South Hedland Power Station

EP Act Referral - Supporting Documentation

Prepared for
TEC Hedland Pty Ltd
by Strategen

June 2014

STRATEGEN
environmental consultants

South Hedland Power Station

EP Act Referral - Supporting Documentation

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June 2014

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Client: TEC Hedland Pty Ltd

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
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Table of contents

List of tables

List of figures

List of appendices

All appendices are in electronic form on a data CD/DVD attached to the inside the back cover of this report or on the disc containing the electronic version of this report.

1. Introduction

This report is an assessment of the potential environmental impacts of construction and operation of the South Hedland Power Station (hereafter referred to as the Power Station) by TEC Hedland Pty Ltd (TECH), a subsidiary of TransAlta Energy (Australia) Pty Ltd, previously proposed by Horizon Power, to be located in the Boodarie Resource Industrial Estate, Port Hedland, Western Australia (Figure 1). This assessment covers the identification of potential environmental impacts, their significance and proposed mitigation and management measures.

1.1 Background

This Proposal involves the construction and operation of two gas turbines and one steam turbine arranged in a combined cycle gas turbine (CCGT) block configuration and two open cycle turbine (OCGT) units, with an overall nominal net capacity of 191 MW, at design reference conditions. Initial commissioning will include the CCGT system and one OCGT. The second OCGT has been included in the design for future expansion, and will be dependent on customer requirements and demand.

There is an existing facility on the site which is owned by Horizon Power. The facility includes, but is not limited to, temporary TM2500 generating turbines which are supported by diesel fuel oil storage and supply, raw water, gas supply, sedimentary and evaporation ponds, substation and stormwater systems. The Power Station will replace the temporary generating turbines, but will utilise the balance of plant.

Each gas turbine unit would use natural gas as its primary fuel source, which would be supplied via the adjacent Pilbara Energy Pipe Line (PEPL). Diesel fuel oil would be stored on site in the existing fuel oil storage tanks, as an emergency back-up fuel source in the event of any disruption to the gas supply. The Power Station would be connected to the North West Interconnected System (NWIS) servicing key regional centres of the Pilbara.

1.1.1 Location

The Power Station is located at Lot 601 on Deposited plan 70566, within the Boodarie Resource Industrial Estate (Figure 2), approximately 13 km south of Port Hedland and approximately 6 km west of South Hedland, in the Pilbara Region of Western Australia. The Power Station is adjacent to the PEPL, approximately 700 m west of the Great Northern Highway and adjacent to the existing Alinta DEWAP Pty Ltd Port Hedland Power Station.

1.1.2 Purpose of document

This document provides detail of the expected environmental impact of the proposed Power Station at Boodarie, and is submitted to support referral of the Power Station to the Environmental Protection Authority (EPA) pursuant to s 38 of Part IV of the *Environmental Protection Act 1986* (EP Act). An application for a Works Approval under Part V of the EP Act will be submitted to the Department of Environment Regulation (DER) following the submission of this Part IV referral.

1.1.3 Project justification

A temporary 60 MW power station is located at the site but is not currently operational. To meet local area demand for the next 25 years, Horizon Power and The Pilbara Infrastructure Pty Ltd (TPI) require a new permanent facility with a larger generating capacity.

The current total combined coincident Contracted Maximum Demand for the Power Station will be 145 MW, with a nominal generating capacity of 191 MW (at design reference conditions) to meet potential future customer needs.

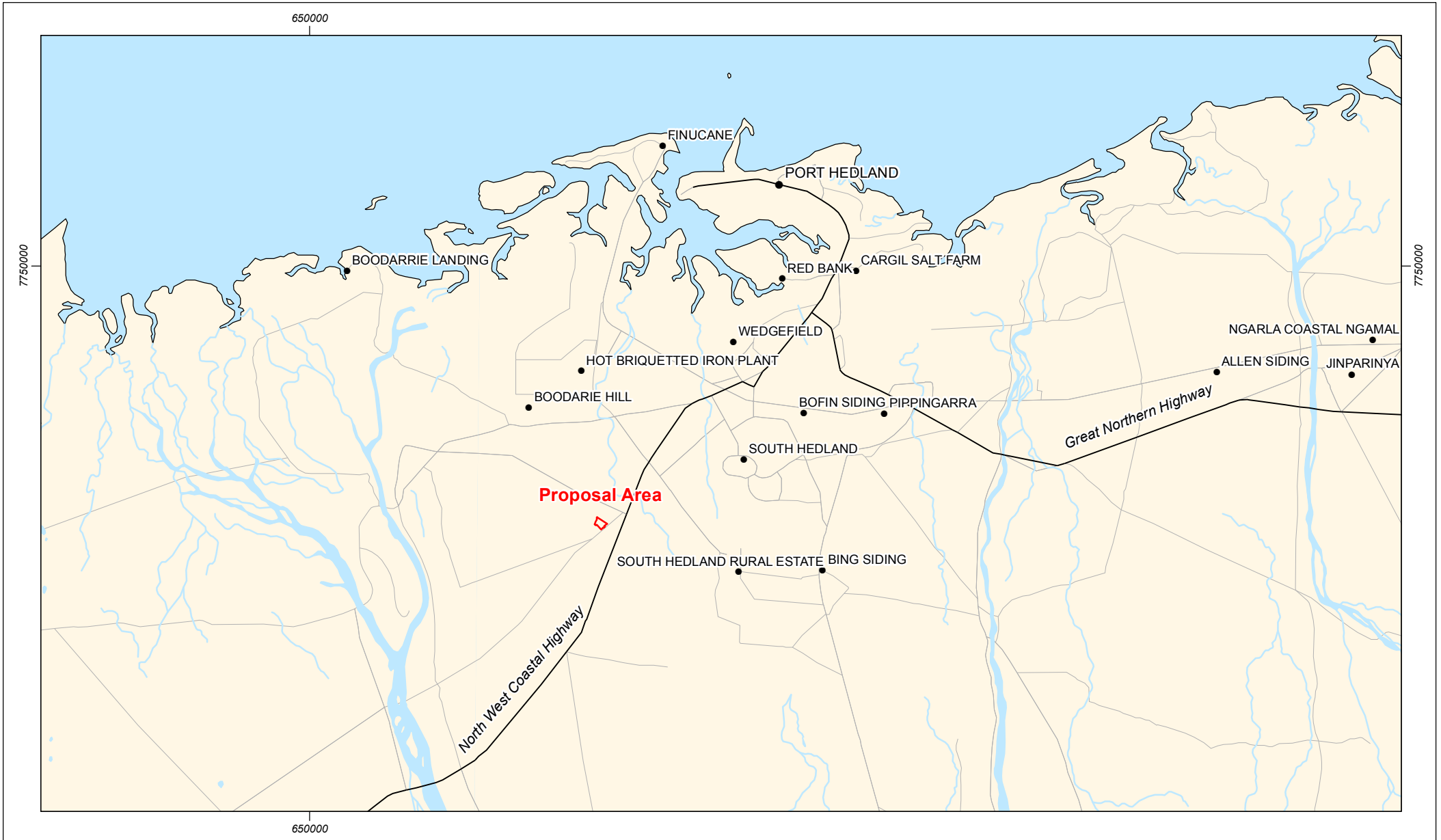


Figure 1: Regional location

Scale 1:200,000 at A4

0 1 2 3 4 5 km

Coordinate System: GDA 1994 MGA Zone 50

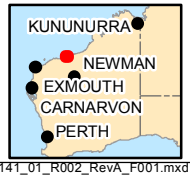
Note that positional errors may occur in some areas

Date: 12/06/2014

Author: SFinning

Source: Topography: Geoscience Australia 2012; Site boundary: Strategen 2014

Path: Q:\Consult\2014\SSA\SSA14141.01\ArcMap_documents\R002\RevA\SSA14141_01_R002_RevA_F001.mxd



Legend

- Site boundary
- Watercourses
- Town
- Major road
- Minor road

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Figure 2: Site layout

Scale 1:5,000 at A4

0 20 40 60 80 100 Meters

N

Coordinate System: GDA 1994 MGA Zone 50

Note that positional errors may occur in some areas

Date: 12/06/2014

Author: SFinning

Source: Aerial photography: Landgate 2014; Site boundary: Strategen 2014.

