

26 April 2024

Environment Protection Authority
Level 1, Arnhemica House
16 Parap Road, Parap NT

Dear EPA,

Imperial Oil & Gas Pty Ltd is proposing the Carpentaria Pilot Program

1. The Environment Centre NT is the peak community sector environment organisation in the Northern Territory of Australia, raising awareness amongst community, government, business and industry about environmental issues, holding government to account over environmental governance, and supporting community members to participate in decision-making processes and action.

Executive summary

2. We refer to the statutory notice published by the Northern Territory Environment Protection Authority (**NT EPA**) on 26 March 2024 in respect of the Carpentaria Pilot Production Project (**Project**), including:
 - a. A referral form (**Referral Form**);
 - b. The referral documents (in three parts) (**Referral Documents**); and
 - c. The Draft Environment Management Plan submitted by Imperial (**EMP**).¹
3. The Project has been referred under s 48 of the *Environment Protection Act 2019* (**EP Act**) as an action that has the potential to have a significant impact on the environment, and was accepted for standard assessment.² Imperial Oil & Gas (**Imperial**) proposes to commence a hydraulic fracturing exploration and appraisal testing program in Exploration Permit (**EP**) 187, including the drilling of up to 10 new wells and up to 4 new well pads, drawing 750ML of water per year from up to nine new and five existing bores.³ Imperial estimates the total scope 1 emissions to be approximately 180,381 tCO₂-e (approximately 30,000 tCO₂-e per year) if it is granted approval by the Minister for Mining and Industry to recover and export, rather than vent,

¹ We note this appears to be a different EMP as compared to the EMP submitted to the Minister for Environment for approval.

² NT EPA, *Notice of Decision*, 14 March 2024.

³ EMP, 8.

appraisal gas.⁴ It does not estimate scope 3 emissions if the gas is sold, but does state that flaring would result in around 475,000 tCO₂-e per year.⁵ If approved, this would be the first time gas from the Beetaloo Sub-basin (**Beetaloo**) has been sold.

4. The purpose of the Project is to support Imperial's development of full-scale production of shale gas within EP 187.⁶ Imperial's entire holdings within the Beetaloo are estimated to be more than 47 trillion Standard Cubic Feet-equivalent of 2U (mid prospective resource). It plans to export gas from the Beetaloo to the east coast by working with the APA Group to build a pipeline which connects the Carpentaria Gas Pipeline to Mount Isa.⁷
5. Through the Project, Imperial intends to expand Beetaloo production throughout the second half of this decade and estimates it will reach 1 billion ft³ / day (~1055 TJ / day) by 2028.⁸ The eventual burning of this fuel would emit 54,364 tCO₂-e emissions per day, or 19,842,914 tCO₂-e per year, not including any flared CO₂, fugitive methane, land clearing, burning of diesel of fracking equipment, gas compression, leakage from wells, pipelines or storage, transport-related emissions or end use combustion.
6. Imperial has stated that it plans to begin by supplying the state-owned Power and Water Corporation in the Northern Territory (with whom it has an MOU)⁹ and the Australian east coast markets, before expanding into Asian LNG markets such as Japan, South Korea, China, India and Qatar.¹⁰ To support this expansion, Imperial raised \$46.8 million to support drilling and development in the Beetaloo.¹¹ In mid-April 2024, Imperial's holding company announced the sale of its American shale gas assets, with its managing director stating the company 'will be a pure-play Beetaloo / McArthur Basin focused developer'.¹²

⁴ Referral Documents, 139.

⁵ EMP, 5.

⁶ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 <<https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>, 13.

⁷ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 <<https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>, 26.r

⁸ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 <<https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>, 13, 22.

⁹ Empire Energy, *Gas Sales and Transportation MOU Executed with Power and Water Corporation*, 1 November 2021 <https://app.sharelinktechnologies.com/announcement/asx/f5df0e33dc86427dd368ddbde18f960e>

¹⁰ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 <<https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>.

¹¹ Empire Energy 'Successful Capital Raise' 17 April 2024 <https://app.sharelinktechnologies.com/announcement/asx/d62cf51c0f180271a93ff923171b2771>

¹² Andrew Duffy, 'Empire cashes out of US assets to focus on Beetaloo gas production' *The Sydney Morning Herald* (12 April 2024) <https://www.smh.com.au/business/companies/empire-cashes-out-of-us-assets-to-focus-on-beetaloo-gas-production-20240412-p5fjg2.html>.

7. In order to sell appraisal gas, Imperial proposes to construct a gas plant and water handling station in EP 187.¹³ In December 2023, Imperial acquired AGL Limited’s Rosalind Park Gas Plant, a gas processing facility with a capacity of 42 TJ / day.¹⁴ It plans to refurbish the plant and reconstruct it, on site, for the Project, to support its plans to commence gas production in 2025 at a pilot rate of at least 25 TJ / day.¹⁵ This represents a significant increase in petroleum infrastructure in the Beetaloo, and the first time that Beetaloo gas will be sold. In April, an NT Government media release stated that Imperial plans to first sell appraisal gas to the Northern Territory market.¹⁶
8. In the referral form identifies that Imperial considers that the Project only has the potential to have a significant impact on ‘atmospheric processes’ within the NT EPA’s environmental factors and objectives (**NT EPA Factors and Objectives**).¹⁷
9. The Environment Centre of the Northern Territory (**ECNT**) is the peak body for conservation in the NT, with over 7,000 supporters. ECNT has considerable concerns about the Project, which has the potential to have a significant impact on the environment.
10. In summary, ECNT submits:
 - a. The NT EPA must accept the Project for environmental impact assessment (**EIA**) based on its potential to have a significant impact on climate change and water and land, due to the risks to NT EPA environmental objectives related to atmospheric processes, hydrogeological processes and inland water environmental quality, and inland water environmental quality;
 - b. The method of EIA must be by way of environmental impact statement report due to Imperial’s failure to identify all potential significant impacts of the Project and the vast information and data gaps present in the Referral Documents provided by Imperial; and
 - c. There is a lack of community interest in the Project being approved.
11. This submission is divided into two sections: Part A, Background, which sets out the details of the Project and the NT EPA’s task in determining that the Project required an EIA and the level

¹³ EMP, 21.

¹⁴ Empire Energy ‘Empire acquires gas processing facility’ (4 December 2023) <<https://app.sharelinktechnologies.com/announcement/asx/1589425137249f568bf375029863e6c2>>.

¹⁵ Empire Energy ‘Empire acquires gas processing facility’ (4 December 2023) <<https://app.sharelinktechnologies.com/announcement/asx/1589425137249f568bf375029863e6c2>>.

¹⁶ Eva Lawler, Mark Monaghan, ‘Economic confidence in the Beetaloo Basin Grows’ (17 April 2024).

¹⁷ Referral Documents, 16; NT EPA, ‘NT EPA Environmental factors and objectives’ 22 May 2022 https://ntepa.nt.gov.au/_data/assets/pdf_file/0020/804602/guide-ntepa-environmental-factors-objectives.pdf.

of assessment, and Part B, which sets out ECNT’s submissions in relation to the requirement for an EIA and the level of assessment required.

PART A. BACKGROUND

12. Imperial, through its wholly owned subsidiary Empire Energy Group (**Empire**), commenced exploration and appraisal in EP 187 in 2019. It has drilled two wells at two separate sites within EP 187. Based on extended production testing results Imperial proposes to expand its activities in EP 187 and move to an appraisal stage and pilot production stage of exploration, through the Project.¹⁸
13. On 18 March 2024 Imperial submitted the Carpentaria Pilot Production EP 187 Environment Management Plan (**EMP**) to the Department of Environment, Parks and Water Security (**the Department**). The Department published the EMP on its website on 22 March 2024, which commenced a 28-day public comment period, ending on 19 April 2024.

Project proposal and referral

14. Imperial plans to significantly escalate its exploration and appraisal activities in EP 187 and associated infrastructure, with the EMP seeking approval to:¹⁹
 - a. Construct four new well pads, tripling the number of well pads;
 - b. Drill 10 new wells, in addition to the two existing wells;
 - c. Clearing 226ha of land for well pads, access tracks, gas and wastewater flow lines, gravel pits, and campsite;
 - d. A 60km gas gathering network;
 - e. Construct a Gas Plant, and connect that plant to the McArthur River Gas Pipeline;
 - f. Construct a wastewater handling station;
 - g. Construct nine new groundwater extraction bores, in addition to the five existing bores;
 - h. Extract 750ML of water per year;
 - i. Frack and extract appraisal gas from the 12 wells, resulting in approximately 180,381 tCO₂-e of total scope 1 emissions²⁰ and, and a further approximately 2,860,000

¹⁸ Empire Energy Group, *Empire Energy Carpentaria Pilot Production Project* (November 2023) <<https://empireenergygroup.net/wp-content/uploads/Carpentaria-Project-Document-EEG-FINAL-NOV-2023.pdf>>.

¹⁹ Referral Documents, 25-26,45.

