ntepa Northern Territory Environment Protection Authority

Onshore Petroleum Activity – NT EPA Advice

CENTRAL PETROLEUM LTD CTP3-4 - ENVIRONMENT MANAGEMENT PLAN (EMP) 2020-21 NT DRILLING CAMPAIGN

BACKGROUND

The Minister for Environment 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 (NT) (the Regulations).

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))
- the principles of ecologically sustainable development (regulation 2(a)), as set out in sections 18 to 24 of the *Environment Protection Act 2019* (NT)
- 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))
- any relevant matters raised through a 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	Central Petroleum Ltd
Petroleum interest(s)	Operating Licence 3 (OL3, Palm Valley Field) Operating License 4 (OL4, West Mereenie Field) Production Licence 6 (PL6, Surprise Field) Production License 7 (PL7, Dingo Field) Exploration Permit 82 (EP82, Orange)
Environment Management Plan (EMP) title	2020-21 NT Drilling Campaign
EMP document reference	CTP3-4
Regulated activity	The EMP proposes to undertake an exploratory and development drilling campaign over the five year life of the EMP, consisting of seven wells across five titles and includes: • civil works consisting of clearing of approximately 26 hectares at the seven drilling locations for establishing the well lease,

	access tracks, flowline routes, vehicle turnarounds and installation of fencing (between 3 and 6 hectares at each location, representing between 0.0003% and 0.07% of the total lease areas) • drilling of seven wells • installation and commissioning of surface infrastructure on six of the seven wells • decommissioning of the Mamlambo-1 well and potentially any of the other six wells, as determined to be needed • flow testing and flaring of wells • use of both existing and new accommodation facilities • rehabilitation.
Public consultation	Public consultation on the EMP under regulation 8A(1)(b) was undertaken from 4 September 2020 to 2 October 2020.

NT EPA ADVICE

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

Information relating to the nature and scale of the regulated activity is provided in a clear format. The existing environment has been adequately described through baseline surveys and is suitably understood. Table 1 summarises the scope and duration of the regulated activity at each location.

Table 1: Summary of the scope and duration of the regulated activity

Location	Activity	Estimated Duration
Production Licence 7 (PL7, Dingo Field)	• Civil works (clearing of 2.6 ha for well lease, flowlines, vehicle turnarounds, gravel extraction and fencing) for Dingo-1 ST1 • Civil works (clearing of 3.18 ha for well lease, flowlines, access track, camp, vehicle turnarounds, gravel extraction and fencing) for Dingo-5	7 days for Dingo-1 ST1 14 days for Dingo-5
	• Drilling exploration wells Dingo-1 ST1 and Dingo-5	45 days for Dingo-1 ST1 64 days for Dingo-5
	• Flaring	9 - 16 days per well
	• If gas flow rates are satisfactory, well completion and suspension and installation of surface infrastructure and commissioning * • If gas flow rates are unsatisfactory, decommissioning	30 days per well
	• Site rehabilitation	14 days for Dingo-1 ST1 5-14 days for Dingo-5 plus ongoing monitoring

Location	Activity	Estimated Duration
Exploration Permit 82 (EP82, Orange)	• Civil works (clearing of 4.04 ha for well lease, access track, camp, vehicle turnarounds, gravel extraction and fencing)	14 days
	• Drilling exploration well Orange-3	62 days
	• Flaring	16 days
	• If gas flow rates are satisfactory, well completion and suspension # • If gas flow rates are unsatisfactory, decommissioning	30 days
	• Site rehabilitation	14 days plus ongoing monitoring
Operating Licence 3 (OL3, Palm Valley Field)	• Civil works (clearing of 2.64 ha for well lease, access track, flowlines, vehicle turnarounds, gravel extraction and fencing)	14 days
	• Drilling exploration well Palm Valley-12 (PV-12)	86 days
	• Flaring	20 days
	• If gas flow rates are satisfactory, well completion and suspension and installation of surface infrastructure and commissioning for production * • If gas flow rates are unsatisfactory, decommissioning	30 days
	• Site rehabilitation	15 days plus ongoing monitoring
Operating Licence 4 (OL4, West Mereenie Field)	• Civil works (clearing of 3.35 ha for well lease, access track, flowlines, vehicle turnarounds, gravel extraction and fencing) for West Mereenie-27 (WM-27) • Civil works (clearing of 5.57 ha for well lease, access track, flowlines, vehicle turnarounds, gravel extraction and fencing) for West Mereenie-28 (WM-28)	14 days 14 days
	• Drilling development well WM-27 • Drilling development well WM-28	27-30 days 28-30 days
	• Flaring	4 days per well
	• If gas flow rates are satisfactory, well completion and suspension and installation of surface infrastructure and commissioning for production * • If gas flow rates are unsatisfactory, decommissioning	30 days
	• Site rehabilitation	30 days plus ongoing monitoring

Location	Activity	Estimated Duration
Production Licence 6 (PL6, Surprise Field)	• Civil works (clearing of 4.33 ha for well lease, access track, vehicle turnarounds, gravel extraction and fencing)	14 days
	• Drilling crude oil exploration well Mamlambo-1	28 days
	• Monitor decommissioning and decommissioning	180 days
	• Site rehabilitation	20 days plus ongoing monitoring

* For wells that are completed, the ongoing production operation of the wells will be undertaken under the applicable Field Environment Management Plan (FEMP) with rehabilitation of the operational well undertaken in accordance with that plan.
# The Orange-3 well will be suspended, and if gas flows indicate suitability for production, this will be subject to an additional approval and EMP.