Legend

- Site boundary
- Lot 600
- Lot 601

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1.1.4 Proponent details

The Proponent for the Power Station is:

TEC Hedland Pty Ltd
Level 14, Parmelia House
191 St Georges Terrace
Perth WA 6000

The contact for the Power Station is.

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General Manager
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08 9420 0629
Aron_Willis@transalta.com

TECH is a wholly owned subsidiary of TransAlta Energy (Australia) Pty Ltd (TransAlta), which in-turn is a wholly owned subsidiary of TransAlta Corporation. TransAlta Corporation is a power generation company and marketer of wholesale electricity. TransAlta Corporation operates a fleet of over 8000 MW comprising a mix of fuel types and technologies at more than 60 facilities across Canada, the United States and Western Australia. TransAlta has considerable experience in developing, building, owning and operating steam and power plants. TransAlta experience covers a broad range of fuel types, including natural gas, coal, hydro, wind and geothermal.

In Western Australia, TransAlta specialises in the provision of power to remote mining operations through the development of long-term strategic relationships. TransAlta own and operate generation and transmission assets that supply power to large-scale mining and processing operations and to the Wholesale Electricity Market in the south west of the State. TransAlta generation assets currently consist of 425 MW of both South West Interconnected System (SWIS) connected and isolated systems in remote locations of Western Australia. In addition, TransAlta own, operate and maintain transmission and distribution networks comprised of over 500 km of conductors ranging from 33 Kilo Volt (kV) up to 132 kV.

2. Proposal description

2.1 Overview

The Proposal is to construct and operate a permanent dual fuel power station, consisting of a CCGT power generation block (consisting of two gas turbine generators; two once through steam generators; and a common steam turbine generator) and two OCGTs with a nominal net generating capacity, at the design reference conditions, of 191 MW. The primary fuel source will be natural gas, with diesel fuel oil for contingency.

The Proposal will replace a temporary Horizon Power generation facility, but will utilise and augment much of the balance of plant and ancillary equipment already installed.

2.2 Key Proposal components

The proposed plant to be installed on the site will consist of the following in a CCGT configuration:

- two gas turbine generators
- two once through steam generators
- one steam turbine generator
- an air-cooled condenser.

And two OCGTs will supplement the installed generating capacity to meet maximum power demand requirements.

Some of the existing balance of plant will be augmented to accommodate the new Power Station generating units.

Figure 3 shows the overall site layout of the Power Station and Figure 4 shows the proposed plant layout, with the combined cycle system (GT3, GT4, the steam turbine and the air cooled condenser), and the two OCGTs (GT1 and GT2).

2.2.1 Open cycle gas turbines (OCGT)

Each OCGT consists of an air inlet system where air is compressed and then a fuel is added and ignited, generating a high temperature and pressure gas stream. This stream then enters a turbine where the gas expands and drives the turbine, which in turn drives a generator, producing electrical power.

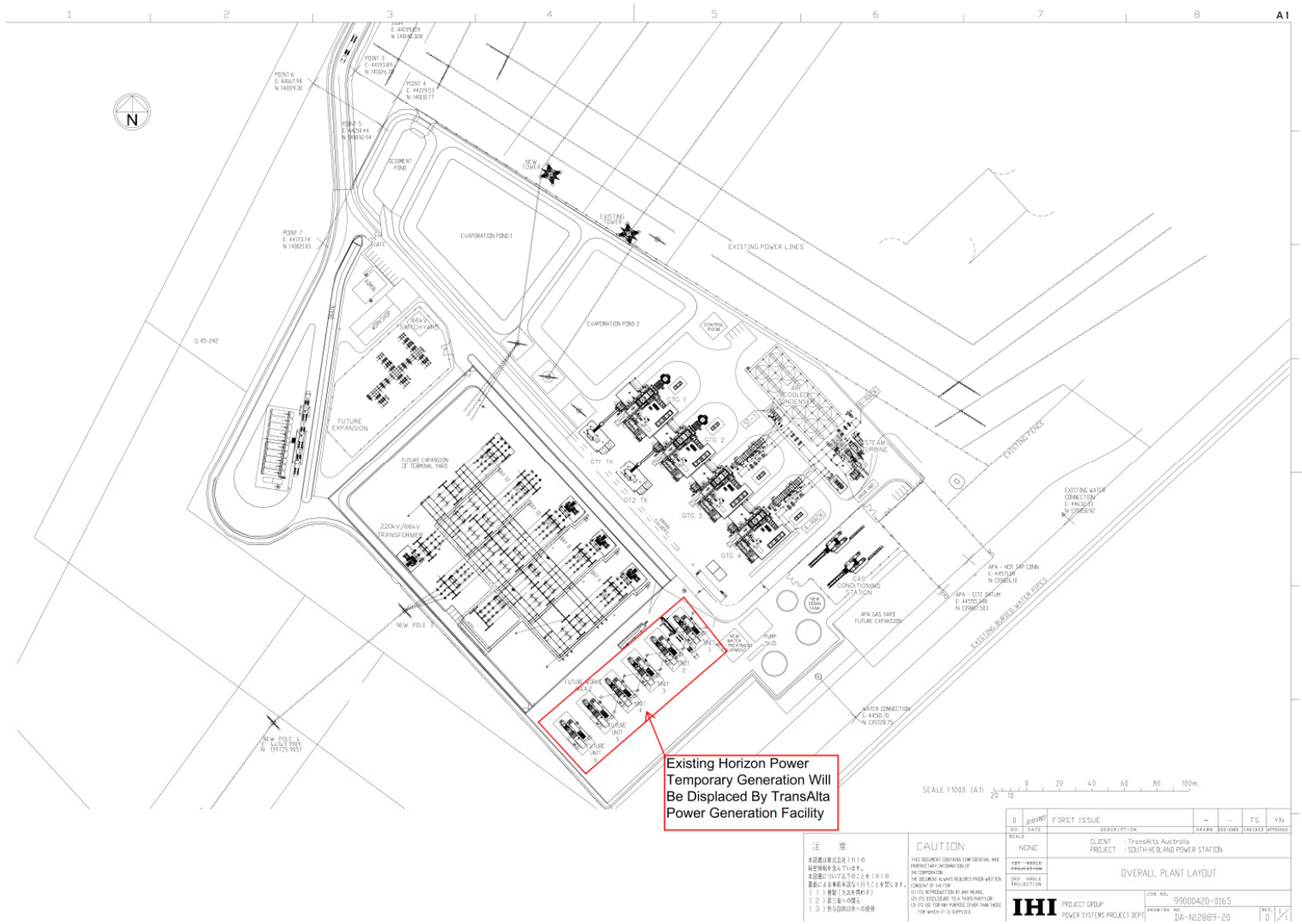
2.2.2 Combined cycle gas turbines (CCGT)

The combined cycle system is also made of OCGT units, as above, but with the exhaust gas energy of each gas turbine supplied to a heat recovery system, utilising once through steam generator technology, which produces steam, which is then supplied and expanded within a common steam turbine generator, which produces additional electrical power. The exhaust steam from the steam turbine is fully condensed in an air cooled condenser, with the condensed water returned to the cycle for reuse.

