

Onshore Petroleum Activity – NT EPA Advice

ENVIRONMENT MANAGEMENT PLAN (EMP) - IMPERIAL OIL & GAS PTY LTD –2020 DRILLING PROGRAM ON EXPLORATION PERMIT (EP) 187

BACKGROUND

The Minister for Environment and Natural Resources has formally requested under section 29B of the *Northern Territory Environment Protection Authority Act 2012* (NT EPA Act) that the Northern Territory Environment Protection Authority (NT EPA) provide advice on all Environment Management Plans (EMPs) received under the Petroleum (Environment) Regulations 2016.

That advice must include a recommendation on whether the EMP should be approved or not, supported by a detailed justification that considers:

- whether the EMP is appropriate for the nature and scale of the regulated activity to which the EMP relates (regulation 9(1)(b))
- whether the EMP demonstrates that the activity will be carried out in a manner by which the environmental impacts and environmental risks of the activity will be reduced to a level that is as low as reasonably practicable and acceptable (regulation 9(1)(c))
- the principles of ecologically sustainable development (regulation 9(2)(a)), and
- any relevant matters raised through the public submission process

In providing that advice, the NT EPA Act provides that the NT EPA may also have regard to any other matters it considers relevant.

ACTIVITY

Interest Holder	Imperial Oil & Gas Pty Ltd
Petroleum interest(s)	Exploration Permit 187 (EP 187)
Environment Management Plan (EMP) title	2020 Drilling Program EP 187
EMP document reference	IMP2-04
Regulated activity	<p>The drilling, well testing, suspension and/or decommissioning of two exploratory petroleum wells during the 2020 dry season (May – September).</p> <p>Well testing activities include: wireline logging, mudlogging, leak-off testing, well barrier integrity verification, and Diagnostic Fracture Injection Testing (DFIT).</p> <p>The EMP proposes and assesses five potential locations for the well pads, although only two of these will be developed; informed by the seismic survey results.</p> <p>The EMP includes consideration of the construction of two well pads; expansion of an existing DIPL campsite; and the upgrade</p>

	<p>and/or creation of access tracks to the wells sites from the Carpentaria Highway.</p> <p>Routine maintenance and environmental monitoring activities, the transport of waste to an authorised disposal facility, the progressive rehabilitation of land disturbance areas, minor ancillary works associated with the above activities and well suspension or decommissioning of each exploration well are included in the EMP.</p> <p>Hydraulic fracturing is not included as part of this regulated activity and may be the subject of a separate EMP in the future.</p>
Public consultation	<p>Public consultation on the EMP was required under 8A(1)(b) of the Petroleum (Environment) Regulations as the EMP proposes the drilling of a well. The EMP was made available for public comment for a period of 28 days from 23 August to 22 September 2019.</p>

NT EPA ADVICE

1. Is the EMP appropriate for the nature and scale of the regulated activity (regulation 9(1)(b))

The technical works program includes drilling up-to two vertical petroleum exploration wells on any two of the five well site locations proposed in the EMP. Post drilling, a series of well evaluation tests will be conducted, such as mudlogging, wireline logging, cased-hole Diagnostic Fracture Injection Testing (DFIT), leak-off and core testing. The EMP does not include hydraulic fracturing of a petroleum exploration well and no produced water or flowback fluid is anticipated as a result of the regulated activities under this EMP.

The EMP includes minor ancillary works associated with the development of each well pad, such as upgrading and/or creating access tracks, and minor land clearing for bushfire mitigation purposes. The proposed work is planned for 80 days during the 2020 dry season. A temporary 30 person camp will be established at an existing Department of Infrastructure, Planning and Logistics (DIPL) roadwork construction camp. A traffic management plan, including an impact assessment will be approved by DIPL prior to commencing activities.