The EMP includes specific measures for protection of important habitat for protected species and through the site selection process, well pads, access tracks and flowline corridors have been considerate of avoiding these features. Important habitat was identified as being the gullies below Palm Valley-12 and the sand dunes in Mereenie, and specific measures have been put in place to avoid impacts to these habitat areas.

A thorough archaeological assessment was undertaken to support the EMP, which identified areas of Aboriginal artefacts at Orange-3 (a knapping site and quarry), PV-12 (artefact scatter), WM-28 (knapping site) and Mamlambo-1 (Grinding stone). Aboriginal Sacred Site clearances have been conducted at all locations, and the interest holder has obtained Authority Certificates from the Aboriginal Areas Protection Authority and site clearances from the Central Land Council. The interest holder has committed to complying with any restrictions applied.

Site selection was supported by on-ground surveys of listed flora and fauna species, archaeological surveys and Aboriginal Sacred Site surveys. These surveys and assessments were undertaken over a much larger area than required for the regulated activity, in order to allow maximum flexibility in final site selection. The area to be cleared at each well location, including associated clearing for accommodation camps and installation of new flowlines and tracks, has been minimised and a detailed site selection process was undertaken to avoid impacts to environmental values to as low as reasonably practicable (ALARP) and acceptable levels. A multi-criteria environmental analysis was used to determine final locations, and site selection included consideration of flood modelling outcomes for a 1 in 100 year rainfall event.

Erosion and sediment control measures, which have taken into account the outcomes of the flood modelling, are included in a primary Erosion and Sediment Control Plan in the EMP, which was updated based on feedback to include specific measures for each well site. In addition, the interest holder relocated two well pads to assist in mitigating potential site-specific risks and impacts.

Drilling will initially use a water-based mud system that is BTEX-free and then switch to an air/mist based drilling fluid prior to drilling through the primary target formations. Wells at Dingo-1 ST1, Dingo-5, Orange-3, WM-27 and WM-28 will either be completed and suspended, or decommissioned. The well at PV-12 well will be completed as a production well, or otherwise decommissioned. The Mamlambo-1 well is a crude oil exploration well for the purpose of determining the presence of an active hydrocarbon system and will be decommissioned at the end of the activity.

Drill cuttings produced during drilling with the water-based mud system are processed at the surface to remove fluids and then directed to lined drill sumps. The fluids are returned to the closed loop mud tank system for reuse. During air and mist drilling operations all the cuttings

will be directed through a blooie line to the flare pit. The total estimated volume of cuttings removed during the drilling operations of each well (mud and air drilling) will range between 0.07 ML to 0.5 ML due to the difference in depths of each well.

At completion of drilling activities, the drill sumps and flare pits are left to dry out, and contents of the flare pits are transferred to the drill sumps. Assessment by a suitably qualified third party will determine whether the dried cuttings are suitable for on-site burial, noting the interest holder intends to take baseline soil testing prior to commencement of drilling. If not suitable for burial, the drill cuttings will be removed from site for appropriate disposal. The interest holder notes that it may take 24 months for the drilling cuttings to dry out.

During drilling the target formations will be tested for gas flow rates. Gas that is extracted during the test will be diverted to the in-ground horizontal flare pit for combustion, at which time, the flare may be continuously active for 10-75 hours at a time, depending on the well being drilled. There is no flaring at Mamlambo-1 as this is an oil well; for all other wells, a conservative estimate of total days of flaring ranges between approximately 4 days (WM-27 and WM28) and 20 days (PV-12).

For wells that are completed (expected to be Dingo-1 ST1, Dingo-5, PV-12, WM-27 and WM-28), surface facilities will be installed to allow the well to be connected to the existing gas collection network for processing before transfer to market. This involves tie-in to the wellhead, installation of monitoring instruments, control valves and shutdown skids, installation of new flowlines to connect the surface facilities and wellhead to existing pipelines. Flowlines are planned to be below-ground at Dingo-1 ST1, Dingo-5 and above-ground at PV-12, WM-27 and WM-28. Special consideration has been given to risks and mitigations for aboveground flowlines.

The interest holder has established a well integrity management system, compliant with ISO 16530-1:2017, the foundation well integrity standard in the Code of Practice: Onshore Petroleum Activities in the Northern Territory (the Code), covering well life cycle governance stages. The interest holder is currently preparing Well Operations Management Plans (WOMPs), consistent with the Code, for approval by the Department of Industry, Tourism and Trade (DITT) prior to the commencement of drilling activities.

Decommissioning is planned for the Mamlambo-1, but may also occur at other wells if found to be non-viable. Decommissioning is to occur in accordance with the Code, and complete and accurate records of the entire decommissioning procedure will be kept and submitted as part of the legislative reporting requirements for the decommissioning of petroleum wells.

Groundwater extraction is proposed from five bores within the Mereenie Field for conduct of the regulated activity at WM-27 and WM-28, with the required volume of 2.15 ML per year already included in an extraction licence application submitted to the Water Resources Division of DEPWS as part of the Mereenie Field operations. It is proposed to extract 1.41 ML of groundwater per year for conduct of the activity at Mamlambo-1 from an existing bore in PL6, for which the interest holder is liaising with Water Resources Division on extraction permit requirements, noting an exemption is in place for annual extraction less than 5 ML.[1] Estimated water supply requirements per year for the regulated activity at Orange-3 (approximately 3.1 ML), PV-12 (approximately 4 ML) and Dingo-5 and Dingo 1 ST1 (approximately 3.2 ML) is to be commercially supplied.