²⁰ Referral Documents, 39.

tCO₂-e that will either be scope 1 or 3 emissions depending on whether the gas is flared or sold..²¹

15. Imperial has only identified that there are potential significant impacts from the Project because of the impacts of emissions on 'atmospheric processes'.²² Imperial submits that if it is granted approval to recover petroleum on an appraisal basis under s 57AAA of the *Petroleum Act 1984* (NT) that the Project's Scope 1 emissions will be reduced to under the threshold of 100,000 tCO₂-e per year, as set out in the NT Greenhouse Gas Emissions Management for New and Expanding Large Emitters.²³

Legislative and policy framework

16. The EP Act sets out the framework for EIA of proposed actions such as the Project. Key aspects of the EP Act include:

- a. The objects of the EP Act, which are set out in s 3 and must be applied by the NT EPA. These include protection of the environment, promotion of ecologically sustainable development (**ESD**), community involvement and recognition of the role of Aboriginal people as stewards of country.
- b. The principles of ESD, which are defined in Part 2, Division 1 and must be applied by the NT EPA.
- c. The environmental decision-making hierarchy, which is set out in s 26 and must be applied by the NT EPA.
- d. The purpose of EIA, which is set out in s 42 of the EP Act.

17. Relevantly for the EPA in considering whether to accept the referred Project for an EIA the EP Act defines 'significant impact' as follows:

A significant impact of an action is an impact of major consequence having regard to:

- (a) the context and intensity of the impact; and
- (b) the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact.

18. It further defines 'impact' in s 10 of the EP Act as follows:

(1) An impact of an action is:

- (a) an event or circumstance that is a direct consequence of the action;
- or

²¹ Referral Documents, 36.

²² Referral Form, 6.

²³ Referral Form, 3.

(b) an event or circumstance that is an indirect consequence of the action and the action is a substantial cause of that event or circumstance.

(2) An impact may be a cumulative impact and may occur over time.

Determining whether a referred action requires environmental impact assessment

19. Section 55 of the EP Act sets out the process by which the NT EPA consider the referral of an action. The NT EPA's task is to determine whether a referred action has the potential to have a significant impact on the environment.²⁴ In making that determination, the NT EPA must consider any applicable environmental objectives, and any other statutory decision-making processes that may mitigate potential environmental impacts of the action.²⁵ The EPA must consider and deal with the referral in accordance with the *Environmental Protection Regulations 2020 (NT) (EP Regulations)*.
20. Division 3 of Part 4 of the EP Regulations set out how the NT EPA must deal with referrals of proposed actions under s 48 of the EP Act.²⁶ In relation to a proponent-initiated referral of an action, such as the referral for the Project, the NT EPA may decide:²⁷
- a. That an environmental impact assessment (**EIA**) is not required; or
 - b. That a standard assessment is required and the method of EIA required.
21. Before making a decision, the NT EPA must consider the accepted referral, any additional information provided to the NT EPA and submissions made in response to the public consultation period.²⁸ Pursuant to s 55(5) if the NT EPA determines that the action has the potential for a significant impact, it must:
- a. Determine that an environmental impact assessment is required for the action; or
 - b. Recommend the Minister refuse to grant approval of the referred action, if it considers that the action is likely to have significant impacts which cannot be appropriate avoided, mitigated or managed.

Method of environment impact assessment

22. Reg 5 of the EP Regulations sets out the methods of environmental impact assessment. There are four potential methods of environmental impact assessment:
- a. Assessment by referral information;
 - b. Assessment by supplementary environmental report;

²⁴ EP Act, s 55(2).

²⁵ EP Act, s 55(3),(4).

²⁶ EP Regulations, reg 54.

²⁷ EP Regulations, reg 58.

²⁸ EP Regulation, reg 56.

- c. Assessment by environmental impact statement;
 - d. Assessment by inquiry.
23. To determine the method of assessment for a referral, the NT EPA is required to have regard to the criteria in r 59, being:
- a. the significance of the potential impact of the proposed action;
 - b. the level of confidence in predicting potential significant impacts, taking into account the extent and currency of existing knowledge;
 - c. the level of confidence in the effectiveness of any proposed measures identified in the referral to avoid, mitigate or manage potential significant impacts of the proposed action;
 - d. the extent of community engagement that has occurred in relation to the proposed action;
 - e. the capacity of communities and individuals likely to be affected by the proposed action to access and understand information about the proposed action and its potential significant impacts.

NT EPA Factors and Objectives

24. The NT EPA Factors and Objectives have been formulated as indicators against which to assess whether the environmental impact of a proposed action may be significant and ultimately whether it is likely to be acceptable.²⁹ The NT EPA Factors and Objectives were created in lieu of the Minister declaring environmental objectives under the EP Act and EP Regs, which would have had flow on effects to decision makers, proponents and the EPA.³⁰

Method of assessment

25. There are four methods of EIA which may be carried out separately, or with another method.³¹

They are by:

- a. Referral information which requires the EIA to be based upon information provided in the referral and additional information, submissions or advice provided during the submission period on the referral.³² This process provides no further public comment or submission period, following the referral submission period.

²⁹ EPA, *NT EPA Environmental factors and objectives: Environmental impact assessment general technical guidance* (22 May 2022) https://ntepa.nt.gov.au/_data/assets/pdf_file/0020/804602/guide-ntepa-environmental-factors-objectives.pdf 5, 6.

³⁰ EPA, *NT EPA Environmental factors and objectives: Environmental impact assessment general technical guidance* (22 May 2022) https://ntepa.nt.gov.au/_data/assets/pdf_file/0020/804602/guide-ntepa-environmental-factors-objectives.pdf 5, 6.

³¹ EP Regulations, reg 5(1),(2).

³² EP Regulations, reg 117.

- b. Supplementary environment report, which requires the proponent prepare a supplementary environment report which must include any information requested by the NT EPA.³³ This process provides a second public submission period, following publication of the supplementary environment report, and a possible further invitation for submissions, if the NT EPA so directs.³⁴
- c. Environmental impact statement, which requires the NT EPA to prepare draft terms of reference which are open for public consultation.³⁵ Once terms of reference are finalised, the proponent to prepare an environmental impact statement.³⁶ This is open for a further period of consultation.³⁷ The EP Regulations provide for the proponent to publish a supplement which responds to submissions, and a further period of public submissions responding to that supplement.³⁸ There is the possibility of further invited public submissions, should the proponent be directed to provide further additional information to the NT EPA.³⁹
- d. Inquiry, requires the NT EPA to prepare draft terms of reference which are open for public consultation.⁴⁰ A panel is then appointed to run the inquiry, with power to decide on the inquiry's procedure.⁴¹ An inquiry allows for a significant public input through written submissions and open inquiry hearings.⁴²

26. When deciding or recommending a method of environmental assessment, the NT EPA must have regard to the following criteria:⁴³

- a. the significance of the potential impact of the proposal;
 - b. the level of confidence in predicting potential significant impacts of the proposal taking into account the extent and currency of existing knowledge;
 - c. the level of confidence in the effectiveness of any proposed measures identified in the referral to avoid, mitigate or manage potential significant impacts of the proposal;
 - d. the extent of community engagement that has occurred in relation to the proposal;
- and

³³ EP Regulations, regs119-121.

³⁴ EP Regulations, regs 122-127.

³⁵ EP Regulations, reg 129.

³⁶ EP Regulations, regs 99, 129-132.

³⁷ EP Regulations, regs 130-134.

³⁸ EP Regulations, regs 138-139.

³⁹ EP Regulations, reg 143-145.

⁴⁰ EP Regulations, regs 99-102.

⁴¹ EP Regulations, reg 151.

⁴² EP Regulations, regs 152-154.

⁴³ EP Regulations, reg 59.

- e. the capacity of communities and individuals likely to be affected to access and understand information about the proposal and its potential significant impacts.

PART B. EIA REQUIRED AND LEVEL OF ASSESSMENT

The Project has the potential to have a significant impact on the environment

27. The EPA's central task in considering whether to accept the Project for an environment impact assessment is to determine whether the Project has the potential to have a significant impact on the environment. It is ECNT's submission that the Project has the potential to have a significant impact on the environment due to:

- a. Emissions generated through extraction of appraisal gas, whether flared or later sold, contributing the climate change. Based on the EMP and Referral Documents Imperial's emissions estimates for the Project are uncertain and are likely to have been under-estimated; and
- b. A high likelihood of wastewater being spilled or discharged into the environment, impacting soil, surface water and groundwater. These risks are compounded by Imperial's sub-standard wastewater management plans and lack of baseline data and plans for monitoring. Without this key information, it is impossible for experts, the public and the NT EPA to properly to understand all of the environmental risks and impacts of the activities on water, including the impact of groundwater extraction on the aquifer and the risk of inter-aquifer leakage. As a result, ECNT Submits the NT EPA should expand the remit of the environmental impact assessment as to include impacts related to land and waste and specifically on the following NT EPA Factors and Objectives: hydrological processes, inland water environmental quality and terrestrial environmental quality.

Potential significant impacts on climate change

28. Emissions from the Project will pose a risk of significant environmental impact on climate change, regardless of when they are emitted – as part of flaring or as a result of the subsequent sale and use of the appraised gas, or where they are emitted – within the NT or elsewhere. Imperial fails to properly account for all emissions of activities that are direct and indirect impacts of the Project and proposes no mitigation measures to ameliorate those impacts.

Uncertainty regarding maximum total emissions of the Project

29. The overall GHG emissions associated with the Project are significant. Imperial indicates various possible 'scenarios' regarding these emissions.