Drilling will use a combination of air drilling and mud based drilling techniques and consequently the Interest Holder will be using less than the total volume of water required for a water extraction licence (<5ML). The Interest Holder has an agreement with DIPL to extract water from an existing road water bore for this purpose. The Interest Holder has committed to installing water meter, and reporting water use to DENR and DPIR on completion of the activity. The NT EPA recommends that the Interest Holder be required to provide regular data on water use to the regulator to ensure the 5 ML limit for groundwater extraction within a 12 month period, is not breached.

Approximately 90 m³ of drill cuttings and 150 m³ of drilling mud will be produced during the activity. Drill cuttings are expected to primarily comprise quartz grains and clays and will appear as gravelly sandy or silty material. The drilling mud will be predominantly comprised of water and clay with minor chemical additives, all approved by the Commonwealth Government Department of Health and the Australian Inventory of Chemical Substances (under the National Industrial Chemical Notification and Assessment Scheme)

The EMP sets out appropriate commitments to manage and dispose of drill cuttings in accordance with the Code of Practice: Hydraulic Fracturing in the NT (2019) (the Code). On completion of the operations, the drill cuttings and residual drilling muds will undergo laboratory testing to determine leachability of heavy metals, Naturally Occurring Radioactive Material (NORM) and other contaminants of potential concern and the results will indicate a suitable disposal method: either in-situ via backfill and burial, or transport to Queensland via a licensed

transporter to an accredited facility. The EMP commits the Interest Holder to providing the laboratory results to DENR within three months of completion of activities, and prior to a decision regarding final disposal. Each hazardous substance (fuel, chemicals, drilling waste) will be stored in a banded containment area at a location protected from escape into the surrounding environment. The EMP contains a Spill Management Plan (SMP) and Wastewater Management Plan (WWMP) as required by the Code.

Diagnostic Fracture Injection Testing (DFIT) is proposed for both wells. This process involves injecting a small volume (<10,000 L) of water with salts (mostly sodium chloride) and biocide into the target reservoir at low pumping rates and high pressure until the initiation of a fracture, then shutting off the well and allowing the resulting pressure to fall naturally after stopping the pump. The pressure decline is monitored at the surface and this data is analysed to assist reservoir characterisation and inform subsequent modelling of any future hydraulic fracturing operation. A DFIT will be conducted only after the well is complete and the overall integrity has been tested and verified by an independent third party. DFIT differs from hydraulic fracturing because it uses only a small volume of water and no proppant, meaning the fractures naturally close and as a result there is no ongoing production from the reservoir. On completion of technical evaluation and integrity of the well, each exploration well will either be suspended for future re-entry, or in a non-success case, a decision made to decommission the exploration well with permanent cement plugs in accordance with the Code.

Information relating to the nature and scale of the regulated activity is provided in the EMP in a clear format. The proposed drilling works and target formations, including total vertical depths, have been adequately described in the EMP

The existing terrestrial environment has been adequately described in the EMP through baseline surveys in 2015 and post-wet 2018, as well as opportunistic assessment at locations along the recently established seismic survey lines, observation via helicopter and detailed desktop analysis. The Interest Holder has committed to continuing baseline groundwater quality and level monitoring, in addition to the sample collected in April 2019. The NT EPA recommends that the Interest Holder be required to obtain a minimum of eight groundwater quality samples prior to the completion of the program.

The stratigraphic formations intersected by the petroleum wells have been adequately described in the EMP and the Interest Holder has undertaken an additional 230km of seismic line to further understand the regional geology. The Interest Holder has committed to complying with the Code requirement (B.4.2.2(e)) and regulation 23 of the Petroleum (Environment) Regulations of notifying the Minister should an unknown aquifer be encountered during the activity. Current data of the broader Beetaloo exploration area indicates there are no major faults present in the area. The target area overlies the intersection between the Beetaloo Sub-basin and Batten Trough, and the newly acquired seismic data will be used to screen for seismic scale sub-surface geohazards (e.g. faults greater than 30 m throw) at the selected drill site location prior to the finalisation of any exploration well location. The seismic data will also facilitate the identification of the well site location to test for basin rim oil-play in the target formation. The proposed wells will help to confirm the Beetaloo eastern basin margin and develop localised stratigraphic and petrographic knowledge of the Beetaloo (OT Downs) sub-basin and the Bauhinia Monocline/Batten Trough linkage.

