Please direct all responses/queries to:
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13th September 2023

[redacted]
Department of Water & Environment Regulation
By e-mail only.

Dear [redacted]

RE: PROPOSED BROWSE TO NORTH WEST SHELF DEVELOPMENT – ASSESSMENT NO. 2191 [DWERT3977]

I refer to your letter of 21 July 2023 requesting further information regarding the proposed Browse to NWS Development (State Component).

Please find attached a table containing responses to the matters for which further information was requested.

Yours sincerely

Jamie Stewart
Vice President, Browse Development

EPA Information Request	Woodside Response
1. Please provide clear environmental outcomes to be achieved during decommissioning. It is noted that a decommissioning plan is likely to change during the life of the proposal, particularly given new technology that is likely to be available at project end. However, please use current examples to discuss likely scenarios (for example, what happens with the removed infrastructure) and potential environmental impacts that will occur during this stage.	**Removal of infrastructure** Infrastructure to be installed in State waters forms the subsea production system to develop the Torosa field. This includes equipment such as well heads, x-mas trees, subsea flowlines and control cables (umbilicals). As per Section 5.3.6 of the ERD, all equipment to be installed in State Waters is designed such that it can be completely removed. Noting decommissioning is not proposed to occur for many decades, no specific environmental outcome for decommissioning was included in the ERD. However, in response to the EPA question, a proposed environmental objective for decommissioning is as follows: "*all subsea infrastructure above the mudline installed as part of the Browse to NWS project in State Waters is to be completely removed within five years of the end of field life*". Note, the only equipment that would remain below the mudline (e.g. below the ocean floor) would be well infrastructure, which is required to be plugged and abandoned as part of decommissioning activities. Woodside notes that a regulatory regime is in place governing oil and gas infrastructure decommissioning, namely, Section 98 of the Petroleum and Geothermal Energy Resources Act 1967 (PGERA), section 23 of the Petroleum Pipelines Act 1969 and section 104 of the Petroleum (Submerged Lands) Act 1982 that require the full removal of all property from the title before relinquishment (unless otherwise approved by the Minister). This suite of regulations establish that decommissioning is to be addressed primarily in Environment Plans, as well as Well Management Plans, which are required to be submitted for each proposed activity. **Remediation considerations** The approximate direct footprint of equipment to be installed in State Waters is conservatively estimated as approximately 0.01km^2 (10 hectares). The habitat type in which this infrastructure will be installed is deep water (>300m), dominated by soft sediments (sandy and muddy substrata with occasional patches of coarser sediments – see example image below) and sparse benthic biota. There are no benthic primary producer habitats affected by the infrastructure due to the depth. Therefore, it will not be necessary to conduct any remediation once equipment is removed as this habitat type will quickly return to a pre-disturbance state once infrastructure is removed.

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Waste management and disposal

Most subsea equipment will come into contact hydrocarbons and therefore there is a risk that the infrastructure becomes impregnated with contaminants such as mercury or naturally occurring radioactive material (NORMS). Typically, subsea decommissioning first involves flushing and purging infrastructure to remove any residual hydrocarbons. Subsea flowlines have been designed such that anything flushed form subsea infrastructure is directed to the FPSO for processing and not discharged on site. Once flushed and cleaned, subsea infrastructure is left in an inert state and ready to be removed.

Removal of equipment would typically involve a vessel with large crane disconnecting and retrieving equipment from the seabed. Depending on the type of equipment, equipment may be cut up on the vessel to allow for easy handling. Retrieved infrastructure would then typically be taken to a suitable onshore site for further cleaning (if required) before being dispatched to recycling or landfill sites as appropriate. There are a number of facilities in Karratha or Perth that are currently licenced to conduct cleaning and processing of these expected types of waste. The decontamination process typically involves speciality washing with the residue collected and appropriately disposed of, but in general, very low volumes of waste are expected to be generated. Contaminants such as mercury or NORMs, if present, would be in trace quantities.

Recent environment plans submitted by Woodside for decommissioning of subsea infrastructure included targets for recycling rates of subsea infrastructure of between 70% and 90%. Typically, the type of equipment that can not be recycled is those with high plastic content where no recycling facility exists in Australia or there is a limited market for the recycled product.