2.2.3 Air cooled condenser

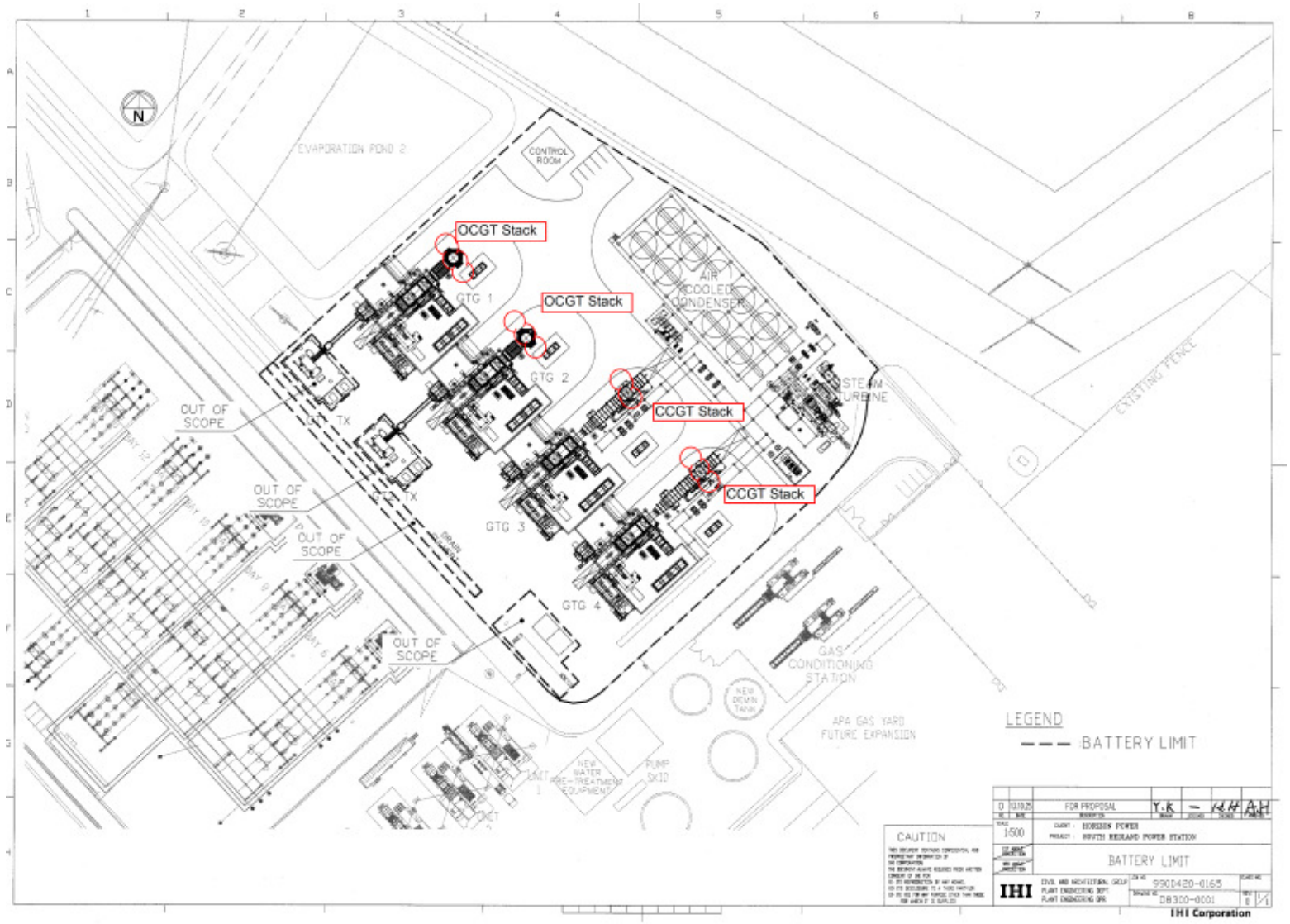
The air cooled condenser cools and condenses the steam from the steam turbine using fans and ambient air cooling.

Figure 3: Overall site layout



NB: This drawing is preliminary and may be changed during detail engineering phase.

Figure 4: Plant layout



NB: This drawing is preliminary and may be changed during detail engineering phase.

2.2.4 Existing services

All necessary existing services will be adapted and augmented as needed in order to meet the required conditions. These adaptations include but are not limited to the following:

- fuel gas supply system, increase of supply to site
- raw water supply system, increase of supply to site
- demineralised water systems, increase of supply to site
- potable water supply systems, increase of supply to site
- fire detection and protection systems, re-locating and design of systems
- stormwater system, re-locating and design of the system
- wastewater and effluent disposal, wastewater amount to be accommodated within current wastewater and effluent disposal methods – no significant increase is expected
- drainage systems, re-locating and design of the system.

2.3 Key characteristics

The key characteristics of the Proposal, excluding existing balance of plant and ancillary equipment already installed, are summarised in Table 1.

Table 1: Key physical characteristics of the Proposal

Element	Location	Proposed Extent
Proposal area	Figure 2	19.5 ha (Lot area is 24 ha)
Combined cycle gas turbine	Figure 4	2 gas turbines and 1 steam turbine unit of combined 107 MW design capacity
Open cycle gas turbine	Figure 4	2 units of 42 MW design capacity each

Table 2: Key operational characteristics of the Proposal

Element	Location	Proposed Extent
Water supply	N/A	Estimated water consumption of 300 ML per year. Water will be sourced from the Port Hedland town water supply.
Fuel supply	N/A	Estimated gas supply of 31.05 TJ per day. Diesel fuel will be supplied to the plant as required.

2.4 Project timeline

TECH proposes to finalise key project documents with Horizon Power in July 2014 with a view to some minor site works to start in October 2014 (Q4 2014). Construction and any associated earthworks are expected to commence in January 2015. Commissioning of the OCGT would take place in Q3 2016 and the CCGT system would be in Q4 2017. It is anticipated that the Power Station would be completed in 2017 and operate continuously for the life of the project (approximately 25 years).

2.5 Regulatory framework

2.5.1 Western Australia

Section 39A of the EP Act provides the basis on which the EPA decides whether to assess a Proposal. The EPA makes this decision based on information provided on the potential impacts to the environment.

Referrals under the *Environmental Protection Act 1986* (EP Act) should contain information on the potential environmental impacts of the Proposal and their potential significance. Information the EPA expects includes:

- a definition of the Proposal
- environmental setting
- relevant environmental aspects
- potential environmental impacts and environmental risks that may arise from relevant environmental aspects
- activities and associated environmental impacts that are regulated by other agencies under other statutes.

The EPA is required to make a decision within 28 days of receipt of a referral on whether the referred Proposal requires assessment and, if so, the level of assessment.

The *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* identify that the EPA carries out some investigations and inquiries before deciding not to assess a Proposal. In deciding not to assess a Proposal, the EPA determines that no further assessment is required by the EPA.

The Power Station has the limited potential to affect a small number of environmental factors, including air quality and amenity (noise), which can be adequately regulated under Part V of the EP Act. There will be no impacts to flora and vegetation or terrestrial fauna from construction of the Power Station, in excess to that already approved to be cleared under an existing Clearing Permit. The Proposal is located within an existing predominantly-cleared footprint, in which a smaller approved gas-fired power station facility exists. Given the above, the Proponent is requesting the EPA to determine that this Proposal be 'Not Assessed – public advice given'.

A Works Approval application to DER under Part V of the EP Act will be submitted following the referral of the Power Station under Part IV of the EP Act.

The operation of the Power Station would be undertaken according to all relevant legislation, guidelines, codes and standards.

2.5.2 Australian Government

This Proposal is not expected to affect Matters of National Environmental Significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Horizon Power originally referred the currently approved facility under the EPBC Act and the proposed action was considered not to be a controlled action on 31 May 2011.

2.6 Relevant legislation

Construction and operation of the proposed Power Station may involve the application of the following key statutes:

- *Environmental Protection Act 1986* (EP Act), of which relevant subordinate regulations include:
  - Environmental Protection Regulations 1987
  - Environmental Protection (Noise) Regulations 1997
  - Environmental Protection (Clearing of Native Vegetation) Regulations 2004
  - Environmental Protection (Controlled Waste) Regulations 2004
- *Dangerous Goods Safety Act 2004*, of which relevant subordinate regulations include:
  - Explosives and Dangerous Goods (Dangerous Goods Handling and Storage) Regulations 1992
- *National Greenhouse and Energy Reporting Act 2007* (NGER Act).

2.7 Relevant guidelines, standards and codes

Guidelines, standards and codes are applicable to:

- air quality
- greenhouse gas
- noise
- hydrocarbon management.

Air quality

The National Environment Protection and Heritage Council (NEPC) has developed the National Environmental Protection Measure (NEPM) for Air Quality. The Ambient Air NEPM (as amended, NEPC 2003) and the Air Toxics NEPM (NEPC 2004) specify standards and goals for ambient levels of air pollutants. DEC adopted the NEPM standards for general application to air quality management in WA.

Greenhouse gases

The EPA has developed Guidance Statement No. 12 for minimising greenhouse gas emissions (EPA 2002). Guidance Statement No. 12 applies to all new proposed projects or extensions subject to EPA approval. The objective of this guidance statement is to ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed in the planning/design and operation of projects and that:

- best practice is applied to maximise energy efficiency and minimise emissions
- comprehensive analysis is undertaken to identify and implement appropriate offsets
- proponents undertake an ongoing program to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time.

Under the Australian Government NGER Act, corporations with 'operational control' over a facility would be required to report if their corporation or facility emit greenhouse gases, produce energy, or consume energy at or above specified quantities per financial year (1 July to 30 June).