The potential impacts and risks of the regulated activity have been identified and relevant environmental outcomes, performance standards and measurement criteria have been provided in the EMP.

The EMP demonstrates how the Interest Holder will comply with relevant requirements of the Code in undertaking this regulated activity. This includes a list of applicable ISO¹/API² standards that have been adopted for the selection of materials for use in well construction; environmental controls and related engineering controls that will be contained in the Well Operations

¹ International Standards Organisation (ISO)

² American Petroleum Institute (API)

Management Plan (WOMP); a summary of which will be provided on the website once approved by the petroleum regulator (DPIR). The risk assessment and Key Performance Objectives provided in the EMP cross reference the Code to enable the reviewer to confirm that the proposed activities (waste management, well drilling, spill management plan etc.) comply with the Code. The EMP also provides the following plans which are compliant with the Code: Wastewater Management Plan; Spill Management Plan; Emergency Response Plan; Methane Monitoring Plan Erosion and Sediment Control; Progressive Rehabilitation and Closure Plan; Weed Management Plan; and Bushfire Management Plan.

The Bushfire Management Plan included in the EMP provides adequate mitigation and management measures to reduce risk of bushfires occurring as a result of the Activity. In the event of an incident occurring on site, the Emergency Response Plan and Safety Management Plan will be implemented, which includes a fire management plan, hierarchy of control, outlines process and procedures and includes appropriate mitigation measures. Evacuation and site readiness protocols are incorporated into the Emergency Response Plan.

A progressive Rehabilitation and Closure Plan (PRC) and accompanying Erosion and Sediment Control Plan (ESPC) have been developed for the activity, to minimise the risk of site erosion and at the conclusion of the activity, and commit the Interest Holder to returning the disturbed land to an environment similar to the original conditions. The PRC is specific, measurable and time-framed and includes the procedure for decommissioning and rehabilitation of the exploration well.

The level of detail and quality of information provided in the EMP is sufficient to inform the evaluation and assessment of potential environmental impacts and risks, and meets the EMP approval criteria under Regulation 9(1)(b).

2. Principles of ecologically sustainable development (regulation 9(2)(a))

Conservation of biological diversity and ecological integrity

The potential impacts and risks to threatened flora and fauna species from clearing were assessed in the EMP for the Imperial 2019 SD Seismic Program EP 187, approved 26 September 2019. That EMP identified two listed threatened species that had previously been recorded in the area: golden-backed tree-rat, from over 100 years ago and is now considered to be locally extinct and the Gouldian Finch, which was not identified through any official searches but included based on anecdotal evidence. The DENR Flora and Fauna Division identified five additional species as having habitat that may overlap with the proposed work area: crested shrike-tit (Northern), red goshawk, grey falcon and ghost bat (listed as Vulnerable under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)) and Merten's water monitor (Listed as Vulnerable under the TPWC Act).

The seismic EMP (IMP001-03) outlined mitigation measures to minimise impacts on affected environmental values including the management of threatening processes such as weeds and fire. The NT EPA advised that it considered the conservation of biological diversity and integrity of threatened species would be maintained in the area if the EMP is complied with.

There are minimal additional potential impacts and risks associated with this activity identified in the current EMP. The proposed activities do not pose a significant risk to threatened species at a population level, due to the low likelihood of threatened species inhabiting the area and the implementation of the proposed control measures to avoid impacts to fauna.