Even with current technology, there is no equipment currently planned to be installed as part of the Browse project that could not be safely treated, recycled or disposed of at existing Western Australian facilities.

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2. Noting the time elapsed since the release of the Environmental Review Document, please advise whether additional or any ongoing consultation has been occurring. If so, please provide up to date information regarding the consultation that has been undertaken and the outcomes of that consultation with stakeholders who have a social and economic interest in State waters, including sea country traditional custodians. Please advise whether any consultation with stakeholders whose interests may be affected by a worst case oil spill has been undertaken.	Following referral in 2019, assessment of the proposed Browse to NWS Project was set at the level of a Public Environment Review. The Environment Review Document was published for an eight-week public comment period between December 2019 and January 2021. More than 19,000 comments on the ERD were received and Woodside is yet to receive notification from the State that public comments have been adequately responded to. The Commonwealth Environment Impact Statement for the Proposal prepared in accordance with the EPBC Act was accepted and published in September 2022. **Extent of environment that may be affected (Socio-economic EMBA)** The EIS/ERD included modelling outputs demonstrating the maximum extent of the environment that may be affected (EMBA) by the worst-case oil spill. In defining consultation requirements of persons that may be affected by Browse activities, a "social-cultural" EMBA threshold, equivalent to hydrocarbon concentration of 1g/m^2 was included as a modelling threshold. This EMBA did not extend to mainland Western Australian (WA) State waters and had a boundary approximately 150km from the nearest mainland WA coastline. Oil was not predicted to accumulate on any WA mainland shoreline or ever be visible in WA mainland waters. No formal traditional custodian interests at Scott Reef were identified during the consultation process. The EMBA covers a larger area than that likely to be affected during any one single spill event, as the model was run for a variety of weather and metocean conditions (100 simulations in total). The EMBA, therefore, represents the combined total extent of all locations where hydrocarbon thresholds could be exceeded, as determined from all modelling runs. The contour maps do not represent a single hydrocarbon spill (floating slick or water column plume at any one point in time). Instead, the contour maps are a composite of a large number of potential slick and plume paths combined into one area. The surface threshold of 1 g/m2 is based on the relationship between film thickness on the sea surface and appearance and represents a 'rainbow' presented as a range of colours (Bonn Agreement, 2015). This threshold has been used to approximate ranges of socio-economic effects for condensate and marine diesel, and to identify potential additional socio-economic receptors which may be affected from an unplanned hydrocarbon release outside of the defined EMBA (e.g. AMPs). This concentration is considered a suitable threshold for the extent to which socio-economic effects may occur (NOPSEMA, 2019), however, the threshold is considered below levels which would cause ecological impacts, and instead represents potential for visual amenity impacts. This modelling showed that even in the worst-case scenario, hydrocarbons do not come into contact with mainland WA waters above a concentration which would be visible. The modelling shows that for the worst-case spill, hydrocarbons would not be present at concentrations to be visible or noticeable approximately 200km from the nearest mainland shoreline or inhabited community.