30. The first is if appraisal gas is flared. This flaring, at the expected rate of approximately 25 TJ/day during the appraisal phase would result in approximately 475,000 tCO₂-e of Scope 1 emissions annually: a total of 2,850,000 tCO₂-e).⁴⁴ Imperial assigns the risks associated with this impact as ‘high’ or ‘5’ – the highest risk rating for impacts associated with the Project in the event that gas is flared.
31. The alternative scenario proposed is one in which Imperial sells appraisal gas rather than flaring. In this scenario, Imperial provides estimates of the average yearly of scope 1 emissions from the Project to be approximately 30,000 tCO₂-e emissions annually or 180,381 tCO₂-e emissions total⁴⁵.
32. However, this scenario is uncertain. It is conditional on permission by the NT Minister of Mining and Industry for approval to recover petroleum on an appraisal basis under s 57AAA of the *Petroleum Act 1984* (NT) which has not yet occurred. Imperial will also need to secure other necessary agreements and may need additional approvals under the *Energy Pipelines Act 1981* (NT) with respect to access to and use of the McArthur River Mine Gas Pipeline. The capacity of that pipeline has a maximum of 15 TJ /day,⁴⁶ raising the likelihood that a significant proportion of the expected daily extraction of 25TJ/day will need to be flared. It is also currently unclear whether Imperial will have the benefit of the entire pipeline capacity or whether it is already contracted. The proposal also requires Imperial to transport and establish a large amount of infrastructure, including a Gas Plant and a large network of gathering lines. Should Imperial be unable to successfully sell the appraisal gas, or elect not to, the gas would need to be flared, generating significant emissions.
33. In light of this, and given that the NT EPA’s task is to assess the *potential* of the proposed action to have a significant impact on the environment, the NT EPA must consider:
- a. the full scope 1 emissions from flaring being 475,000 tCO₂-e annually (a total of approximately 2,850,000 tCO₂-e over the complete course of the Project) when assessing whether to accept the Referral; and
 - b. the additional 180,381 tCO₂-e emissions from sources other than flaring.

Further, as outlined from [46] below, there are reasons to believe that Imperial’s estimate of the average yearly scope 1 emissions at 30,000 tCO₂-e emissions annually may be a significant underestimated.

⁴⁴ Referral Documents, 124.

⁴⁵ Referral Documents, 139.

⁴⁶ See Australian Energy Market Commission, NT: McArthur River Pipeline (Accessed 26 April 2024) <<https://www.aemc.gov.au/energy-system/gas/gas-pipeline-register/nt-mcarthur-river-pipeline>> .

Failure to describe impacts from GHG emissions

34. Within the Referral Documents and EMP, Imperial makes no attempt to estimate or consider how emissions associated with the Project will contribute to global warming and climate change, Australia's nationally determined contribution to emissions reductions or the NT Government's goal of net zero emissions by 2050.
35. The only analysis of impacts associated with emissions performed in the referral document is an assessment of whether the NT Government's Greenhouse Gas Emissions Management for New and Expanding Large Emitters policy (**Large Emitters Policy**).⁴⁷ Relying on its uncertain plans to sell appraisal gas, Imperial assesses that it does not need to comply with the Large Emitters Policy and takes no further steps to quantify or describe the impacts resulting from the Project's GHG emissions nor any steps to address them.
36. Such an approach is erroneous. Whether or not the gas is flared or sold as appraisal gas, the Project's GHG emissions have the potential to have a significant impact on the environment, triggering the requirement in s 55(5) of the EP Act for environmental impact assessment. The emissions resulting from the use of the appraisal gas are clearly indirect impacts of the Project that have a major consequence (as set out from [59] below and impacts for which no abatement or mitigation is currently proposed. They must be adequately described and assessed under the EP Act.
37. The Large Emitters Policy is not the only method by which the NT EPA must consider whether a project meets the NT's goal, and the relevant NT EPA Objective related to 'Atmospheric Processes'.⁴⁸ The NT Government's actual objective must be examined. According to 'Northern Territory Climate Change Response: Towards 2050', the document which announced the NT's net zero goal, the objective is articulated as follows:

1. *Net zero emissions by 2050*

Our objective is to progressively reduce net greenhouse gas emissions in the Territory, with the goal of achieving net zero emissions by 2050. This long-term objective sets expectations about future emissions constraints to help our industries and businesses plan and adapt. Aiming to achieve net zero emissions aligns the Territory with all other States and Territories across Australia

⁴⁷ Department of Environment, Parks, Water Security, *Greenhouse Gas Emissions Management for New and Expanding Large Emitters policy*, 21 August 2021
<https://depws.nt.gov.au/_data/assets/pdf_file/0008/1041938/ntg-large-and-expanding-emitters-policy-2021-version-1.1.pdf>.

⁴⁸ That policy 'one of a range of policies developed to support the NT's target of net zero greenhouse gas emissions by 2050', see Department of Environment, Parks, Water Security, 'Large Emitters Policy' (accessed 24 April 2024) <https://depws.nt.gov.au/environment-information/large-emitters-policy/large-emitters-policy>

38. ECNT notes that this objective does not differentiate between scopes of emissions – the goal applies to ‘emissions in the Territory’. The substantial emissions produced by the Project will jeopardise this objective, particularly since at least part of the gas will be used within the Northern Territory.
39. The Referral Documents do not detail where the gas recovered on an appraisal basis will be sold and ultimately used. It appears likely at least part of the gas, and potentially a large amount will be used within the NT, given:
- b. on 17 April 2024 the Northern Territory Government published a media release which stated that:⁴⁹

Today, announced on the ASX, Empire Energy has successfully raised over \$46 million enabling them to progress drilling in the Beetaloo Sub-Basin for natural gas.

*The drilling will comprise of a pilot development well for pre-production testing. Empire Energy is anticipating commencement of commercial production by 2025 with the **first supply of natural gas going into the Northern Territory Market.***

[emphasis added]
 - c. On 23 April 2024, the Northern Territory Government announced that it is the first party to contract for gas produced by a similar Project run by Tamboran B1 Pty Ltd.
 - d. Empire Energy also has an MOU with the NT Power and Water Corporation.⁵⁰
40. In the context of the silence on this issue in the Referral Documents and EMP and the indications from the above media release, the NT EPA should request further information from Imperial and, but must assume that part or all of gas recovered on an appraisal basis – and gas produced pursuant to a production stage – will be used within the Northern Territory, contributing further emissions within the Territory. These emissions would detrimentally impact upon NT Government’s goal of achieving net zero gas emissions by 2050.
41. The Referral documents also contain no analysis contextualising the proposed action’s potential emissions under either alternative scenario within available carbon budgets for consistency with the Paris Agreement.

⁴⁹ NT Government, ‘Economic confidence in the Beetaloo Basin grows’, (17 April 2024) <https://www.energyclubnt.com.au/news/13344897>.

⁵⁰ Empire Energy, *Gas Sales and Transportation MOU Executed with Power and Water Corporation*, (1 November 2021) <https://app.sharelinktechnologies.com/announcement/asx/f5df0e33dc86427dd368ddbde18f960e>.

Referral documents do not propose any mitigation of emissions

42. The Referral documents do not set out any credible plans to reduce, mitigate or offset emissions associated with the Project.
43. Imperial's only proposed plans to 'reduce' emissions by selling appraisal gas – if allowed – will only shift when and where the emissions are burnt. Imperial estimates reducing flared emissions by 475,000 tCO₂-e, but does not confirm whether– if sold – the same amount that would be emitted at end use and makes no provision for mitigation with respect to these emissions. This is contrary to the clear direction of the *Scientific Inquiry Into Hydraulic Fracturing (Pepper Inquiry)*, at recommendation 9.8,⁵¹ that there is 'no net increase in the lifecycle GHG emissions emitted in Australia from any onshore shale gas produced in the NT'. Whether flared or sold, these emissions will contribute to climate change.
44. Imperial has also failed to articulate how it plans to comply with the Safeguard Mechanism. Shale gas extraction facilities, such as the Project, must have net zero scope 1 emissions.⁵² Each year of the Project, Imperial estimates the Project will produce scope 1 emissions. As described above and below, ECNT submits that the potential scope 1 emissions are likely much higher than estimated by Imperial and could be in excess of 475,000 tCO₂-e per annum given it is uncertain that Imperial will avoid flaring emissions it hopes to sell. The Referral information provides no details of how it plans to reduce those emissions to 'net zero' as required by the Safeguard Mechanism.
45. This failure to take steps to limit emissions, or mitigate their impacts, or offset as required by the Safeguard Mechanism, substantially increases the potential significant impacts associated with the proposed action.

Significant under-estimate of emissions not associated with flaring

46. Understanding the risk of significant impact on the environment requires an accurate calculation of a Project's potential emissions, including the maximum emissions that could result from the proposed activities. Recent research indicates that emissions from natural gas production, processing, transportation, and use have been greatly underestimated by industry, including poorly monitored methane releases to relieve pressure in tanks and pipelines, leaks from all types of equipment, and the high variability of incomplete combustion in final use.⁵³

⁵¹ NT Government, *Scientific Inquiry Into Hydraulic Fracturing In The Northern Territory – Final Report* (April 2018) (**Pepper Inquiry**).

⁵² *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015*, 5 10, 54.

⁵³ International Energy Agency Global Methane Tracker 2022, *Estimating Methane Emissions* (2022), <<https://www.iea.org/reports/global-methane-tracker-2022/estimating-methane-emissions>>; Robert Howarth, *Methane Emissions from the Production and Use of Natural Gas*, The Magazine for Environmental

Actual emissions, and therefore the potential risks of significant harm, are likely to be higher, including for the following reasons.