The EMP identifies other potential impacts to biodiversity arising from: vehicle strike, increased weeds, an increase in bushfire risk during the activity, flora dieback resulting from dust, and a decrease in topsoil productivity. The impact mitigation measures proposed in the EMP are compliant with the Code and include:

- appropriate separation distances between the well pad and surrounding vegetation that provides fauna habitat

- fencing and fauna ladder in the sump and any open storages
- driving is only permitted on designated access roads
- speeds on unsealed roads will be limited to a maximum of 60 km/hr
- approved Weed Management Plan
- no flaring to occur on site unless in an emergency situation and an approved Bushfire Management Plan
- fire extinguishers will be fitted to all vehicles
- drip trays and spill kits will be available in all higher risk areas.

Cumulative impacts to flora and fauna from the regulated activity and the approved seismic activities are not considered to be significant. The NT EPA considers that implementation and compliance with the EMP will ensure the conservation of biological diversity and ecological integrity is not impacted by the regulated activity.

Integration of long-term and short-term economic, environmental, social and equitable considerations

The EMP has considered environmental controls in well integrity design to secure the long-term protection of aquifers. These controls include a Well Barrier Integrity Verification (WBIV) report which will require certification by an independent and reputable validator in accordance with Clause 302a of the Schedule of Onshore Petroleum Exploration and Production Requirements (2019). The WBIV must comply with the DPIR Well Barrier Integrity Validation Reporting guideline and be provided to the regulator (DPIR). The controls and other routine procedures identified in the EMP are compliant with the Code, and can be checked and audited against the Well Operations Management Plan (WOMP).

The regulated activity is low impact, small scale and has a duration of 80 days. It forms one component of a broader exploration program to inform the Interest Holder on the potential for commercial petroleum production in the region. Cumulative estimated volumes of groundwater extraction and greenhouse gas (GHG) emissions from the regulated activity, previously approved civils and seismic activities have been included in the EMP.

The regulated activity poses a very low risk to groundwater sustainability as groundwater use will not exceed 5ML within a 12 month period, and is therefore exempt from the groundwater extraction licensing requirements of the Northern Territory *Water Act 1992*.

The Interest Holder has calculated the total GHG emissions generated by the activity (land clearing and drilling) to be approximately 4,200 tCO₂e (tonnes of carbon dioxide equivalent).

Standard GHG mitigation measures detailed in the Methane Emissions Management Plan and consistent with the Code include switching to an overbalanced well after the isolation of aquifers to prevent the influx of gas into the well bore, combustion flaring in emergency situations, and operational staff to carry personal calibrated gas detectors during every routine operational visit to the well sites to be made aware of any unplanned leaks and surface casing vents as soon as practicable. This EMP is limited to drilling of the exploration wells, and limited production of hydrocarbons is anticipated. Flaring of wells is only anticipated in an emergency situation.

Total cumulative GHG emissions for the approved activities in the Imperial 2019-20 exploration program on EP 187 are estimated to be 9,900 tCO₂-e. The total estimated GHG emissions for the exploration program will likely result in an overall increase in NT GHG emissions of 0.006%. Under these circumstances of preliminary exploration activity, the NT EPA considers that cumulative emissions are not significant when considered in context of 2017 NT and Australian emissions, which were approximately 16.5 million tonnes and 535 million tonnes respectively³.

³ NT and Australian GHG emissions in 2017 were approximately 16.5 million tonnes and 535 million tonnes, respectively, as reported in the DOEE (2019) *State and Territory Greenhouse Gas Inventories 2017*. <http://www.environment.gov.au/system/files/resources/917a98ab-85cd-45e4-ae7a-bcd1b914cfb2/files/state-territory-inventories-2017.pdf>

The regulated activity will be subject to requirements of an Aboriginal Areas Protection Authority (AAPA) Authority Certificate and cannot be approved until this Certificate is obtained. There are no significant economic, environmental, equitable adverse effects from the regulated activity.

The EMP adequately assesses the environmental impacts and risks associated with the regulated activity and outlines appropriate avoidance and mitigation measures. This includes the assessment and management of social impacts and risks, including the appropriate management of cultural heritage. The Interest Holder has demonstrated ongoing stakeholder engagement in the EMP as required by the Regulations with landholders and land managers, traditional owners, the Northern Land Council (NLC) and NT Government Agencies.

