WOODSIDE RESPONSE TO SUMMARY OF PUBLIC SUBMISSIONS

1.1 PART A – RELOCATION OF THE TRD DRILL CENTRE

No.	Submission and/or issue	Response to comment
1	A high number of submitters consider that the relocation of the drill centre is unlikely to eliminate or avoid the risk of significant impacts to the environment from the proposal, noting that the revised drill centre location: • is only marginally changed from the original location (approximately 900 m), and therefore still poses significant risk (e.g. from pollution, leaks) to Scott Reef and marine ecosystems of concern • is still located within 3 km of the Scott Reef, which is too close to be environmentally acceptable • is still located at the entrance to the channel between the north and south Scott Reef atolls, which may facilitate (based on the proponent's modelling) the dispersal of spills through the channel • does not prevent against horizontal drilling towards critical habitat areas/towards Scott Reef • will still cause disruption to marine and migratory species and sensitive habitats • retains the risk of subsidence of the ocean floor and subsequent impacts to the reef, as the overall extraction mass has not been reduced.	Woodside identified an opportunity to further reduce environmental impacts and risks by expanding the minimum 'buffer' distance between the TRD drill centre and Sandy Islet and incorporating a commitment that no drill centre will be within 20 km of Sandy Islet. While complete elimination of environmental impacts and risks is not always feasible, Woodside has identified and assessed these in the EIS/ERD and has proposed commitments to manage them to an acceptable level. *Location relative to Scott Reef and the channel entrance* The proximity of the drill centres to Scott Reef has been considered and assessed in the EIS/ERD. Drilling discharges will be managed to avoid potential impacts to Scott Reef shallow water benthic communities and habitats (<75 m water depth), as outlined in the Browse to NWS Project State Waters Environmental Quality Management Plan (specifically Appendix A: Management Approach – Torosa Wells in the State Proposal Area). The adoption of pyrotechnic shear ram technology also significantly reduces the risk of a loss of well control event impacting Scott Reef. *Horizontal drilling* Production wells will typically be drilled at an inclination (up to horizontally) outwards from each drill centre. Some trajectories may extend beneath the area 20 km around Sandy Islet, targeting reservoirs located 3,500 m to 4,500 m vertical depth below sea level. *Marine and migratory species and sensitive habitats* Potential disruption to marine and migratory species, and sensitive habitats has been assessed in the EIS/ERD, with mitigations proposed to reduce the impact to an acceptable level. Details on the management of impacts to turtles, pygmy blue whales and Scott Reef environment water quality are provided in the supporting Management Plans. *Subsidence* Modelling indicates that subsidence from hydrocarbon extraction would be up to

		around 3.8 mm at Sandy Islet, and in the order of less than 100 mm at Scott Reef over the life of the proposal. This minor subsidence is not expected to significantly contribute to sea level changes and associated impacts. Subsidence at Sandy Islet and Scott Reef will be monitored throughout the life of the project, as outlined in Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5.
2	Submitters consider that the proponent's amendment information did not adequately justify or provide confidence to the suitability of the revised drill centre location, as no new supporting technical studies or modelling results have been provided. Submitters raised concerns that the revised drill centre location has failed to consider potential impacts to: o deeper water corals o the seabed/ocean floor o marine fauna from noise and vibration impacts o water quality and marine organisms from sediment plumes o benthic ecosystems.	In the current project stage, concept definition, the suitability of drilling centre locations is assessed based on bathymetry data and benthic environment surveys have also been conducted at representative locations to provide an indication of sensitivities in the Browse Development Area. Section 5.3.1.2 of the EIS/ERD describes the results of site surveys that have informed the understanding of the benthic habitat of the deeper waters (>300 m) of the Browse Development Area. The deep seabed habitats in the area are largely characterised by fine sand and silt, with sparse benthic fauna such as anemones, sea urchins, brittle starts, crinoids and sea pens. No deepwater soft or hard corals were found in the surveyed area; these habitats are typically found on the steep and narrow slopes of Scott Reef. These findings are consistent with broader studies of the Kimberley continental shelf, suggesting the benthic biota are widespread and not unique to the deeper waters (>300 m) of the Browse Development Area, and that the sampled locations are representative of the broader area. Woodside has reviewed available bathymetry data for the region and concluded that the characteristics of the seabed are expected to be similar between the referred and proposed TRD locations. The existing bathymetry information covers the Development Envelope, and the benthic fauna survey locations are representative of the wider area. Therefore, this information is considered sufficient to understand the suitability of the proposed drill centre locations and no further studies are proposed at this stage. The exact location of infrastructure will be refined and determined during the detailed design stage of the project. Potential impacts to deeper water corals, the seabed/ocean floor, marine fauna from noise and vibration impacts, water quality and marine organisms from sediment plumes, and benthic ecosystems have been considered in the EIS/ERD. These aspects were reviewed with respect to the change in TRD drill centre location. Impacts to the seabed are not expected to change significantly, as the seabed locations surveyed are representative of the wider development envelope. Impacts associated with discharges or sediment disturbance are not expected to be significantly different as there are no substantial changes

		proposed to drilling activities. Therefore, it was determined that the impact assessments remain valid for the new TRD drill centre location. The existing commitments in Section 6.3.1 of the EIS/ERD for impacts to the seabed will apply to the new indicative location. These include: • No moorings for the MODUs will be installed in the Scott Reef shallow water benthic communities and habitat (<75 m bathymetry). • Vessels will be required to comply with an anchoring management plan which will include mooring analysis, with the requirement to avoid placing anchors on sensitive receptors. Other aspects of the drilling campaign that have the potential to result in an environmental impact will be managed through existing commitments in the EIS/ERD and supporting Management Plans.
3	Relocation of the drill centre outside the 'habitat critical to the survival of green turtles inter-nesting area' does not mitigate impacts to the migratory pathways of turtles or movements of hatchlings. Industrial activity along the migratory routes increases risk of mortality and pressure on vulnerable populations.	*Migratory pathways* Impacts to migratory green turtles are assessed in the EIS/ERD and Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5. Artificial light is not predicted to impact migratory turtles, and vessel presence is unlikely to impact migratory turtles as vessels will be required to travel at speeds less than 6 knots in the State waters surrounding Scott Reef. Satellite tagging studies described in the EIS/ERD have provided an indication of the behaviour and migratory routes of adult green turtles leaving Scott Reef. These studies showed that upon leaving Sandy Islet, tagged turtles swum through South Reef lagoon and over the shallow reef flat. Turtles then dispersed toward the Western Australian mainland via two distinct post nesting migration pathways, either south towards the Kimberly, or east towards the Northern Territory (shown in Figure 5-38 of the EIS/ERD). The majority of tagged turtles did not migrate through the area of the proposed development envelope. It is possible that a migrating turtle may travel through the area, but it would be for a short time as tracking data indicated they migrate quickly from Sandy Islet and Scott Reef after their final nesting event. Based on the expected migratory pathways and implementation of the existing management measures, drilling activities or other activities associated with the Project are not expected to disrupt migratory behaviours of green turtles. *Movement of hatchlings* Light modelling indicated that no impact to post-emergence sea finding of hatchings is expected to occur as a result of operational light emissions from a

		MODU operating at TRD, given the distance from the original TRD location to Sandy Islet. The relocation of TRD further away from Sandy Islet supports this conclusion. The light source where a behavioural impact was possible, was flaring from the MODU. This impact pathway has now been removed with the commitment to limit planned flaring from the MODU at Torosa locations to daylight hours. Once entering the water, the movement of hatchlings is driven by currents. Given the distance of the TRD well centre from Sandy Islet, the density of dispersing hatchlings that may occur near the TRD drill centre during drilling is expected to be very low. The relocation of the TRD well centre will further reduce this density as hatchlings are dispersed with the currents once they enter the water at Sandy Islet.
4	Submitters consider that the relocation of the drill centre raises significant cultural concerns, including: • incursion into culturally sensitive areas without proper cultural mapping or consent • sufficient cultural heritage impact data relating to the proposed drill centre site (and assurance that Traditional Owners were informed of, or involved in, the updated site assessment) has not been provided • potential exacerbation of cumulative impacts on turtle dreaming paths, reef formations connected to cultural knowledge, and totemic systems. • Submitters consider that the proposed relocation site should be subject to consent-based processes, and a full cultural heritage assessment be undertaken in collaboration with Traditional Owners.	The proposed updated TRD drill centre location is within the State Development Envelope/State Proposal Area assessed throughout the EIS/ERD. To summarise: • No known sites of Aboriginal Heritage significance are located within or proximate to the development area according to the Western Australian DPLH Aboriginal Cultural Heritage Inquiry System (ACHIS) or Australasian Underwater Cultural Heritage Database. • The existence of any unknown Aboriginal sites or artefacts of significance within the Development Envelope is considered highly unlikely due to its remote offshore location. No archaeological sites within the development area have been identified by Traditional Custodians in discussions and consultation with Woodside since early development of the area commenced in the 1970s. There are no Native Title claims or determinations over the Browse to NWS Project Development Envelope or at Scott Reef, therefore consent-based processes with Native Title holders do not apply. While acknowledging that cultural features and heritage values may exist outside of the Native Title framework, Woodside considers this to be the broadest extent over which First Nations groups have claimed Native Title rights and interests. *Cultural Values* Woodside recognises the potential for marine ecosystems to include cultural features as well as environmental values – which may include turtle dreaming paths, reef formations connected to cultural knowledge and totemic systems. These are aspects of the broader concept of “Sea Country”, which can be defined