Environmental monitoring and surveys include:

- weed surveys
- volume of groundwater used and its quality
- volume of wastewater generated and disposed of

[1] Northern Territory Government Gazette No. S109/2018 <https://nt.gov.au/__data/assets/pdf_file/0008/621926/S109.pdf>.

- baseline soil analysis, to enable assessment of suitability for burial of drill cuttings
- flaring
- methane leaks.

In addition, visual inspections will be undertaken and records kept in relation to waste storage, erosion and sediment control measures and any erosion found to have occurred, waste types and quantities (including disposal of NORM contaminated materials), interaction with fauna (e.g. vehicle strikes), fencing for prevention of fauna access, interference with Sacred Sites and tank and sump integrity. The monitoring activities are non-invasive and will not result in any increase in ground disturbance.

The EMP includes a progressive rehabilitation plan that is suitable for the nature, scale and location of the regulated activity and will be applied to disturbed land not required for ongoing activities. Once the drilling activities are completed and it is determined the well is successful (and either to be put into production or cased and suspended for future production) or is unsuccessful and is to be decommissioned, mud sumps, flare pit and water storages are to be filled in, drill cuttings either buried or removed, the site re-contoured as close as possible to the pre-existing natural landscape, hardstand will be deep ripped to relieve compaction, encourage infiltration and water retention, topsoil will be respread and lightly scarified to encourage moisture retention and seed capture, and vegetation will be respread over the lease to support erosion control, provide habitat and promote natural revegetation. Where practical the leases are reduced in size and rehabilitation of these surplus areas will also be undertaken. Erosion and sediment controls will be put in place and all areas will be subject to ongoing weed monitoring and control and monitoring for rehabilitation success. At the completion of the program, all well sites will transition to the relevant Field EMP (Mereenie Field EMP, Palm Valley Field EMP, Dingo and Surprise Field EMP), apart from Orange-3 in EP82, which is not subject to a separate Field EMP and which will be rehabilitated in accordance with the Rehabilitation Management Plan.

The EMP demonstrates how the interest holder will comply with relevant requirements of the Code in undertaking the regulated activity. The EMP also provides the following plans which are compliant with the Code:

- Weed Management Plan
- Bushfire Management Plan
- Wastewater Management Plan
- Spill Management Plan
- Methane Emissions Management Plan
- Erosion and Sediment Control Plan
- Rehabilitation Management Plan
- Emergency Response Plan.

In addition, in recognition of the regulated activity being conducted over the wet season, the EMP includes a Wet Season Management Plan, which is a proactive measure the interest holder has introduced to ensure wet season works are appropriately managed.

The interest holder has identified the impacts and risks associated with the regulated activity (44 in total). Mitigations outlined in the risk register are classified based on the hierarchy of controls and the level of certainty is indicated for each risk. Impacts and risks should be reduced to an acceptable level through the proposed mitigation and management measures. Environmental performance standards and measurement criteria have been provided in the EMP (section 8.0).

The level of detail and the quality of information provided in the EMP is sufficient to inform the evaluation, assessment and management of environmental impacts and risks, and meets the

approval criteria under Regulation 9(1) for the Minister's decision about approval of the environment management plan. As a further precautionary step, the NT EPA has provided advice relating to Ministerial Conditions for this EMP contained at the end of this advice.

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

2.1 Decision making principle (*s 18 Environment Protection Act 2019* (NT))

The EMP adequately assesses the environmental impacts and risks associated with the regulated activity and outlines appropriate avoidance and mitigation measures, to ensure no long-term adverse impacts to the environment in which the activity is conducted. The regulated activity is considered low impact and small scale at each location, and are to be undertaken in a planned and measured way. The activity will inform longer-term decision making on development of a petroleum resource and developing petroleum production so that the optimum value of the resource is returned to the Territory as required under the *Petroleum Act 1984* (NT).

The impacts and risks associated with the drilling program have been assessed as predominately low risk if carried out in accordance with the mitigations and controls proposed in the EMP. Wet season contingencies and controls are proposed to mitigate potential erosion and sediment impacts associated with wet season transport, and land clearing activities will be avoided as much as possible during the wet season. These controls have been assessed by NT Government agencies and deemed adequate.

The communications log reflects ongoing stakeholder communications with landholders and land managers, traditional owners, the Central Land Council (CLC) and NT Government agencies, in respect to the regulated activity covered under this EMP, as required by the Regulations. Stakeholder communication logs demonstrate ongoing community satisfaction with no concerns raised.

2.2 Precautionary principle (s 19 *Environment Protection Act 2019* (NT))

The NT EPA considers there is a low threat of serious or irreversible damage from the regulated activity. The risks associated with undertaking conventional drilling activities is well understood. In addition, the regulated activity will be conducted in compliance with the Code, and the EMP provides measurable performance standards to ensure that the environmental outcomes are met.

The risk assessment clearly classifies the hierarchy of controls for the mitigations applied to each risk (e.g. eliminate, substitute, engineering, administrative, personal protective equipment). Uncertainty in relation to the environmental features was assessed, with no areas of environmental uncertainty identified. The EMP outlines the interest holder's investigations into the physical, biological and cultural environment and demonstrates a sound understanding of the environment at each location, providing a satisfactory scientific basis to assess potential environmental impacts and risks for the activity, and to identify measures to avoid or minimise those impacts and risks.