Precautionary principle

The NT EPA considers there is a low threat of serious or irreversible damage from the regulated activity.

The Interest Holder's investigations into the physical, biological and cultural environment provide a satisfactory scientific basis to assess potential environmental impacts and risks, and to identify measures to avoid or minimise those impacts and risks and address scientific uncertainty.

The risks of drilling are well understood and there are internationally recognised standards and established best practice management measures for operations; these are reflected in the mandatory requirements of the Code. Wells will be located away from known geohazards and given the low risk associated with through-going faults, there is a very low likelihood of contamination to shallow aquifers occurring via this mechanism. Subsurface geohazard assessment is required under the Code for wells to be hydraulically fractured. The NT Schedule of Onshore Petroleum Exploration and Production Requirements (301c), requires the WOMP to include a separate well plan summary, detailing the location of all known faults and geo-hazards to be submitted for uploading on DPIP's website.

The NT EPA is of the view that the precautionary principle has been considered in assessing the regulated activity and has not been triggered due to the low threat of serious or irreversible damage existing and the presence of a satisfactory scientific basis to assess potential impacts and risks.

Principle of inter-generational equity

The potential environmental impacts and risks associated with the regulated activity can be adequately avoided or managed through the management measures and monitoring programs proposed in the EMP. NORMs are likely to increase above background levels in some of the drill cuttings as a result of the organic rich intervals in the Kyalla and Velkerri Formations. The disposal of drill cuttings and drilling mud will be managed through minimisation via evaporation, with final disposal and/or rehabilitation measures to be guided by the results of laboratory testing and either: transported to a licenced waste disposal centre in Queensland; or mixed with topsoil and buried in-situ, depending on the advice from DENR. The management of waste, including wastewater, is in accordance with the Code, exceeds necessary capacity (not including the 1m minimum freeboard) and final disposal will be at the discretion of the regulator (DENR) based on the results of laboratory analysis.

The NT EPA considers the estimated greenhouse gas emissions minimal in the context of annual Northern Territory and national emissions, and potential impacts on the environment are not significant.

The NT EPA considers that environmental values will be protected in the short and long term from the activities outlined in the EMP and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations.

The regulated activity will be subject to requirements of an AAPA Authority Certificate. Appropriate measures are proposed for the management of items of heritage value should they be discovered.

Promotion of improved valuation, pricing and incentive mechanisms

The Interest Holder will be required to prevent, manage, mitigate and make good any contamination or pollution arising from the regulated activity, including contamination of soils, groundwater and surface waters through accidental spills.

All stages of the regulated activity, including progressive rehabilitation of all disturbed areas to an acceptable standard, will be at the cost of the Interest Holder. The Interest Holder will be required to provide an adequate environmental rehabilitation security bond to indemnify the NT Government. This is based on an assessment by DENR and approval of the rehabilitation security costs associated with the proposed Activity in the EMP provided by the Interest Holder.

3. Relevant matters raised through public submissions

Public consultation on the EMP was required under the Petroleum (Environment) Regulations 2016, as the EMP proposes drilling activities. The EMP was made available for public comment for 28 days from 23 August to 20 September 2019 and four submissions were received: one from a community member and three from non-government organisations.

The submissions covered a range of social, environmental and regulatory issues (Table 1). Many of the issues raised in the public submissions are dealt with in other sections of this advice. Cross reference to the relevant sections is provided in Table 1 to avoid repetition. Where a matter relevant to the EMP has not been discussed elsewhere in this advice, it is considered below.