		as the area of sea over which a First Nations group has interests, cultural value, connection and use. Although Scott Reef, as a feature of the ocean, forms part of Sea Country, its limited accessibility makes it unlikely to be a part of everyday culture and life as compared to reef systems and islands closer to the coast. Nevertheless, Woodside acknowledges Scott Reef's role in the health of turtle populations and other culturally significant migratory species and therefore its broader value in Sea Country. This is of deep importance for coastal First Nations stakeholders, as identified through the extensive consultation with Pilbara and Kimberley-based Traditional Owners to understand the cultural heritage values of the marine environment that may be associated with the Browse to NWS Project. Woodside recognises and respects these values and, guided by the knowledge and direction of First Nations consultation, seeks to actively manage any potential environmental impacts to these species (as outlined in section 6.3 of the draft EIS ERD) and thereby manage potential impacts to cultural values. *Underwater Cultural Heritage* Woodside has commissioned a desktop Underwater Cultural Heritage assessment of the development area (including the proposed drill centre site) to assess the potential for archaeological sites (both First Nations' and historical). Preliminary results have identified no major underwater cultural heritage factors/considerations that may need to be considered in assessment of the Browse to NWS Project. Results of the ethnographic component of this study determined that there is currently no evidence directly indicating that Scott Reef or its surrounding areas hold cultural importance for First Nations communities. This is consistent with the information received by Woodside during consultation on the Browse to NWS Project. *Consultation* Woodside has undertaken consultation with Pilbara and Kimberley-based Traditional Owners to understand the cultural heritage values of the marine environment that may be associated with the Browse to NWS Project, including the Kimberley Land Council as the Native Title Representative Body for the development area. During consultation, no Traditional Owners or cultural authority has been nominated or have self-identified as having cultural responsibility for Scott Reef. Furthermore, Woodside has not been advised of any known or cumulative impacts to turtle dreaming paths or reef formations associated with cultural knowledge or totemic systems by First Nations stakeholders.

		Woodside also undertook desktop research of a range of literature sources to identify First Nations cultural values associated with Scott Reef. No specific mention of Scott Reef as a place of cultural significance was identified in the desktop research. In May 2025, Woodside consulted Traditional Owner groups in the Kimberley, including Yawuru, Lombadina, Bardi Jawi, Gogolanyngor and Nimanburr Aboriginal Corporations on the proposed amendment to the proposal. No concerns were raised about the relocation of the drilling centre.

1.2 PART B – USE OF DUAL PYROTECHNIC SHEAR RAMS FOR DEVELOPMENT OF TOROSA WELLS

No.	Submission and/or issue	Response to comment
5	Submitters consider that any level of oil spill/leakage would be detrimental to the marine environment and impacts could be long-lasting or irreversible. Submitters reference material from the proponent's documentation, including: • impacts to Scott Reef from a major spill at Browse would *'likely be severe and potentially irreversible'* • the proponent's modelling which demonstrates that despite the proposed mitigation measure, a spill would still compromise the environment. Submitters consider that the only acceptable level of risk for an oil spill at Scott Reef is 'no risk'.	The modelling and assessments undertaken as part of the proposal have considered a range of scenarios, including worst-case credible events, and Woodside understands that even low-probability incidents can generate concern. Under Section 4A of the *Environmental Protection Act 1986*, the precautionary principle states that where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used to postpone measures to prevent environmental degradation. In applying this principle, decision-making must be guided by a careful evaluation of the potential for serious harm and a risk-weighted assessment of available options. While the risk of hydrocarbon spills can never be eliminated for offshore petroleum activities, Woodside has proposed appropriate and practicable mitigation measures that will be implemented to reduce the likelihood and consequences of an oil spill. All reasonable and practicable steps have been taken to avoid, manage, and respond to hydrocarbon spill risks.
6	Submitters consider it unlikely that the response time for the containment of a loss of well event could be reduced from 77 days (as previously stated) to 12 hours, and seeks further information on: • the revised modelling results that indicate a worst-case scenario spill would not exceed 12 hours • whether revised modelling accounted for the risk of failure of the technology (given the technology is relatively unproven and novel) • modelling for how the technology would function and the extent to which it would mitigate hydrocarbon spillages that may be expected under a loss of well control scenario • how the proponent could guarantee the identification of a leak and activation of stoppage technology across such a large and remote site, and under adverse weather conditions/scenarios (e.g. if a leak occurs during a storm or cyclone)	The response time for a loss of well containment event with the activation of dual pyrotechnic shear rams is significantly lower than the response times for other techniques. For example, the response technique of drilling a relief well to stop a release is estimated to take around 77 days. Deployment of a capping stack to stop a release is estimated to take around 11-16 days. With implementation of the dual pyrotechnic shear rams, the likelihood that a loss of well containment event of this duration would occur is now lower than a theoretical possibility. *Defining the modelling scenario* The response times are used as an input to hydrocarbon spill modelling to understand the environmental impacts associated with a loss of well containment event. The pyrotechnic shear rams are installed as part of the blowout preventer and/or as a separate device in addition to the blowout preventer and are pre-positioned on the well so the response time is almost immediate once activated by the MODU. Therefore, the spill duration would be dependent on how long the MODU takes to activate the pyrotechnic shear rams (e.g. 10 minutes, 30 minutes, 1 hour etc.). The risk of failure of the technology has been accounted for by committing to the

	• the environmental safeguards and proposed disposal procedures that may be required in the event of a misfire or expiration of pyrotechnic charges.	use of two pyrotechnic shear rams (a second is available in the event one fails), and through presenting the probability of a 77 day loss of well containment event as <1 in 1,000,000 years, rather than 0. Although a range of shorter spill durations (0-12 hours) would be considered representative of a pyrotechnic shear ram response, Woodside has chosen to account for the risk that MODU personnel fail to activate the pyrotechnic shear rams by modelling a conservative scenario with a spill duration greater than 'immediate'. In this scenario, a support vessel would be used to activate the pyrotechnic shear rams by sending an acoustic signal or with ROV intervention. 12 hours was considered a conservative and credible timeframe for a vessel to respond, deploy an ROV (if required) and activate the device, as it is standard practice for a vessel to be nearby during drilling operations. 12 hours has been used as the release duration for hydrocarbon spill modelling, which is provided in Attachment D Woodside Browse Torosa Quantitative Spill Risk Assessment Rev 1. *Identification of a leak* During drilling, continuous monitoring of the well is undertaken to maintain an effective primary barrier, enabling a well control event to be responded to immediately. If activation of the pyrotechnic shear rams were required during drilling, this would be triggered by the MODU during drilling. The pyrotechnic shear rams are not required if the metocean conditions require that a well is suspended and the MODU departs the Torosa field. A suspended well has two barriers installed, which are verified at the time of installation to confirm integrity is established for the duration of well suspension. As such, a leak from a well suspended with verified barriers is not a credible scenario. *Disposal procedures* Waste generated from the adoption or activation of pyrotechnic shear rams will be disposed of in accordance with MARPOL requirements and other relevant regulatory requirements.
7	Submitters note that changes (resulting from the amendment) to the proponent's logistics or capability to respond to an oil spill has not been provided. Submitters seek further information about how the technology would be operated as part of the proponent's blowout risk management processes.	The pyrotechnic shear rams are pre-positioned with the blowout preventer on the well during drilling operations so that they are available to cap the well immediately upon activation. During drilling, continuous monitoring of the well is undertaken to maintain an effective primary barrier, enabling a well control event to be responded to immediately with a blowout preventer.

