the environmental review (EPA, 2018). One element of this scope was to document the site selection processes and to undertake a peer review of this process (Table 1). In November 2018 Dr Bruce Hegge was endorsed by the Environmental Protection Authority to undertake the peer review.

The site selection process was documented in the Pipeline Bundle Fabrication Facility Site Selection Process report (Site Selection Report) which was prepared by Subsea 7 and provided for review on 26 February 2019. The peer review of the draft Site Selection Report was completed on 19 March 2019 (Teal, 2019). Following consideration of the peer review comments the Site Selection Report was revised (Subsea 7, 2019) and provided together with a table of responses to the peer review comments on 12 April 2019.

Table 1 Scope of work defined in the Environmental Scoping Document to address the regional context and integrating issues

Item	Description
Regional Context	The proposal is located in the Cape Range Region, with construction and operational activities having the potential to impact on the: Exmouth Gulf; Ningaloo Marine Park; Ningaloo Coast World Heritage Property/Ningaloo Coast World Heritage Place; Cape Range Subterranean Waterways; and the significant environmental values they support.
Required Work	The EPA has identified the following issues which cut across multiple preliminary key factors that need to be addressed in the PER document. 1. 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. *Note: Information regarding the environmental constraints and values at risk for the alternative options should be supported by environmental data.*
Peer Review	Commission, in consultation with the EPA, and include in the PER a peer review of the selection process for the proposal site and tow route (Scope 1).

Source: Table 4 of Environmental Scoping Document (EPA, 2018)

The revised report and table of responses have been reviewed and it is noted that the peer review comments have largely been accepted and are reflected in changes to the revised report. A key clarification was the explicit documentation of the

time frame of the site selection process, which was undertaken between July and December 2016, and completed 16 months prior to the issuing of the ESD. Hence the documentation of the site selection process against the scope presented in the ESD is necessarily a post hoc exercise. The considerable changes made throughout the revised report provide more clarity and strengthens the coherence and logic of the site selection process undertaken. It is acknowledged that significant further work has been undertaken and documented as part of the suite of PER studies undertaken at the Learmonth site; however, this work is outside the scope of the site selection study.

I am satisfied that the information presented in the revised Site Selection Report demonstrates that the chosen site (Learmonth) and tow route meets the physical site requirements as defined by Subsea 7. The revised report provides sufficient information to demonstrate that the Learmonth site, when compared with the alternatives considered, has been chosen to avoid and minimise impacts. On the basis of the site selection process undertaken and the information provided, the alternative sites do not appear to be suitable for this development.

Regards,

Dr Bruce Hegge
17 April 2019

References

Environmental Protection Authority, 2018. Environmental Scoping Document—Learmonth Bundle Site, Assessment Number 2136. Approved 18 April 2018.

Subsea 7, 2019. Learmonth Pipeline Fabrication Facility: Site Selection Process. Prepared by Subsea 7 Australia Contracting Pty Ltd. Report APFAC017-HSE-00003. 12 April 2019.

Teal Solutions, 2019. Peer Review of Pipeline Bundle Fabrication Facility Site Selection Process. 19 March 2019.

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1.		Include a discussion on the differences between temporary and permanent facilities and why a permanent facility is considered preferable.	Introduction	Bruce Hegge	Text has been added to Section 1.2.1 in the report.	Closed
2.		Include details of why the Migration Study concluded that the North West Shelf region of Western Australia was the most viable offshore oil and gas area for the development of a bundle fabrication facility.	Introduction	Bruce Hegge	The final paragraph of Section 1.2.3 has been revised. Please note that the Migration Study process and results contain confidential IP and commercial related material that Subsea 7 will not include in these reports. A summary, at a high level has been provided. If further information is required, please request it and we will endeavour to answer any specific requests.	Closed
3.		Document the time period in which the site selection process was conducted.	Site Selection Process	Bruce Hegge	Agreed that this would be beneficial context. A timeline has been added to Section 1.1 of the report showing that the site selection occurring during 2016, prior to EPA referral and the release of the ESD.	Closed