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	Direct consultation on the EIS / ERD was undertaken with representatives from communities on the Dampier Peninsula that, while not within or proximate to the EMBA but adjacent to it, including Djarindjin, Djarindjin airport, Lombadina and Ardyaloon (One Arm Point), Yawuru Jarndu Aboriginal Corporation. We have continued to engage with First Nations stakeholders following completion of the Response to Submissions using multiple methods of engagement, including face-to-face meetings, community forums, emails, letters and phone calls. A key outcome of these engagements was that Broome and Dampier Peninsula stakeholders continue to place a high value on the preservation of the natural environment for traditional and cultural reasons. Consultation has also continued with stakeholders with tourist and fisheries with interests at Scott Reef, including the Western Australian Fishing Industries Council and the Kimberley Marine Tourism Association. **Consultation since 2019** Following submission of the ERD Response to Submissions in 2019, Woodside has continued to engage with relevant stakeholders in relation to the proposed Browse to NWS Project. These stakeholders have included decision-making authorities, other relevant government agencies and authorities (Local, State and Commonwealth), the local community, local First Nations groups, academics, research authorities and environmental NGOs. Multiple methods of engagement have been used, including via face-to-face meetings, community forums, emails, letters and phone calls. In 2020 and 2021, Woodside's ability to continue regular in-person engagements with stakeholders was impacted by COVID, which restricted in-person engagements. We continued to engage on the Browse to NWS Project through quarterly engagements with Woodside's Karratha Community Liaison Group and maintained engagement with Karratha and Roebourne Traditional Owner Groups through our quarterly cultural heritage meetings. In mid-2022, we re-engaged key Broome stakeholders on Browse with in-person meetings with the Shire of Broome, Broome Heliport and Broome Chamber of Commerce and Industry. In 2023, Woodside hosted information sessions in Broome, Derby and Kununurra, where we engaged with a number of stakeholders about the Browse to NWS Project. Community Information Sessions regarding Woodside's activities on 'land and sea country' have also been held throughout 2023, culminating with Karratha's annual community festival FeNaClNG in August 2023 and Passion of the Pilbara festival in Onslow where we provided an opportunity for

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	community stakeholders to engage on Browse to the NWS Project, along with other Woodside activities. See Table 1 for the consultations undertaken in support of the Browse to NWS Project in 2023. **Future Commonwealth Environment Plan Consultation** Woodside has a portfolio of quality oil and gas assets and more than 30 years of operating experience. We have a strong history of working with local communities, the relevant regulators and a broad range of persons and organisations to understand the potential risks and impacts from our proposed activities and to develop appropriate measures to manage them. Woodside remains committed to close consultation with the relevant persons in the areas in which we operate by way of community and individual meetings, attending community events, and ensuring accessibility for feedback or questions as needed. A key element of our consultation efforts is our willingness to be flexible and adaptable in our consultation format to suit the audience. For the Browse to NWS Project, we share an overarching view of upstream and downstream components of the project in all consultations. In developing and prior to executing any activities as part of the Browse to NWS Project, Woodside will be required to submit several Environment Plans (EPs) prepared in accordance with relevant State and Commonwealth legislation. Commonwealth legislation requires that consultation occur with relevant persons. Woodside has developed a methodology for identifying relevant persons, in accordance with the Environment Regulations. This methodology reflects NOPSEMA's Guideline on consultation in the course of preparing an environment plan (May 2023) and demonstrates that, to meet the requirements of NOPSEMA when preparing the EP, Woodside understands: • our planned activities in the Operational Area, being the area in which our planned activities are proposed to occur; and • the geographical extent to which the environment may be affected (EMBA) by risks and impacts from our activities (unplanned). Woodside is committed to applying a comprehensive approach to consultation with relevant persons holistically across all consultation activities for State and Commonwealth environment plans.
3. It is noted that the incorporation of CCS is likely to result in a significant decrease in the amount of greenhouse gases emitted. Please provide further information on how the scope 1, 2 and 3	Woodside previously provided a copy of a request made to DCCEEW to vary the scope of the Browse to NWS Development to incorporate a Carbon Capture and Storage system. The BJV has requested to withdraw this application and may refer the CCS System as a standalone proposal

