Submission on the referral

Imperial Oil & Gas Pty Ltd – Carpentaria Pilot Project

This submission is made under regulation 53 of the Environment Protection Regulations 2020

Government authority: Australian Government Department of Climate Change, Energy, the Environment and Water

Summary: DCCEEW has not received a referral for the proposed action. The referral provided to the NT EPA concluded that the project will not have a significant impact on matters of national environmental significance (MNES), however, this referral did not consider the expanded scope of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) Act water trigger provision (as of December 2023) to all unconventional gas activities. The department contacted Empire Energy Group (of which Imperial Oil and Gas Pty Ltd is a subsidiary) to advise them on their obligations with the water trigger amendments. If the proposed action is referred and a determined to be a controlled action under the EPBC Act, then the expanded water trigger may have implications for how the bilateral agreement applies; DCCEEW is investigating this. Any concerns the NT government have about water resource impacts from the project would ostensibly apply under the expanded EPBC water trigger.

Section of Referral	Theme or issue	Comment
Appendix 1 Section 3.2.1	Impacts on Matters of National Environmental Significance	<u>Gouldian Finch</u> DCCEEW recognises that the proposed action may intersect with the known occurrence of the endangered Gouldian Finch (*Erythrura gouldiae*), which is sited in the middle of this species' range. The *National Recovery Plan for the Gouldian Finch (2006)* states that it is not possible to map habitat critical for the species' survival. Known breeding habitat is characterised by rocky hills with hollow-bearing smooth-barked gums, *Eucalyptus brevifolia* or *E. tintinnans*, which were not identified in field survey outcomes. Field surveys provided by the proponent found that no Gouldian Finches were observed within the study area during field surveys undertaken over a 2-year period between 2021-2023. Potential impacts on the Gouldian Finch as a result of the proposed action would be the reduced availability of critical wet season grass seed resources.
Appendix 1 Section 3.2.1	Protection of water resources from unconventional gas development and large coal mining development	On 15 December 2023, the EPBC Act water trigger was amended to include consideration of likely significant impacts on water resources in relation to all types of unconventional gas, for example, shale and tight gas related developments. An action is likely to have a significant impact on a water resource if there is a real or not remote chance or possibility that it will directly or indirectly result in a change to the hydrology of a water resource and the water quality of a water resource. The consideration of this MNES, in reference to the EPBC Act specifically, was not included in the proponent's referral to the NT EPA. The proposed action includes building four new well pads, and potential expansion of existing well pads, that will facilitate underground gas extraction via hydraulic fracturing, which meets the definition of "unconventional gas development" per section 24D of the EPBC Act. These activities include up to 12 total gas wells comprising up to 10 new and 2 existing wells. Fluids from these wells have the potential to intersect or interact with existing subsurface hydrological systems that may be connected to other regional surface water resources such

		as the Roper River, potentially via Cambrian Limestone Aquifers. Approximate mapping of the project area identifies the project area overlies/intersects the Carpentaria and McArthur basins. Potential impacts on water resources include: • Contaminant fluid migration into water resources, where fugitive chemicals could migrate from the subsurface to shallow aquifers, potentially via compromised well casings or barriers, but also via surface spills that may infiltrate the ground surface; and • Ground water extraction of 950 ML over a 5-year period may result in water drawdown impacts and a reduction in environmental flows.
Referral main report - Part 1, Key Conclusions, p. 39	GHG emissions	The fourth bullet point on p. 39 of the Referral main report – part 1 notes that "With no flaring of gas, total GHG emissions from the Activity appraisal stage are reduced by more than 90%." However, this claim does not appear to be supported by the information in Table ii of this document (p. 27), which shows that the majority of the gas composition at the Carpentaria-2H and -3H sites is methane (>80%). The combustion of methane during flaring reacts it with oxygen to form CO_2 and H_2O, which reduce the CO_2-equivalent footprint because CH_4 is a more potent GHG than CO_2. Therefore, the information from the testing campaign (Table ii) supports the opposite conclusion, that not flaring of gas would <u>increase</u> the total GHG emissions in CO_2-equivalent terms. It appears therefore that the "no flaring" means that extracted gas will be recovered and stored in a production sense, as indicated on p. 6 of the Methane Emissions Management Plan (Appendix 13). This distinction could be made clearer in future documentation of the proposal than is currently expressed in the Referral main report.
Various sections (citations in comment)	Water resources	DCCEEW notes that the proponent's evidentiary basis for concluding that there will not be impacts to water resources and receptors that depend on them (humans and avifauna) could be stronger. At present, the information presented has some gaps that may need addressing to provide confidence that the project design and its avoidance and mitigation measure are strong enough to prevent impacts to water resources. <u>Issue 1 – potentially unrepresentative waste-water spill modelling inputs</u> Modelling in Appendix B (Potential Risk to Groundwater from Hypothetical Water Releases) of Appendix 8 (Human Health and Environmental Risk Assessment) is used to support the proponent's conclusion that an unintended spill of contaminated waste-water on the land surface would either not infiltrate to or substantially contaminate the nearest subsurface aquifer, which is the Cambrian Limestone Aquifer (CLA) of the Gum Ridge Formation/Tindall Formation at the EP187 tenement. Appendix B (Potential Risk to Groundwater from Hypothetical Water Releases) notes that well completion reports for the Carpentaria 1 and 2 wells provide lithological information on the stratigraphy that overlies the CLA in the EP187 tenement. However, the stratigraphic description of the subsurface in Appendix B are highly approximate despite the probable availability of more precise lithological and depth information from the completion reports of the Carpentaria wells. For example, the lithology overlying the CLA is characterised as being about 50 m thick (p. 10 of Appendix B) and comprising relatively low permeability "siltstone/clay/basalt" (p. 29 of Appendix B), yet these features appear to be based on the Tanumbirini-1 well that is 40 km west of the EP187 tenement, and p. 10 (Appendix B) also notes that the CLA "is anticipated that this formation shallows and thins towards EP187 where it potentially outcrops at the basin margin." This basin is understood to be the McArthur Basin. From this information, it would be reasonable to conclude that the upper surface of the CLA in the EP187 tenement/project site is shallower than 52 mbgl which was the interception depth in the Tanumbirini-1 well. Therefore, the infiltration modelling may be inapplicable if the overlying strata above the CLA is thinner than 50 m, especially if it is thinner than