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4.		To strengthen the site selection process it would be beneficial to seek input from other relevant stakeholders, in particular local business interests, local community and indigenous groups.	Site Selection Process	Bruce Hegge	Text in Section 2.2 has been revised, and additional detail on engagement during the Site Investigation stage has been added to Section 5. Please note, this focuses on engagement undertaken during the site selection process in 2016 only. The broader and detailed project stakeholder engagement forms part of the PER. Specifically, local businesses, community and indigenous groups were not engaged during this site selection stage of the project.	Closed

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5.		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 (see for example Table 2 in Peer Review Report). 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 Selection Process	Bruce Hegge	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. 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.	Closed
6.		The report would be strengthened with the definition of concise assessment outcomes, e.g. 'suitable' (green), 'more information required' (amber); and 'unsuitable' (red).	Site Selection Process	Bruce Hegge	Table 2-3 in the report has been revised to include definitions alongside the assessment key 'traffic lights' and associated descriptions.	Closed

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7.		It is stated that the minimum water depth is 7.0–7.5 m to provide safe under keel clearance for tow operations. Noting that the launch and tow operation is expected to be completed within two to three days what consideration was given to timing these launch operations during suitable tidal windows (e.g. neap phase); in areas of larger tides this approach may reduce the under keel clearance constraint.	Site Selection Process	Bruce Hegge	The minimum water depth provide in the report was used as a screen tool to identify if access to a site would likely be available. This is not the only consideration that would go into the detailed operability of a site. In response to the query regarding tides: Subsea 7 do not consider that any of the potential sites that were assessed as unsuitable due to nearshore water depths, would have their assessments changed by inclusion of a specific tidal window. The sites with unsuitable UKC were generally only meeting this requirement at large distances offshore, so an allowance of even an additional 1-2 m was not going to make them viable. For example, Anketell did not reach the necessary UKC until ~13 km from the land, and even with a 7 km launchway, it was a further 6 km to the necessary water depth. If this water depth constraint was able to be lowered by say 2 m, the distance from the extended launchway to the tug would still be ~5 km range, which remains in excess of the preferred distance for operability. This has been added to the notes to Table 2.2.	Closed
8.		The distance to offshore development fields (<2,000 km) seems overly simplistic and it would be good to understand how this might be influenced by the different oceanographic conditions (swell/currents) likely to be experienced along the route.	Regional Site Identification	Bruce Hegge	Text in the first paragraph of Section 3.2 has been revised to provide additional context around the engineering analysis on tow distances and Bundle fatigue.	Closed

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9.		It would enhance the report if the effect of the other two elements (bathymetry and travel distance) were also represented spatially to so that the areas of interest defined by the key site requirements are shown geographically.	Regional Site Identification	Bruce Hegge	The figure for Section 3 has been revised and now a single figure the 1,000 nm towing distance, 60km driving distance, and bathymetry (shaded and contour lines) for the NWS region.	Closed
10.		Regarding the 'initial screening of navigation charts, aerial imagery, and existing road and port infrastructure': This initial screening has a fundamental bearing on the outcome of the site selection process and therefore warrants considerably more discussion in the text than it is presently given.	Regional Site Identification	Bruce Hegge	This text has been removed to avoid misinterpretation. Text in Section 3.5 regarding the five non-SIA sites has been revised, and includes a statement for each site on why it was added to the potential sites list.	Closed

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11.		The site assessment logic was not followed through for all sites; Exmouth and Gnoorea Point were considered unsuitable (red) for both terrestrial conditions and land tenure yet still included discussion on heritage and environment. Furthermore, Gnoorea Point was also progressed to the next assessment stage which effectively undermines the stated assessment logic.	Desktop Assessment	Bruce Hegge	It is acknowledged that Gnoorea Point is an exemption to the process in moving from the Desktop to Site Inspection Assessment. However, this was noted in the report (Section 4.7). Gnoorea Point was selected to be assessed in more detail as Subsea 7 had worked there previously for bundle build and launch operations. The text in Table 4.10 for Exmouth environment and heritage values was included in error. No formal inclusion of these elements was completed as part of the Desktop Assessment; however, it was well known at the time that this site was within World Heritage and Marine Park areas. We have removed the text from the table to maintain consistency in the process; but have included it as incidental information within the section.	Closed