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emissions from the whole Browse to NWS proposal and what will be regulated under Commonwealth and State processes (including under any exiting assessments and approvals for the North West Shelf or the Pluto Gas Plants). The EPA needs to consider the emissions impact on WA environment, separate to consideration of how it is regulated. Include: • how the proposal will meet the Safeguard Mechanism reform which appears to require net zero baseline for reservoir, including the percentage for carbon capture and storage, offsets etc. • information consistent with the revised Environmental Factor Guideline Greenhouse Gas Emissions (EPA 2023), particularly for best practice, trajectory, baseline, offsets percentage and type, operations beyond 2050 and ongoing improvement	under the EPBC Act. We are currently working through this process with DCCEEW and will provide updates to DWER/EPA as this process progresses. The carbon capture and storage system as included in the EPBC referral variation application (as previously provided to EPA) sought to reduce Scope 1 emissions from the proposed Browse to NWS Project by 47%. As emissions as from the processing of gas extracted from the Torosa field are outside of the scope of the Proposed Browse to NWS Project (State Component), CCS will not change the Scope 1 emissions of the Proposed Browse to NWS Project (State Component). The revised Scope 1 and 3 emissions from the Browse to NWS Proposal, should CCS be incorporated, are included in **Table 2** below. If implemented, CCS could lead to a ~5% reduction in Scope 3 emissions from the proposed Browse to NWS Project (State Component) based on the definition of Scope 3 emissions in the GHG Environment Factor Guideline (EFG) which is as follows *"indirect GHG emissions, other than scope 2 emissions, that are generated in the wider community. Scope 3 emissions (both upstream and downstream) occur as a consequence of the activities of a proposal, but from sources not owned or controlled by the proponent as part of the proposal*." Scope 1 emissions from the proposed Browse to NWS Project (State Component) are significantly below the threshold at which the EPA's guideline indicates GHG emissions will be considered by the EPA. Emissions from the Browse to NWS Project (State Component) have been estimated as being approximately ~350 $ktCO_2e$ over the life of the project, with emissions in typical operational years approximately 1 $ktCO_2e$. **How the proposal will meet the Safeguard Mechanism** The safeguard mechanism (SGM) is a Commonwealth Government mechanism for reducing emissions at industrial facilities. It sets legislated limits—known as baselines—on the greenhouse gas emissions of these facilities. According to information published by the SGM Regulator, these baselines will decline, predictably and gradually, on a trajectory consistent with achieving Australia's emission reduction targets of 43% below 2005 levels by 2030 and net zero by 2050. Given first operations from Browse will be after 2023, BJV assumes it is likely to be considered a "new" facility under the SGM. As a new facility, the Browse SGM baseline is expected to be set at an emissions intensity level equivalent to *international best practice*, adapted for the Australian context. In the context of Browse, this best practice benchmark will apply to production variables such as power generation and reservoir emissions vented. For reservoir emissions, the international best practice baseline has been set at zero, meaning every tonne of reservoir CO_2 vented will either need to be avoided (e.g. re-injected via CCS) or offset. Emissions associated

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	with Browse production processed at KGP would be regulated under the existing NWS SGM facility. **Carbon Capture and Storage (CCS) offsets percentage** All reasonably practicable measures will be undertaken during design of the CCS System to ensure that at least 85% of reservoir emissions will be abated through re-injection into a geological formation. Any residual reservoir emissions will be subject to requirements of the SGM, noting the baseline component for reservoir emissions venting is zero. **Offset percentage and type** Where emissions from Browse exceed the SGM baseline, either Australian Carbon Credit Units or Safeguard Mechanism Credits must be surrendered equivalent to any exceedance. As the decline rates for activities beyond 2030 have not been published, it is not possible to determine the exact percentage of overall facility emissions that will be required to be offset. **Emissions Baseline and Trajectory** EPA's factor guideline for GHG (EFG) emissions states that the EPA's usual minimum expectation for proposals is for deep, substantial and sustained emissions reductions this decade and achievement of net zero emissions no later than 2050 along a linear trajectory (at a minimum) from 2030. Given Browse will be subject to the SGM, post-2030, emissions reduction will align to the SGM baseline decline rate, which will be set in predictable five-year blocks, after updates to Australia's Nationally Determined Contribution (NDC) under the Paris Agreement. Decline rates for 2030-31 to 2034-35 are expected to be set by 1 July 2027. The SGM baseline setting process will involve the Australian Government taking advice from the Climate Change Authority (CCA) and the latest Annual Climate Change Statements to Parliament. More than half of all emissions in State Waters occur in the first ten years of the project life (predominantly arising from drilling of wells) and annual gross emissions during routine operations beyond 2050 are expected to be in the order of 1,000tCO_2e, only being associated with operation of offshore vessels that will be involved in any inspection, maintenance, repair or decommissioning activities. **Best Practice design** Infrastructure planned to be installed as part of the Browse to NWS Project (State Component) are not expected to generate routine or planned greenhouse gas emissions. This subsea equipment is sealed from the environment but occasional unplanned fugitive emissions could occur (estimated as a maximum of 240t CO_2e/year). Actual fugitive emissions are expected to be significantly lower than this estimate and this will be routinely verified through maintenance and