Measures for managing risks during wet season operations include commitments to minimising chemical transport during the wet season and ensuring no chemical delivery occurs during rainfall events, inspecting roads prior to re-commencing chemical transport after a rainfall event, shutting down operations during significant wet weather (>15 mm in 24 hours) or flooding, undertaking a risk assessment following a shutdown to ensure controls are still appropriate to manage risk to ALARP, covering bunded chemical stores to prevent rain ingress and risk of bund overflow, ensuring wastewater tanks and mud sumps have enough freeboard to manage 1 in 1000 year average rainfall interval event. The NT EPA has recommended the interest holder provide to DEPWS an updated schedule of works quarterly and immediate written notification to DEPWS of any halt to the regulated activity due to the wet season.

The NT EPA has formed the view that firstly the precautionary principle has been considered by the interest holder in assessing the regulated activity and secondly that the precautionary principle 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. In

addition, the environmental monitoring commitments contained in the EMP are compliant with the Code and should provide measureable performance measures to ensure that the environmental outcomes are met.

2.2 Principle of evidence-based decision making (s 20 *Environment Protection Act 2019* (NT))

The EMP demonstrates an adequate understanding of the environment in which the regulated activity will be undertaken, and considers all relevant aspects of the environment that have potential to be affected. As the EMP proposes land clearing and drilling in both the wet season and the dry season, particular focus is placed on prevention of erosion and sedimentation, site design to avoid flooding impacts and protection of natural and cultural values at each location.

A detailed flood modelling report which recommended specific measures to prevent flooding of well pads and for use in assisting with site selection was included in the EMP. The interest holder has committed to implementing the recommendations of the report, and will undertake inspection and maintenance of erosion and sediment controls after rainfall events.

Site selection was informed by ecological field surveys and specific mitigations are included to avoid impacts to important habitat and avoid clearing listed (near-threatened) flora. Two well sites were moved (PV-12 and WM27) to minimise impacts to listed species and important habitat. The NT EPA has recommended the interest holder provide DEPWS an annual summary of progressive rehabilitation outcomes.

A detailed archaeological survey conducted at each location has concluded there is a low risk of harm from conduct of the activity, and the interest holder will establish buffered exclusion zones at known sites of archaeological heritage.

The EMP aligns with the requirements of the Code, including tracking of water use and wastewater generation and movement. The NT EPA has assessed the potential for spills from chemicals and hydrocarbons (e.g. diesel) stored in designated bunded areas at each location. The mitigations described in the EMP include bunding around chemical storage areas, installation of a drain around the chemical mixing area and drilling fluid tanks that terminates in the lined drill sump, containment of hydrocarbons in double-lined diesel storage tanks and spill prevention and response procedures for hazardous spill prevention, monitoring, assessment, response and clean-up, in accordance with the Code of Practice. The NT EPA has recommended the interest holder provide DEPWS with a written report of any contaminant incidents exceeding 200 litres, within 24 hours of the incident being detected.

The EMP commits to balancing stored volumes of chemicals on site, against the need for frequent transport of chemicals to the site, which is a non-mandatory preferred approach outlined in the Code. Transport, handling, storage and use of chemicals is to be undertaken in accordance with the Code. The EMP includes a risk assessment related to transport of chemicals to site during the wet season, which concludes there is a low risk of environmental harm with implementation of the proposed management measures. In addition, the interest holder has proactively included a Wet Season Management Plan, which provides specific additional controls for conduct of the regulated activity during the wet season.

The proposed environmental outcomes are likely to be achieved based on the best available information on the nature and scale of the activity, and the environment in which the regulated activity will be conducted. The studies undertaken by the interest holder to inform the EMP affords the interest holder with a detailed and reliable knowledge of the potential environmental impacts and risks and the most appropriate measures for mitigation of those impacts and risks.

The NT EPA is of the view that the evidence-based decision-making principle has been considered in assessing the regulated activity and that in the circumstances, decisions can be based on best available evidence that is relevant and reliable.

2.4 Principle of inter-generational and intra-generational equity (s 21 *Environment Protection Act 2019* (NT))

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.

Protection of cultural values is achieved through compliance with the requirements of Authority Certificates issued by the Aboriginal Areas Protection Authority. There is limited potential for disturbance to archaeological heritage as the recommendations resulting from detailed surveys conducted to inform the EMP will be implemented. This includes establishing exclusion zones and seeking authorisation under the *Heritage Act 2011* (NT) to relocate the finds outside of the disturbance area at PV-12. A chance-find procedure will be implemented should further artefacts be discovered during site clearing.

The proactive measures included in the EMP regarding bushfire and weed management (such as fuel monitoring and weed surveys and control) will have an overall positive impact on the condition of the environment for future generations. In addition, the EMP commits the interest holder to progressive rehabilitation throughout the life of the activity which, combined with the Code requirements, is considered to reduce the risks to biodiversity and soil contamination to ALARP and acceptable levels.

The regulated activity will improve production potential in the Amadeus Basin, thereby also continuing to provide social and economic benefits to current and future generations of the Aboriginal landholders. Ongoing engagement with pastoralists and traditional owners and their level of satisfaction with the interest holder's activities shows the interest holder plans to avoid leaving a lasting negative legacy for future generations.

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.

