

EXECUTIVE SUMMARY

PROPOSED CONSTRUCTION AND OPERATION OF COGENERATION PLANT FOR NIBONG TEBAL PAPER MILL SDN BHD

PROJECT PROPONENT



**NIBONG TEBAL
PAPER MILL SDN. BHD.**

ENVIRONMENTAL CONSULTANT



**WIRANDA (M)
SDN. BHD.**

INTRODUCTION

- A gas-fired cogeneration plant with 14MW capacity will be installed to support the paper mill operation
- Able to produce two forms of energy (electricity and heat) from a single fuel source
- The proposed facility can greatly influence NTPMs' energy and environmental strategy to reduce their carbon footprint and ensure energy security

STATEMENT OF NEED

- Technologies that decrease total fuel consumption and related greenhouse gas (GHG) emissions by generating both, electricity and useful heat from the same fuel input
- Natural gas produces about 50-60% less CO₂ compared to coal when used for electricity generation, reducing its impact on climate change
- Able to capture and use the heat that would otherwise be wasted in traditional power generation processes
- Cogeneration system can achieve efficiencies of up to 70%, compared to the 40-50% efficiency seen in conventional separate heat and power generation systems
- The project is in line with development policy such as National Energy Transition Roadmap , Dasar Tenaga Negara, RSN Pulau Pinang 2030 and RTD Seberang Perai 2030.