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12.		This assessment stage would benefit greatly through a more expansive presentation of the available information (including both text and figures) for each factor supported by detailed referencing. This absence of detail provides some appearance of possible inconsistency in the assessment outcomes.	Desktop Assessment	Bruce Hegge	As noted above, the Site Selection occurred prior to the end of 2016. The report has been deliberately structured to capture the process that was performed, and the information that was available, at the time of site selection process. The collection of significant environmental data for Learmonth occurred after this process and has not been included in the site selection report; but a fully detailed environmental assessment of the Learmonth site is performed in the PER. Please advise if there is any specific element of the assessment that appears inconsistent and this will be clarified. No revisions to the report have been made.	Closed
13.		For several sites it appears that environmental considerations are included with comments on other assessment factors, often marine or terrestrial conditions. As noted above, if the report was structured to provide a clearer distinction between site requirements and environmental issues this cross over may have been avoided.	Desktop Assessment	Bruce Hegge	There are occasions where an environmental value is linked to a marine/terrestrial condition; e.g. ground remediation works may be required in areas of mangrove or mudflat habitat as bearing capacity needs to be increased. Where appropriate these comments are now linked together in the report rather than separate dot points in the tables in Section 4. The comment regarding the report structure is acknowledged. However, as per previous responses the report was based on works completed during 2016 and not directly on EPA environmental factors.	Closed

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14.		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. A tabulation of all data sources used as input for each stage would help to clarify this ambiguity. Again, it appears that many environmental considerations are included in the commentary on other assessment factors.	Site Inspection	Bruce Hegge	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.	Closed
15.		Inclusion, and attribution, of more stakeholder input would also have improved this assessment stage. In assessing land tenure at Gnoorea Point is it noted that the "site has significant recreational value for both locals and tourists and any development of Gnoorea Point would restrict this use; this was considered an unacceptable social impact". There is very little supporting information provided (e.g. description of the uses, number of users, seasonality of use) for this conclusion. Without a more detailed assessment of this factor it implies that the concerns of these users override the social impact concerns for the Learmonth site expressed by the community.	Site Inspection	Bruce Hegge	Details on specific stakeholder engagement undertaken during the Site Inspection stage has been added (new Section 5.1.1). Also see response to Item 4. The site selection assessment of Gnoorea Point does not compare this site to Learmonth, or any other site. The assessment of one site was not performed by comparison to other sites, but rather by comparison to a broad set of criteria. This will be clarified in the report (Section 2.3). Gnoorea Point is an approved camping ground (Heron Point is not). Reference to the approved camp grounds has been added to the report (in Section 5.3.3).	Closed

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16.		It is noted that legal and tender consultants undertook an investigation of Native Title and aboriginal heritage for the Learmonth site. It is not apparent whether this investigation was undertaken for the other two sites during this assessment phase. If this was not completed for the other two sites it would be valuable to understand why not.	Site Inspection	Bruce Hegge	The following clarification is provided: A heritage report for Anketell or Gnoorea Point was not undertaken during the Site Investigation stage. The Anketell site was within the vicinity of other existing development approvals and SIAs, and was therefore considered to be a lower risk in regards to the proposal and so a detailed investigation was not considered necessary during this stage. Further information has been included in Section 5.2.5 on this item. The Gnoorea Point site did not review favourably at the Desktop Assessment stage, and was taken forward to Site Inspection primarily on the basis that it had been used previously for bundle operations. Given the unfavourable review, Subsea 7 did not consider it necessary at this stage to commission a heritage or native title assessment in advance of the site visit. Had the site visit been favourable, an assessment would have been conducted. Further information has been included in Section 5.4.5.	Closed
17.		The outcomes from the investigation of Aboriginal Heritage and Native Title at Learmonth are presented in summary; it would be appropriate to revise the phrasing of the last of these dot points which, as presently phrased, could be considered patronising.	Site Inspection	Bruce Hegge	Comment appreciated, and text has been revised.	Closed