2.5 Principle of sustainable use (s 22 *Environment Protection Act 2019* (NT))

Exploration is necessary to enable commercial appraisal of resources. The interest holder has committed to minimise use of resources where possible.

Cumulative use of groundwater resources was considered in the EMP. The interest holder is limiting its use of groundwater during the activity to only two locations – OL4 (west Mereenie Field) and EP82 (Orange). All other water requirements will be commercially acquired (approximately 10.5 ML per annum in total). The interest holder has applied for an extraction licence for 52.8 ML per annum from the Mereenie Sandstone aquifer, which includes the 2.15 ML per annum that may be required for this activity at OL4. Groundwater extraction at Mamlambo-1 is also from the Mereenie Sandstone aquifer, and the estimated 1.41 ML required per annum represents a 0.01% increase on the total existing extraction of approximately 11,400 ML per annum from the Mereenie aquifer by all users.

A conservative estimate of greenhouse gas emissions likely to be generated by the activity is approximately 18,265 tonnes of carbon dioxide equivalent (tCO_2-e) per annum, generated from land clearing, flaring and diesel combustion. The proposed flare is 98 % efficient in combustion of methane. This emissions represent approximately 0.11% of the total estimated annual greenhouse gas emissions for the NT (16 million tCO_2-e for 2018, Department of Industry, Science, Energy and Resources, May 2020) and an overall increase of 33% per annum of current emissions from the interest holder's activities in the Amadeus Basin. The NT EPA notes that the Government has committed to implementing all recommendations of the Hydraulic Fracturing Inquiry, including that the NT Government seeks to ensure there is no net increase in the lifecycle GHG emissions emitted in Australia from any onshore petroleum produced in the NT.

The NT EPA is of the view that the sustainable use principle has been considered in assessing the regulated activity.

2.6 Principle of conservation of biological diversity and ecological integrity (s 23 *Environment Protection Act 2019* (NT))

The potential impacts and risks to threatened flora and fauna species from the regulated activity have been adequately assessed in the EMP, with measurable environmental outcomes and environmental performance standards included. The EMP was informed by desktop assessments and an ecological survey at each location, with the survey area covering between 12 and 44 hectare areas, compared to the much smaller area proposed to be disturbed (between 2.6 and 5.57 hectares, and 25.71 hectares in total). This provided flexibility for the interest holder to change the location of well pads, access tracks and flowline corridors based on the outcomes of the surveys.

The five petroleum interests occur within the Finke (Dingo-1 ST1, Dingo-5, Orange-3), MacDonnell Ranges (PV-12 and edge of WM-28) and Great Sandy Desert (WM-27, WM-28, Mamlambo-1) bioregions. None of the proposed locations include groundwater dependent ecosystems or are declared ecological communities under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The key ecological features identified are as outlined in Table 2.

Table 2: High Value Features of Well Locations and Mitigations

Well Location	High Value Features	Mitigations
PV-12	• Located within the Greater MacDonnell Ranges Site of Conservation Significance (SOC), which is recognised as internationally significant and has high ecological value based on the number of threatened and endemic species, particularly short-range endemics and the permanent water sources which act as habitat refuges • Located in the Palm Valley Site of Botanical Significance, which is nationally important due to the number of species of conservation significance and endemic species in the area • Sits on a plateau which leads to important gully habitat that likely feed tributaries linked to riverine channels lower in the landscape and significant riparian vegetation • Contains two Near Threatened flora species (*Eucalyptus lucens* and *Stenanthemum centrale*) as per the *Territory Parks and Wildlife Conservation Act 1976* (NT) (TPWC Act); only a single *E. lucens* specimen was within the proposed clearing area and *S. centrale* was patchily scattered throughout the proposed clearing area • May contain suitable habitat for the Slater's Skink (*Liopholis slateri*) along roadside spoon drains, which is listed as Vulnerable under the TPWC Act, as it is known to occur within other areas on the plateau, including near PV-2, near the Palm Valley Gas Field headquarters and drains associated with the main access road	The interest holder has: • committed to undertake a survey of Slater Skinks along access tracks prior to widening or maintenance activities • relocated the well pad which resulted in a reduction in clearing of near threatened flora species • committed to avoiding disturbance to gully areas and has included a 25 m vegetation buffer between the well pad and the gully areas Both *E. lucens* and *S. centrale* are relatively common in the surrounding Krichauf and James Ranges.
WM-27	• Located on the edge of the Lay Cock's Sandplain Site of Botanical Significance, which has 'bioregional' significance due to the number of endemic and restricted range species in the area • May contain suitable habitat in the low dunes and sand hills for the Southern Marsupial Mole (*Notorcytes typhlops*), which is listed as Vulnerable under the TPWC Act	The interest holder has: • committed to avoiding disturbance of potential habitat for the Marsupial Mole in WM-27 and WM-28 • relocated the well pad for WM-27 which has resulted in avoidance of an impact to a near threatened flora species and dune habitat
WM-28	• Located on the edge of the Mereenie Site of Botanical Significance, which has 'bioregional' significance due to the number of endemic and restricted range species in the area • Includes rocky breakway considered to be locally important refugia for native species • May contain suitable habitat in the low dunes and sand hills for the Sothern Marsupial Mole (*Notorcytes typhlops*), which is listed as Vulnerable under the TPWC Act	
Mamlambo-1	• May contain suitable habitat in the sandplain areas for the Greater Bilby (*Macrotis lagotis*) and Brush-tailed Mulgara (*Dasycercus blythi*) (both Vulnerable)	Comprehensive tracking surveys did not record previous/current occupation of these species.