Table 1: Issues raised in public submissions

Theme	Issues raised	Response
Water	Water security: the Onshore gas industry is going to negatively impact groundwater quality and quality.	The cumulative volume of water anticipated to be used by the Interest Holder is less than the amount required to obtain a groundwater extraction license under the Water Act 1992 Implementing the well integrity requirements specified by the Code mean the risk to groundwater quality is considered ALARP.
Water	The application is in an area that may impact nearby waterways and Tarrenbool Lake.	The activity is being undertaken in the dry season when the small intermittent streams are unlikely to flow. Further, Tarrenbool Lake’s catchment area is outside of the tenement area. The well pads are located a minimum of 3.5 km from the nearest stream order 3 watercourse. All watercourses on the tenement flow into the McArthur River and eventually into the Gulf of Carpentaria, when enough rain occurs. Should a spill occur, the spill management plan and emergency response plan in the EMP outline the response and clean-up procedures

Theme	Issues raised	Response
		that will be undertaken to mitigate the impact to local waterways.
Regulation	Recommendation 7.7 and 7.2 (putting a charge on water and instituting a water control district in onshore gas areas) have not been implemented. This is going against the NT Government's commitment to implement all 135 recommendations made in the Final Report by the Scientific Inquiry into Hydraulic Fracturing in the Northern Territory.	These recommendations are required to be implemented prior to production licenses being issued, and are not relevant for exploration licenses.
Regulation	The EMP does not address the additional impact of future hydraulic fracturing at the site.	The Interest Holder has not made a decision regarding hydraulic fracturing at this well site. Any proposed hydraulic fracturing will require approval of a separate EMP. That EMP would need to consider cumulative impacts.
Climate	Approving onshore gas production will accelerate anthropogenic induced climate change.	Section 2: <i>Integration of long-term and short-term economic, environmental, social and equitable considerations</i> The Government has committed to implementing all recommendations of the Scientific Inquiry, including that the NT Government seeks to ensure there is no net increase in the life cycle GHG emissions emitted in Australia from any onshore shale gas produced in the NT. This EMP is only for exploratory purposes, and no flow or limited flow of gas or hydrocarbons is anticipated under this EMP.
Traditional Owners	Native Title Holders are concerned about the impact of the industry on country, especially on subterranean waters. Traditional Owners see their way of life as being put at risk and require additional information and assurance before genuine consent has been obtained. Regulation 7(2)(a) has not been complied with.	The Interest Holder has applied for an AAPA certificate for the proposed works. The Interest Holder has had consultation on country, including in-language, since 2017. Traditional Owners have been employed as cultural advisors to the company to ensure culturally appropriate solutions to any 'on ground' finds are able to occur in real time
Community	The Boorooloola community are opposed to fracking; strong public opposition the industry in the NT; industry does not have a social license to operate.	Appendix 2 of the EMP details the stakeholder engagement undertaken in accordance with Schedule 1, Part 3 (9) of the Regulations
Environment	NT environment is fragile and should be protected; It is not	Section 1; Flora and Fauna technical

Theme	Issues raised	Response
	appropriate to exclude species from consideration as a result of a lack of data – e.g. endangered land snails. Approvals should not be granted until data gaps have been addressed.	specialists have provided advice regarding the EMP. There are very minor additional potential impacts to the Territory environment above those outlined in the approved seismic EMP, which included analysis on data deficient species. All species were determined as not likely to have a significant impact at a population level.
Other	ESD principles are not being appropriately considered.	Section 2 <i>Integration of long-term and short-term economic, environmental, social and equitable considerations</i>
	Interest holder should be made to resubmit their EMP, once the final well locations have been selected.	The Interest Holder has assessed all potential impacts and risks for all five potential well locations.

4. Environmental impacts and risks reduced to a level that is as low as reasonably practicable (ALARP) and acceptable (regulation 9(1)(c))

The Interest Holder has undertaken a process to avoid impacts on environmental values, informed by appropriate baseline studies and surveys. The EMP emphasizes compliance with the Code, as a mechanism of demonstrating achievement of ALARP.