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18.		It is surprising that the commentary on the environmental considerations for the Learmonth site does not mention the Ningaloo Coast World Heritage site.	Site Inspection	Bruce Hegge	This was an oversight in reporting; it was well recognised by Subsea 7 at the time of site selection that Learmonth was within the vicinity of World and National Heritage areas. Revision to the report in Sections 5.4 and 6.3 have been made.	Closed
19.		Based on the assessment logic it is surprising that Anketell Point was progressed as the Site Inspection Phase considered Anketell Point to have unsuitable (red) terrestrial conditions and land tenure yet it was progressed to the Site Investigation stage with the rationale that further investigation of the marine conditions was required.	Site Investigation	Bruce Hegge	Text in Section 5.2.7 has been revised. It is acknowledged that terrestrial and tenure were assessed as unsuitable during the Site Inspection phase. However, given the difficulties in finding a site to fulfil all technical requirements, Subsea 7 wanted to investigate the marine conditions further before making a final assessment on site suitability.	Closed

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20.		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.	Site Investigation	Bruce Hegge	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.	Closed
21.		The report would be significantly improved with the inclusion of considerably more references to the information sources used.	General Comments	Bruce Hegge	A data source table has been added (refer to response to Comment #14). Additional references have been included where used.	Closed
22.		The report would benefit from a substantive edit to improve the structure, content and style. This review should also include checking for: consistency, repetition, referencing of figures and tables, ensure all text references included in reference list, italicizing of scientific names, and resolution of all figures for legibility.	General Comments	Bruce Hegge	Comment appreciated, but believe this to be outside the scope of the peer review. A further editorial review has been conducted, but please advise if anything specific is required in order to conduct the peer review.	Closed

Peer Review of Pipeline Bundle Fabrication Facility Site Selection Process

Subsea 7 propose to construct and operate a pipeline fabrication facility at Lots 233 and 1586 on the east of Minilya-Exmouth Road, Learmonth. The Learmonth Pipeline Fabrication Facility[1] will be used to manufacture pipeline bundles which incorporate, into a single product, all the necessary structures, valve work, pipeline and control systems required to operate in an offshore oil and gas development field. Once fabricated, the pipeline bundles are launched and towed offshore at a controlled depth to a bundle parking area where they are temporarily lowered to the seabed to enable tow reconfiguration before the bundle is transferred offshore to the client's oil and gas development field. The fabricated bundles may be up to 10 km in length and it is anticipated that up to three bundles may be launched per year with each launch and tow operation expected to take two to three days to complete.

The pipeline fabrication facility will consist of the following key elements:
Onshore

- Fabrication site (including offices, staff facilities, laydown area and carparking)
- Bundle tracks (two parallel tracks up to 10 km long)
- Launchway facilities area (for temporary equipment storage during pipeline launching operations)
- Launchway (extends offshore from the bundle tracks to facilitate shore transfer of pipeline bundles from land to sea)

Offshore

- Inshore operations area (tow path corridor between the launchway and the bundle parking area)
- Bundle parking area (where bundles are temporarily laid on the seabed and tow arrangement may be reconfigured)
- Offshore operations area (tow path corridor between the Bundle Parking Area and client site)

To ensure appropriate buoyancy of the bundle during launch and towing, a series of ballast chains (typical chain size 76 mm diameter) are suspended beneath the bundle. Within the inshore operations area a portion of these ballast chains will contact the seabed. In the offshore operations area the bundles shall be elevated to the surface and there will be no contact with the seabed.