47. The EMP's calculations of GHG emissions suffer from several flaws. The EMP estimates, '[w]ith no flaring of gas....Annual average estimated GHG emissions are approximately 30,000 tCO₂-e from FY 2024 through 2029 (5-year term of the EMP),' for a total of approximately 180,381 tCO₂-e.⁵⁴ To arrive at this figure, the EMP and Referral Documents estimate emissions from four sources excluding flaring: (1) vegetation clearing, (2) diesel fuel combustion, (3) gas fuel combustion, and (4) fugitive emissions.
48. There are significant flaws in these calculations.
49. Firstly, there is missing or incomplete information:
 - a. Emissions from gas fired power generation may be missing or emissions from compressors may be missing: The EMP estimates a total of 101,425 tCO₂-e for 'Gas Fuel Combustion' for 'Compressor Fuel Gas.'⁵⁵ It is not clear if this total is for one or all of the following three components: (1) a 'Gas-fired power generation infrastructure [that] will be installed to supply the electricity demand of the [Carpentaria Gas Plant]' (**CGP**) that 'will use produced gas a fuel for the power generator, compressor engine, TEG reboiler burner[,] and flare pilot'; (2) the 'compressor packages' that have fin-fan coolers to reduce gas temperature; or (3) the 'booster compressor' that may be installed downstream of the sales gas metering.⁵⁶ Similarly, there is no information to verify why a .000272 tCO₂-e / m³ assumption is correct for any one or all of these power systems or compressor stations.
 - b. Fracking operation fuel use and quantity: The EMP does not provide the engine type and amount of fuel used/hour while pumping or idling, or any other calculations, to verify their estimate of 8,000 litres/day needed for fracking activities.
 - c. Vehicle emissions: Imperial estimates approximately 65 light vehicles and 29 heavy vehicles per week,⁵⁷ and average 'movements' of each vehicle per stage of operations,⁵⁸ but provides no information that would be able to verify what the

Managers (December 2022),

<https://www.research.howarthlab.org/documents/Howarth2022_EM_Magazine_methane.pdf>.

⁵⁴ Referral Documents, 139.

⁵⁵ EMP, 142.

⁵⁶ EMP, Section 3.8.1.

⁵⁷ EMP, 151.

⁵⁸ EMP, 145-6.

emissions from these vehicle movements would be or if they have been included as part of the diesel emissions for each activity.

- d. Appraisal operations: No information is provided to verify the EMP's assumption that appraisal operations will use only 250 litres of diesel across all locations per day.⁵⁹ This is a key calculation to verify because appraisal activities will last for 1,583 days, and thus could result in significant emissions. The EMP suggests diesel usage for appraisal activities could be high because '[a]ppraisal operations may occur 24 hours a day, 365 days per year, including the wetter months (December to March).'⁶⁰
- e. Flaring: The EMP provides no information that would allow verification of their estimates of 9,166 tCO₂-e for flaring.⁶¹ The flare combustion efficiency rate is not provided, for example. Recent research has found that flare efficiencies are commonly much lower than claimed across oil and gas fields, hovering around 91%.⁶²
- f. Venting: The GHG emission table has no entry for venting.⁶³ The methane management plan states that, during stimulation, 'flow to the atmospheric separator will likely be vented as flaring is not currently practicable, however this will be for a short duration when the well is not producing significant gas volumes, so only releases a small amount of gas into the atmosphere from flowback fluid'.⁶⁴ No information is provided to give an estimate of what Imperial means by a 'short duration'. Similarly, Imperial claims that after fracking, when sand is being removed from the well fluids, the 'gas content of the well fluids is very low during this stage' and '[t]herefore, the quantity of gas vented will be minimal.' No information is provided to verify what the quantity of gas will be to assure that it is a minimum amount. Given the high global warming potential of methane directly vented to the atmosphere, and the long duration of the Project and stimulation activities, estimates of venting and calculations to verify those estimates must be provided.
- g. Emissions from pneumatic systems may be missing: The EMP claims that 'pneumatic controllers on the wellsite will have a natural gas bleed rate not greater than 0.17

⁵⁹ EMP, 142.

⁶⁰ EMP, 57.

⁶¹ EMP, 144.

⁶² Genevieve Plant et al., [Inefficient and unlit natural gas flares both emit large quantities of methane](#) 377 *Science* (2022) 1566.

⁶³ See EMP, 140 Table 3.9 -5.

⁶⁴ Methane Emission Management Plan, 9.

m3 per hour and will have pump emissions routed to a control device that achieves greater than 95% emission reduction.⁶⁵ There is no category of emissions from pneumatic controllers in Table 3.9 -5 “Greenhouse Gas Emissions Estimates (tonnes CO2-e/a) for the Activity for this EMP,’ and thus it is not clear these emissions have been captured.⁶⁶

50. Secondly, the EMP also under-estimates emissions, including in the following three ways:

- a. Vegetation clearing: The Project will clear 226 hectares, with 64.31 tCO2-e/ha assumed, totalling 14,533 tCO2-e.⁶⁷ Actual emissions are likely to be approximately one and half times larger. Using the Northern Territory carbon emissions estimate calculator, estimated emissions near the project area equal approximately 102 tCO2-e/ha,⁶⁸ for a total of 23,052 tCO2-e (difference of 8,519 tCO2-e).
- b. Diesel fuel combustion: The EMP under-estimates emissions associated with burning diesel in two ways: (1) the Global Warming Potential (**GWP**) of chemicals relevant to diesel, including methane, are estimated using outdated figures not supported by the IPCC and are therefore artificially low and not defensible; and (2) the emissions calculations often under-estimate the amount of days that some activities will last when compared to the project timeline in the EMP, resulting in significantly undercounting emissions.

Firstly, burning diesel is not only associated with CO2 but also with other chemicals such as methane and nitrous oxide, and thus calculating the GHG emissions of burning diesel requires understanding the GWP, expressed in terms of tCO2-e, of each chemical.⁶⁹ Imperial does not disclose what GWP they are using for methane or other relevant chemicals. However, the GWP can be derived by making a comparison between Imperial’s calculation of tCO2-e per litre of diesel burnt and the calculation provided by the Australian National Greenhouse Accounts Factors (**Accounts Factors**). Both calculations arrive at nearly the same number (.00272

⁶⁵ EMP, 130.

⁶⁶ EMP, 140.

⁶⁷ EMP, 140.

⁶⁸ NT Government, *Carbon Emissions Calculator*, <://nrmaps.nt.gov.au/carbon/carbon.html> (The NT Government online carbon emissions estimate calculator is a free online spatial tool that allows estimation of the greenhouse gas emissions that may be associated with clearing of native vegetation. This tool has been developed to enable the estimation of carbon dioxide (CO2) emissions associated with the clearing of an area of native vegetation in the Northern Territory).

⁶⁹ Australian Government, *Australian National Greenhouse Accounts Factors* (February 2023) <https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2022.pdf> (noting the CO2, NH4, and N2O components of diesel combustion and their tCO2-e equivalents).

tCO₂-e /litre for Imperial⁷⁰ and .002709 tCO₂-e/litre for the Accounts Factors⁷¹), and thus one can assume both calculations used a similar GWP for methane. The 2023 Australian National Greenhouse Accounts Factors use a global warming potential (GWP) of 28 for methane in its calculation of methane to CO₂-e.⁷² This figure is not used by the best available science. The IPCC AR6 states that fossil CH₄ has a GWP of 29.8 over 100 years, and 82.5 over 20 years.⁷³ The 20-year timeframe is arguably more relevant given the risks of climate tipping points that lead to an acceleration of warming.⁷⁴ However, even using the most recent figures for the 100-year GWP of 29.8 could make a significant difference in the total estimated emissions of the project and should be applied to generate a scientifically defensible emissions estimate.

Secondly, the EMP undercounts diesel emissions, including in the following ways:

- i. Water Bore: The emissions calculation from diesel fuel combustion for water bores assumes 126 total days of activity, 250 litres/day, and .00272 tCO₂-e /litre burnt for a total of 86 tCO₂-e.⁷⁵ This appears to significantly underestimate actual emissions. The timeline of activities in the EMP states there will be a total of 314 days of water bore drilling starting on 18/09/2024, 28 days starting on 3/11/2025, and 214 days starting on 3/11/2026 for a total of 556 days of water bore drilling.⁷⁶ Using Imperial's estimates above, this would equal 378 tCO₂-e (difference of 292 tCO₂-e).
- ii. Facilities civil construction: The emissions calculation from diesel fuel combustion for facilities civil construction assumes 170 days total of activity with 1,000 litres/day burned, for a total of 462 tCO₂-e.⁷⁷ The timeline of activities states there will be 243 days of facilities construction, which would result in 661 tCO₂-e (difference of 199 tCO₂-e).⁷⁸

⁷⁰ EMP, 140.

⁷¹ Australian Government, *Australian National Greenhouse Accounts Factors* (February 2023) <https://www.dcceew.gov.au/sites/default/files/documents/national-greenhouse-accounts-factors-2022.pdf> (38.6 GJ/kL energy content factor for diesel oil, with a scope 1 emission factor of 80.2 kg CO₂-e/GJ, which equals approximately 2.709 kgCO₂-e/L of diesel, or .002709 tCO₂-e/L of diesel).