The EMP demonstrates a systematic identification and assessment of environmental impacts and risks associated with the regulated activity. The key potential environmental impacts and risks identified include:

1. Inland Environmental Water Quality:

- a. Unintended release of wastewater during flooding events
- b. Spills associated with chemicals and wastewater during storage, handling and transport
- c. Well integrity failure during the drilling operation contaminating the groundwater

2. Terrestrial Environmental Water quality:

- a. Soil contamination as a results of spill and leaks associated with storage, handling and transport of chemicals, drilling muds, cuttings and fuel
- b. Erosion of exposed soils as a result of a cleared well pad

1(a) & 1(b): Inland Environmental Water Quality: Unintended release of wastewater during flooding events, and spills associated with chemicals and wastewater

The potential impacts of decreased surface water quality caused by inappropriate storage, handling and transport of chemicals and/or wastewater have been adequately discussed by the Interest Holder. Commitments in the EMP to reduce the potential impacts to levels that are ALARP and acceptable include the containment of chemicals in a bunded and lined storage area, and a bunded drilling waste sump lined in compliance with the Code, including exceeding the code requirement of 1m minimum freeboard by 35%, and the restriction of the activity (including the transport of waste and hazardous substances) to the Dry season. The EMP includes a Waste Water Management Plan, a Spill Management Plan, and clearly documents how the Interest Holder will comply with the the Code as a minimum best practice standard. Moreover, the short duration of the activity and its seasonal timing (between May-September) mean that the likelihood of any release occurring as a result of flooding is considered to be very unlikely.

1(c): Inland Environmental Water Quality: Well integrity failure causing groundwater contamination

The aquifer that is anticipated to be intersected is of high environmental value. As such, there should be 'no change' to existing baseline groundwater quality, i.e. no change in the natural range of values as a result of the regulated activity. In this preliminary stage of petroleum exploration in the Cambrian Limestone aquifer (CLA) region which includes karstic terrain, the NT EPA recommends the Interest Holder be required to provide to DENR a cementing report for the 13-3/8" and 9 5/8" casing strings through the aquifers for information to demonstrate isolation of aquifers.

The Interest Holder has documented a range of controls and mitigation measures to reduce the risk of adversely impacting groundwater, including using underbalanced drilling techniques and restricting drilling lubricants to water based drilling muds until all aquifers have been isolated with all barriers verified and approved by DPIR. The EMP commits the interest holder to complying with the Code, which as a minimum best practice standard reduces the risk to ALARP and acceptable.

2(a): Soil contamination as a result of spills and leaks associated with transport, storage and handling of chemicals, drilling waste and fuel

As described above, the likelihood of a spill of wastewater is considered to be very unlikely. The likelihood of a risk of a spill of chemicals, fuel or drilling waste will be adequately mitigated by the controls and commitments outlined by the Interest Holder in the EMP. The risk of soil contamination as a result of the aforementioned risks eventuating will be further mitigated by the compaction of the hardstand area which will limit infiltration of any spills from entering the soil profile; and should the risk eventuate, the Interest Holder is required to notify DENR under the Regulations and has committed to remediating any spill area in accordance with the National Environment Protection Measure (NEPM) requirements. The EMP commits the Interest Holder to progressive rehabilitation throughout the life of the activity which, combined with the Code requirements, is considered to have reduced the risk of soil contamination to a level that is ALARP and acceptable.

2(b): Erosion of exposed soils as a result of a cleared hardstand area

The Erosion and Sediment Control Plan documents all measures that will be taken by the Proponent to mitigate the potential impact of erosion. The ESCP has been reviewed by a DENR technical specialist who confirmed it meets the requirements of the Code and is of a satisfactory standard. In addition to site selection, key erosion controls identified in the ESCP include: the stabilisation of high traffic areas on the well pad with gravel, a rainfall forecast trigger for the stabilisation of all exposed surfaces (> 60% chance of > 50mm) and a minimum 70% cover of exposed surfaces for stabilisation. The EMP includes a Rehabilitation Plan and adequately describes controls and mitigations that reduce the risk of erosion to ALARP and acceptable.