In October 2017 Subsea 7 referred the proposal to the Western Australian Environmental Protection Authority (EPA) for assessment under Section 38 of the Environmental Protection Act 1986 and the Commonwealth Department of Environment and Energy for assessment under the Environmental Protection and Biodiversity Conservation Act 1999. Following the public comment period on the referral information[2] the EPA set the level of assessment as Public Environmental Review (PER) with an eight week public review period in November 2017 (EPA, 2017). In February 2018 the Department of Environment and Energy determined that the proposal was a controlled action and that the assessment be undertaken by accredited assessment under the Western Australian Environmental Protection Act 1986 (Department of Environment and Energy, 2018).

The EPA approved and issued the Environmental Scoping Document (ESD) in April 2018 which outlines the form, content, timing and procedure for the environmental review (EPA, 2018a). The ESD identified the following ten preliminary key environmental factors:

- Benthic Communities and Habitat
- Coastal Processes

[1] *A change to proposal was submitted in February 2019 referencing and description within this memo is consistent with the Request for Change to Proposal (MBS Environmental, 2019); this Change Request was open for public review until 15 March 2019.*

[2] *A total of 139 public submissions were received and the distribution of these public submissions across the assessment levels was as follows: 14 do not assess; 3 assess on referral information; 8 assess as environmental review with no public review; and 114 assess as public environmental review.*

- Marine Environmental Quality
- Marine Fauna
- Flora and Vegetation
- Subterranean Fauna
- Terrestrial Fauna
- Hydrological Processes
- Inland Waters Environmental Quality
- Social Surroundings

The ESD recognised the regional context of the proposal and presented an outline of work required to address issues that cover multiple preliminary key environmental factors. One element of this scope was to document the site selection processes and to undertake a peer review of this process (Table 1). In November 2018 Dr Bruce Hegge was endorsed by the Environmental Protection Authority to undertake the peer review with the intention of examining the site selection study to ensure that it not only demonstrates that the chosen site and tow route meet the physical requirements, but also demonstrates that when compared to the alternatives considered (environmental constraints and values) the site has been chosen to avoid and minimise impacts (EPA, 2018b). This peer review report addresses the completeness and veracity of the technical content presented in the site selection report; however, it does not express an opinion regarding the suitability or otherwise of proceeding with the proposal; that is the preserve of the regulators.

Table 1 Scope of work defined in the Environmental Scoping Document to address the regional context and integrating issues

Item	Description
Regional Context	The proposal is located in the Cape Range Region, with construction and operational activities having the potential to impact on the: Exmouth Gulf; Ningaloo Marine Park; Ningaloo Coast World Heritage Property/Ningaloo Coast World Heritage Place; Cape Range Subterranean Waterways; and the significant environmental values they support.
Required Work	The EPA has identified the following issues which cut across multiple preliminary key factors that need to be addressed in the PER document. 1. 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. *Note: Information regarding the environmental constraints and values at risk for the alternative options should be supported by environmental data.*
Peer Review	Commission, in consultation with the EPA, and include in the PER a peer review of the selection process for the proposal site and tow route (Scope 1).

Source: Table 4 of Environmental Scoping Document (EPA, 2018a)

The site selection process was documented in the Pipeline Bundle Fabrication Facility Site Selection Process report (Site Selection Report) which was prepared by Subsea 7 and issued for use on 26 February 2019 (Subsea 7, 2019). The Site Selection Report is 70 pages long and has the following structure:

- Introduction: Including scope of work and background
- Site selection process: Documenting the filtering approach used for the site selection process
- Regional site identification: The first stage of site selection in which the sites to be considered were identified
- Desktop review: Second stage of site selection process in which available information was reviewed to determine sites to progress to the next stage.
- Site inspection: Third stage of the site selection process whereby additional information from site visits and stakeholder consultation was obtained to determine sites to progress to the next stage.
- Site investigations: Final stage of the site selection process to address remaining knowledge gaps.
- Outcome: Summary of rationale for chosen site

The peer review comments presented below follow the structure of the Site Selection Report.