⁷² Australian Government, *Australian National Greenhouse Accounts Factors* (Feb. 2023) 41, Table 22.

⁷³ IPCC, *AR6 - Climate Change 2021, The Physical Science Basis - Chapter 7*, (August 2021) 1017.

⁷⁴ Timothy M. Lenton et al., *Climate tipping points — too risky to bet against*, 575 (7784) *Nature* (2019) 592.

⁷⁵ EMP, 140.

⁷⁶ EMP, 56, Figure 1.6 - 1.

⁷⁷ EMP, 140.

⁷⁸ EMP, 56 Figure 1.6 - 1.

- iii. Flowline construction: The emissions calculation for diesel from flowline construction assumes 153 days with 1,000 litres/day for a total of 416 tCO₂-e.⁷⁹ The timeline of activities states there will be 280 days of flowline construction,⁸⁰ which would total approximately 761 tCO₂-e (difference of 345 t-CO₂e).

51. Lastly in relation to ways the EMP may have undercounted emissions, the EMP does not appear to account for all possible well completions. The EMP states '[c]ompletion is a generic term used to describe the events and equipment necessary to access the formation and encourage it to flow to surface.'⁸¹ The Referral Documents note that 'Drilling hydraulic fracturing completion and workover of up to 10 new wells.'⁸² However, the number of well completions in the GHG emissions table is less than 10, showing only 2 wells will be completed in 2027/28 and in 2028/29.⁸³

52. In addition, the EMP identifies the gas gathering flowline network as a potential source of emissions⁸⁴, and estimates 5,554 tons of CO₂-e of fugitive emissions from this network.⁸⁵ This is likely to be a significant underestimate.⁸⁶ Methane is a potent GHG with more than 80 times the warming potential of carbon dioxide, which means reducing methane emissions is essential to have a significantly reduce climate change in the near term.⁸⁷ A 2022 study of methane emissions from gas gathering networks, akin to that proposed by Imperial, found emissions from those pipelines to be at least 14 times greater than estimates by the US Environment Protection Agency.⁸⁸ The researchers undertook extensive surveys and found that leaks in gathering lines often persisted over months or years.⁸⁹ If similar leaks occur in the Project's network, it is likely that actual emissions are underreported in the EMP are an underestimation

⁷⁹ EMP, 140-1.

⁸⁰ EMP, 56.

⁸¹ EMP, 121.

⁸² Referral Documents, 17.

⁸³ EMP, 142.

⁸⁴ EMP, Appendix 13, Methane Emissions Management Plan, 10.

⁸⁵ EMP, 142-3.

⁸⁶ EMP, 139

⁸⁷ Environmental Defense Fund, *Methane: a crucial opportunity in the climate fight*

<https://www.edf.org/climate/methane-crucial-opportunity-climate-fight#:~:text=Methane%20is%20a%20potent%20greenhouse,after%20it%20reaches%20the%20atmosphere.>

⁸⁸ Yu, Jevan et al 'Methane Emissions from Natural Gas Gathering Pipelines in the Permian Basin' *Environ. Sci. Technol. Lett.* 2022, 9, 11, 969–974, < <https://pubs.acs.org/doi/10.1021/acs.estlett.2c00380>>.

⁸⁹ Yu, Jevan et al 'Methane Emissions from Natural Gas Gathering Pipelines in the Permian Basin' *Environ. Sci. Technol. Lett.* 2022, 9, 11, 969–974, < <https://pubs.acs.org/doi/10.1021/acs.estlett.2c00380>>.

of the project's environmental impact. For example, if fugitive emissions here were similarly 14 times higher, emissions would be closer to 77,756 tCO₂-e.

53. Leaks from gas gathering lines also pose significant safety risks where gas comes into contact with the outside world. In Texas, explosions caused by leaks from gathering line networks, as at 2019, killed at least three people (one child and two workers) and injured many more, including multiple workers.⁹⁰ As a result of these leaks in 2021 the US Federal Department of Transport introduced new reporting rules that require all onshore gas operators to report annual and file incident reports related to the gas gathering networks.⁹¹
54. An additional issue is a lack of information regarding the fate of CO₂ in the gas. CO₂ comprises between .86 and .91 percent of the project's gas.⁹² There are two key sets of information that must be disclosed: (1) whether CO₂ will be vented or whether it will be captured, transported, and stored; and (2) what are the emissions of the CO₂ if vented or the emissions of the energy used to capture, transport and store these emissions.
55. Regarding the first uncertainty, the process description fails to explain what will happen to the CO₂ in the gas stream. Imperial describes several steps in its operational process, but none mention how CO₂ will be handled or separated or whether it would be vented or captured.⁹³
56. Regarding the second set of information that has not been disclosed, there is no estimate in the GHG analysis regarding whether the CO₂ would be (i) vented; or (ii) captured, transported, and

⁹⁰ Mike lee and Mike Soraghan, 'Explosions from unregulated pipelines can kill in Texas while energy companies go unpunished' *Texas Tribune* (7 March 2019) < <https://www.texastribune.org/2019/03/07/oil-gas-deadly-pipelines-no-rules/> >

⁹¹ UD Department of Transportation, 'Gas Gathering Fact Sheet' < <https://pstrust.org/gas-gathering-pipelines/> >.

⁹² EMP, 4.

⁹³ The process flow diagrams and descriptions state the following steps will take place: (1) During operations of the wells, "[a]ll fluids, sand and hydrocarbons from the well will initially flow to an atmospheric pressure open separator" and this "flow to the atmospheric separator will likely be vented" (EMP Appendix 13, Methane Management Plan, 9); (2) "Once the fluid flow stabilises and gas flow increases, the process flow is directed to a pressurised separator" that "splits the comingled flow from the wellbore into gas and water"; (3) (4) Gas from the field gathering network enters a slug catcher to capture any entrained slugs of free water; (5) Downstream of the slug catcher, gas moves through filter/coalescer vessels to remove additional water from the gas stream; (6) Gas is then compressed in self-contained compressor packages to reduce the gas temperature; (7) the cooled gas leaving the compressor packages will pass through a scrubber vessel, where any condensed water/lube oil will be removed from the gas stream; (8) The gas from the scrubber vessel will enter a Tri-Ethylene Glycol (TEG) dehydration unit; (9) Gas from the TEG dehydration unit is to be sent to the Sales Gas Metering Skid to remove fine particulate matter and liquids (particularly TEG), a gas chromatograph unit/s to measure gas composition, and a custody transfer flowmeter; (10) Booster compressor unit may be installed downstream of the sales gas metering; (11) The CGP has a sales gas pipeline, through which we understand Imperial will send conditioned and pressurized gas "for export to the MRGP," the McArthur River Gas Pipeline. EMP, Section 3.8.1.

stored and, if so, what the emissions associated with the energy required to capture, transport and store the CO₂ would be.⁹⁴

57. Lastly, the CO₂ content of a gas stream can be significant, even if the CO₂ makes up only a small percentage of the gas. For example, the Fayetteville Shale play in the south of the United States has a CO₂ content of only 1% of the gas,⁹⁵ which is similar to the .91% CO₂ content of the gas targeted by the Project.⁹⁶ Despite CO₂ comprising such a small portion of the Fayetteville gas, annual CO₂ emissions from this play totalled 1,225,643 tons of CO₂ in 2008⁹⁷ as a result of production activities totalling ~2 bcf/day.⁹⁸ Imperial expects half that production from gas targeted by Carpentaria, or 1 bcf/day.⁹⁹ Carpentaria's CO₂ total could similarly be half of Fayetteville's totals, or approximately 550-600,000 tons per year once full scale production begins,¹⁰⁰ a significant amount. While the CO₂ total from the activities covered by this EMP (25 TJ/day, or .024 bcf/day)¹⁰¹ could be significantly less, approximating 13,000 tons of CO₂/year,¹⁰² these would be emissions in addition to the existing totals that have not been accounted for and that would need to be either vented or captured, transported and stored. If these CO₂ emissions are captured, there would be additional emissions associated with the energy required to capture, transport, and store the CO₂.
58. Given the above, it is highly likely that the potential emissions from the Project will be much higher than the total of 180,381 tCO₂-e estimated in the EMP and Referral Documents.

⁹⁴ See EMP, 140.

⁹⁵ Professor David J C MacKay FRS Dr Timothy J Stone, *Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use*, UK.Department of Energy and Climate Change,(Sep. 2013), 17 Table 1 < https://assets.publishing.service.gov.uk/media/5a7582b3ed915d731495a856/MacKay_Stone_shale_study_report_09092013.pdf>.

⁹⁶ EMP, 4.

⁹⁷ D. Lyon, T. Chu, Arkansas Dept. of Environmental Quality, D. Lyon, Environmental Defense Fund, *Emissions Inventory & Ambient Air Monitoring of Natural Gas Production in the Fayetteville Shale Region* <https://www3.epa.gov/ttnchie1/conference/ei20/session6/dlyon.pdf> (emissions estimate for the year 2008).

⁹⁸ See, U.S. Energy Information Administration, *Natural gas explained Where our natural gas comes from* <https://www.eia.gov/energyexplained/natural-gas/where-our-natural-gas-comes-from.php>; See also U.S. Energy Information Administration, More Data https://www.eia.gov/energyexplained/natural-gas/data/monthly_shale_gas.xlsx (showing an average of ~2 billion cubic feet/day for the Fayetteville play in 2008).