		In the event the blowout preventer fails to prevent escalation of the loss of well control event or regain control of the well, the MODU would activate the pyrotechnic shear rams to stop the release of hydrocarbons to the environment. If a hydrocarbon release has occurred and the MODU is unable to activate the pyrotechnic shear rams, a support vessel equipped with ROV and/or an acoustic trigger would form the next layer of response, by activating the pyrotechnic shear rams independent of the MODU. The technology is not mobilised as part of emergency response like a capping stack, or a separate MODU to drill a relief well, so specific logistics or mobilisation plans are not required. Woodside's process also involves preparing a Source Control Emergency Response Plan to detail the source control response techniques and the associated project-specific details that will support execution of a response, if required.
8	Submitters consider that recent investigation into a hydrocarbon spill from the proponent's asset off the Ningaloo coast casts doubt over the proponent's ability to prevent an oil spill. Submitters cite examples of oil spills from other offshore projects and noted that as with the current proposal, the spills were considered 'unlikely' up until they occurred.	In May 2025, in preparation for decommissioning a subsea flowline for the Griffin field located off the coast of Northern Western Australia, Woodside experienced a Tier 1 process safety event when unexpected fluids were released during flushing activities. Water quality monitoring identified no impact on the environment and an investigation is underway to determine root causes and identify preventative actions. Any relevant learnings from the investigation will be applied to the Browse to NWS Project. Woodside's incident response teams are trained and prepared to events that have the potential to impact people or the environment. Woodside's processes for spill response planning and preparedness are aligned with industry and international good practice. The arrangements that form part of Woodside's spill response capability are tested routinely through exercises and drills.
Technology is new/unknown		
9	Submitters raise concerns about the newness of the proposed technology, and that it is unproven in the field (except for one technical trial in the Gulf of Mexico). Submitters consider that: • there is an over-reliance on 'emerging technology' that has not been tested in a real-world emergency, and lacks sufficient data to provide confidence that the technology will function as expected	Dual pyrotechnic shear rams are being proposed as a precautionary measure for drilling in proximity to Scott Reef and the types of emergency situations it is designed to respond to are unlikely to occur. The example pyrotechnic shear ram technology, K-BOS, was identified as an 'emerging technology' in earlier revisions of Woodside's Overview of Proposed Browse to NWS Project Hydrocarbon Spill Risk Management Approach. In 2024, Woodside received a copy of a certificate that confirms K-BOS is qualified for its designated use by classification society, DNV (see Attachment E K-BOS DNV

	• there are uncertainties about the integrity and performance of the technology under the unique conditions of the proposal area (e.g. deepwater, high-risk environment, exposed to harsh climatic conditions) • there is a risk that the technology may introduce new risks or exacerbate risks to environmental values, such as additional noise and vibration impacts to marine fauna from activation of pyrotechnic devices Submitters consider that adequate technical information has not been provided to assess the feasibility of the integration of the technology into the infrastructure. Submitters seek further evidence or findings from the proponent's testing of the technology in the Gulf of Mexico, and information about whether that testing could be applied to potential project approval conditions.	Statement of Qualified Technology). As it has been certified as a Qualified Technology, is it no longer considered 'emerging'. K-BOS also has obtained regulatory approvals in a range of countries, as summarised in a conference presentation from Kinetic Pressure Control[1] Woodside has deployed the K-BOS on subsea wells for over 350 days in water depths ranging from 730 m to 1,300 m and has conducted subsea activation tests. During these operations, there were no emergency situations which required it to be activated as the primary and secondary well control measures already in place were sufficient. K-BOS has also been installed by other operators for drilling activities in countries including Canada, Norway and Brazil. As dual pyrotechnic shear rams are being proposed as a precautionary measure, the existing DNV Technical Qualification is considered sufficient at this stage, noting any device procured for the Browse project will undergo its own certification process to demonstrate suitability for the conditions at Torosa. The DNV Statement of Qualified Technology for K-BOS addresses the uncertainties about the performance of the technology in the conditions of the proposal area. Woodside has reviewed the DNV Statement of Qualified Technology and compared with Browse drilling conditions. K-BOS is qualified for more severe environmental conditions than those experienced in the Browse region in terms of pressure, circulating temperature, water depth and fluid composition. Woodside has also evaluated the dynamic loads under the expected metocean conditions and confirmed that they fall within acceptable limits. If pyrotechnic shear ram technology is developed by other organisations, these will be assessed to confirm they are qualified for its designated use. *Environmental impacts or risks associated with the technology* In the context of a well blowout event, the primary objective is to minimise significant impact to the environment. The application of dual pyrotechnic shear rams helps to achieve this objective. Although the pyrotechnics are contained in the body of the device, some noise and vibration may be generated upon activation. However, these effects are considered negligible when compared to the potential environmental impact of not enacting a response measure. The trial in the Gulf of America (formerly Gulf of Mexico) was completed by Transocean's Deepwater Invictus. Summaries of the results of the trial are

[1] Kinetic Pressure Control, AADE New Orleans conference presentation 2022: Microsoft PowerPoint - 220519 - K-BOS Overview for AADE New Orleans

		available on Transocean's and Kinetic Pressure Control's websites[2]. As the tubular ranges proposed to be used for the Browse to NWS Project have already been proven to be shearable by the device, and subsea testing of the K-BOS has been completed at greater water depths, repeating the testing is not considered necessary.

10	Submitters express concern about the introduction of pyrotechnic technology to the proposal, noting:
	• pyrotechnic shear rams are single use - activation of a pyrotechnic shear ram permanently disable the blowout preventer for further uses
	• if the dual rams are reliant on the same actuation system, the perceived redundancy may be ineffective, offering no true backup in the event of system failure
	• pyrotechnic systems cannot be tested in-situ prior to activation, so their reliability must be inferred from modelling rather than real-time diagnostics
	• how the ongoing integrity and functionality of the pyrotechnic charges can be assured over the lifespan of the wells (assuming that there will be limited ability to test and maintain the charges once installed subsea)
	• compared to mechanical or hydraulic alternatives which allow for testing, resetting and maintenance, the single use pyrotechnic shear ram is less flexible, less controllable and irreversible in effect, which:
	  • infers that continued control over the well could be lost
	  • introduces the possibility that a malfunction could result in uncontrolled release of hydrocarbons
	  • increases the risk of environmental harm
		Woodside maintains that the application of pyrotechnic shear ram technology (e.g. K-BOS) is sufficient to further reduce the risk of a loss of well control event:
		• Activation of a pyrotechnic shear ram does not disable the blowout preventer and will not affect the operation or monitoring of the blowout preventer. Although the pyrotechnic shear rams themselves can only be activated once, the example device (K-BOS) itself is not single use. After activation, rams can be re-opened hydraulically, and the device can be recovered to surface, re-fitted and returned to service.
		• Although they have the same actuation system (i.e. pyrotechnic), the dual pyrotechnic shear rams are separate devices that can be activated independently. The dual pyrotechnic shear rams can be configured with multiple redundant modes of activation. For example, the shear rams can be activated directly by the MODU, or via an acoustic signal from a support vessel or manually from an ROV launched from a support vessel. The pyrotechnic shear rams also provide additional redundancy in the event of blowout preventer failure, as the failure modes that may impact the blowout preventer will not impact the pyrotechnic shear rams.
		• Even though the pyrotechnic rams can be tested in-situ prior to activation, the components within the device are consumable so testing of the components themselves would require those components to be replaced. Instead, pressure testing of the bore is conducted periodically during drilling operations, and continuous monitoring is implemented on the K-BOS' electrical firing circuit along with other indicators to continually assess its ability to activate pyrotechnics. Due to the nature of pyrotechnics, this is an appropriate control to confirm availability during operations and provides advantages over periodic function testing.
		• Maintaining the integrity and functionality of the charges over the lifespan of the wells is not required, as the pyrotechnic shear rams are only deployed for