LEGISLATIVE REQUIREMENT

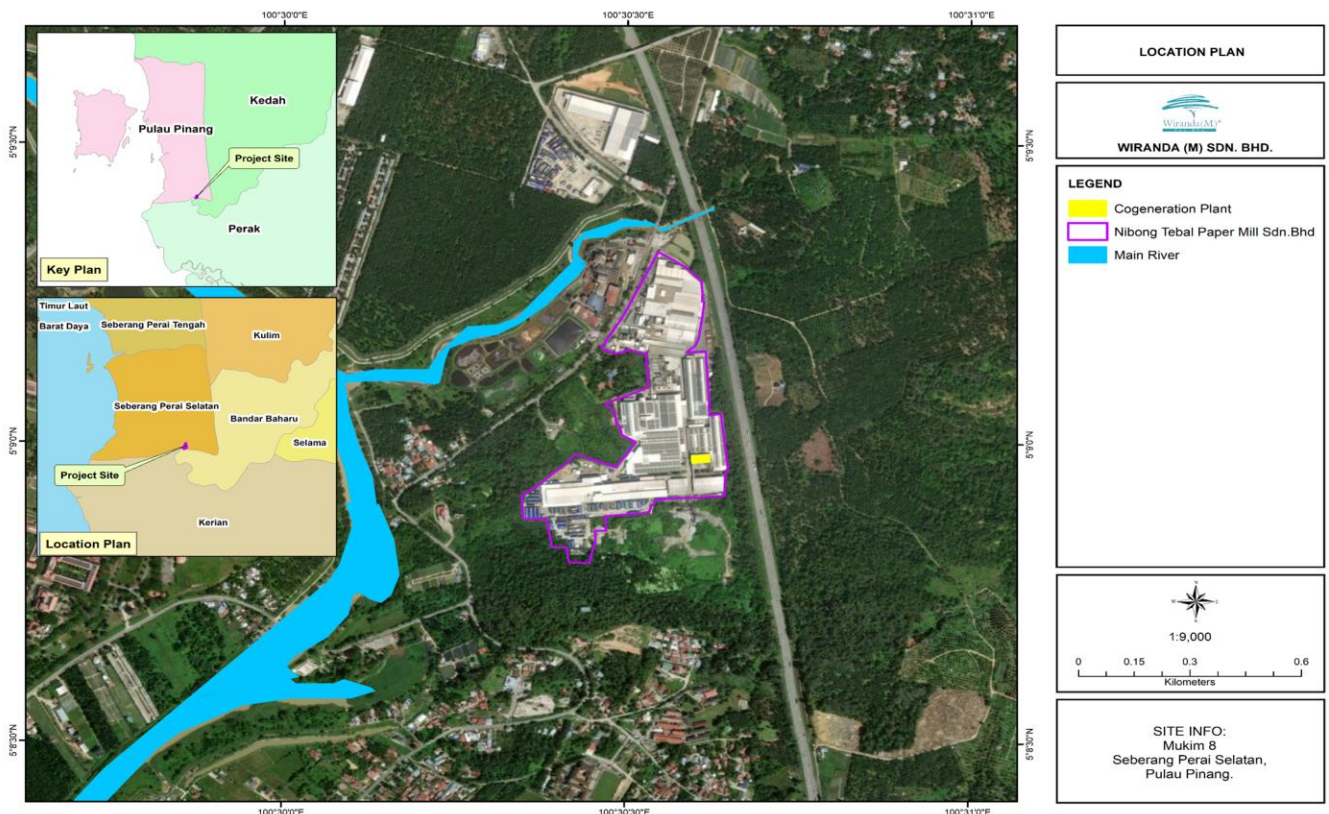
First Schedule

11. POWER GENERATION AND TRANSMISSION:

(a) Construction of steam generated power station using fossil fuels (other than coal) and having the capacity of 10 megawatts or more, with or without transmission line

PROJECT LOCATION

- Lot 609 & Lot 808, Nibong Tebal Paper Mill Sdn Bhd, Jalan Bandar Baru, Sungai Kecil, 14300 Nibong Tebal, Penang
- Nearest town is Nibong Tebal town



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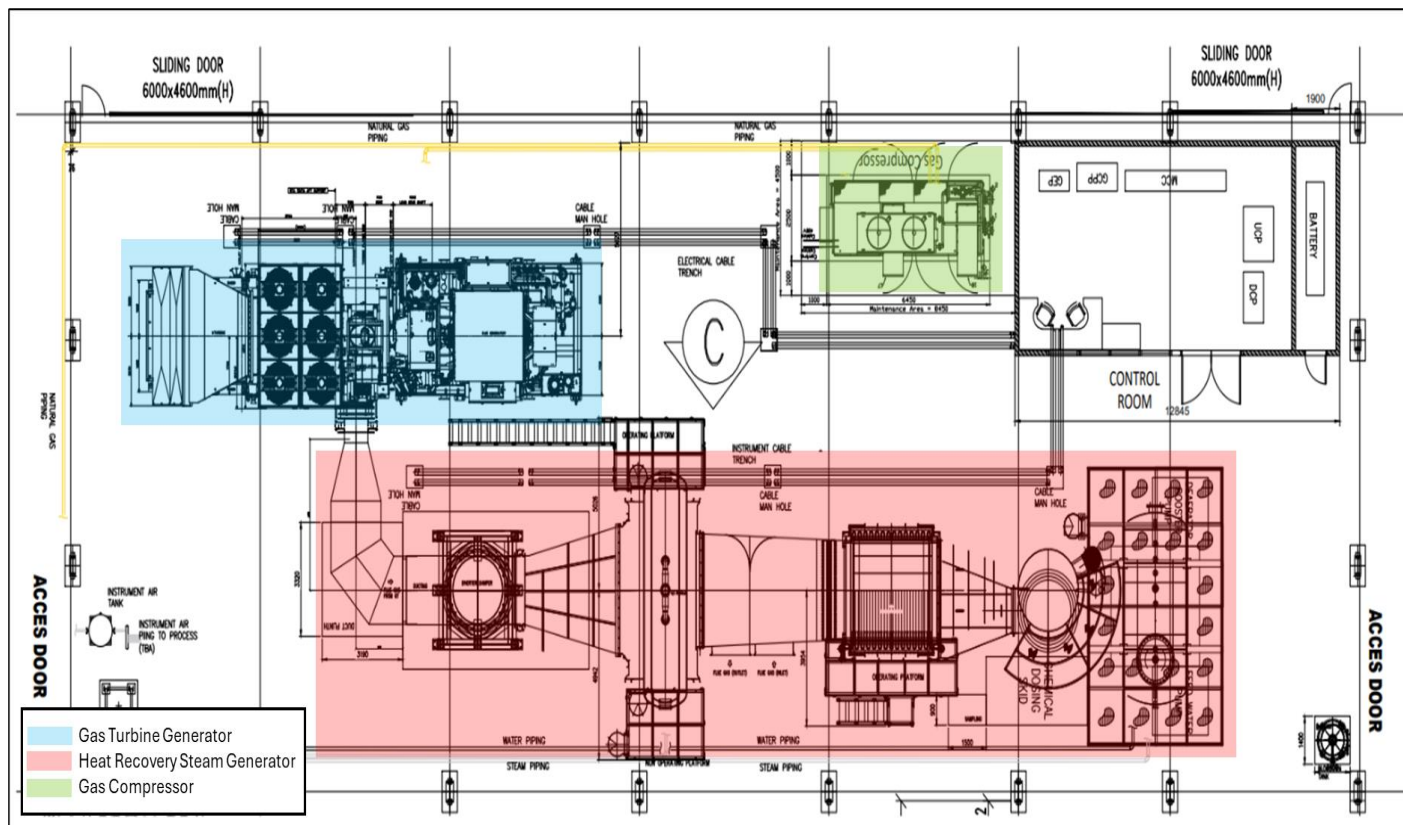
PROJECT CONCEPT