⁹⁹ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 < <https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>.

¹⁰⁰ Imperial production is expected to be half of the Fayetteville's production in 2008, and thus its CO₂ from that production could similarly be halved (612,821 tons of CO₂) assuming 1% CO₂ in the gas, or 557,667 tons assuming .91% CO₂ content.

¹⁰¹ Santos, Conversion Calculator <https://www.santos.com/conversion-calculator/> (25 TJ = 23.57 million cubic feet, or .024 bcf/day).

¹⁰² Noting that 1 bcf/day of production of Carpentaria gas could result in 550-600,000 tons of CO₂ using Fayetteville as an example, one can multiply .024 [the amount of gas generated by activities covered by this EMP assuming 25 TJ/day] * 550-600,000 = 13-14,400 tons of CO₂).

Significance of emissions impacts

59. Regardless of whether appraisal gas is flared or sold for use, it is clear that proposed action is a substantial cause of major direct and indirect climate emissions that will have significant impact on the environment, triggering the requirement for environmental assessment.
60. If appraisal gas is flared at the expected rate of approximately 25 TJ/day during the appraisal phase would, on Imperial's calculations, this would result in approximately 475,000 tCO₂-e of Scope 1 emissions annually: a total of 2,850,000 tCO₂-e.¹⁰³ Adding Imperial's estimated scope 1 emissions of 180,381 tCO₂-e., Imperial estimates the total direct emissions footprint is 3,030,381 tCO₂-e, however, as described above, this is likely a significant underestimation.
61. In 2022, the most recent year for which official estimates are available in Australia's National Greenhouse Accounts, the NT's emissions totalled 16,732,600 tCO₂, and increase from 14,112,500 tCO₂-e in 2023.¹⁰⁴ This Project will add around another 3% towards the NT's growing emissions, though likely more given the under-estimates described above. This is equal to the combined per capital emissions of more than 7,500 people in the Territory.
62. Even if appraisal gas is sold rather than flared, the substantial emissions arising from the use of the gas are a significant impact on the environment. Impacts include events or circumstances that are either 'a direct consequence of the action' or that are 'and indirect consequence of the action and the action is a substantial cause of that event or circumstance.'¹⁰⁵
63. It is clear that the Project is a substantial cause of the emissions associated with the use of appraisal gas that is sold for use.
64. The Referral Documents fail to quantify these indirect GHG emissions, or describe their impacts. However, assuming that the emissions associated with the use of appraisal gas off-site are likely comparable to those associated with flaring, these GHG emissions are would be approximately 2,850,000 tCO₂-e. (plus additional emissions of at least 180,381 tCO₂-e).
65. In effect, it does not matter if appraisal gas is flared by Imperial or used off-site; contribution to global greenhouse emissions and the subsequent impacts of climate are of the same scale.
66. Whether an impact is significant is determined by whether an impact is of major consequence having regard to the context and intensity of the impact and the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact.¹⁰⁶ Clearly, the significant emissions under either scenario will have a major adverse

¹⁰³ Referral Documents, 124.

¹⁰⁴ Australian Government (2024) Australia's National Greenhouse Accounts.
<https://www.greenhouseaccounts.climatechange.gov.au>

¹⁰⁵ EP Act , s 10(1)(b).

¹⁰⁶ EP Act, s 11.

consequence to the environment in light of the extensive reputable scientific resources addressing the issue of climate change and the need to urgently reduce greenhouse gas emissions. These include:

- c. The Intergovernmental Panel on Climate Change (**IPCC**) report 'Climate Change 2021: The Physical Science Basis' (August 2021) found that human influence on the climate by way of anthropogenic greenhouse gas emissions was 'unequivocal', already causing unprecedented changes to the climate system, and that the 1.5°C and 2°C warming levels will be exceeded during the 21st century unless deep reductions in greenhouse gas emissions occur in the coming decades.
- d. The IPCC Special Report 'Global Warming of 1.5°C' (October 2018) highlights the importance of emissions reductions beginning as soon as possible – by 25-45% from 2010 levels by 2030, with more rapid reductions producing better warming outcomes.
- e. The International Energy Agency's report 'Net Zero by 2050: A Roadmap for the Global Energy Sector' (May 2021) confirms that to achieve net zero emissions by 2050, fossil fuel use needs to decline drastically and no new oil and natural gas fields are required.
- f. Extensive analysis of carbon budgets compatible with warming scenarios such as 1.5°C, for example the Climate Council document from April 2021 'Aim High, Go Fast: Why Emissions Must Plummet', which also highlights the need for rapid emissions reductions before 2050.

67. As noted above, the Referral Documents contain no analysis contextualising the Project's potential emissions under either alternative scenario within available carbon budgets for consistency with the Paris Agreement.

68. Given every tonne of GHGs emitted into the atmosphere from human activities worsens climate change, the urgency of action required and the catastrophic consequences of failure to reduce atmospheric concentrations of emissions from current levels, this environmental factor requires comprehensive assessment of the potential significant impacts of the Project.

69. Emissions from the Project will pose a significant impact on the environment, regardless of when they are emitted – within the NT or elsewhere.

Indirect impacts associated with production emissions

70. ECNT submits that the emissions outlined above are clearly potential impacts of major consequence and the Project must thus be accepted for environmental assessment by the NT EPA on this basis alone.

71. However, in considering the potential for this Project to have a significant impact on climate change, the NT EPA must consider the potential significant impact of emissions generated by future production stages given these are inextricably linked to pilot production.
72. The sole purpose of this Project is to expand Imperial's development and production of shale gas in Beetaloo. The objectives of the Activity include assessing 'the commerciality of the resource necessary for moving beyond the pilot phase into full-field development'.¹⁰⁷ Accordingly, this Project is a step in substantially larger expansion plans which Imperial has in Beetaloo throughout the second half of this decade, which it estimates reaching approximately 1 billion ft³ / day (~1055 TD / day) by 2028, amounting to 54,000 tCO₂-e emissions per day, or 19,842,914 tCO₂-e per year.¹⁰⁸ This number does not include emissions related to extraction and processing of the gas and is already more than double NT's current annual GHG emissions.¹⁰⁹ There is clearly a sufficient link between the Project and future production given:
- i. the appraisal stage of works are an essential precondition that enable the production; and
 - ii. the production phase is "within the contemplation of the proponent of the action".¹¹⁰

Accordingly, any adverse consequences arising from the potential significant impacts of productions ought to be considered as down-stream indirect impacts of the Project. This requires Imperial to disclose their production emissions estimates.

Potential significant impacts on water and land

73. Imperial's EPA referral of the Project fails to identify that the Project has the potential to have a significant impact on water and land because of the high likelihood of wastewater spills or leaks, the impact of groundwater extraction on the aquifer and the risk of inter-aquifer leakage. These potential significant impacts require the EPA's environmental impact assessment of the Project to include the water and soil, in order to ensure that the Project does not have an unacceptable environmental impact on these NT EPA Factors and Objectives.

¹⁰⁷ EMP, 46.

¹⁰⁸ Empire Energy, 'The Beetaloo Basin Pioneer moving into production' 2024 <

<https://app.sharelinktechnologies.com/announcement/asx/6424cd58de59c6dd8c20478e05ab46c1>>,

¹⁰⁹ The Australia Institute, 'The Northern Territory is the world leader in per capita emissions' (7 August 2023) <https://australiainstitute.org.au/post/the-northern-territory-is-the-world-leader-for-per-capita-emissions/>

¹¹⁰ *Minister for Environment & Heritage v Queensland Conservation Council Inc* (2004) 139 FCR 24 at [57].

74. To support ECNT’s submissions on these issues, we rely upon three expert reports obtained by the Lock the Gate Alliance (**Lock the Gate**) and submitted to the EPA as part of Lock the Gate submission on the EMP, being:
- a. Comments on groundwater risk assessment for Carpentaria Pilot Project Environmental Management Plan: Imperial Oil & Gas EP187, by Professor Matthew Currell, a hydrogeologist who is the Head of Civil and Environmental Engineering at Griffith University (**Currell Report**);
 - b. Review of the hydrogeological and hydrological impact assessment of the Environment Management Plan for Carpentaria Pilot Production, by hydrogeologist Dr Ryan Vogwill (**Vogwill Report**); and
 - c. Carpentaria Pilot Production EMP and EPA referral by Professor Neil McIntyre from the Centre for Water in the Minerals Industry at the University of Queensland (**McIntyre Report**).
75. Firstly, a spill of fracking wastewater or flowback fluid above ground presents a potential impact of major consequence to the soil and terrestrial environment, to surface water and to shallow aquifers. Fracking wastewater and flowback fluid contain a mix of chemicals (added to a mixture of sand and water) and the dissolved solids and metallic salts brought from deep underground to the surface, which may be toxic or radioactive. A 2018 study found that the risk of surface water and groundwater contamination from spills at any given well can be as high as one in 10.¹¹¹ Similarly, an earlier study of tens of thousands of fracking wells in the US showed contamination occurring at 2 to 16 per cent per active well, with spills most likely in a well’s first three years of operation.¹¹² Most of the spills from that study were associated with waste water flowlines, significant amounts of which are planned to be used for the Project — up to 60km.¹¹³
76. Given Imperial proposes to drill up to 10 new wells and frack those wells over three years and proposes a 60km wastewater flowline network, it is almost certain there will be a spill. As noted in the Vogwill Report, spill of wastewater and chemicals can impact ecosystems, groundwater and surface water and the wider environment. ¹¹⁴
77. Water used for hydraulic fracturing, and the produced water that returns to the surface -- both of which will be stored at the wellpad during the Project -- pose grave risks to both the

¹¹¹ Shanafield, M et al., 2018. ‘Towards quantifying the likelihood of water resource impacts from unconventional gas development’ *Groundwater* 57(4): 547-561

¹¹² Patterson, L.A. et al., 2017. Unconventional oil and gas spills: Risks, mitigation priorities and state reporting requirements. *Environmental Science and Technology* 51: 2563-2573

¹¹³ EMP, 54.