From 1 July 2008, corporations have been required to register and report if they control facilities that emit 25 kt/y or more of greenhouse gas.

Noise

The EPA has developed Draft Guidance Statement No. 8 (EPA 2007) for environmental noise to provide guidance to proponents submitting Proposals for environmental impact assessment to ensure that the noise emissions from the premises on which the Proposal is based comply with the Environmental Protection (Noise) Regulations 1997.

Hydrocarbon management

Standards, codes and guidelines relevant to hydrocarbon management at the Power Station include:

- *Dangerous Goods Act 2004* (i.e. Dangerous Goods Safety [Storage and Handling of Non-explosives] Regulations 2007)
- Australian Standard 1940-2004 - Storage and Handling of Flammable and Combustible Liquids
- Department of Mines and Petroleum (DMP) - Storage and Handling of dangerous goods – Code of Practice: Resource Safety (DMP 2010).

2.8 Local Government Authority

The local government authority is the Town of Port Hedland. Under Town of Port Hedland TPS No. 5 (2011), any Prescribed Premise under the Environmental Protection Regulations 1987 (as amended) is defined as 'Industry – Noxious' and is not permitted to be built within the Strategic Industry zone without planning approval from the Council. No change to the zoning is proposed for this Power Station.

2.9 Internal guidelines

In addition to the above guidelines, the manufacturer of the proposed elements of the Power Station will be required to have a set of test procedures to be implemented prior and during operation of the turbines. TECH will adhere to all guidelines and procedures that the manufacturer has put forward to ensure the operability of the turbines.

3. Consultation

3.1 Stakeholders

The following stakeholders have been identified for inclusion in the consultation process:

- Hon. Colin Barnett MLA, Premier
- Hon. Michael Nahan MLA, Minister for Energy
- Hon. Terry Redmond MLA, Minister for Lands
- Office of the Environmental Protection Authority
- Department of State Development
- Department of Mines and Petroleum
- Department of Environment Regulation
- Town of Port Hedland
- The Kariyarra People
- Pilbara Native Title Service (PNTS)
- Pilbara Development Commission
- Port Hedland Chamber of Commerce Inc.
- Local Members of Parliament
- Main Roads
- Alinta Energy
- Water Corporation
- APA (Pilbara Pipeline) Pty Ltd.

3.2 Current consultation

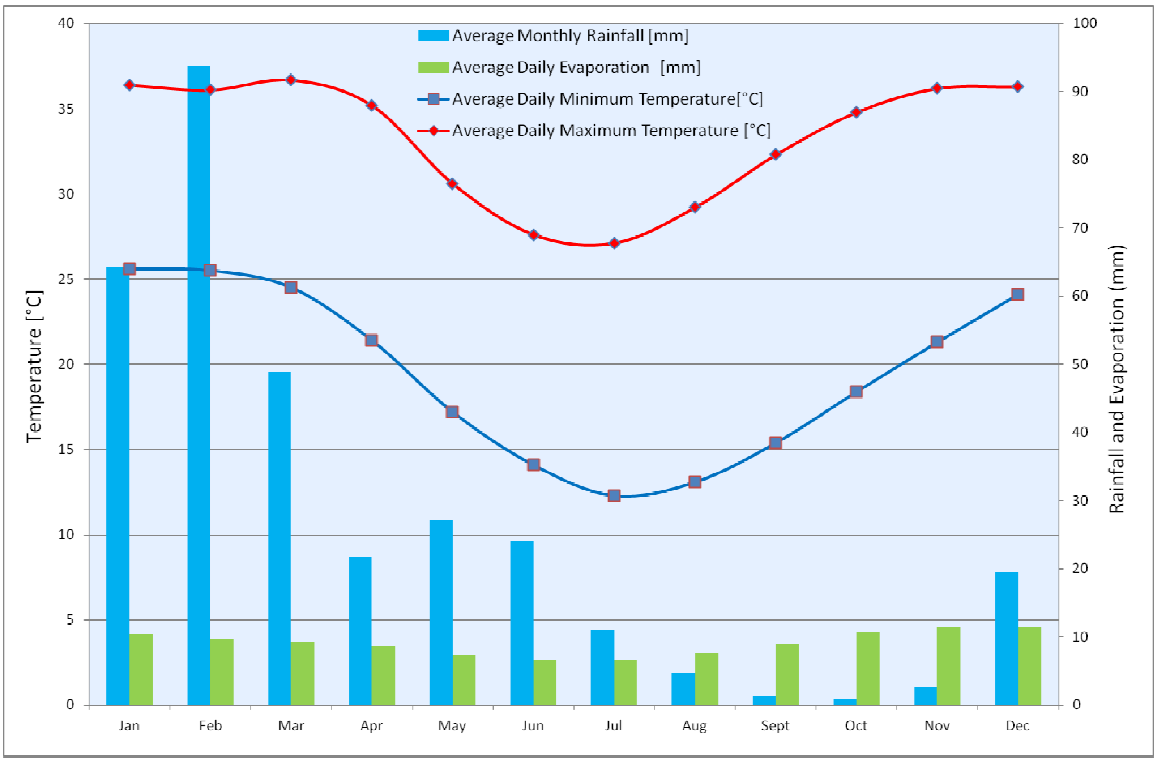
TECH has been in communication with representatives of the Office of the Environmental Protection Authority (OEPA), the DER and the Department of State Development (DSD). Discussions have been at a high level and have centred on the overall project design and key differences between the original Horizon Power Proposal and the new Proposal.

4. Existing environment

4.1 Climate

The Proposal is located in the Pilbara region of Western Australia which experiences a hot and dry arid climate. Weather patterns are characterised by extremes in temperature and rainfall, with rainfall largely associated with scattered thunderstorms and cyclonic events between the months of November and April.

Figure 5: Climate statistics for Port Hedland



Source: BoM 2014

4.2 Soils and topography

The Proposal area falls within the De Grey Lowlands region, which is characterised by floodplains and deltaic plains, interspersed by granitic and limestone lowlands. Soils are generally dominated by alluvial, shoreline or Aeolian deposits of Phanerozoic origin (Van Vreeswyk *et al* 2004). Base rock is predominantly deeply weathered Precambrian granite overlain by Quaternary sediments. The Boodarie Industrial Estate is underlain by Pleistocene red–brown silty sands with patches of Pleistocene clayey sand, with floodplain surface areas consisting of loose quartz and fine gravels (Woodward-Clyde 1996).

The coastal plain on which the Proposal area is located has low relief. The maximum elevation across the Boodarie Industrial Estate is 21 m Australian Height Datum (AHD), in the south–west section of the estate. The proposed Power Station would be located at an elevation between 10 m and 20 m AHD.

4.3 Groundwater

Groundwater in the area is generally brackish, being around 1000–3000 mg/L Total Dissolved Solids (TDS) as per the Department of Water (DoW) Hydrogeological Atlas (DoW 2011). The watertable is located at depth of 7 m at the adjacent Alinta DEWAP Power Station, and generally lies between 4 to 7 m below the surface across the coastal plain (Woodward-Clyde 1996).

4.4 Surface water

The closest watercourse to the Proposal area is South West Creek, around 1 km to the north and east of the proposed Power Station. South-West Creek is ephemeral, with the lower reaches subject being tidal. It drains a 73 km^2 catchment into the Port Hedland Harbour (Woodward-Clyde 1996). Modelling undertaken for the Industrial Estate environmental assessment indicated that total or partial filling of the flood fringe area would result in a rise in flood levels of 0.15 m under a 100-year Average Recurrence Interval (ARI) event, which is within the Floodplain Management Guidelines recommended by the then Water Authority for residential development (Woodward-Clyde 1996).

Other creeks in the vicinity of the Estate are the Turner River (approx. 8 km west) and Beebingarra Creek (approx. 15 km east).

4.5 Social environment

4.5.1 Zoning

The Boodarie Industrial Estate area in which the proposed Power Station is to be located is zoned 'Strategic Industry' under the Town of Port Hedland Town Planning Scheme (TPS) No. 5 (WAPC 2014). Within this zone, the Town of Port Hedland has confirmed that the Proposal area itself will be designated as an 'Industry – Noxious' (classification number 36) zone. The land on which the Alinta DEWAP Power Station is located is zoned for 'Other Public Purposes – Energy' under the Port Hedland TPS No 5. Surrounding lands are zoned 'Rural' under the same TPS.