Introduction

This section presents a summary of Subsea 7's bundle technology and the potential for expanding the application of this technology beyond Subsea 7's permanent bundle fabrication facility in Scotland. It is noted that bundle pipelines have been constructed and deployed from temporary facilities at a number of locations in Africa and Australia. This section would benefit with inclusion of a discussion on the differences between temporary and permanent facilities and why a permanent facility is considered preferable.

It is stated that Subsea 7's global Bundle Technology Migration Study concluded that the North West Shelf region of Western West Shelf was the most viable offshore oil and gas area for the development of a bundle fabrication facility. The text provides a brief summary of the elements considered in this assessment, but no information *per se* is presented. It is acknowledged that some elements of the Bundle Technology Migration Study may be commercial-in-confidence; however, it is likely that considerable information used in this assessment is in the public domain and the inclusion of additional details in the Site Selection Report would help demonstrate the validity of this conclusion.

Site Selection Process

The site selection process used throughout the report is documented in this section. The process defines four assessment stages whereby sites in the North West Shelf region are initially identified then reviewed to determine the preferred site. The intention is that at each subsequent assessment stage additional and more detailed data is brought to bear to support the assessment decisions. This filtering approach is valid and an appropriate method to ensure that the level of effort is directed towards those sites considered to be most prospective. It is understood that the site selection process was conducted between July 2016 (completion of the Bundle Technology Migration Study) and February 2018 (completion of Site Selection Report) however, it would be beneficial to document the time period during which each of these assessment stages was undertaken. This would provide a context to understand any changes in circumstance (e.g. Cape Preston aerodrome is now operational) which have occurred over the period of the site selection study.

A number of internal and internal specialist advisors were engaged to provide input throughout the different assessment stages of the site selection process. It is noted that Subsea 7 is the only organisation globally which specialises in the build and launch of pipeline bundles and therefore are best placed to document the specific site requirements for this technology. Input was also sought from government departments/agencies and specialist consultants however, to strengthen the site selection process it would be beneficial to seek input from other relevant stakeholders, in particular local business interests, local community and indigenous groups. This input would support an assessment of impacts to the 'Social Surrounding', one of the preliminary key environmental values identified in the ESD. It is clear that there is a high level of community concern regarding the proposed Learmonth site, yet this issue is not considered in the Site Selection Assessment.

For each assessment stage the following six assessment factors were considered in the site selection process:

- Marine conditions
- Terrestrial conditions
- Land tenure
- Local infrastructure
- Heritage values
- Environmental values

The key considerations for each of these assessment factors is also presented. This structure and the listed 'key considerations' present a mix of site requirements and environmental issues. This mix of content throughout the Site Selection Report acts to obscure the key intentions of the Site Selection Report as presented in the ESD, which may be summarised as:

- Demonstrate that the chosen site meets the engineering requirements; and
- Demonstrate that the chosen site minimises the environmental impacts (when compared to the alternative sites), in particular, across the ten preliminary key environmental factors listed in the ESD

At present 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 (see for example Table 2). Using this approach only locations which met the site requirements would need to be assessed for the environmental issues. Furthermore, it would ensure that the environmental issues (for those locations that meet the site requirements) are specifically addressed for each of the preliminary key environmental factors. 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. The clarity of the report would also be greatly improved if, for each assessment stage, there was a clear separation between 1) the data/information; and 2) the interpretation of this material used in determining the assessment outcomes.