¹¹⁴ Vogwill Report, 6-7.

environment and human health. As identified in a recent review,¹¹⁵ over 1000 chemicals can be used in hydraulic fracking fluids, including acids, aromatic hydrocarbons, bases, hydrocarbon mixtures, polysaccharides, and surfactants. An (often undisclosed) subset of these will be used at any given well. Large quantities of chemicals are often kept at the well pad.

78. Water returning from the production aquifer additionally contains chemical constituents associated with the formation, including radioactive elements, heavy metals, and salts. This water is planned to be stored in both open and closed tanks at the well pad. Potential leaks of this fluid due to either handling failure, leakage through the tank lining, or in the case of the Beetaloo, through impact due to cyclone activity, could cause irreversible impact to the soil and the Cambrian Limestone Aquifer. Both handling failure and tank lining failure have been cited in multiple published studies as frequent causes for pollution at the well pad.¹¹⁶ Many of these chemicals are known carcinogens or endocrine disruptors.¹¹⁷
79. Moreover, there is a risk to human health and wildlife from airborne volatile organic contaminants (**VOCs**) and airborne particulate matter (PM2.5) contaminated with a mixture of hydrocarbons, metals, radioactive elements, and salts due to airborne migration of dried soil where water has leaked onsite. Release of VOCs commonly occur during the drilling, flaring and finishing, and gas production stages¹¹⁸.
80. In its risk assessment, Imperial identifies the risk of leakage from flow lines to be 'medium'. According to the Currell Report, this assessment is overly optimistic, and lacks a true understating the true potential or likelihood of the risks, increasing the likelihood that a spill won't be appropriately avoided, mitigated.¹¹⁹
81. Imperial plans to store wastewater in open topped storage tanks, which presents the potential for this toxic water to spill into the environment through tanks overflowing. This is contrary to the *Code of Practice: Onshore Petroleum Activities in the NT (Code of Practice)*.¹²⁰ As noted in the Currell Report, the risks associated with this type of storage appears to be inadequately

¹¹⁵ Lefebvre, 2016. 'Mechanisms leading to potential impacts of shale gas development on groundwater quality' WIREs Water 2017, 4:e1188.

¹¹⁶ See Shanafield et al 2018 and Patterson et al 2017 for lists of multiple studies quantifying this risk.

¹¹⁷ Mrdjen and Lee 2016 'High volume hydraulic fracturing operations: potential impacts on surface water and human health' International Journal of Environmental Health Research, 26(4): 361–380

¹¹⁸ Brown et al 2015. 'Human exposure to unconventional natural gas development: A public health demonstration of periodic high exposure to chemical mixtures in ambient air' J Environ Sci Health A Tox Hazard Subst Environ Eng. 2015;50(5):460-72.

¹¹⁹ Currell Report, 5.

¹²⁰ Department of Environment and Natural Resources, Department of Primary Industry and Resources, *Code of Practice: Onshore Petroleum Activities in the NT* (2019) <https://depws.nt.gov.au/_data/assets/pdf_file/0011/705890/code-of-practice-onshore-petroleum-activity-nt.pdf>. 18

measured in the EMP as 'moderate'. The McIntyre Report also identifies that Imperial's plans to reduce the risk of open topped ponds overflowing due to significant rain events are insufficient because the only trigger to reduce water levels is where heavy rainfall (more than 300mm over four days) is predicted.¹²¹ To reduce risks of open tanks flowing toxic water into the environment, McIntyre recommends also including a trigger related to the water level in the open tanks.¹²² Vogwill additionally notes that the flood extent modelling in the EMP is insufficient, missing water velocities, a sensitivity analysis and an inaccurate modelling data.¹²³ Moreover, the impacts of heavy winds on wastewater storage facilities during cyclones are not considered.

82. As water evaporates out of the ponds, there is also the potential for the dried-out dust – made up of concentrated chemicals, metallic salts and dissolved solids, some of which are toxic or potentially radioactive – to be blown in the wind and carried into the environment.¹²⁴

83. Second, contamination of chemicals can also occur as a result of inter-aquifer leakage, which may also result in the migration of hydrocarbons such as methane produced by fracking into aquifers. Well integrity breaches, are a significant factor in leakage, and research cited in the Currell Report showing these failures occur in two to 75% of all oil and gas wells over their lifetime.¹²⁵ Professor Currell and Dr Christopher Ndehedehe have undertaken extensive work on the hydrogeology of the Beetaloo Basin, including a review of the Groundwater sections of the Strategic Regional Environmental Baseline Assessment (**SREBA**).¹²⁶ Their review found extensive knowledge gaps in the inter-aquifer and basin connectivity, particularly as it relates to the structures targeted for fracking and the overlying shallower aquifers.¹²⁷

84. The risks associated with fracking wastewater or flowback fluid associated with the Project thus involve potential impacts of significant magnitude on ecosystems, surface water, ground water and soil with potentially severe consequences for environmental values such as ecological health, land use and the welfare and amenity of people that could be irreversible and long-

¹²¹ McIntyre Report, 3.

¹²² McIntyre Report, 3.

¹²³ Vogwill Report, 7.

¹²⁴ As occurred in the Aral Sea, see Renock, D., J.D. Landis, and M. Sharma. 2016. Reductive weathering of black shale and release of barium during hydraulic fracturing. *Applied Geochemistry*, v. 65, p. 73-86.

¹²⁵ Currell Report 4-5.

¹²⁶ Matt Currell, Christopher Ndehedehe, 2023. SREBA Expert Review – Groundwater. Commissioned by Environment Centre, NT <
https://assets.nationbuilder.com/ecnt/pages/914/attachments/original/1697102379/SREBA_Review_Currell_and_Ndehedehe_August_2023.pdf?1697102379>.

¹²⁷ Matt Currell, Christopher Ndehedehe, 2023. SREBA Expert Review – Groundwater. Commissioned by Environment Centre, NT <
https://assets.nationbuilder.com/ecnt/pages/914/attachments/original/1697102379/SREBA_Review_Currell_and_Ndehedehe_August_2023.pdf?1697102379>., 2.

standing. Potential impacts on the Cambrian Aquifer, as well as impacts due to inter-aquifer leakage or contaminated dust dispersal, also have the capacity to spread over large geographic areas. It is clear that these impacts are potentially of major consequence and the action thus has the potential for significant impact. They are also not remote: the proper management of wastewater is therefore essential to ensuring that project does not have an unacceptable impact.

Insufficient analysis and information concerning significant risks in referral documents

85. It is clear that at present, the significant impacts outlined above have been insufficiently analysed and quantified by the proponent.

86. Currell, McIntyre and Vogwill Reports all identify significant informational gaps in the EMP and EPA Referral Documents which made it difficult for each expert to evaluate the environmental risks and environmental impacts of the activity and whether the EMP proposes adequate mitigation. This information includes:

- a. **Surface water monitoring:** The McIntyre Report identifies that the EMP does not provide details of such a program, providing only generic details that monitoring will exist.¹²⁸ Surface water monitoring is essential to ensure there is a baseline against which significance of contamination events from activities in the Project are understood and tracked. Such a program should, according to the McIntyre Report, have information of proposed locations, frequencies, water quality parameters and a map, at a minimum.
- b. **Groundwater testing and drawdown modelling, and shallow aquifer mapping:** Imperial plans to extract 750ML of water per year for the Project, or around 10% of the total allocation for petroleum activities under the Georgina Wiso Water Allocation Plan. The Currell Report identifies that, given the vast amount of water proposed to be extracted, the EMP should include testing and drawdown modelling of the effects of such extraction locally and on the vast Georgina Basin.¹²⁹ As noted in the Vogwill Report, shallow aquifer mapping of the area is required to understand impacts of water extraction on aquifers in the Project area that support vegetation and groundwater dependent ecosystems.¹³⁰ Currell and Vogwill identify possible impacts of such a large extraction including reduction in groundwater in existing bores, lower flows to groundwater dependent ecosystems or inter-aquifer

¹²⁸ McIntyre Report, 3.

¹²⁹ Currell Report, 2.

¹³⁰ Vogwill Report, 6.

leakage.¹³¹ The NT EPA must request this testing and modelling to understand the acceptability of the risks of the Project on groundwater.