The Proposal area is located on Crown Reserve owned by the Government of Western Australia. Horizon Power has been administered a management order by the Government (Department of Lands) to manage the site for Power Station purposes.

4.5.2 Contaminated site identification

The Proposal area is currently not listed on the online DER Contaminated Sites Database (DER 2014) under the *Contaminated Sites Act 2003*. Any evidence uncovered in the future which suggests that there may be some contamination of the Proposal area would be investigated and reported to DER as required under legislation.

4.5.3 Surrounding land use

The nearest residences to the proposed Power Station are:

- the South Hedland Rural Estate (Boodarie locality), 5 km to the east south east
- the town of South Hedland, 6 km to the north east
- Boodarie Homestead, approximately 8 km to the west.

The closest other industrial activity is the existing Alinta DEWAP Power Station, adjacent to the proposed Power Station, whose property boundary is located approximately 75 m to the north east of the main Power Station site; operational areas are located approximately 200 m form the Power Station boundary.

There is no other significant industry nearby with most of the Boodarie Industrial Estate yet to be populated by other operations. The Estate itself was divided into four major zones under original planning, including one for the previously proposed BHP Direct Reduced Iron Plant (a project since abandoned). The other three zones were as follows:

1. Down Stream Iron Ore Processing.
2. Power Intensive Industry.
3. Down Stream Petroleum Processing (in which this Proposal is located).

A donga storage area is adjacent to the north west boundary of the lot. There is no residential component to this area.

The Proposal area (and part of the Boodarie Estate) is located within the northern boundary of the Turner River Water Reserve, a Public Drinking Water Source Area (PDWSA) (No. 134, DoW 2011), which has not been assigned a protection priority rating by the Department of Water (DoW 2011). This water source is not used to supply water to the any public water supply system.

There are no conservation reserves or other types of reserves in the vicinity of the Proposal area.

4.5.4 Heritage

A search of the Department of Aboriginal Affairs (DAA) Heritage Inquiry System website indicated there are no Aboriginal Heritage sites registered within or near the Proposal area (DAA 2014). Some midden and scatter sites have previously been discovered along South West Creek, as reported in Woodward-Clyde (1996); however, these sites do not appear to have been registered with the DAA. Consultation with Aboriginal people for earlier assessments of the Boodarie Industrial Estate indicated there were no ethnographic sites in the area (Woodward-Clyde 1996).

In 2008, Horizon Power entered into consultation with the Pilbara Native Title Service (PNTS)[1], whose Native Title Claim (WC99-033) overlaps the Proposal area, to discuss Aboriginal heritage matters. During these discussions in 2008, the following became apparent:

- a heritage survey needed to be undertaken and agreement made on the need for a heritage monitor to be present during construction
- the Proposal area is on land reserved under Section 33 of the *Land Act 1933* (now the *Land Administration Act 1997*).

In November 2009, Horizon Power contacted the DAA (former the Department of Indigenous Affairs) and the PNTS to discuss Aboriginal heritage matters further. The PNTS advised that no native title rights and interests would be affected by proposed access and works, but also advised that Horizon Power consult with the Marapikurrinya Nominees Pty Ltd (a subsidiary of the Kariyarra Native Title Claimant group) as a precautionary measure. Negotiations resulted in the execution of a Heritage Agreement in December 2010 between the relevant parties. A heritage survey of the Proposal area was completed in April 2011. TECH is negotiating an agreement with Marapikurrinya Nominees Pty Ltd and Horizon Power under which the Heritage Agreement will be extended to cover activities by TECH within the Proposal area.

A search on the Heritage Council of WA database did not list any European heritage sites within the Proposal area (HCWA 2014).

[1] PNTS acts as the legal representative for the Kariyarra people

5. Assessment of environmental significance

5.1 Environmental factors and objectives

Consistent with the *Environmental Assessment Guideline for Environmental Factors and Objectives* (EAG 8) (EPA 2013a) and the *Environmental Assessment Guideline for Application of a significance framework in the environmental impact assessment process* (EAG 9) (EPA 2013b), environmental factors relevant to the Proposal have been identified through a preliminary risk assessment of expected impacts.

There is potential for the unmanaged impacts of the Proposal to air quality and amenity (noise) to be at variance with the EPA objectives, identified in Table 3.

Table 3: Key environmental factors and objectives

Key environmental factor	Objective
Air quality	To maintain air quality for the protection of the environment and human health and amenity.
Amenity	To ensure that impacts to amenity are reduced as low as reasonably practicable.

EPA objectives for all other factors are considered likely to be met with application of standard management practices and regulations under other statutes.

5.2 Significance assessment

In accordance with the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2012* (the Procedures), the likely significance of impacts on key environmental factors, an assessment has been undertaken against 10 criteria identified in Section 7 of the Procedures. The outcomes of this assessment are given in Table 4.

Table 4: Significance assessment

Criteria	Assessment
Values, sensitivity and quality of the environment which is likely to be impacted	The Proposal area is located within the Pilbara region of Western Australia. The entire Proposal area is located within an existing cleared footprint, currently intended to be used for a temporary 60 MW Horizon Power facility, within the Boodarie Resource Industrial Estate. There may be limited clearing of native vegetation and fauna habitat for the purpose of construction/laydown areas. The clearing will be in accordance with an existing clearing permit held by Horizon Power. **Potential significant effects are unlikely.**
Extent (intensity, duration, magnitude and geographic footprint) of the likely impacts Consequence of the likely impacts (or change) Resilience of the environment to cope with the impacts or changes	The Proposal is for the construction and operation of a 191 MW dual fuel power station, with a primary fuel source of natural gas, and diesel fuel oil capability for emergency backup. The Proposal will replace the temporary 60 MW Horizon Power facility in the same location. There may be limited clearing of native vegetation and fauna habitats in accordance with an existing clearing permit held by Horizon Power. Potential impacts are likely to relate only to air and noise emissions. **Potential significant effects are unlikely.**
Cumulative impact with other projects	Cumulative impacts of the Proposal have been addressed for air emissions; noise impacts are forthcoming. Cumulative impacts are expected to be low. **Potential significant effect unlikely.**
Level of confidence in the prediction of impacts and the success of proposed mitigation	Given the minimal amount of clearing of native vegetation and fauna habitat, impacts are likely to be restricted to air and noise emissions. Modelling for air quality impacts has been undertaken and noise modelling is currently being undertaken. **High level of confidence in prediction of impacts.**
Objects of the Act, policies, guidelines, procedures and standards against which a Proposal can be assessed	Relevant legislation, policies, guidelines, procedures and standards have been considered. **The Proposal can be implemented in a manner that will conform to relevant objects of the EP Act, policies, guidelines, procedures and standards.**
Presence of strategic planning framework	**Not applicable.**
Presence of other statutory decision-making processes which regulate the mitigation of the potential effects on the environment to meet the EPA objectives and principles for EIA	The following key regulatory controls can be applied to the Proposal to ensure appropriate management including (but are not limited to): • conditions of works approvals issued under Part V of the EP Act for construction activities • conditions of licence issued under Part V of the EP Act for the operation of activities **Significant opportunity exists for other regulatory processes to mitigate impacts to the environment sufficient to meet the EPA objectives and principles for EIA.**
Public concern about the likely effect of the Proposal, if implemented, on the environment	As the Proposal is located in an Industrial Estate at a location where there is currently another power station being built, the likelihood of public concern is considered to be low. **The Proposal is not expected to generate any public concern.**

5.3 Air quality

The Proposal will emit a number of pollutants to the atmosphere as result of combustion of natural gas fuel and diesel fuel. Emissions include gaseous emissions such as carbon monoxide (CO), oxides of nitrogen (NOx) and sulphur dioxide (SO_2); particulate matter (PM) and greenhouse gases.

5.3.1 Regulations and guidelines

The National Environment Protection Council has developed the National Environmental Protection Measure (NEPM) for Air Quality (NEPC 2003). In 2000, the Department of Environmental Protection (now DER) adopted the Ambient Air Quality NEPM standards for general application to air quality management.

The Ambient Air Quality NEPM specifies standards and goals for ambient levels of 'criteria' air pollutants as outlined in Table 5.