[2] Kinetic Pressure Control: https://shearanything.com, Transocean: K-BOS (https://www.deepwater.com/about/features/k-bos

	in the event of equipment failure. • Submitters consider the use of such a high-risk technology reflects a broader reliance on high-risk extraction methods for an industry prioritising cost and speed (over environmental protection). The submitters query whether a robust secondary or tertiary mechanical shearing mechanism had been considered as an independent and reliable backup in case of pyrotechnic failure.	drilling activities and do not remain with the wells for production, where other well barriers are in place. The example pyrotechnic shear ram technology, K-BOS, has a service life of five years and is maintained accordingly for the duration of drilling activities. • As the pyrotechnic shear rams will be implemented as an additional control to the blowout preventer, comparison to mechanical or hydraulic alternatives is not central to the assessment. Further, there is no loss to hydraulic blowout preventer functionality when the pyrotechnic shear rams are installed with the blowout preventer. • The use of dual pyrotechnic shear rams has been proposed as an additional precautionary measure for drilling in proximity to Scott Reef. The primary method of shearing remains the blowout preventer and dual pyrotechnic shear rams are being included as secondary and tertiary measure to shear the tubulars in the well bore and cap the well.
11	Submitters reference comments from Chevron (2024) regarding the use of a pyrotechnic subsea isolation device for their Dino South-1 project. Chevron provided a number of reasons as to why the technology would not be adopted for its project, including: • the device had never been activated to control a subsea loss of containment • the effectiveness of the device was based on testing, modelling and simulation under controlled conditions • the system could not be function tested (i.e. one-shot activation) which had associated challenges for assessing its readiness or general functionality at any point in time.	Risk reduction measures are evaluated and selected on a case-by-case basis to reduce a risk to as low as reasonably practicable (ALARP). With a review of Chevron's assessment, it appears Chevron determined the risk was already ALARP without adopting a pyrotechnic subsea isolation device as a control. This is likely to be based on circumstances that are specific to its own operations. Woodside has conducted a similar assessment that is specific to Torosa drilling activities and determined that the application of dual pyrotechnic shear rams is an appropriate control to significantly reduce the risk of a loss of well containment event when drilling near Scott Reef. Woodside has considered the following aspects of the technology: • K-BOS has been installed for other drilling operations. During these operations, there were no emergency situations which required it to be activated as the primary and secondary well control measures already in place were sufficient. • Shear and seal testing of the example technology, K-BOS, has been performed per API16A requirements for blind shear rams (where relevant to the pyrotechnic shear rams design) and meets the requirements. Testing, modelling and simulation under controlled conditions are practical limitations accepted for qualification of existing well control equipment including the hydraulic shear rams in blowout preventors. • Continuous monitoring is implemented on the K-BOS' electrical firing circuit

		along with other indicators. Due to the nature of pyrotechnics, this is an appropriate control to confirm availability during operations and provides advantages over periodic function testing.
12	Submitters consider that the proponent's modelling used thresholds that are too high for the sensitive species at Scott Reef. Consistent with NOPSEMA guidance, the proponent should provide scientific evidence to justify the selected thresholds or adopt conservative thresholds in the absence of scientific certainty. In the absence of scientific certainty, submitters recommend that the proponent should adopt NOPSEMA's low threshold value (10 ppb for dissolved oil) for modelling. One submitter considers that based on the proponent's information, the worst-case scenario loss of well control event could lead to hydrocarbons contacting receptors at levels higher than the thresholds. Further consideration should be given to ensuring that in the event of loss of well control, the thresholds set by NOPSEMA (or ideally, lower target levels) are observed.	Attachment D Woodside Browse Torosa Quantitative Spill Risk Assessment Rev 1 presents all thresholds modelled for the scenario and a range of modelling results including maximum concentration (at levels higher than the thresholds) in the worst replicate. The information in the hydrocarbon spill modelling report is reviewed to assist with the impact assessment. Of the results in the hydrocarbon spill modelling report, the 50 ppb dissolved results were extracted for inclusion into the S43A Amendment Cover Letter, as this fate and concentration is currently the most relevant for assessing potential impacts to coral reef communities. Table 6-155 of the EIS/ERD includes justification for the thresholds selected for determining the environment that may be affected by the modelled hydrocarbon spill scenarios. The thresholds selected for impact assessment purposes are: • Surface hydrocarbon: 1 g/m^2 to approximate ranges of socio-economic effects, and 10 g/m^2 for assessing biological impacts. • Entrained hydrocarbons: 100 ppb for informing risk assessments • Dissolved aromatic hydrocarbons: 50 ppb (condensate) for potential toxic effects, particularly sub lethal effects to sensitive species. These thresholds align with the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) Environment Bulletin on Oil Spill Modelling (April 2019). For dissolved aromatic hydrocarbons, Woodside has also undertaken lab-based ecotoxicology testing, where a range of test organisms are exposed to differing concentrations of condensates from the Browse Basin. The range of no observed effect concentrations for the organisms tested ranged from 1,280 ppb to 77,310 ppb (Table 6-155 of the EIS/ERD). Applying a dissolved aromatic hydrocarbon threshold of 50 ppb is considered conservative given the expected ecotoxicity of hydrocarbons from the Browse Basin. Woodside also observes the lower range of thresholds recommended by NOPSEMA. A threshold of 10 ppb (dissolved oil) has also been modelled and is used to establish the area that Woodside plans scientific monitoring to be deployed in the unlikely event of a hydrocarbon spill, rather than for environmental impact assessment. As the modelling report includes all relevant thresholds, information is available to revise the impact assessment if guidance

		from NOPSEMA changes in the future.
13	Submitters consider that the application of the technology is limited in scope; it will not help to arrest hydrocarbon spills from other components of the proposal, such as MODUs, floating production storage areas, or support vessels. Submitters also consider that the proponent's updated modelling for hydrocarbon spill risk did not adequately account for risk of spill from other project infrastructure.	The pyrotechnic shear ram technology has been applied to significantly reduce the likelihood and consequence of a loss of well control event during drilling, which was the highest risk event of the worst-case credible spill scenarios modelled for the Browse to NWS Project. There are other worst-case credible spill scenarios that are identified in Section 6.3.21 of the EIS/ERD. The risks of hydrocarbon spill events from other components of the proposal infrastructure are managed through mitigations and controls that are already in place including but not limited to: • Testing will be undertaken prior to commissioning to confirm integrity of subsea umbilicals, risers, flowlines and the Browse trunkline system prior to commissioning. • The wells, subsea systems and FPSO will use corrosion resistant materials, where applicable and be designed to protect against integrity threats. • Inspection, maintenance and repair activities to manage integrity of integrity of subsea systems will occur throughout operations. • The configuration of reservoir isolation barriers during the operations phase. • FPSO facilities are assessed against one in 10,000-year return period weather conditions to mitigate the risk of extreme weather conditions. • FPSO facilities will include double sided hull design to minimise risk of hydrocarbon release in the event of a collision. The complete list is detailed in Section 6.3.21.7 of the EIS/ERD. The other credible spill scenarios presented in the EIS/ERD remain unchanged, and the existing modelling remains valid to assess the risk of the other worst-case credible hydrocarbon spill scenarios identified.
14	Submitters consider that a third-party review/assessment of the proposed technology should be undertaken, and include: • analysis of the reliability and safety record of the technology • the environmental impact of pyrotechnic vs. mechanical shear rams in similar deepwater applications	Third party reviews and assessment of pyrotechnic shear ram technology (e.g. K-BOS) have been undertaken, including: • Review and Certification from classification society, DNV, which includes completion of a Design Verification Report and a Statement of Qualified Technology (see Attachment E K-BOS DNV Statement of Qualified Technology). • Attachment C Independent Review of Torosa Well Blowout Risk Management Final (included in Woodside's s43a submission).

	• evidence that dual pyrotechnic systems offer at least the equivalent safety and environmental protection as conventional hydraulic systems • testing of the shear rams, emergency drills and contingency plans. Submitters note that there is currently no independent research or modelling available for the proposed technology.	• Kinetic Pressure Control and NASA have completed a probabilistic risk assessment, which is not shared publicly by NASA or Kinetic Pressure Control. • Woodside commissioned a second report from a consultant, Elemental Energies, which concluded that the Pyrotechnic Shear Ram technology provides an additional layer of immediate first response to the existing measures for addressing a loss of well control event. This report includes proprietary and confidential information from Kinetic Pressure Control so cannot be published. • There are also papers authored by other companies who have reviewed the technology which can be accessed online (e.g. https://doi.org/10.2523/IPTC-22152-MS). A demonstration that the pyrotechnic system provides equivalent safety and environmental protection to a blowout preventer is not required, as pyrotechnic shear rams are proposed to be implemented in addition to the blowout preventer's hydraulic blind shear ram, not as a replacement of the blind shear ram. Due to the design of the device, testing procedures are different to hydraulic rams. Continuous monitoring is implemented on the electrical firing circuit along with other indicators. Due to the nature of pyrotechnics, this is an appropriate control to confirm availability during operations and provides some advantages over periodic function testing. Testing of hydraulic shear rams, well control drills and emergency response exercises are conducted per Woodside Management System and in accordance with regulatory requirements. These will be further refined during development and assessment of the Environment Plan(s) for the activity.
Independent Expert Report – s.43A Package, Attachment C		
15	Submitters note that the Stuart & Wright (2024) *Independent Review of Well Blowout Risk Management* commissioned by the proponent (the independent expert report) states that the proponent will *'conduct further research in this area to determine if the K-BOS system should be deployed on the Torosa project with the potential advantage calculated of getting a well under control in 24 hours.'*	The 'further research' is referring to Woodside's hydrocarbon spill modelling. This was conducted to compare the environmental consequence with the use of a pyrotechnic shear ram stopping a blowout, with other techniques (e.g. capping stack). These modelling results were used to support the Woodside decision to adopt K-BOS at Torosa. Modelling outputs were incorporated in the Browse to NWS Project S43A Application Cover Letter. See also Attachment D Woodside Browse Torosa Quantitative Spill Risk Assessment Rev 1. Woodside also reviewed the Statement of Qualified Technology for K-BOS (from