Table 2 Example of allocation of key considerations and preliminary key environmental factors against the assessment factors defined in the Site Selection Report between 'Site requirements' and 'Environmental issues'

Assessment Factors used in Site Selection Report	Site requirements	Environmental Issues
Marine conditions	• Shore interface • Offshore and nearshore bathymetry • Inshore metocean conditions • Navigation safety	• Benthic Communities and Habitat • Coastal Processes • Marine Environmental Quality • Marine Fauna
Terrestrial conditions	• Land area • Topography • Geotechnical conditions	• Flora and Vegetation • Subterranean Fauna • Terrestrial Fauna • Hydrological Processes • Inland Waters Environmental Quality
Land tenure	• Availability • No conflicting uses • Long-term security • Native title status	
Local infrastructure	• Proximity to offshore development fields • Proximity to local workforce • Accessible by road • Proximity to port and airport infrastructure • Proximity to local industrial support	• Social surroundings
Heritage	• Proximity to significant sites	• Social surroundings
Environmental		

At each assessment stage the assessment factors were allocated a traffic light colour (green, amber of red). The report would be strengthened with the definition of concise assessment outcomes, e.g. 'suitable' (green), 'more information required' (amber); and 'unsuitable' (red). These definitions could then be used within the text and would create less ambiguity between the text and tabulated information presented. It is stated that the minimum water depth is 7.0–7.5 m to provide safe under keel clearance for tow operations. Noting that the launch and tow operation is expected to be completed within two to three days what consideration was given to timing these launch operations during suitable tidal windows (e.g. neap phase); in areas of larger tides this approach may reduce the under keep clearance constraint.

Regional Site Identification

The following three key site requirements were used in the first pass to identify potential areas of interest within the North West Shelf region:

- Within 2,000 km of the offshore development fields to avoid bundle fatigue during towing operation;
- Bathymetry would ensure safe towing operations (e.g. towing pathway to development fields should avoid deep water areas where the bundle could not be lowered to the seabed in case of an emergency event); and
- Within a travel distance of 1 hour from an existing town with sufficient workforce available to support the facility

The distance to offshore development fields (<2,000 km) seems overly simplistic and it would be good to understand how this might be influenced by the different oceanographic conditions (swell/currents) likely to be experienced along the route. It would be appropriate during this first pass to also include the obvious requirement for a site with a shore interface (which would immediately have excluded the Boodarie Strategic Industrial Site). Figure 3-1 presents a yellow shaded area (defined in the legend as the Regional Area) presumably identifying the distance limit to the offshore development fields. It would enhance the report if the effect of the other two elements (bathymetry and travel distance) were also represented spatially to so that the areas of interest defined by the key site requirements are shown geographically.

Following consultation with government agencies Subsea 7 was encouraged to consider development of the Pipeline Fabrication Facility at one of five Strategic Industrial Areas which were located within the defined areas of interest. Subsequently, four additional sites were identified by Subsea 7 following an 'initial screening of navigation charts, aerial imagery, and existing road and port infrastructure'. It is assumed, but not clear from the text, that this screening was focussed within the areas of interest defined above. The process by which this screening was undertaken is addressed in one sentence. This initial screening has a fundamental bearing on the outcome of the site selection process and therefore warrants considerably more discussion in the text than it is presently given. The inclusion of Gnoorea Point as a potential site is appropriate as this site was previously used to build and deploy two bundles during the 1990s. Consequently, the following ten potential sites were identified and progressed through the site selection process (ordered along the coast from north to south):

- Browse Strategic Industrial Area
- Boodarie Strategic Industrial Area
- Burrup Strategic Industrial Area
- Maitland Strategic Industrial Area
- Ashburton Strategic Industrial Area
- Anketell Point
- Gnoorea Point
- Cape Preston East
- Learmonth
- Exmouth

Desktop Assessment

The desktop stage used available information to consider the following four assessment factors:

- Marine conditions
- Terrestrial conditions
- Land tenure
- Local infrastructure

It is stated that if any of these factors were found to be unsuitable (red) then the heritage and environmental assessment factors were not assessed. This approach, is appropriate and ensures that the site requirements are met prior to undertaking further work. However, this logic was not followed through for all sites; Exmouth and Gnoorea Point were considered unsuitable (red) for both terrestrial conditions and land tenure yet still included discussion on heritage and environment. Furthermore, Gnoorea Point was also progressed to the next assessment stage which effectively undermines the stated assessment logic. The desktop assessment for each site was presented as a 'summary' table and generally included a site location figure. This format presents an extremely cursory precis of the key considerations for each assessment factor.