Table 5: Ambient air quality NEPM goals

Pollutant	Averaging period	Maximum concentration (ppm)	Goal within 10 years maximum allowable exceedances
CO	8 hours	9	1 day a year
NO_2	1 hour	0.12	1 day a year
	1 year	0.03	None
SO_2	1 hour	0.20	1 day a year
	1 day	0.08	1 day a year
	1 year	0.02	None
Particles as PM_{10}	1 day	NA	5 days a year
Particles as $PM_{2.5}$[a]	1 day	NA	None
	1 year	NA	None

a. $PM_{2.5}$ reporting standard is an advisory reporting standard

5.3.2 Existing air quality

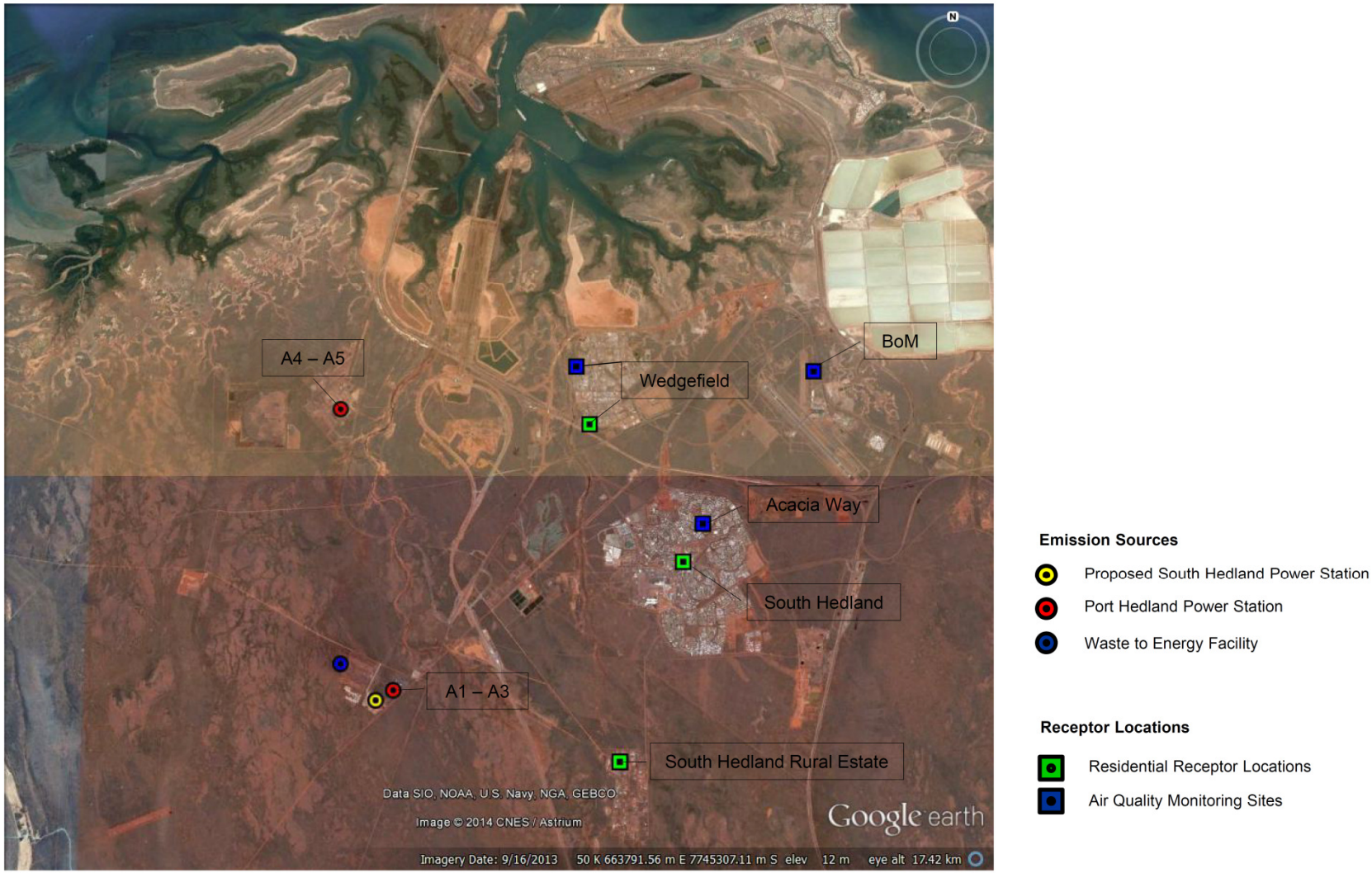
The Port Hedland Industries Council (PHIC) has established a network of ambient air quality monitoring stations around the Port Hedland area. The measurement of PM, ambient NO_2 and SO_2 are being monitored at a number of locations. The monitoring locations nearest to the proposed Power Station include Acacia Way, Wedgefield and a BoM site, shown in Figure 6. PM_{10} is monitored at all three of these locations, and NO_2 and SO_2 is measured at Acacia Way and at the BoM site.

The most recently published monitoring results are for the period 1 July 2012 to 30 June 2013. The monitoring results indicate that the ambient concentrations of NO_2 and SO_2 measured at Acacia Way and the BoM site comfortably complied with the relevant ambient criteria.

Historically, ambient PM_{10} concentrations in the Port Hedland region have been elevated due to dust generated by port and industry activity, as well as naturally high background dust levels throughout the region. As such, there were a number of occasions during the monitored period when the measured concentration of PM_{10} exceeded the ambient criteria. The particularly high level of PM_{10} measured in Wedgefield during the monitored period was likely caused by localised activities and sources at the monitoring station, and therefore is not considered to be representative of background air quality in the region.

Further information on existing air quality is located in the air emissions report (Appendix 1).

Figure 6: Emission sources, monitoring locations and receptor locations for air emission investigation



Source: ENVIRON 2014

5.3.3 Potential impacts

The operation of natural gas turbines proposed for the Power Station will generate NOx, CO, PM and SO_2. Emissions of these pollutants into the atmosphere could affect the health of people living nearby. Construction activities have the potential to generate dust that could affect people in the vicinity of the Power Station.

Operation of the Power Station will also release greenhouse gases. Increased release of these gases is understood to exacerbate the natural 'greenhouse effect' caused by predominantly carbon-based gases that warm the earth by trapping heat emitted by the sun.

5.3.4 Predicted impact

Gaseous emissions and particulate matter

ENVIRON Australia Pty Ltd (ENVIRON) completed an air quality assessment of the atmospheric emissions associated with this Proposal. Modelling was conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD). This model is widely used in Australia and internationally for regulatory modelling applications.

The assessment modelled the predicted air quality impacts from the proposed Power Station under the following three scenarios:

1. Full Load – Natural Gas: CCGT system and both OCGTs operating at full load, operated by natural gas.
2. Part Load – Natural Gas: CCGT system operating at full load and both OCGTs operating at part load (50%) fuelled by natural gas.
3. Emergency – Distillate Fuel Oil: CCGT system and both OCGTs operating at full load, fuelled by distillate.

The modelling assessment considered NOx and CO for the first two scenarios. The air quality impacts of SO_2 and PM were also considered, in addition to NOx and CO, for the emergency scenario. Modelling was used to predict ground level concentrations across the model domain and at sensitive receptor locations.

The assessment did not consider emissions under start-up operations, as start-up will take less than six minutes for a gas turbine to reach full load and therefore the air quality impacts are not expected to be significant.

The assessment utilised a meteorological dataset obtained from the BoM Port Hedland Airport over a five calendar year period from 2009 to 2013. The air quality impacts were considered in isolation. The modelling also considered the cumulative impact of emissions with other existing power station sources and other approved sources within the region.