	Submitters consider that this research, if undertaken, should be made publicly available prior to any environmental approvals being granted.	the classification society, DNV) and compared the qualifications with Browse drilling conditions. Woodside confirmed that the example pyrotechnic shear ram technology, K-BOS, is qualified for more severe environmental conditions than those experienced in the Browse region in terms of pressure, circulating temperature, water depth and fluid composition. Woodside has also evaluated the dynamic loads under the expected metocean conditions and confirmed that they fall within acceptable limits. Woodside also reviewed a Failure Modes and Effects Analysis study provided by Kinetic Pressure Control for K-BOS, which concluded that the device has a very low probability of failure. Woodside used this to support an assessment of the risk reduction benefit of application of dual pyrotechnic shear rams. *Additional information on K-BOS performance* Woodside refers to the Statement of Qualified Technology for the 18-15M K-BOS, indicating API 16A Performance Requirement Level and successful shear and seal tests witnessed by classification society, DNV (Attachment E K-BOS DNV Statement of Qualified Technology). A publicly available conference presentation from Kinetic Pressure Control[1] provides an overview of the K-BOS system from Kinetic Pressure Control and includes certifications achieved and results from testing undertaken by Kinetic.
16	Regarding the proponent's worst-case discharge (WCD) scenarios for the drilling phase, submitters note the technical expert's recommendation *'that any shallower hydrocarbon zones (drilled prior to the objective reservoir hole section) be reviewed for WCD. As these shallower zones with larger hole diameters can be more difficult to control than the objective reservoirs.'* Submitters consider that information addressing the recommended review was not provided with the proponent's amendment documentation, and it was unclear if the proponent intends to undertake the additional work.	Discharges from the deeper, target reservoirs are regarded as the worst-case discharge scenario. Shallower hydrocarbon zones do not possess the same potential to impact the environment given the lower reservoir quality when compared to the target reservoir. The statement made by the expert that *'shallower zones… can be more difficult to control than the objective reservoirs'* is also relevant for highlighting potential challenges of relief well drilling and dynamic kill operations for shallow zones. It is normal practice to assess all hydrocarbon zones (including shallower hydrocarbon zones) prior to drilling. This process is used to understand if there are any shallow subsurface hazards that may be intersected during drilling, and the outputs are also used in Source Control and Emergency Response Plans suitable for site specific conditions. Woodside is committed to undertaking this work in subsequent phases in accordance with regulatory requirements.
17	Submitters express concern about the statement in the independent expert report that *'residual risk remains, albeit smaller, that the K-BOS when activated does not*	The EIS/ERD states loss of well control event frequency for the Browse project of less than 1 in 10,000 years. As described in the EIS/ERD this assessment is based on SINTEF offshore blowout database and significant strengthening of well

	function as intended and that this residual risk needs to be accurately quantified in any probabilistic analysis.' Submitters consider that the proponent's revised spill risk estimates and timeframes did not include the required residual risk quantification, and that a revised probabilistic analysis has not been provided.	barriers since 2010, including more stringent API Standard 53 requirements for subsea blowout preventers. Woodside has assessed two studies to quantify the likelihood of failure of the example pyrotechnic shear ram technology, K-BOS: • NASA Probabilistic Risk Assessment (PRA) of Kinetic Blowout Stopper System (K-BOS). The full study has not been shared publicly by Kinetic Pressure Control; however, some findings are summarized in a conference presentation from Kinetic Pressure Control[1] • A Failure Modes and Effects Analysis study conducted by Kinetic Pressure Control for the 18-15M K-BOS which conclude the device has a very low probability of failure. Although this study has not been shared publicly by Kinetic Pressure Control, publicly available information can be found from industry papers such as https://doi.org/10.2523/IPTC-22152-MS which assess a similar device. The residual likelihood after incorporating pyrotechnic shear rams (e.g. K-BOS) as a control has been determined as the product of: (1) blowout frequency in the EIS/ERD (<1 in 10,000 years), and (2) the probability of failure on demand of the pyrotechnic shear rams. The probability of failure on demand assumed in the NASA report is 0.003, which resulted in a conclusion that there is a ~300x reduction in probability of failure when using a K-BOS to replace a casing shear ram when compared to the conventional hydraulic blowout preventer. Other cases assessed included use of two K-BOS devices as well an arbitrary 10% failure rate for K-BOS not sealing after shearing. In contrast, the Failure Modes and Effects Analysis study conducted by Kinetic Pressure Control, which uses an alternative method, determined a probability of failure which is two orders of magnitude lower at ~0.00002 (for a single device). Woodside has considered the range of these results. The resultant frequency of a 77 day loss of well containment scenario is estimated to be less than 1 in 1,000,000 years when using two pyrotechnic shear rams (as proposed). This conclusion is considered an upper bound conservative estimate of the likelihood of this scenario. The device is pre-positioned on the well, with a 'virtually immediate' response time when activated. A spill duration would be negligible if the pyrotechnic shear rams are activated immediately by the MODU. However, Woodside recognised

		that the K-BOS studies reviewed determined the probability of failure on demand, but did not account for human factors. Therefore, Woodside has chosen to model a conservative scenario where a hydrocarbon release has occurred and MODU personnel are unable to activate the pyrotechnic shear rams immediately. In this case, a support vessel would be used to activate the pyrotechnic shear rams (either through sending an acoustic signal or with ROV intervention). It is considered that 12 hours is credible to allow time for a vessel to respond and activate the device, as it is standard practice for a vessel to be nearby during drilling operations. As such, this was the release duration used for modelling the potential environmental impact of a loss of well control with the use of dual pyrotechnic shear rams.
18	Submitters consider that the independent expert report highlighted uncertainties about the realistic time requirement associated with deploying a capping stack, including whether the proponent's proposed timeframe is likely to be achievable.	Woodside acknowledges the concerns raised regarding the timeframe for deploying a capping stack. To address the challenges associated with capping stack mobilisation and deployment, Woodside has incorporated two pyrotechnic shear ram devices which are pre-positioned on the well, with a 'virtually immediate' response time in the event of a loss of well control. Use of this technology makes it far less likely a capping stack is ever required.
19	Submitters consider that the following statement in the independent expert report is unsubstantiated: *'WEL's* [Woodside Energy Ltd] *record shows they have not experienced a blowout in their entire history and have been excellent stewards of responsible environmental care particularly in their well activities.'*	These statements reflect the expert's professional opinion based on the information they had available. The scope of the report was to review the proposed Browse approach against global contemporary industry 'best practice' for preventing and mitigating the risk of subsea well blowouts. The key conclusions regarding the scope have been substantiated.
20	Submitters raise concerns about the independence of the technical experts commissioned by the proponent to review the well blowout risk management approach. Submitters consider that a truly independent assessment would be one undertaken by an expert that has not been commissioned by the proponent.	Independent experts were engaged in accordance with standard practice, and their assessments were conducted under recognised professional guidelines. For example, Woodside's S43A Application Attachment C Independent Review of Torosa Well Blowout Risk Management Final includes an expert witness statement that references the Federal Court of Australia "Expert Evidence Practice Note (Gpn-Expt) General Practice" note.