Other fauna species which may occur sporadically in the region include the Grey Falcon (*Falco hypoleucos*) and Princess Parrot (*Polytelis alexandrae*) (both Vulnerable), but no specific mitigations are required for these species, beyond those already being implemented under the Code.

The DEPWS Flora and Fauna Division is satisfied that that the regulated activity do not pose a significant risk to threatened species, important habitats or significant vegetation types. Further, that the mitigation controls identified in the EMP are adequate to reduce risks associated with vehicle strike, dust, erosion and/or spills to as low as reasonably practicable, in relation to potential impacts on biodiversity. Cumulative impacts to flora and fauna and their habitat from the regulated activity are not considered to be significant. In recognition of environmental sensitivities present at some locations, the NT EPA has recommended the interest holder provide DEPWS with geospatial files showing the extent of land disturbance at each location.

The disturbance area for the regulated activity is less than 6 ha at each location, inclusive of well pads, access tracks and flowline corridors. The amount of clearing required has been reduced to the greatest extent possible through using existing tracks and seismic lines and siting well pads on disturbed areas, where possible. The interest holder assessed the proportion of each petroleum interest that will be subject to new land clearing and determined it ranged from 0 to 0.07%.

The EMP outlines measures to minimise impacts on affected environmental values, including the management of threatening processes such as weeds and fire. Where relevant, management measures for the aforementioned threatening process are consistent with the requirements of the Code, NT Land Clearing Guidelines and Weed Management Planning Guideline: Onshore Petroleum Projects. Specific precautions to ensure interaction with wildlife is avoided are included in the EMP, including installation of fencing around the flare pits, appropriate storage of waste and use of speed limits and avoidance of driving on unsealed roads after significant rainfall.

The NT EPA considers that implementation of, and compliance with, the EMP will ensure the conservation of biological diversity and ecological integrity is not impacted by the regulated activity.

2.7 Principle of improved valuation, pricing and incentive mechanisms (s 24 *Environment Protection Act 2019* (NT))

The interest holder is 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 disposal of waste, commercial purchase of groundwater, and progressive rehabilitation of all disturbed areas to an acceptable standard, are at the cost of the interest holder. The interest holder is required to provide an adequate environmental rehabilitation security bond to indemnify the NT Government. This is based on an assessment by DEPWS of the estimated rehabilitation cost, to be supported by independent contractor quotes' submitted by the interest holder.

The NT EPA is of the view the principle of improved valuation, pricing and incentive mechanisms has been considered in assessing the regulated activity and is based on the interest holder bearing any environmental costs for the activity.

3. 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 identified measures to avoid impacts on environmental values, informed by a baseline studies and surveys at each location.

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 considered in the EMP are:

- impacts to groundwater quantity through incomplete cement placement or casing failure, cross flow of water and/or gas from deeper formations into a utilised aquifer, excessive groundwater extraction, groundwater inflow during drilling and loss of containment of wastewaters or chemicals
- impacts to groundwater quality through cross flow of water and/or gas from deeper formations into a utilised aquifer, uncontrolled discharge of formation water or hydrocarbons to groundwater, loss of containment of wastewaters or chemicals and loss of drilling fluids into a utilised aquifer
- impacts to surface water quality resulting from earthworks, loss of containment of wastewaters or chemicals, erosion and sediment releases, runoff from treated effluent irrigation areas and flooding
- impacts to land and soil from soil compaction, lack of preservation of topsoil, erosion in cleared areas, loss of containment of wastewaters or chemicals and failure of flowlines
- impacts to air quality from generation of dust and emissions from accidental bushfire ignition
- increase in greenhouse gas emissions from flaring, loss of containment of gas, infrastructure gas leaks, unplanned venting, emissions from diesel combustion, land clearing and release of volatile organic compounds during use and mixing of chemicals
- impacts to fauna and flora, resulting from land clearing, vehicle movements, loss of containment of wastewaters or chemicals, fire, weeds, erosion, fauna entrapment in sumps and increase in pest species
- impacts to cultural heritage resulting from unauthorised access to exclusion areas
- impacts to sensitive receptors and local communities resulting from fire, inadequate or lack of stakeholder engagement, increase in traffic, noise and light emissions, introduction of weeds, inadequate rehabilitation and industrialisation of the landscape.

The EMP also considers cumulative impacts to groundwater, flora and fauna, loss of habitat, greenhouse gases, local amenity (traffic and visual amenity) and increase in competition for labour services and concludes the cumulative impacts are not significant.

The EMP includes an analysis of additional workforce numbers required and additional vehicle movements. The workforce for civils, surface infrastructure installation and rehabilitation works is to be locally sourced. Two rotating specialist drilling crews will likely be sourced interstate, to support 24 hour a day operations. The interest holder has a NTG approved COVID-Safe plan.

Traffic increases associated with conduct of the regulated activity were assessed against regional annual 2019 data and traffic flows on public roads and are not considered significant (Section 4.8.6). At peak there will be approximately 20 additional vehicles per day (~ 40% being heavy vehicles). Average daily traffic additions during the remainder of the project period are likely to be 10-15 movements per day for the first two weeks, reducing down to three-four movements for the remainder of the period.