- c. **Survey of geological structures and hydrogeological pathways:** Understanding the risk of inter-aquifer connectivity of the Project requires Imperial to undertake further surveys of the geological structures, including site-specific analysis of permeability and rock properties, according to the Currell Report.¹³² The Vogwill Report further emphasises that understanding the permeable underground pathways is essential to stop fracking fluids from spreading by natural fractures and newly created fractures reaching groundwater. The lack of mapping of these structures and pathways was a major gap in the SREBA studies, as noted by Currell and Ndehedehe.¹³³ The NT EPA must require Imperial to undertake a survey in order to understand the risk of inter-aquifer connectivity during the Project's operation.
- d. **Surface water hydrology and hydrogeology:** Imperial has only provided generic risks in relation to the groundwater dependent ecosystems and inflow dependent ecosystems. The Vogwill Report sets out the hydrogeology and surface water hydrology must be 'rigorously documented' in order to understand the potential impacts of the Project on these ecosystems when a wastewater spill takes place.¹³⁴
- e. **Comprehensive details of the wastewater management system:** As discussed above at [75], there is a high likelihood that any significant impact of the project on surface water, soil and groundwater will come from a spill of wastewater into the terrestrial environment. Imperial proposes a significant wastewater management system that includes a treatment facility and 60km of flowlines to connect open tanks. However, described in the McIntyre Report, the EMP 'lacks a clear description and illustration of the proposed water management system'.¹³⁵ According to McIntyre, a clear wastewater management system is vital to understand the risk of spills from wastewater storages, including the proposed tanks.¹³⁶ To meet this requirement, a water and wastewater management plan must include 'a node-link water system diagram that describes: the type of storage (freshwater, wastewater

¹³¹ Currell Report, 2; Vogwill Report, 6.

¹³² Currell Report, 4.

¹³³ Matt Currell, Christopher Ndehedehe, 2023. SREBA Expert Review – Groundwater. Commissioned by Environment Centre, NT <
https://assets.nationbuilder.com/ecnt/pages/914/attachments/original/1697102379/SREBA_Review_Currell_and_Ndehedehe_August_2023.pdf?1697102379>., 19.

¹³⁴ Vogwill Report, 5, 9.

¹³⁵ McIntyre Report, 2.

¹³⁶ McIntyre Report, 2.

untreated, wastewater treated, greywater, cover, uncovered, floating cover); flow rates between storages under design conditions; water sources, locations and type of treatment; and references to the relevant wet weather triggers'. The EMP and Referral Document fail to include these details. It also fails to provide the details required by the *Code of Practice: Onshore Petroleum Activities in the NT (Code of Practice)* to include an 'auditable chain of custody system' for wastewater tracking. Consequently, ECNT submits that the NT EPA must seek them from Imperial to understand the risk of a wastewater spill as a result of the plan proposed by Imperial. In ECNT's view, the construction of wastewater flowlines is very risky and untested in a Northern Territory context. Further, it is clear to ECNT that this petroleum activity is not actually covered by the Code of Practice. In ECNT's view, references to "pipelines" in the Code of Practice relate to gas pipelines, with standards and risks that are specific to this infrastructure (for example, addressing methane leaks). Imperial has sought to rely on a standard for coal seam gas, but this standard may not be appropriate for Northern Territory conditions, and in any case is not incorporated into the Code of Practice which is, by definition, intended to cover all petroleum activities. In ECNT's view, constructing and operating wastewater flowlines as proposed in the Imperial EMP does not comply with the Code of Practice, and to authorise the EMP would breach s58(ab) of the Petroleum Act.

87. This inadequate assessment of risks and impacts by Imperial and the uncertainty about the sufficiency of the management systems proposed due to the information gaps in Project documentation increases the likelihood that the impacts of the Project on the environment will be of major consequence on hydrogeological processes, inland water and environmental quality, aquatic ecosystems and the terrestrial environmental quality. Without further assessment by the NT EPA, the environmental objectives for each of these key factors cannot be achieved.

Level of assessment required

88. For the reasons discussed below and above, the information provided by Imperial in the Referral clearly provides an inadequate basis for environmental assessment by the NT EPA. Given this, and the significant public engagement in relation to Imperial's plans for exploratory fracking in the Beetaloo, a method of assessment must be adopted that requires Imperial to

provide the additional information necessary for the environmental impact assessment and for the public to have the opportunity to provide further comment on this information.

89. We submit the NT EPA should assess the Project by way of an environmental impact statement. Assessment by environmental impact statement is appropriate given Imperial failed to identify that the Project has the potential to have significant impact on water and land, and provided insufficient information for the NT EPA to adequately assess the significance of these risks, and the significance of the impact of the Project on climate change. An environmental impact statement-level assessment is warranted most significantly due to the significance of the environmental impacts and lack of adequate mitigation measures proposed by Imperial. This requires an assessment of the Project that allows the public to comment on proposed terms of reference, to ensure all the potential impacts identified in this submissions are included, and for the public to then have an opportunity to comment upon publication of the environmental impact statement. This level of assessment will ensure the NT EPA obtains essential information about the Project's impacts on climate change, water and land to enable it to perform its functions under the EP Act consistently with the NT EPA Factors and Objectives.

Climate change

90. As set out at [28]-[67] the Project has the potential to have a significant impact on climate change and 'atmospheric processes' due to its emissions profile, regardless of where the emissions are emitted or how they are accounted for.
91. When considering which method of EIA is to be undertaken for a Project, the NT EPA is also to consider the level of confidence in predicting potential significant impacts of the proposed action or strategic proposal taking into account the extent and currency of existing knowledge.¹³⁷ There are numerous of gaps in the information provided by Imperial in the Referral Documents, which lead to uncertainty in the potential significant impacts of the proposed Project on climate change and 'atmospheric processes'. As outlined above, this includes but is not limited to:
- a. the estimated scope 2 and scope 3 emissions from the Project;
 - b. a breakdown of assumptions used in calculating the Project's emissions;
 - c. information about Imperial's proposed application to recover petroleum on an appraisal basis;
 - d. Emissions estimates from leaks in the gas gathering network;
 - e. A comprehensive analysis of the Project's contribution to climate change, including the in the context of the remaining available carbon budget in accordance with

¹³⁷ EP Regulations, reg 59(b).

targets set under the Paris Agreement, Australian’s nationally determined contribution to emissions reduction and the NT Government’s net zero emissions target;

- f. Imperial’s plans to avoid, mitigate or offset emissions in line with the Pepper Inquiry and the Safeguard Mechanism;
- g. clarification about where the gas recovered is to be sold and ultimately used; and
- h. estimated production-stage emissions of Imperial’s holdings in the Beetaloo.

92. This further information is vital for the NT EPA to understand the acceptability of risks of both indirect and indirect emissions related to this Project. Without further information, the EPA cannot know that the true emissions footprint of the direct and indirect consequences of the Project are, or how the Project impacts upon the NT EPA Factors and Objectives related to atmospheric processes. Given this, the referral information alone is clearly inadequate and the NT EPA should request that assessment proceed by way of environmental impact statement.

93. The EPA must have regard to the confidence in the effectiveness of any proposed measures identified to avoid, mitigate or manage potential significant impacts.¹³⁸ As set out at [42]-[45] above, Imperial's only plan to reduce emissions appears to be to 'sell the appraisal gas', but that selling appraisal gas does not reduce the overall emissions of the Project; it only shifts those emission from being counted as scope 1 emissions to being scope 3, or end use emissions. For this reason, the NT EPA should have a low level of confidence in this this proposed measure to 'mitigate' the potential significant impacts and at the least, further information of the type discussed above ought to be sought.

Water and land

94. The Project additionally has the potential to have a significant impact on water and land, and the NT EPA Objectives related to 'terrestrial environmental quality', 'hydrological processes' and 'inland water environmental quality'. Objectives related to these factors are particularly at risk due to the high likelihood of a wastewater spill severely polluting the surrounding environment and water resources. Given the highly dangerous and toxic nature of the chemicals, heavy metals, salts and potential radioactive elements within the wastewater, these pose a significant risk to human health, wildlife, soil and surface and groundwater.

95. As described at [8686] above, the Referral Documents and EMP provide incomplete information to fully assess the potential significance of environment impact of the Project. Three experts who reviewed the EMP – two hydrogeologists (Vogwill and Currell) and one engineer whose expertise is in mining wastewater management (McIntyre) – all noted significant gaps in the

¹³⁸ EP Regulations, reg 59(c).

baseline data and surveys of the Project area and water that resulting in their being unable to provide concrete conclusions on the extent and potential of the environmental risks and impacts of the Project. In the face of a high probability that a wastewater spill will occur in the life of the Project this level of uncertainty is unacceptable.

96. In light of these potential risks, Imperial ought to have included land and water impacts in its referral to the NT EPA. It did not, and, as a result, neither the Referral Documents nor the EMP include sufficient details of the impacts to water and land such that the NT EPA can be certain about those impacts. In order for the NT EPA to conduct a sufficient assessment of the acceptability of the proposed action with respect to potential impacts on hydrological processes, inland water environmental quality and terrestrial environmental quality, further information should be provided by means of an environmental impact statement addressing matters that include, but are not limited to the following:

- a. A surface water monitoring program which includes baseline data, proposed locations, frequencies, water quality parameters and a map, at a minimum.
- b. Groundwater testing and drawdown modelling to understand the impact of the extraction proposed;
- c. Shallow aquifer mapping;
- d. A survey of geological structures and hydrogeological pathways;
- e. Surface water hydrology and hydrogeology; and
- f. A comprehensive wastewater management plan.