1.3 PART C – CHANGE TO THE MODU

No.	Submission and/or issue	Response to comment
21	Submitters consider that the changes to the operational conditions of the MODU do not mitigate against all the residual environmental risks from the MODU proposal element, which include: • noise emissions during transit and operation of the MODU • light emissions during operation of the MODU • storage of large volumes of fuel/hazardous materials on the MODU (inferring potential spill risk).	*Noise emissions* The use of dynamic positioning during drilling is the most significant source of noise associated with MODU operations. Other noise sources during drilling operations include drilling noise, supply vessel operations during resupply, the MODU transiting to site, dynamic positioning use while connecting/disconnecting to mooring lines, or if dynamic positioning is required for safety. Impacts of these noise sources will be further reduced through the following measures: • Operation of a MODU will not occur at times and locations where foraging by pygmy blue whales is likely to occur within the behavioural disturbance footprint, with these areas and periods defined based on scientific monitoring. • Detection and Mitigation: The MODU must implement a vessel specific Noise Mitigation Plan, including: o Measures to detect whales within a defined observation zone; and o Measures to cease underwater noise sources (use of dynamic positioning for transit and mooring connection/disconnection, drilling) if a whale is detected within the relevant shut-down zone. • Vessels will travel at speeds less than 6 knots in WA State waters around Scott Reef. *Light emissions* Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5 includes a comprehensive assessment of light emissions, including modelling of light generated from MODU and FPSO operations under a range of flaring and weather scenarios. Light modelling indicated that flaring at a drill centre is unlikely to result in behavioural impact to hatchling turtles and is not predicted to impact adult turtles. To further reduce the likelihood of light resulting in a behavioural impact to hatchling turtles, Woodside proposed to modify the temporal extent of planned flaring from a MODU such that it cannot occur outside daylight hours. This removes the impact pathway of light from flaring impacting turtles at Sandy Islet. Modelling from the closest drill centre to Sandy Islet (TRD) indicated that the MODU operational lighting, the only remaining planned MODU light source, is not expected to impact hatchling or adult turtles. As a result, no impacts to turtles

		from any MODU light sources are expected. *Storage of fuel/hazardous materials* The storage of fuel and/or hazardous materials on the MODU is managed to prevent loss of fluid to the marine environment, including: • Segregation and appropriate containment of waste streams. • Drilling fluids will be selected in accordance with Woodside's chemical selection and assessment process, which considers the ecotoxicity, bioavailability and bioaccumulation potential of components of drilling fluids. • In the event that hazardous or non-hazardous waste is accidentally released to the environment, any surface residue will be recovered where safe to do so.
22	Submitters consider that the proposed day-time restriction on flaring of hydrocarbons from the MODU does not adequately address the impacts of light pollution from the proposal on the behaviour or breeding of green turtles. Submitters also note that the proposed mitigation measure is limited to the relatively short construction phase of the proposal.	The day-time restriction on MODU flaring is one of several controls proposed so that light emissions during the construction phase remain below levels likely to cause biologically relevant impacts to green turtles. Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5 includes a comprehensive assessment of light emissions, with specific modelling of MODU and FPSO operations under a range of flaring and weather scenarios. Light modelling indicated that well clean-up flaring at a drill centre is unlikely to result in behavioural impact to hatchling turtles, and is not predicted to impact adult turtles. Modelling indicated that operational lighting at TRD (closest drill centre to Sandy Islet) is not expected to impact hatchling or adult turtles. As the pathway of MODU flaring impacting turtles has been removed, no impacts to turtles from MODU lighting are expected. The proposed mitigation measures are appropriately limited to during well construction phases, because MODUs will depart the field when well construction activities are complete. Should future construction activities be required within State waters (i.e. well workovers), adaptive management would be used to implement the same day-time restrictions on flaring. Mitigations relevant to FPSO flaring are included in Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5.
23	Submitters consider that the amendment information does not clarify whether the proposed change to the MODU would: • impact response time and/or response effectiveness	The EIS/ERD included the option for the MODU to be moored or on dynamic positioning for station keeping while drilling. The amendment was proposed to provide more certainty on the planned activities by confirming that the MODU will be moored while drilling at Torosa locations. As the EIS/ERD included both

	during a loss of well containment event • cause an increase in greenhouse gas emissions or impacts to air quality • result in increased disturbance to marine fauna • result in increased impacts to the seafloor (from mooring during drilling) • ensure the MODU can safely and effectively operate in the specific metocean conditions of the proposal site, and with other planned or existing infrastructure in the area • warrant revised stability analyses, updated inspection and maintenance regimes, and updated operating procedures • require additional actions/commitments at decommissioning stage (to remove moorings).	station keeping options, the description in the amendment application predominantly focused on the noise reduction benefit of the commitment. *Emergency response capability* The proposed change to confirm the MODU will be moored while drilling does not alter the emergency response framework or capabilities. Emergency response plans will be refined further prior to execution in field. *Greenhouse gas emissions and air quality* The proposed change to confirm the MODU will be moored while drilling would likely generate less emissions from fuel consumption when compared to dynamic positioning. This slight reduction is not expected to reduce the overall estimate of emissions included in the Browse to NWS Project Proposal Content Document. *Marine fauna disturbance* The proposed change to confirm the MODU will be moored while drilling will reduce the duration that marine fauna could be exposed to underwater noise from MODU dynamic positioning operations, as dynamic positioning is only intended to be used when arriving at and connecting moorings, or departing from the drilling location and disconnecting. *Seabed impacts from mooring* The proposed change to confirm the MODU will be moored while drilling does not result in an increased extent of seabed disturbance. The proposal allows for up to 0.24 km² of direct seabed disturbance, including a 25% contingency (Attachment B Proposal Content Document – Proposed Browse to NWS Development Jul 2025). This area was based on indicative locations of physical infrastructure and inclusion of relevant buffer zones for temporary construction activities such as MODU anchor deployment if required (Section 6.3.1.2 of the EIS/ERD). The exact estimate of planned seabed disturbance, within 0.24 km^2, will be refined during detailed design when the field layout is confirmed. *Safe Operations, stability analyses, inspection and maintenance regimes and operating procedures* The EIS/ERD considered both dynamic positioning and a mooring system for MODU station keeping. Details on safe operations, stability, inspection and maintenance, operating procedures are further refined during design of the MODU mooring system, and risk assessments that will be undertaken before MODU and mooring operations. *Decommissioning*

		At the end of the project life, the subsea infrastructure will be decommissioned in accordance with good oilfield practice and relevant legislation and practice at the time. All infrastructure installed above the seabed will be designed to allow removal. This also applies to the MODU mooring system.
24	Submitters note that additional impacts may be introduced as a result of the amendment, from: • support vessels deploying, managing, moving and servicing the moored MODU • deployment of mooring devices and equipment for each drill site, which risks benthic habitat damage and turbidity • possible damage to seabed infrastructure (during inclement weather conditions) which may increase the risk of oil spills.	The EIS/ERD included the option for the MODU to be moored or on dynamic positioning to hold position while drilling. The amendment was proposed to provide more certainty on the environmental impact assessment by removing the provision for the MODU to use dynamic positioning while drilling. As such, there are no additional impacts that would be introduced as a result of the amendment. Impacts that have been described and assessed in the EIS/ERD include: • Impacts from vessel operations (including physical presence, routine discharges, light, noise, emissions, waste etc.) are assessed throughout Section 6.3 of the EIS/ERD. • Impacts to benthic habitat, seabed quality and water quality associated with the installation and removal of infrastructure and equipment (including anchors/moorings) are assessed in Section 6.3.1 of the EIS/ERD. This section also includes relevant commitments, including that no moorings for the MODUs will be installed in the Scott Reef shallow water benthic habitats (<75 m water depth) and communities, and that vessels will be required to comply with an anchoring management plan which will including mooring analysis, with the requirement to avoid placing anchors on sensitive receptors. • The risk of a hydrocarbon spill from damage to seabed infrastructure and subsequent loss of containment is identified and assessed in Section 6.3.21 of the EIS/ERD. Commitments are also outlined, for example that drilling and completion activities will only be undertaken when metocean conditions are deemed suitable for safe operations.
25	Submitters consider that in the context of other activities contributing to the noise emissions of the proposal, the use of a moored MODU during drilling does not represent a material decrease in noise impacts to the marine environment. Submitters consider that the change is specific to one small component of the proposal, and that underwater noise impacts will still	Within the Development Envelope, drilling and completions from the MODU represents the longest-term construction activity in one area, estimated at around 2-3 months per well. Other construction activities, such as flowline installation, Vertical seismic profiling and subsea construction are short term and intermittent activities. The commitment to not use a dynamic positioning system other than when transiting to/from the drilling location (unless for safety or emergency purposes), reduces the estimated distance that underwater noise will exceed the

