

Name: Jon Bailes Date: 26 March 2021
 Company: Z1Z Resorts Pty Ltd Job/Doc. No.: 60294
 Email: dgriffin@fiveight.com Inquiries: Jon Bailes

**NINGALOO LIGHTHOUSE RESORT PROJECT
 Greenhouse Gas Assessment**

The following information is provided to support the s38 Referral for Ningaloo Lighthouse Resort Project.

1.1 EPA Objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018) identifies the objective for Greenhouse Gas (GHG) Emissions is "*to reduce net greenhouse gas emissions in order to minimise the risk of environmental harm associated with climate change*".

1.2 Policy and Guidance

A summary of the relevant policy and guidance for GHG emissions is provided in Table 1.

Table 1: Greenhouse Gas Policy and Guidance

Author	Title	Year of Publication
EPA	Statement of Environmental Principles, Factors and Objectives (EPA 2018)	2018
	Environmental Factor Guideline: Greenhouse Gas Emissions (EPA 2020)	2020
Government of Western Australia	Greenhouse Gas Emissions Policy for Major Projects (Government of Western Australia 2019)	2019
Commonwealth	<i>National Greenhouse and Energy Reporting Act 2007</i> (NGER Act)	2007
	National Greenhouse and Energy Reporting (Measurement) Determination 2008	2008
	National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015	2015

The Western Australian Government's Greenhouse Gas Emissions Policy for Major Projects (the State GHG Policy) commits the State Government to work with all sectors of the Western Australian economy to achieve net-zero GHG emissions by 2050 and commits to working with the Commonwealth Government's interim target of emission reductions of 26 to 28 per cent by 2030.

The State GHG Policy is designed to guide government decision making for major projects that are assessed by the EPA. In accordance with the policy, the Minister for Environment will consider the particular characteristics of each project and the advice and recommendations of the EPA. The Government may then consider whether it is appropriate to apply a condition that sets out the requirements for a plan detailing the proponent's contribution towards achieving the Government's aspiration of net zero emissions by 2050.

The EPA has also recently released its GHG guideline, which requires proponents of major greenhouse gas emitting projects to show how they can reasonably and practically avoid, reduce, and offset emissions to contribute to the State's aspiration of net zero emissions by 2050.

1.3 Receiving Environment

The State Government's Climate Change in Western Australia Issues Paper (DWER 2019) presents the challenge that climate change poses to Western Australia. Impacts from climate change are noted to have already occurred, including higher than average temperatures and a decline in rainfall.

The Australian Government developed the Regional Natural Resource Management Planning for Climate Change Fund. Australia has 54 natural resource management (NRM) regions, which are defined by catchments and bioregions. These NRM regions are grouped into 'clusters', which largely correspond to the broad-scale climate and biophysical regions of Australia (Watterson, I. et al., 2015).

The Proposal is in the Rangeland cluster (Rangelands North sub-cluster). The Rangelands cluster contains varied landscapes, including the Flinders and Pilbara Ranges, salt lakes that flood sporadically, and the centre of Australia. There is a wide range of vegetation, from tropical woodlands to shrublands, grasslands and saltbush, and it includes relatively intact ecosystems. The water features in the cluster are mostly intermittent, and aside from the coastal rivers of the west, most streams drain into salty lakes, in particular Lake Eyre. The cluster is home to many of Australia's indigenous people, and important agricultural activity includes the grazing of cattle and sheep. Rainfall systems vary from seasonally reliable monsoonal influences in the far north of the sub-cluster through to very low and variable rainfall patterns in much of the centre.

1.4 Potential Impacts

The Proposal will result in additional GHG emissions from the clearing of native vegetation, operation of machinery and plant equipment and from power generation. The increase in greenhouse gas emissions from the Proposal has a potential impact by contributing to global GHG concentrations.

Government predict that future climate change projections for the Rangelands North sub-catchment predict (CSIRO 2015):

- average temperatures will continue to increase in all seasons (very high confidence);
- more hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence;
- Changes to summer rainfall are possible but unclear. Winter rainfall is projected to decrease with high confidence;
- Increased intensity of extreme rainfall events is projected, with high confidence; and
- Mean sea level will continue to rise, and the height of extreme sea-level events will also increase (very high confidence).