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	inspection in which any leaks would be apparent, and a response and repair plan would be initiated based on the magnitude of the leak. This is consistent with the scope of the referred proposal and as described in the draft EIS/ERD. The majority of Scope 1 emissions for the Browse to NWS Project (State Component) will occur as a result of the operation of subsea construction vessels and mobile offshore drill rigs (MODU). MODUs that can be moored while drilling will be used preferentially to dynamically positioned (DP) MODUs while in State Waters, as these consume significantly less diesel (typically ~40%) than DP MODUs. As technology evolves, alternatively fuelled (e.g. hydrogen) or zero emissions MODU's capable of deep offshore drilling may become available but currently do not exist. Woodside does not have direct control over the design of the offshore vessels and MODUs to be used in State Waters, but this equipment will be subject to the requirements of the GHGMP which requires the completion of *5-yearly assessment of reasonable and practicable emission reduction equipment and technologies that could be implemented to reduce GHG emissions.* **Alignment with net zero 2050** EPA's EFG requests Proponents to demonstrate how the scope 1, 2 and 3 emissions from a project's operation beyond 2050 are consistent with a global low-carbon transition to net zero by 2050. Emissions from the Browse to NWS Project (State Component) will be required to comply with the Safeguard Mechanism and therefore required to achieve net zero emissions in 2050. As per Table 2, Scope 3 emissions in Australia are subject to the SGM and State Ministerial Conditions, both limiting emissions to net zero in 2050. Scope 3 emissions due to the end use of products sold by Browse, which may occur in Australia or overseas are expected to be subject to the requirements of the Paris Climate Accord. It should also be considered that as the world transitions towards lower-carbon energy systems, it is expected that natural gas will increasingly be utilised as feedstock for production of fuels such as hydrogen or used at facilities which have carbon capture infrastructure installed which significantly reduce emissions associated with combustion.

Table 1 Stakeholder consultations regarding the Browse to NWS Project conducted in 2023

Engagement	Date/s	Stakeholders	Details
Regular engagements			
Woodside Karratha Community Liaison Group (CLG) quarterly meetings	24/03/23 29/06/23	The Karratha CLG comprises representatives from: • City of Karratha • DevelopmentWA • WA Police • Pilbara Ports Authority • Karratha Health Care • NYFL • Department of Education • Karratha and Districts Chamber of Commerce and Industry • Pilbara Development Commission • Murujuga Aboriginal Corporation • Dampier Community Association • Horizon Power • Regional Development Australia	Provided updates on the proposed Browse to NWS Project.
Additional engagements			
Karratha Shopping Centre community information session	27/08/23	Karratha community members	Provided updates on the proposed Browse to NWS Project.
City of Karratha Woodside Senior Leaders meetings	16/03/23 27/06/23	City of Karratha CEO, Directors and key staff	Provided updates on the proposed Browse to NWS Project.
Broome Chamber of Commerce and Industry briefing	17/05/23	Broome CCI Executive Committee	Provided an update on the proposed Browse to NWS Project, including the Browse Carbon Capture and Storage concept.
Community Information Sessions, Roebourne	04/05/23 10/05/23 19/05/23 24/05/23 19/07/23	Roebourne and surrounds community members	Provided updates on the proposed Browse to NWS Project.
Community Information Session, Broome	12/06/23	Local community members, including traditional owners / custodians	Representatives from Woodside, including project and environment