	occur extensively and persistently from: • the use of dynamic positioning systems during construction, and to transit and position MODUs to/from the drilling location • general drilling operations (which produce much greater total noise emissions than the dynamic positioning of a MODU) • seismic surveys, vessel traffic and operation of subsea infrastructure. Submitters consider that the significance of the change to the MODU in reducing noise impacts has been overstated by the proponent and must be independently verified. The proponent should demonstrate with clear evidence that the change to the operation of the MODU will not increase risk of environmental harm.	cetacean behavioural response threshold from ~4.5 km to ~0.5 km from the sound source. This is a material decrease to the underwater noise footprint, both from drilling activities and the broader Proposal. Noise impacts from the MODUs use of dynamic positioning systems to transit and position the MODU will be limited, as: • These operations are transient in nature, as the MODU is on station performing drilling and completions activities most of the time. • Operation of a MODU will not occur at times and locations where foraging by pygmy blue whales is likely to occur. • The MODU must implement a Noise Mitigation Plan including measures to detect whales and cease underwater noise sources (including the use of dynamic positioning for transit and positioning the MODU). To provide additional clarity to the response, when arriving at the drill centre location, the MODU may continue to use dynamic positioning while it is being connected to the mooring system. Similarly, prior to departing the MODU may use dynamic positioning while it is being disconnected from the moorings. This use of dynamic positioning will be managed under the Noise Mitigation Plan described above. Wording has been revised in Attachment G Browse to NWS Proposal Pygmy Blue Whale Management Plan Rev 5 to provide this clarification. It should also be noted that: • General drilling operations produce materially less noise than dynamic positioning. Underwater noise levels from general drilling operations were established in Austin *et al.* 2018[3]. • Vertical seismic profiling and vessel operations in the State Proposal Area will not occur at times and locations where foraging by pygmy blue whales is likely to occur and will require Noise Mitigation Plans which will include measures to detect whales and cease underwater noise sources. Vertical seismic profiling is the seismic monitoring activity included in the Proposed Browse to NWS Development EP Act Referral. Unlike other seismic monitoring activities (e.g. 3D or 4D seismic surveys), vertical seismic profiling uses a much smaller energy source and for a shorter duration on a localised well bore area. • Noise from well heads will be minimised such that noise above 120 dB does

[3] Austin, M.E., D.E. Hannay, and K.C. Bröker. 2018. Acoustic characterization of exploration drilling in the Chukchi and Beaufort seas. Journal of the Acoustical Society of America 144: 115-123. https://doi.org/10.1121/1.5044417

		not propagate at distances greater than 150 m from the well head. *Independent Verification* The impact reduction benefit of the commitment in reducing noise impacts has been estimated through conservative underwater noise modelling. Woodside has also committed to conducting in-field verification of key underwater noise sources (MODU, FPSO). If in-field verification demonstrates that the underwater noise source is substantially different than expected, then the shut-down zones in the relevant noise mitigation plan will be revised. *Environmental impacts and risks* The EIS/ERD included the option for the MODU to be moored or on dynamic positioning to hold position while drilling. The amendment was proposed to provide more certainty on the environmental impact assessment by removing the provision for the MODU to use dynamic positioning while drilling. As such, there are no additional impacts that would be introduced as a result of the amendment.
26	Submitters consider that the amended noise impact from the MODU (reduced from 182 decibels (dB) to 170 dB) is still too great, given that based on the proponent's modelling, the threshold for a marine mammal behavioural response to continuous noise is 120 dB. Submitters consider that any level of noise impact to pygmy blue whales is unacceptable, and the proposal should ensure no noise impact on whale behaviour.	*Approach to underwater noise management (applied to MODUs)* The commitment to not use a dynamic positioning system at Torosa other than when transiting to/from the drilling location including mooring connection and disconnection (unless for safety or emergency purposes), is one commitment which should be considered within a broader management approach for underwater noise. Woodside is proposing to manage the impacts of underwater noise on pygmy blue whales through a hierarchy of controls across all project phases and activities based on the Australian Government guidance on Blue Whale Conservation Management Plan – Frequently Asked Questions document. This hierarchy of controls involves (as specifically applied to the MODU): • Avoidance: Operation of a MODU will not occur at times and locations where foraging by pygmy blue whales is likely to occur within the behavioural disturbance footprint, with these areas and periods defined based on scientific monitoring. • Minimisation: Any MODU drilling at Torosa or Brecknock must not use a dynamic positioning system other than when transiting to/from the drilling location and connecting/disconnecting from moorings, unless for safety or emergency purposes. Drilling is not to occur while dynamic positioning

		systems are active. o Detection and Mitigation: The MODU must implement a vessel specific Noise Mitigation Plan which includes measures to detect whales and cease underwater noise sources upon detection of a whale. The detection and mitigation component which includes ceasing drilling as a result of whale detection, is expected to have the effect of further reducing the distance to the behavioural disturbance threshold of 120 dB from ~0.5 km to ~0.2 km. *Acceptable underwater noise impacts to pygmy blue whales* Woodside acknowledges the importance of minimising disturbance to pygmy blue whales and has designed the management approach to avoid biologically significant impacts. However, setting the acceptable level of impact so that there is zero disturbance to any individual whale, is not consistent with how the Blue Whale Conservation Management Plan has been applied to other marine activities in known foraging areas, such as the Bonney upwelling or the region between the Rottnest channel and Geographe Bay. A zero-impact interpretation would imply that essential marine activities, including regulated shipping and fishing, could not occur during migratory periods. Instead, Woodside's approach aligns with accepted practice by focusing on avoiding injury and biologically significant behavioural disturbance, supported by monitoring and adaptive management. Woodside considers that it is possible to demonstrate a proposal is not inconsistent with the Blue Whale Conservation Management Plan through adherence to the following principles: • Effective mitigation measures for underwater noise shall be implemented such that no threat of unacceptable impacts (injury or biologically significant behavioural disturbance) to blue whales exist, where: o Injury is both permanent and temporary hearing impairment (Permanent Threshold Shift and Temporary Threshold Shift) and any other form of physical harm arising from anthropogenic sources of underwater noise. o Biologically significant behavioural disturbance can occur where a blue whale is stopped/prevented from foraging or moved on from a foraging area over a sufficient temporal/spatial magnitude to pose a threat to the fitness of the blue whale. Woodside considers that the Proposal is consistent with the Blue Whale Conservation Management Plan as all underwater noise sources will be managed

		such that no threat of unacceptable impacts to blue whales exist.
27	Submitters raise concerns about the reliability of the proponent's predictions that pygmy blue whales would be exposed to proposal-associated noise capable of eliciting a behavioural response for only one hour, with the proposed change to the operational condition of the MODU. Submitters consider that this assumption relies on vague and speculative modelling.	One objective of the modelling study was to understand the expected reduction in underwater noise if the MODU is moored while drilling, instead of continuing to use dynamic positioning during drilling. The modelling report achieved this, so the outcomes were presented in the Browse to NWS – S43a Application Cover Letter. The intent of including the statement that 'any pygmy blue whale would only be exposed to noise capable of eliciting a behavioural response for less than one hour while passing this region', was to describe the scale of the reduced underwater noise footprint from the MODU in a simplified context (i.e. an individual pygmy blue whale migrating through the region), rather than to provide a detailed impact assessment. This statement is based on underwater noise footprint estimates developed from industry standard and independent acoustic modelling performed by JASCO. It is recognised that assuming a whale moving linearly at constant speed through any given area is a simplification. Non-migratory behaviours may result in increased residency time and probability of exposure, however these are further managed through controls adopted to prevent disturbance to foraging whales. These are detailed in Attachment G Browse to NWS Proposal Pygmy Blue Whale Management Plan Rev 5, which includes commitments to reduce the impacts of project noise on pygmy blue whales including avoiding conducting certain activities during times and locations where pygmy blue whale foraging is likely to occur, and designing equipment and activities to further minimise underwater noise generated. *Noise modelling uncertainty* All modelling and thresholds applied inherently involve a degree of uncertainty. However, the modelling conducted to assess the impacts of different sources of underwater noise is not considered vague or speculative. The inherent uncertainties in modelling have also been accounted for by using conservative estimates and results for impact assessment purposes.
28	Submitters note that dynamic positioning was developed by the oil and gas industry to overcome the impracticalities, physical limitations, and safety of using complex, heavy fixed mooring lines while drilling in depths greater than a few hundred metres. It is uncertain as to whether there may be additional risks to the benthic environment (and to human safety) from the proposed	The EIS/ERD described the option to use moorings or dynamic positioning for MODU station keeping operations. Woodside has experience using dynamic positioning and mooring systems to hold position during drilling and there are costs and benefits associated with each option. *Rationale for mooring* The commitment to moor the MODU was made to further minimise underwater