1.5 Estimated Emissions

National and international GHG reporting standards define a set of distinct classes (scopes) of GHG emissions that delineate sources and associated responsibilities. Scope 1 GHG emissions are the emissions released to the atmosphere as a direct result of an activity or a series of activities at a facility level. Scope 2 GHG emissions are the emissions from the consumption of an energy product from a third party supplier. Scope 3 emissions are indirect GHG emissions other than Scope 2 emissions that are generated in the wider community, which occur as a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business (Clean Energy Regulator 2018).

The Proposal will contribute to global GHG concentrations from:

- Direct emissions from the clearing of native vegetation and operation of machinery and plant equipment (Scope 1 emissions); and
- Indirect emissions from the consumptions of electricity (Scope 2 emissions).

GHG emissions are expressed in CO₂-e, which is an aggregate of GHG emissions, including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and nitrogen trifluoride (NF₃) calculated as an equivalent CO₂ emission (CO₂-e) by factoring in the global warming potential (GWP) of each gas. GWP is applied in accordance with National Greenhouse and Energy Reporting (Measurement) Determination 2008.

Calculations have been undertaken using the methodologies described by the National Greenhouse and Energy Reporting (Measurement) Technical Guidelines (Commonwealth of Australia 2017), which provide guidance and commentary to assist reporters in estimating GHG emissions for reporting under the *National Greenhouse and Energy Reporting Act 2007* (NGER Act). Method 1 of the Technical Guidelines has been used to estimate emissions for the Proposal. This method specifies the use of designated emission factors in the estimation of emissions and is based on the National Greenhouse Accounts (NGA) Factors default method. These emission factors are national average factors determined using the Australian Greenhouse Emissions Information System (AGEIS).

The maximum Scope 1 emissions associated with the Proposal are estimated to be up to tCO₂-e per year. Scope 2 emissions are estimated to be up to 302,000 tCO₂-e. Therefore, the total Scope 1 and Scope 2 emissions associated with the Proposal will be 768,000 tCO₂-e per year.

Details of the Scope 1, Scope 2 and Scope 3 emissions sources are provided below.

1.5.1 Scope 1 emissions

The works associated with the Proposal will result in the clearing of vegetation leading to loss of bio-sequestration capacity. Degradation of the removed vegetation leads to stored carbon being released to the atmosphere mainly as CO₂ and methane. These Scope 1 emissions have been estimated for the Proposal. Emissions associated with fuel consumption by mobile equipment used for land clearing are also Scope 1. These have not been accounted for in this assessment as they are likely to be insignificant due to the small size of the land parcel, the density of the vegetation and clearing being a one-off occurrence.

The calculation of GHG emissions associated with land clearing for the Proposal is based on the following conservative assumptions and exclusions:

- vegetation is mature without any disturbance;
- above and below-ground biomass would be removed from 4.52 ha of land;
- the above-ground biomass estimate derived from the maximum biomass density inside the Proposal area in the Maximum Above Ground Biomass (also known as M) spatial layer developed for the Full Carbon Accounting Model (FullCAM) is representative of the site;
- a root to shoot ratio of 0.24 is representative of the site vegetation;
- the default Intergovernmental Panel on Climate Change (IPCC) value of carbon fraction of biomass dry matter of 0.5 is representative;
- all carbon in biomass removed would all be released as CO₂;
- any rehabilitation of the conservation area to be retained would provide a negligible contribution to residual carbon sequestration potential; and
- soil to remain on-site is expected to mostly be covered with an impervious surface (e.g., bitumen or concrete) or landscaping; therefore, soil carbon would largely be retained and was not accounted for.

The carbon sequestration loss from vegetation clearing was estimated from the following formula.

$$\Sigma E_v \text{ t CO}_2 - e = A \times \text{AGB} \times (1 + R) \times \text{CF} \times \text{CD}$$

Where:

ΣE_v tCO₂-e is the carbon lost from vegetation clearing

A is the area to be cleared in hectares [4.52 ha]

AGB is the above-ground biomass [16.8 t dry matter/ha]

R is the root to shoot estimate of below-ground biomass [0.24]

CF is the carbon fraction of biomass [0.5]

CD is the ratio of the molecular weight of carbon dioxide to carbon [3.67]

Using the above values, the potential GHG emissions from the clearing of vegetation and loss of bio-sequestration capacity for the Proposal would be 173 t CO₂-e.