This assessment stage would benefit greatly through a more expansive presentation of the available information (including both text and figures) for each factor supported by detailed referencing. This absence of detail provides some appearance of possible inconsistency in the assessment outcomes (e.g. why is the restricted tow path (and an area of relatively high tidal currents) between North West Cape and the Muiron Islands considered better than other restricted pathways highlighted elsewhere in the report). Throughout this whole section there appears to be only one reference to available information. Hence, there is very little basis to review the veracity of the assessment outcomes. For several sites it appears that

environmental considerations are included with comments on other assessment factors, often marine or terrestrial conditions. As noted above, if the report was structured to provide a clearer distinction between site requirements and environmental issues this cross over may have been avoided.

Site Inspection

Three sites were progressed to the site inspection assessment stage: Anketell Point, Gnoorea Point and Learmonth. 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. It is stated that this assessment stage was conducted with a greater level of detail than the desktop stage and included further liaison with stakeholders. However, this additional level of detail is not readily apparent, and it appears that some of the information presented herein might reasonably have been available for the desktop stage. A tabulation of all data sources used as input for each stage would help to clarify this ambiguity. Again, it appears that many environmental considerations are included in the commentary on other assessment factors.

The inclusion of more on ground site photographs would also have enhanced this section together with more detailed and comprehensive review of the information, for example analysis of metocean conditions, presentation of topographic and bathymetric datasets, consideration of anticipated geotechnical conditions, evaluation of road access routes, figures showing land tenure and Native Title status. Inclusion, and attribution, of more stakeholder input would also have improved this assessment stage. In assessing land tenure at Gnoorea Point is it noted that the "site has significant recreational value for both locals and tourists and any development of Gnoorea Point would restrict this use; this was considered an unacceptable social impact". There is very little supporting information provided (e.g. description of the uses, number of users, seasonality of use) for this conclusion. Without a more detailed assessment of this factor it implies that the concerns of these users override the social impact concerns for the Learmonth site expressed by the community.

It is noted that legal and tender consultants undertook an investigation of Native Title and aboriginal heritage for the Learmonth site. It is not apparent whether this investigation was undertaken for the other two sites during this assessment phase. If this was not completed for the other two sites it would be valuable to understand why not. The outcomes from this investigation at Learmonth are presented in summary; it would be appropriate to revise the phrasing of the last of these dot points which, as presently phrased, could be considered patronising. It is surprising that the commentary on the environmental considerations for the Learmonth site does not mention the Ningaloo Coast World Heritage site.

Site Investigations

Two sites were progressed to the Site Investigation assessment stage: Anketell Point and Learmonth. Based on the assessment logic it is surprising that Anketell Point was progressed as the Site Inspection Phase considered Anketell Point to have unsuitable (red) terrestrial conditions and land tenure yet it was progressed to the Site Investigation stage with the rationale that further investigation of the marine conditions was required. 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.

General comments

In addition to the section specific comments presented above the following general comments are provided.

The report would be significantly improved with the inclusion of considerably more references to the information sources used. The report presents many unattributed comments and it is therefore not possible to determine background data which was used in support to positions expressed. It is possible that some of the sources used to inform the Site Selection Report are commercial-in-confidence, perhaps those elements can be addressed in discussion with the EPA which could include a request for confidentiality under S39(2) of the Environmental Protection Act 1986. On several occasions in the report it is stated that

the view of a stakeholder on certain issues was unknown; the report would be enhanced if these views were sought and documented.

The report would benefit from a substantive edit to improve the structure, content and style. This review should also include checking for: consistency, repetition, referencing of figures and tables, ensure all text references included in reference list, italicizing of scientific names, and resolution of all figures for legibility.

Regards,

Dr Bruce Hegge
19 March 2019

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