	change to moor the MODU during drilling.	noise emissions and reduce potential behavioural disturbance to marine fauna, particularly whales. Woodside has successfully conducted drilling operations using a moored system at depths exceeding those outlined in the proposed amendment. Drilling at the Torosa drill centres will commence with the MODU held in place by a mooring system, with dynamic positioning used only during arrival and departure at the drilling location, and while connecting and disconnecting from the mooring lines. *Impacts to the benthic environment* The Proposal includes up to 0.24 km² of direct seabed disturbance (which includes a 25% contingency), and all physical elements are confined within a defined Development Envelope of 78.3 km². This extent remains unchanged with the proposed amendment. This envelope has been selected to minimise interaction with sensitive benthic habitats and to ensure that mooring activities are conducted in areas with suitable seabed conditions. *Consideration of safety risks* This amendment does not result in additional safety risks as the EIS/ERD included the option for a moored and a dynamically positioned MODU. Safety risks relevant to mooring operations will be risk assessed and managed during planning for MODU activities.
29	Submitters consider that the proponent should disclose the type of MODU to be used for the proposal, noting that different types of MODU (size, discharge profile, noise output) will have different impacts on the environment.	MODUs can be hull-based vessels equipped with drilling derrick or platforms, or self-propelled drill ships. Woodside described the aspects of both MODU types in the EIS/ERD and used the more conservative value to inform impact assessments, where available. Woodside has since identified that a semi-submersible is the likely MODU type to be used for the Browse to NWS Project, with mooring to be used for station keeping during drilling at Torosa and Brecknock. This activity detail has been used to further refine assumptions and inputs for modelling of noise impacts from the MODU, as presented in Attachment G Browse to NWS Proposal Pygmy Blue Whale Management Plan Rev 5. When the MODU is contracted, environmental aspects and modelling assumptions are usually reviewed and assessed during Environment Plan development to understand whether there are changes to the predicted environmental impacts associated with MODU operations.

1.4 PART D – OTHER MATTERS RELATING TO THE AMENDMENT

No.	Submission and/or issue	Response to comment
30	A high number of submitters express concern that the proposed amendment does not prevent or meaningfully mitigate the significant impacts of the proposal to environmental values. Submitters consider that despite the amendment, the risks of the proposal to the environment remain high.	The amendment is part of a broader environmental management framework which includes a suite of avoidance, minimisation, and mitigation measures designed to ensure that the project is undertaken in a manner that meets specific environmental objectives, such as: • Preventing direct disturbance to Scott Reef shallow water benthic communities and habitats (<75 m bathymetry). • Implementation of the Proposed Browse to NWS Project State Waters Environmental Quality Management Plan which sets out the environmental management framework to maintain the environmental values of the State Proposal Area in accordance with the EPA's Technical Guidance Protecting the Quality of Western Australia's Marine Environment (EPA, 2016). • Preventing physical injury to marine fauna, including cetaceans, marine turtles, whale sharks, dugongs, seabirds, and migratory shorebirds. • Avoiding activities during sensitive periods for key species, such as green turtles and pygmy blue whales. The amendment is not presented as a standalone solution, but as a meaningful contribution to the overall reduction of impacts when considered alongside existing design features and management measures. Where uncertainty exists, Woodside has adopted a precautionary approach, including conservative modelling, ongoing monitoring, and adaptive management strategies. This includes baseline and periodic water and sediment quality monitoring, as well as monitoring of key species and habitats, including green turtles and pygmy blue whales.
31	Some submitters consider that while the EPA could accept the amendment on the basis that it does not make the project environmentally worse, the amendment cannot be used to argue that the overall proposal is acceptable.	The purpose of the amendment application is to reflect refinements made to the Proposal since the publication of the Response to Submissions on the Environmental Review Document. These refinements include reductions in the spatial extent of the development envelope and relocation of infrastructure to avoid sensitive marine habitats, such as the exclusion of drill centres within 20 km of Sandy Islet. Importantly, the amendment aims to reduce potential environmental impacts and improve clarity around the location and extent of physical elements. As outlined in the Proposal Content Document, all physical elements remain confined within

		a defined development envelope and are subject to the same environmental management framework as previously assessed. The acceptability of the overall Proposal remains subject to the full environmental impact assessment process. This amendment is a step that was taken to provide greater certainty around key activities as part of the Proposal.
32	Submitters consider that the spatial reductions to the proposal development envelope are administrative. The revised development envelope spatially reduces the risk of environmental impact, but in practice, does not ameliorate the significance of environmental impact to Scott Reef and surrounds from the proposal.	Woodside considers this to be a procedural amendment that provides greater certainty on the maximum authorised extent of activities associated with the Proposal. As outlined in the Browse to NWS Project – S43a Application Cover Letter, this change is proposed to better reflect the design considerations and modifications made to date that are relevant to spatial restrictions. This amendment also has practical applications as it seeks to provide improved transparency and certainty as to the maximum authorised extent of the location of activities of the Proposal. This is an improvement on the development envelope presented in the EIS/ERD, which included areas where the placement of infrastructure on the seabed or permanent seabed disturbance was not being proposed. The development envelope is defined in EPA guidance[4] as the maximum area within which the proposal footprint, including all physical elements, will be located. Although a development envelope provides flexibility for the location of the physical elements of a proposal within the development envelope, the proposed amendment ensures that activities are confined to a clearly delineated area for the life of approval.
33	Regarding the proponent's comments in the s.43A package that there will be no planned activities or infrastructure at any location shallower than 75 m, and that this change will ensure that no direct impacts to coral habitat are planned to occur as a result of the proposal, submitters consider that: • the proposal may still result in impacts to marine life within deepwater areas (below 75 m) • there is insufficient scientific information about	As documented in the EIS/ERD, the benthic communities at Scott Reef and surrounding areas have been studied over the last 30 years. These studies have shown that scleractinian corals (light dependent) are found to a maximum depth of 75 m, while the narrow, deepwater, outer reef slopes deeper than 75 m, are characterised by filter-feeding, light independent octocorals (sea fans and whips) and sponges with little presence of hard corals. The deep seabed habitats off the reef slopes are largely characterised by sandy, soft sediments with sparse benthic biota (invertebrate fauna). The Browse to NWS Project Environment Quality Management Plan (EQMP)[5]

[4] Government of Western Australia, Instructions and template: how to identify the content of a proposal, Environmental Protection Authority, March 2024; EPA Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual.
[5] Woodside Browse to NWS Project State Waters Environment Quality Management Plan, provided in Appendix B.1 of the Proponent response to submissions, 4 December, 2023.

	species within deeper water areas for the proponent to make the claim that the proposal will have no effect on the ecosystem around Scott Reef above the 75 m mark • the proposed depth restriction does not negate the requirement for the proponent to consider impacts to ecological processes like upwelling and vertical mixing within and proximal to the envelope.	sets Zones of Ecological Protection that will be achieved during the Project. The EQMP requires that there is no change from natural condition to the water column or benthic environment at Scott Reef above the 75 m depth contour. Further, the majority of the Development Envelope, including areas deeper than and adjacent to the 75 m contour will be maintained at a High Level of Ecological Protection (LEP) which "Allows for small measurable changes in the quality of water, sediment, and biota, but not to a level that changes ecosystem processes, biodiversity, or abundance and biomass of marine life beyond the limits of natural variation". Areas of low or moderate LEP are restricted to the area within 200 m of the wells, which are located in deep water (>300 m). The relocation of the TRD well centre moves these areas further away from the Scott Reef 75 m contour. The impact assessment undertaken for the ERD and development of the EQMP has been based on various modelling exercises including hydrodynamic model validation. This modelling has considered processes such as upwelling and vertical mixing as detailed in the EQMP.
34	Some submitters express general support for the amendment and consider that: • the proponent plays an important role in Australia's economy • the proponent has utilised technological advancements to achieve a responsible outcome for the proposal • the proposed technology (K-BOS) appears to represent industry best practice.	Woodside appreciates the supportive comments from submitters. Woodside acknowledges the significance of operating in a sensitive environment and remains committed to implementing measures to manage the impacts and risks associated with the proposed activities. Woodside also recognises the broader role the energy sector plays in Australia's economy and is focused on delivering responsible outcomes that meet both regulatory expectations and community standards.

Attached:

1. Attachment B Proposal Content Document – Proposed Browse to NWS Development Jul 2025
2. Attachment C Blue Whale Acoustic Monitoring Report 03879
3. Attachment D Woodside Browse Torosa Quantitative Spill Risk Assessment Rev 1
4. Attachment E K-BOS DNV Statement of Qualified Technology
5. Attachment F Browse to NWS Proposal Turtle Management Plan Rev 5
6. Attachment G Browse to NWS Proposal Pygmy Blue Whale Management Plan Rev 5