1.5.2 Scope 2 emissions

Indirect Scope 2 emissions associated with the Proposal will be generated from electricity consumed at the resort, which will be supplied by Horizon Power from its gas-fired (9 MW) power station in Exmouth.

The greenhouse gas emissions in tonnes of CO₂-e attributable to the quantity of electricity consumed has been calculated with the following equation.

$$Y = Q \times \left(\frac{EF}{1000} \right)$$

Where:

Y is the scope 2 emissions measured in CO₂-e tonnes.

Q is the quantity of electricity purchased (kilowatt-hours).

EF is the scope 2 emission factor.

The Proposal is estimated to use 1,687,500 kWh per year for lighting and power of fixed infrastructure (roads, paths, kitchens, shower blocks, chalets etc.) and for powered campsites. This is based on a 4.5 multiplier of the current caravan park consumption of 375,000 kWh per year (average of measured 2018 and 2019 consumption).

Exmouth is not part of the North West Interconnected System, and therefore no standard emission factors in the National Greenhouse Accounts Factors (Commonwealth of Australia 2020) are applicable. The 2019:2020 annual report for Horizon Power¹ states that its greenhouse gas emissions factor was 0.54 kg CO₂-e per kWh.

Based on a consumption (Q) of 1,687,500 kWh and emission factor (EF) of 0.54, the annual Scope 2 emissions (Y) associated with the Proposal are estimated to be 911 tCO₂-e.

1.6 Mitigation Measures

the development includes a number of renewable initiatives (photovoltaics including solar lighting) that will offset a large portion of the electrical load.

1.6.1 Assessment of Impacts

The estimated total Scope 1 and Scope 2 emission associated with the Proposal of 1,084 tCO₂-e is well below the 100,000 tCO₂-e per year threshold defined by the EPA for detailed assessment and

¹ <https://www.horizonpower.com.au/about-us/reports-publications/annual-reports/>

requirement for a GHG Management Plan (EPA 2020). Despite the low GHG emission footprint, the Proposal will implement a number of renewable initiatives to reduce emissions.

Furthermore, the contribution of the Proposal to the total GHG emissions for Western Australia of 91.4 M tCO₂-e (Commonwealth of Australia 2020) is negligible and will not impede the Stage GHG Policy aspiration of net zero emissions by 2050.

Based on the above, no significant impacts associated with GHG emissions are anticipated. Consequently, it is considered that the EPA's objective for Greenhouse Gas Emissions will be met.

References

- Clean Energy regulator (2019) Greenhouse Gases and energy webpage available at <http://www.cleanenergyregulator.gov.au/NGER/About-the-National-Greenhouse-and-Energy-Reporting-scheme/Greenhouse-gases-and-energy> [Accessed March 2021].
- Commonwealth of Australia 2017. *National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the estimation of emissions by facilities in Australia*. Department of Environment and Energy, Australian Government, Canberra ACT. Available from: <http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications/nger-technical-guidelines-reporting-year-2017-18> [Accessed March 2021]
- Commonwealth of Australia 2020. *National Greenhouse Account Factors*. Department of Environment and Energy, Australian Government, Canberra ACT. Available from: <https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors-2020> [Accessed March 2021]
- CSIRO 2015. *Climate Change in Australia Projections for Selected Australian Cities* Available from: https://www.climatechangeinaustralia.gov.au/media/ccia/2.1.6/cms_page_media/176/CCIA_Australian_cities_1.pdf [Accessed March 2021].
- DWER 2019. *Climate Change in Western Australia Issues Paper*. Department of Water and Environmental Regulation, Perth WA.
- Environmental Protection Authority (EPA). 2018. *Statement of Environmental Principles, Factors and Objectives*, EPA, Western Australia.
- Environmental Protection Authority (EPA) 2020, *Environmental Factor Guideline: Greenhouse Gas Emissions*, EPA, Western Australia.
- Government of Western Australia 2019. *Greenhouse Gas Emissions Policy for Major Projects*.
- Intergovernmental Panel on Climate Change 2006. 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4: Agriculture and Other Land Use. Available from: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf [Accessed August 2020]
- Watterson, I. et al., 2015. *Rangelands Cluster Report, Climate Change in Australia Projections for Australia's Natural Resource Management Regions: Cluster Reports*, eds. Ekström, M. et al., CSIRO and Bureau of Meteorology, Australia.