		20 m. DCCEEW however recognises that p. 94 of the Referral main report – part 2, shows the depths to aquifers in the Carpentaria project area, which are generally at depths of >50 mbgl (Table 6.3-1). Issue 2 – VLEACH modelling only considers biodegradable contaminants The VLEACH modelling (to the subsurface) in Appendix B of Appendix 8 (Human Health and Environmental Risk Assessment, p. 25 to 29) considers infiltration and longevity of fugitive contaminants in an unintended spill event. However, the compounds that are modelled are all biodegradable compounds, even though 11 chemicals were identified as needing Tier 2 assessment because of potential environmental concern (see Table 4-1, p. 10 of Appendix 7 – Spill Management Plan). Some of these 11 compounds have significantly greater environmental persistence potential than the methanol, NaCl and glutaraldehyde considered in the VLEACH modelling, as noted in Appendices 7 and 8 (e.g., decamethyl-cyclopenta siloxane, dodecamethyl-cyclohexa siloxane and octamethyl-cyclotetra siloxane). Choice of VLEACH modelling contaminants may need to be reconsidered in the impact assessments to water resources as Appendix B of Appendix 8 concludes that environmental risk is low partly because methanol, NaCl and glutaraldehyde "would completely decompose within the predicted 100 years that it would take infiltration to reach 20 m depth", which also relates to the appropriateness of the Green and Ampt model and Darcy model inputs (e.g., thickness of overlying strata above the CLA). Issue 3 – unintended spill assessment does not consider contaminant dispersal in flood event? The Spill Risk Assessment (Appendix 7) lists potential impact pathways to water resources in Table 5-1 (starting p. 13), but there are no maps of spill dispersal footprints for the scenarios considered. Furthermore, there is inundation modelling of the project area in the Referral main report – part 2 (section 6.3.1.1), but there is no discussion of the cumulative outcome of a spill event occurring during a high rainfall event and the implications for fugitive contaminant dispersal. This is an area where further investigation may be required to demonstrate that impacts to surface water resources will not occur. Issue 4 – absence of hydraulic fracturing water budget Although Appendix 00 (Environmental Management Plan) states that the hydraulic fracturing zone is approximately 1,600 mbgl (e.g., Fig. 3.5-1), which is some >900 m below identified aquifer units, the long-term fate of unreturned contaminants in injected formulations into target shale is not described in detail. The proposed use of groundwater resources to support hydraulic fracturing activities (e.g., Table 7.3-1 of the Referral main report – part 3, p. 139) of an additional 950 ML suggests that there will be substantial loss of water and contaminants into the fractured shale zone. Further information on these potential long-term environmental changes, irrespective of their perceived threat to human and ecological receptors, would be beneficial for understanding the potential impacts of the proposal comprehensively. Other remarks DCCEEW notes that conclusions regarding the lack of likely significant impacts to water resources will strongly depend on the integrity of well casings and well barriers that prevent unintended injection/waste-water leakage vertically and horizontally, which would need to be supported by appropriate groundwater monitoring programs to identify subsurface spills to undertake immediate corrective action.

References

DEPWS (2021). Identification of knowledge gaps for regional aquifers overlying the Beetaloo Sub-basin: SREBA Water Studies Project 1. WRD Report Number 18/2021. Northern Territory Department of Environment, Parks and Water Security, Northern Territory Government. Palmerston, Northern Territory.

DCCEEW 2022, Significant Impact Guidelines 1.3: Coal seam gas and large coal mining developments— impacts on water resources, Department of Climate Change, Energy, the Environment and Water, Canberra. CC BY 4.0.

O'Malley, C. (2006). National Recovery Plan for the Gouldian Finch (Erythrura gouldiae). WWF-Australia, Sydney and Parks and Wildlife NT, Department of Natural Resources, Environment and the Arts, NT Government, Palmerston.