The EMP has considered the hierarchy of controls (elimination, substitution, engineering, administration) and provided demonstration of why the controls to be implemented are considered ALARP and acceptable. Of the 44 environmental risks identified by the interest holder, 34 are considered ‘low’ risk, and therefore are ALARP and acceptable. The remaining 10 risks are considered ‘medium’ and the interest holder has included mitigations that can/will be implemented such that the risks will therefore be managed at levels that are ALARP. Specifically:

1. Reduction in groundwater levels from wellbore failure leading to impaired capacity of surrounding groundwater bores and reduced environmental flows in connected rivers and springs: the interest holder has committed to adhere to the requirements of the Code, and install multiple barriers across aquifers to ensure isolation. Cement log bonds and pressure testing will occur for each string, to confirm that barriers have met design requirements. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

2. Local contamination of groundwater aquifers from crossflow of water and/or gas from deeper formations into a utilised aquifer: the interest holder has committed to adhere to the requirements of the Code, and install multiple barriers across aquifers to ensure isolation. Cement log bonds and pressure testing will occur for each string, to confirm that barriers have met design requirements. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

3. Local contamination of groundwater aquifers from uncontrolled discharge of formation water/hydrocarbon: the interest holder has committed to adhere to the requirements of the Code, and install multiple barriers across aquifers to ensure isolation. Cement log bonds and pressure testing will occur for each string, to confirm that barriers have met design requirements. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

4. Loss of long term soil productivity and viability from soil compaction leading to failure of rehabilitation, landowner complaints and additional cost to remediate: the rehabilitation management plan has been designed to ensure disturbed areas are returned to pre-disturbance land capability. The interest holder has committed to undertake progressive rehabilitation in those areas not required for future use, inclusive of deep ripping to reduce the effects of compaction and preservation of topsoil and cleared vegetation for respreading. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

5. Significant decrease in population of conservation significant flora and fauna from land clearing: The interest holder used desktop research and a baseline ecological assessment to determine the presence or absence of significant fauna and flora, and habitat. This allowed site selection for well pads, access tracks and flowline corridors to be sited such that impacts are limited. The interest holder has also used existing disturbed areas (such as old seismic lines) to the greatest extent possible, to reduce areas requiring clearing. Exclusion zones with buffers will be instated to protect significant flora, fauna and habitat, and impacts have been avoided at all locations apart from removal of a single individual of a near threatened *Eucalyptus lucens* in PV-12, and a small number of a near threatened shrub scattered on the plateau at PV-12. An assessment of the significance of these losses on overall population viability was deemed to be low, as the species are relatively common throughout the gullies below the plateau. In addition, the interest holder has committed to undertake further ecological assessments where it is determined access tracks to PV-12 require maintenance, to avoid inadvertent destruction of Slater Skink (listed as vulnerable) burrows, known to occur in spoon drains. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

6. Significant decrease in population of conservation significant flora and fauna from introduction or spread of weeds from movement of vehicles and earthworks: The interest holder requires all vehicles and equipment to be cleaned and inspected prior to mobilisation to the locations and conducts ongoing weed surveys and control programs. Baseline weed assessments did not detect any declared weed species at any location. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

7. Significant decrease in population of conservation significant flora and fauna from occurrence of bushfire as a result of conduct of the regulated activity: The interest holder has incorporated design features to each site which minimise the risk of accidental ignition from flaring, including use of horizontal in-ground flares and flare pits which allow for a buffer. Cleared vegetation will be stockpiled and have surrounded by a 4 m firebreak, and no flaring is permitted on designated fire ban days. Portable fire-fighting equipment will be available at each site, and onsite personnel are trained in its use. The interest holder also maintains ongoing communications with stakeholders (e.g. pastoralists, local communities) to ensure consistency with regional fire management strategies. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

8. Reduction in conservation significant flora and fauna from occurrence of bushfire as a result of conduct of the regulated activity: As per risk 7 above, the interest holder has a range of mitigations to limit the likelihood of occurrence of accidental bushfire. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

9. Unauthorised disturbance to Aboriginal Sacred Sites or culturally sensitive sites: The interest holder has obtained Authority Certificates from the Aboriginal Areas Protection Authority and undertaken site clearances in consultation with the Central Land Council, which has identified restricted work areas. Baseline archaeological assessments identified areas of archaeological importance, which will be protected by buffered exclusion areas at all locations apart from one site at PV-12, which the interest holder has applied to relocate under the *Heritage Act 2011* (NT). Inductions for all personnel will highlight the importance of cultural heritage and the location of exclusion areas to prevent unauthorised access. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

10. Reduction in productivity of land from introduction and spread of weeds: As per risk 6 above, the interest holder range will implement a range of mitigations to limit the likelihood of introduction and spread of weeds to the work sites. The 'medium' risk ranking is based on the likelihood being considered 'remote', but the consequence of the event occurring being considered 'serious'.

Erosion and sedimentation at each location will be managed through site-specific secondary Erosion and Sediment Control Plans, to prevent lasting erosion occurring at the interest holder's facilities. The Wet Season Management Plan provides additional mitigations for erosion and sediment control during the wet season. The NT EPA considers that the measures in place will limit erosion and sedimentation risks to ALARP and acceptable levels.