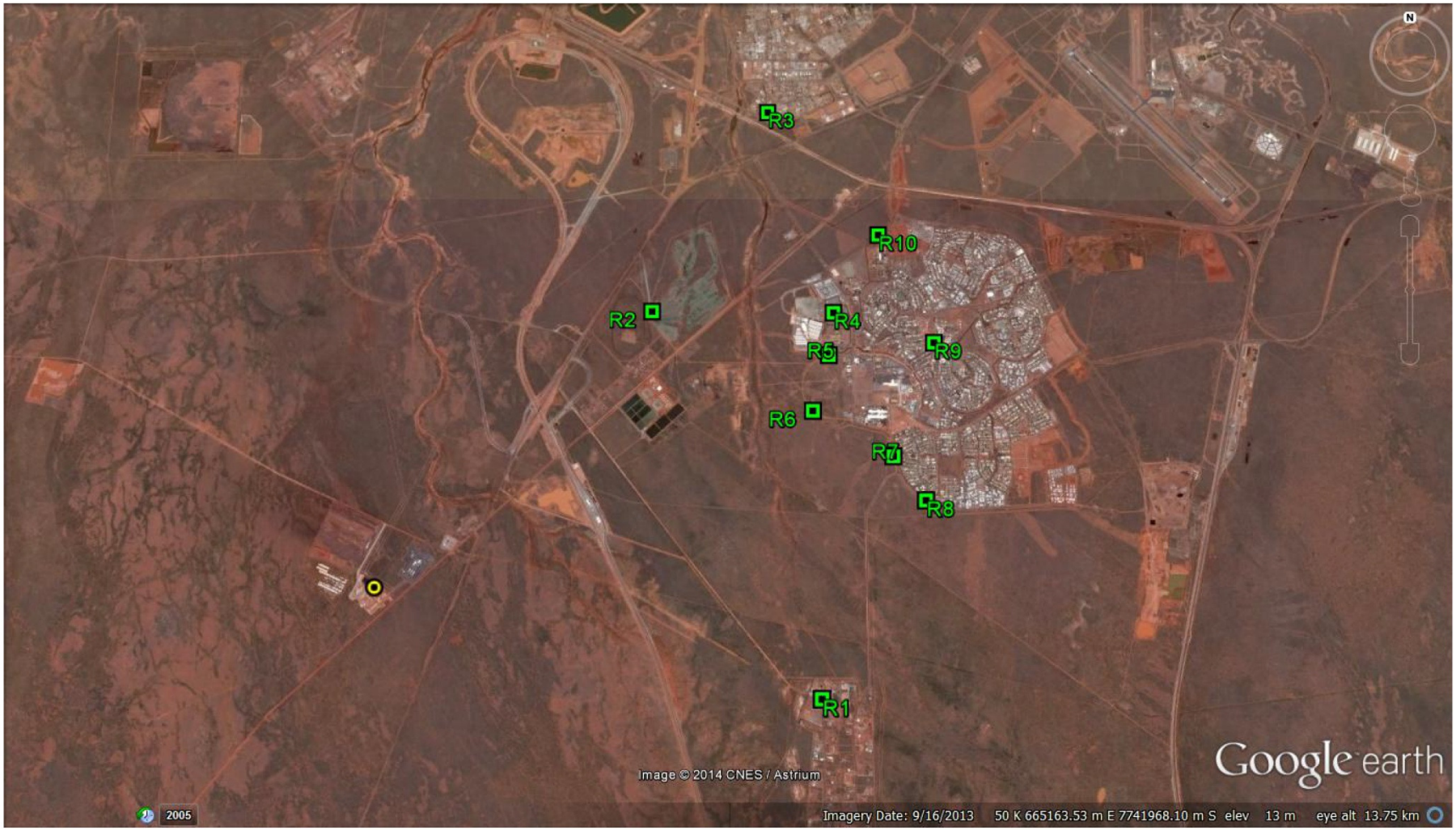
Discrete locations were selected to represent sensitive receptors for the air quality modelling. These are identified in Table 6 and shown in Figure 7.

Table 6: Discrete sensitive receptors

Reference	Location description	Reference	Location description
R1	Quartz Quarry Road, South Hedland Rural Estate	R6	Colebatch Way, South Hedland
R2	Port Hedland Golf Club	R7	Wambiri Street, South Hedland
R3	Wedgefield	R8	Steamer Avenue, South Hedland
R4	South Hedland Sports Complex	R9	Cottier Drive (roundabout), South Hedland
R5	Scadden Road, South Hedland	R10	Parker Street, South Hedland

Source: ENVIRON 2014

Figure 7: Discrete sensitive receptor locations



Source: ENVIRON 2014

Predicted air quality impacts in isolation

Air quality emissions in isolation are predicted to be well below the relevant ambient criteria at the receptor locations for all operating scenarios modelled (ENVIRON 2014).

A summary of the maximum ground level concentrations (GLCs) predicted by the modelling is provided in Table 7.

Table 7: Maximum predicted ground level concentrations

Compound	Averaging period	Full Load – Natural Gas			Part Load – Natural Gas			Emergency – Distillate fuel			Ambient Criteria ($\mu g/m^3$)
		Model Domain ($\mu g/m^3$)	Receptors ($\mu g/m^3$)		Model Domain ($\mu g/m^3$)	Receptors ($\mu g/m^3$)		Model Domain ($\mu g/m^3$)	Receptors ($\mu g/m^3$)		
NO_2	1-h	67	9	R2	152	26	R1	146	31	R2	226
	Annual	3	0.3	R1	8	1	R1	-	-	-	56
CO	8-h	28	2	R1	108	7	R1	28	2	R1	10 311
SO_2	1-h	-	-	-	-	-	-	0.6	0.08	R2	524
	24-h	-	-	-	-	-	-	0.3	0.02	R1	209
	Annual	-	-	-	-	-	-	0.03	0.003	R1	52
PM_{10}	24-h	-	-	-	-	-	-	3	0.2	R1	46

Source: ENVIRON 2014

The results of the modelling indicate that the air quality impacts due to emissions from the Power Station in isolation are predicted to be well below the relevant ambient criteria at the receptor locations for all of the operating scenarios included in the modelling. Notwithstanding this, the cumulative impact due to background pollutant levels and other emission sources in the region has been taken into account to enable an assessment of overall compliance with the ambient criteria (refer to the next section).

For the Full Load – Natural Gas scenario, the maximum 1-hour average GLC of NO_2 predicted across the model domain was equal to 30% of the relevant ambient criteria, and the annual average was equal to 5% of the relevant ambient criteria. The maximum 8-hour average GLC of CO predicted across the model domain is equal to less than 1% of the relevant ambient criteria. Considerably lower impacts are predicted to occur at the receptor locations, with the predicted GLCs of NO_2 remaining below 4% of the relevant ambient criteria.

For the Part Load – Natural Gas scenario, the maximum 1-hour average GLC of NO_2 predicted across the model domain is equal to 67% of the relevant ambient criteria, and the annual average is equal to 14% of the relevant ambient criteria. The maximum 8-hour average GLC of CO predicted across the model domain is equal to 1% of the relevant ambient criteria. The maximum GLCs are predicted to occur in the immediate vicinity of the proposed site, within the Boodarie Industrial Estate power plant buffer. Considerably lower impacts are predicted to occur at the receptor locations, with the predicted GLCs of NO_2 remaining below 18% of the relevant ambient criteria.

For the Emergency – Distillate Fuel Oil scenario, the maximum 1-hour average GLC of NO_2 and the maximum 8-hour average GLC of CO predicted across the model domain are very similar to the model results for the Part Load – Natural Gas scenario. The maximum GLCs are also predicted to occur in the immediate vicinity of the proposed site, within the Boodarie Industrial Estate power plant buffer. Considerably lower impacts are predicted to occur at the receptor locations, with the predicted GLCs of NO_2 remaining below 14% of the relevant ambient criteria.

The air quality impacts associated with emissions of SO_2 and PM_{10} were also considered for the Emergency – Distillate Fuel Oil scenario. The maximum GLC of SO_2 predicted for various averaging periods across the model domain are all equal to less than 1% of the relevant ambient criteria. The maximum 24-hour average GLC of PM_{10} predicted across the model domain is equal to 6% of the relevant ambient criteria. The predicted impacts of SO_2 and PM_{10} are considered negligible within the context of existing ambient concentrations measured in the region, particularly as the duration of distillate fuel operations will be restricted to less than 15 hours at full load in an emergency.

Cumulative impact

An assessment of the cumulative impacts of NOx emissions has been undertaken by summing the predicted maximum ground level concentrations for NOx emissions from the Full Load – Natural Gas Scenario and the Emergency – Distillate Fuel Oil scenario, with the highest recorded background concentrations. NOx was chosen as this has the largest background and modelled impact (as discussed above) and would have the largest impact on cumulative emissions.

Modelling predicts that the maximum 1-hour average and the cumulative 1-hour average ground level concentration of NO_2 will not exceed the ambient criteria for both scenarios (Table 8). In addition, predictions of the annual average ground level concentration of NO_2 indicate that the cumulative impact for both scenarios will not exceed the ambient criteria at receptor locations.