The EMP describes the management and monitoring measures appropriate for the nature and scale of the regulated activity to which the EMP relates to mitigate the potential impacts and risks. The NT EPA recommends that the Interest Holder be required to provide to DENR an assessment report on the spatial disturbance footprint to demonstrate that surface disturbance activities remain ALARP and acceptable. The EMP demonstrates compliance with the Code and the potential impacts and risks to surface water and groundwater quality from drilling activities have been reduced to a level that is ALARP and acceptable.

5. Other relevant matters

Regulation 9 requires that an EMP provides a comprehensive description of the regulated activity, including provision of a detailed timetable for the activity. To meet this requirement, the NT EPA recommends that the Interest Holder be required to submit a detailed timetable for the regulated activity with the final selected well sites to DENR prior to commencing the activity. The

timetable should address all aspects of the activity and include, but not be limited to dates for the implementation of commitments and associated hold points.

The amount of excavation and fill required of a well pad can potentially impact on land clearing requirements for stockpiling of excavated material, haulage requirements of suitable gravel material and disturbance areas of gravel pits. The NT EPA recommends the Interest Holder provide to DENR a geotechnical assessment report across each proposed well site to inform an indicative calculation of the amount of excavation (and stockpiling) and fill required to reach acceptable compaction and load bearing for the well pad.

CONCLUSION

The NT EPA has reviewed the public and NT Government agency submissions as part of its decision-making and when making recommendations to the Minister. This NT EPA advice to the Minister for Environment and Natural Resources considers and provides a response to any relevant matters raised in public submissions.

The NT EPA considers that, subject to the recommended EMP approval conditions, the EMP:

- is appropriate for the nature and scale of the regulated activity
- demonstrates that the regulated activity can be carried out in a manner that potential environmental impacts and environmental risks of the activity will be reduced to a level that is as low as reasonably practicable and acceptable.

In providing this advice the NT EPA has considered the principles of ecologically sustainable development.

RECOMMENDATION

The NT EPA recommends that should the EMP for Imperial Oil & Gas Pty Ltd be approved, the following conditions be considered:

Condition 1: On selection of the final locations of the two well sites, the Interest Holder must provide to DENR, at least four weeks prior to commencement of the regulated activity:

- i. a detailed map showing the final location of the two wells
- ii. a geotechnical assessment report for the final locations of the two well sites, developed by a suitably qualified independent person, that:
 - includes results of 60cm soil cores, taken at three sites across the well pad area for analysis for particle size distribution;
 - determines the amount of excavation and quantity of surface material that will be required to be stripped at the well pad to ensure a stable base;
 - determines stockpiling requirements of stripped material and
 - determines the amount of suitable gravel material required to build the well pad.

Condition 2: The Interest Holder must provide to DENR:

- i. monthly data on groundwater use until the activity is completed
- ii. data from a minimum of eight groundwater quality sampling events from RN039574 and RN027848 bores prior to completion of the drilling program.

Condition 3: The Interest Holder must provide to DENR within three months of completion of the regulated activity:

- i. a high resolution imagery of the disturbance footprint
- ii. a digital aerial photograph or UAV imagery of the disturbed area, ortho-rectified using ground control points measured using a differential GPS (DGPS) and spatial accurate of approximately 1-2m

- iii. a spatial assessment report on the disturbance footprint for the approved regulated activity.

Condition 4: In addition to the minimum methane leak detection inspection frequencies required by the Code, the Interest Holder must undertake methane leak detection within seven (7) days of commissioning equipment that is in hydrocarbon service and under pressure and record to an auditable standard.

Condition 5: The Interest Holder must provide to DENR a cementing report for the 13-3/8" and 9 5/8" casing strings as soon as practicable but not more than 14 days after completion of the cementing job for Imperial exploration wells on EP 187.



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CHAIRPERSON
NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

6 JANUARY 2020