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Community Information Session, Derby	13/06/23		personnel, attended the sessions. Copies of the Browse to NWS Project fact sheet were available to attendees. Community members, including Indigenous stakeholders, engaged Woodside representatives to understand the proposed activity and how it may affect them, ask questions and provide feedback. Promotion of the information sessions was developed with input from Indigenous representatives and adapted to incorporate culturally appropriate and accessible language to encourage engagement and understanding of Woodside's proposed activities including the Browse to NWS Project.
Community Information Session, Kununurra	15/06/23		
Karratha FeNaClNG Festival – Community Information Session	04/08/23	Community members from towns within the City of Karratha, including Karratha, Roebourne, Wickham, Dampier and Point Samson. Visitors from other locations, including but not limited to Perth, Busselton and Port Hedland.	About 2,000 stakeholders visited the Woodside stand and engaged with Woodside personnel. Members of Woodside's Corporate Affairs and Operations teams actively engaged the community to discuss proposed activities, including the Browse to NWS Project. Community members were encouraged to provide their views on Woodside's activities through the feedback form on the Woodside website, or to subscribe to Woodside updates. An iPad was available for stakeholders to do this on the spot.
Onslow Passion of the Pilbara – Community Information Session	19/08/23	Community members from towns within the Shire of Ashburton. Visitors form the City of Karratha and Perth.	About 100 stakeholders visited the Woodside stand and engaged with Woodside personnel to discuss

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			proposed activities, including the Browse to NWS Project. Community members were encouraged to provide their views on Woodside's activities through the feedback form on the Woodside website, or to subscribe to Woodside updates.

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Table 2 - Scope 1 and 3 emissions from the proposed Browse to NWS Development (State Component) including a description of regulatory regimes applicable to these emissions.

Scope*	Emissions Source [Jurisdiction]	Average Year ($mtCO_2e$)		Total over expected field life [31 years] ($mtCO_2e$)		Applicable legislation
		Without CCS	With CCS	Without CCS	With CCS	
Scope 1	Emissions from construction, installation and operation of Browse to NWS infrastructure (State Component) [Western Australia]	0.01 – 0.02	0.01 – 0.02	0.4	0.4	• Pt IV Environment Protection Act [& any relevant Ministerial Conditions] • Greenhouse Gas Management Plan (State) prepared in accordance with EPA factor guidance. • Safeguard Mechanism • Environment Protection and Biodiversity Conservation Act [& any relevant Ministerial Conditions] • Environment Plans prepared in accordance with the Petroleum and Submerged Lands Act • Any works approval or licences required under PtV of the EP Act.
Scope 3	Processing of gas at the Torosa and Calliance FPSOs prior to export to NWS [Commonwealth Waters]	3.6	1.9	112	59	• Safeguard Mechanism • Conditions applied in accordance with the EPBC Act • Environment Plans prepared in accordance with the OPGGS Act
Scope 3	Gas processing and liquefaction at the Karratha Gas Plant [Subject to conditions of NWS Project Extension, per EPA assessment 2816]	2.8	2.5	88	78	• Safeguard Mechanism • Subject to any conditions of authorisation under the Environment Protection Act. EPA has recommended emissions from NWS be managed on a linear trajectory to net zero by 2050.
Scope 3	Use of gas and condensate by end users, for uses including petrochemical	32	32	995	995	• It is expected that 15% of gas exported will be consumed in Western Australian as domestic gas and subject to State and Commonwealth regulation, unless

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Scope*	Emissions Source [Jurisdiction]	Average Year ($mtCO_2e$)		Total over expected field life [31 years] ($mtCO_2e$)		Applicable legislation
		Without CCS	With CCS	Without CCS	With CCS	
	manufacture or energy generation.					this gas is not combusted or used at a facility below coverage threshold. • All remaining emissions governed under the Paris Climate Accord product sales are anticipated to occur with companies in Paris aligned countries.
Total		**38.42**	**36.42 (-5%)**	**1,196**	**1,132 (-6%)**	**-**

*As defined by the EPA Factor Guideline for Greenhouse Gas Emissions, Scope 1 GHG emissions are those released to the atmosphere as a direct result of an activity, or a series of activities, which are part of a proposal being considered by the EPA. The scope of the Browse to NWS proposal [State Component] referred to the EPA under Pt IV of the EP Act is limited to drilling and completion, subsea installation, commissioning, operation, inspection, maintenance and repair and decommissioning of up to 20 subsea wells and associated subsea infrastructure located in Western Australian State waters, to extract hydrocarbons from the Torosa reservoir, located approximately 425 km north of Broome and approximately 290 km off the Kimberley coast. Gas processing, liquefaction or end user combustion is beyond the scope of the Proposed Browse to NWS Project [State Component] and are not Scope 1 emissions.