The Wastewater Management Plan includes the requirements from the Code and additional measures, such as inclusion of drainage lines to the lined sump to avoid spread of hazardous material should an incident occur. An Emergency Response Plan will be implemented, which includes event response measures for loss of containment or other major spills, flooding and fire. Evacuation and site readiness protocols are incorporated into standard operating procedures, including the evacuation of non-essential personnel. The Spill Management Plan considers immediate corrective actions for onsite spills, and storage of chemicals or hazardous materials is in fit-for purpose storage facilities. The measures provided are appropriate to the nature and scale of the activity, and if implemented, the residual risk to the environment is likely to be acceptable. In recognition of environmental sensitivities present at some locations, the NT EPA has recommended the interest holder provide DEPWS with a written report of loss of containment of contaminants exceeding 200 litres, within 24 hours of the incident being detected.

The NT EPA considers that all reasonably practicable measures will be used to control the environmental impacts and risks, considering the level of consequence and the resources needed to mitigate them, and the nature, scale and location of the regulated activity. The NT

EPA considers that the environmental impacts and risks will be reduced to a level that is ALARP and acceptable, considering the sensitivity of the local environment, relevant standards and compliance with the Code.

4. Relevant matters raised through public submissions

Public consultation on the EMP was required under regulation 8A. The EMP was made available for public comment for 28 days from the 4 September to 2 October 2020 on the DEPWS website, in the NT News and online via the Centralian Advocate. A single submission was received from the Arid Lands Environment Centre in the NT. Table 2 outlines the issues raised and the NT EPA response.

Table 2: Relevant matters raised in the public submission

Theme	Issues raised	Response
Regulation	Grouping drilling at five locations under one EMP is inconsistent with regulation 8(2) of the Regulations, which states *a plan must relate to only one regulated activity, regardless of whether the activity it so be carried out in one or more locations* and five separate EMPs should have been submitted by the interest holder.	Regulation 8(2) does not disallow inclusion of multiple locations in one EMP Further, regulation 8(5) allows for more than one regulated activity to be included in an EMP. There is no requirement for the interest holder to submit five separate EMPs
Cumulative impacts	Providing only one EMP for five different locations is an attempt by the interest holder to downplay cumulative and climate impacts of five separate projects.	The interest holder has clearly set out the potential environmental impacts and risks at each location, and included an assessment of cumulative impacts. The EMP provides adequate consideration of contribution to greenhouse gases, taking into account total emissions from flaring, land clearing and diesel combustion. The EMP is transparent on the contribution of greenhouse gases from conduct of the regulated activity and overall represents an increase in 0.11% of greenhouse emissions in the NT.
Expansion of petroleum exploration and development in the Amadeus Basin	Expansion of oil and gas exploration and development in the Amadeus Basin as it runs counter to the definition of Ecologically Sustainable Development as outlined in the *Environment Protection Act 2019* (NT).	The principles of ecological sustainable development are considered by the Minister when making approval decisions. Ecological sustainable development does not preclude development of the petroleum industry.

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. The EMP includes an estimate of duration of the regulated activity, but at the time of preparation the exact timing of each activity

is not known. To meet this requirement, the NT EPA has provided advice that the interest holder be required to submit an updated timetable for the regulated activity prior to commencement. The timetable should address all aspects of the activity and include, but not be limited to, dates for the implementation of commitments and should be updated quarterly or as other constraints, such as seasonal weather forecasts or travel restrictions emerge.

CONCLUSION

The NT EPA considers that, subject to the consideration of 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 Central Petroleum Ltd be approved, the following conditions be considered:

***Condition 1*:** The interest holder must submit to the Department of Environment, Parks and Water Security (DEPWS):

i. an timetable (including time-bound commitments) for the regulated activity prior to the commencement of the activity and each quarter thereafter;

ii. daily on-site reports indicating the status and progress of vegetation clearing and drilling, and the freeboard available in drilling sumps;

iii. a five-day activity forecast for the duration of the activity during the wet season (1 October – 30 April each year);

iv. written notification of any halt to the activity due to wet season conditions, within 24 hours of the halt; and

v. immediate written notification of any fires potentially threatening the activity from external or internal sources.

Condition 2: In the event of any accidental release of contaminants that exceeds 200 litres (for liquids), the interest holder must provide a written report to DEPWS within 24 hours of the incident being detected. The report must include:

i. details of the incident specifying material facts, actions taken to avoid or mitigate environmental harm;

ii. the corrective actions taken, including the volume and depth of any impacted soil removed for disposal; and

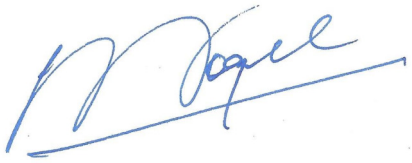
iii. any corrective actions proposed to be taken to prevent recurrence of an incident of a similar nature.

'Contaminant' is defined in section 117AAB(1) of the *Petroleum Act 1984* (NT).

Condition 3: The interest holder must provide an annual report to DEPWS on its environmental performance, in accordance with item 11(1)(b) in schedule 1 of the Petroleum (Environment) Regulations 2016 (NT). The first report must cover the 12 month period from the date of the approval, and be provided within three calendar months of the end of the reporting period. The annual environmental performance report must align with the template prepared by DEPWS for this purpose.

Condition 4: In support of Schedule 1, item 11 of the Regulations and clause A.3.4 of the Code,

the interest holder must provide to DEPWS geospatial files showing land disturbance footprints within 60 days of completion of each land clearing activity or within 6 months of approval of this EMP, whichever occurs first.



PAUL VOGEL AM

CHAIRPERSON

NORTHERN TERRITORY ENVIRONMENT PROTECTION AUTHORITY

25 NOVEMBER 2020