Ground level concentrations of NO_2 at receptor locations will increase marginally as a result of emissions; however, this is predicted to be by less than 10 $\mu g/m^3$, which is not considered significant relative to the ambient criteria and existing background concentrations (ENVIRON 2014).

Summary

The results of the modelling indicate that the air quality impacts due to emissions from the proposed Power Station in isolation are predicted to be well below the relevant ambient criteria at the receptor locations for all of the operating scenarios included in the modelling. For the Full Load – Natural Gas scenario, the GLCs of NO_2 are predicted to be less than 4% of the relevant ambient criteria. For the Part Load – Natural Gas and Emergency – Distillate Fuel Oil scenarios, the GLCs of NO_2 are predicted to be less than 18% of the relevant ambient criteria. The predicted impacts of SO_2 and PM_{10} emissions associated with the Emergency – Distillate Fuel Oil scenario are considered negligible.

Ambient monitoring data available for NO_2 has been used together with model predictions to determine the cumulative impacts of the proposed Power Station at the receptor locations. The maximum predicted 1-hour average GLC of NO_2 at the receptor locations indicate that the cumulative impact of the proposed Power Station will not exceed 92 $\mu g/m^3$ (or 41% of the ambient criteria) for Full Load – Natural Gas operations, and will not exceed 113 $\mu g/m^3$ (or 50% of the ambient criteria) for Emergency – Distillate Fuel Oil operations. The predicted cumulative impacts have been determined on the basis of existing "worst-case" background pollutant concentrations, and are considered to be particularly conservative for the short term (1-hour) averaging times.

Model predictions indicate that the GLCs of NO_2 at the receptor locations will increase marginally due to emissions from the proposed Power Station. The increase in the maximum 1-hour average GLCs of NO_2 at receptor locations is predicted to be less than 10 $\mu g/m^3$. This increase is not considered to be significant when compared to existing air quality and the relevant ambient air quality criteria.

Table 8: Cumulative maximum predicted ground level concentrations (µg/m^3) of NO_2

Averaging Period	Receptor	Measured Concentration	Model Predictions				Measured Concentrations and Model Predictions			Ambient Criteria
			Existing Sources	Approved Sources	Cumulative		Approved Sources	Cumulative		
					Full Load – Natural Gas	Emergency – Distillate Fuel		Full Load – Natural Gas	Emergency – Distillate Fuel	
1-hour	R1	74	8	9	18	39	83	92	113	226
	R2	74	7	7	17	39	82	91	113	
	R3	74	6	6	12	28	80	86	102	
	R4	74	6	7	13	31	81	87	105	
	R5	74	6	7	12	30	81	86	104	
	R6	74	7	7	14	31	81	88	105	
	R7	74	6	6	12	27	80	86	101	
	R8	74	6	7	12	26	81	86	100	
	R9	74	6	7	13	26	81	87	100	
	R10	74	7	7	12	28	81	86	102	
Annual	R1	9.8	0.4	0.4	0.7	-	10.2	10.5	-	56
	R2	9.8	0.3	0.3	0.4	-	10.1	10.2	-	
	R3	9.8	0.3	0.3	0.4	-	10.1	10.2	-	
	R4	9.8	0.3	0.3	0.4	-	10.1	10.2	-	
	R5	9.8	0.3	0.3	0.5	-	10.1	10.3	-	
	R6	9.8	0.3	0.4	0.5	-	10.1	10.3	-	
	R7	9.8	0.3	0.4	0.6	-	10.1	10.4	-	
	R8	9.8	0.4	0.4	0.6	-	10.2	10.4	-	
	R9	9.8	0.3	0.3	0.5	-	10.1	10.3	-	
	R10	9.8	0.3	0.3	0.4	-	10.1	10.2	-	

Source: ENVIRON 2014

Dust

Dust is a nuisance in the environment and can decrease amenity values. Dust may also have physical effects on plants such as blockage and damage to stomata, shading, and abrasion of leaf surfaces or cuticles. It can also be a human health hazard causing respiratory problems and can pose a risk to traffic safety by reducing visibility.

Dust can be generated by:

- operating plant, equipment and vehicles
- wind blowing over cleared ground
- stockpiles, or uncovered loads of construction materials.

The majority of the airborne particles associated with dust emissions from construction activities are likely to be larger than PM_{10} and may result in nuisance rather than public health problems. In addition, these larger particles tend to settle back to the ground within a short range (<300 m) from the source reducing the potential impact of the operations.

Port Hedland has traditionally experienced high loads of dust (or particulate matter) due to past port management practices and the arid climate of the area (an anthropogenic source). Dominant sources of dust in the vicinity of the town originate from ore handling facilities and other industrial activities.

The air emission modelling results (Table 7) show the increase in ambient PM_{10} concentration is predicted to be around 7% of measured background at discrete receptors (ENVIRON 2014).

Diesel fuel will be used if there are gas shortages. The combustion of diesel will produce particulates of various sizes, and at concentrations higher than those from the combustion of natural gas. As diesel will rarely be used and particulate estimates are below NEPM standards, the risk to surrounding residents is expected to be low.

Greenhouse gases

Greenhouse gas emissions have been estimated based upon the methodologies outlined in the *Australian National Greenhouse Accounts, National Greenhouse Accounts Factors*, published by the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education. (Australian Government 2014). Estimated emissions of greenhouse gas are expected to be approximately 570 000 tCO_2-e/yr.

5.3.5 Management

The Power Station would be designed and constructed to ensure compliance with the Ambient Air Quality NEPM. Air emission modelling will be required in the event that equipment proposed for the Power Station does not comply with the specification. This modelling must demonstrate compliance with the NEPM limits.

During commissioning, air emission testing will be required to be carried out under the construction contract to demonstrate compliance with the NEPM limits and conformance with any modelling results.

Potential impacts of air emissions will be managed through the following:

1. Gas turbines shall be fitted with dry low-emissions combustion technology suitable for operation without water or steam injection on both natural gas and diesel fuel oil generation.
2. Advanced high efficiency generation systems to reduce the emissions per MW generated.
3. Sampling ports shall be provided for each stack.

Air emissions from the Power Station can be adequately managed under Part V of the EP Act in accordance with Works Approval and Licensing provisions. An application for a Works Approval under Part V of the EP Act is being submitted to the DER following the Part IV referral.

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) establishes a national framework for Australian corporations to report greenhouse gas emissions, reductions, removals and offsets, and energy consumption and production, from 1 July 2008. The Proponent will be obliged to register and report on greenhouse gas emissions in compliance with the NGER Act.

The impact of dust from this Proposal during construction is expected to be insignificant. Dust emissions will be minimal, as dust management strategies will be implemented to reduce dust lift-off (e.g. wetting bare surface to prevent dust lift). The temporary nature of construction, distance from premises and low traffic volumes associated with the construction process will further reduce any risk associated with dust emissions.

5.4 Amenity

Noise management in Western Australia is implemented through the Environmental Protection (Noise) Regulations 1997. The Regulations specify maximum noise levels (assigned levels) which are the highest noise levels that can be received at noise-sensitive premises, commercial and industrial premises. Assigned noise levels are different for noise sensitive premises, commercial premises, and industrial premises.

Noise is an amenity issue that can cause significant disruptions in peoples' lives, causing loss of sleep, interference to activities and emotional stress. In addition, exposure to very loud noise can result in permanent hearing loss. While the level of noise emitted is the primary issue, the three key characteristics of noise (i.e. tonality, modulation and impulsiveness) will influence how intrusive it is.

The proposed Power Station will emit noise during operation of the gas turbines and associated equipment required to run the facility, such as transformers, condensers, compressors and the water treatment (demineralisation) plant. The nearest residences to the Power Station are located approximately 5 km away within the South Hedland Rural Estate (locality of Boodarie), the town of South Hedland and the Boodarie Homestead. Noise generated at the Power Station has the potential to affect not only these receptors but also the Alinta DEWAP Power Station adjacent to the proposed Power Station.

Noise modelling for operation of the Power Station is currently being undertaken by SVT Engineering Consultants. Potential impacts from noise emissions will be addressed in the Works Approval application to follow this referral under Part IV of the EP Act and will be subject to regulation by DER.

6. References

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