- The cogeneration process begins with the combustion of natural gas in a gas turbine which generates mechanical energy (rotational energy) and heat.
- The mechanical energy produced by the gas turbine is used to drive a generator, which produces electricity.
- The combustion process also produces a significant amount of waste heat that can be used to generate steam through a heat recovery steam generator (HRSG).
- The steam produced is typically used in the paper mill's processes—such as drying paper, pulping, and cooking chemicals.
- 14 megawatts of electricity will be produced.
- The proposed plant will also be equipped with a 30 ton/hour heat recovery steam generator.

PROJECT COMPONENT

No.	Component	Function	Area (m ²)
1.	Gas Turbine Generator	Burns natural gas to generate mechanical energy and electricity and converts mechanical energy from the turbine into electricity.	80.5
2.	Heat Recovery Steam Generator (HRSG)	Captures the waste heat from the combustion process to generate steam for industrial processes.	383.3
3.	Gas Compressor	Increases the pressure of the natural gas before it enters the turbine to ensure optimal combustion.	15.5
4.	Control Room	Process control	80.3

PROJECT LAYOUT



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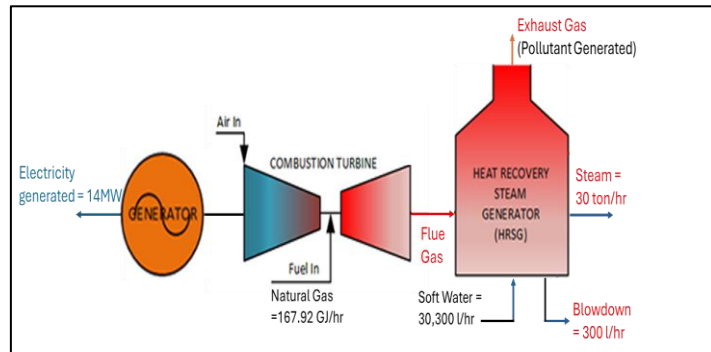
RAW MATERIALS

NO.	RAW MATERIALS	QUANTITY	SOURCE
1	Primary Fuel – Natural Gas	4,062 kg/hour	Gas Malaysia
2	Water - For steam generation process in the Heat Recovery Steam Generator (HRSG).	30 ton/hour	Perbadanan Bekalan Air Pulau Pinang (PBAPP)
3	Chemicals – Boiler Feed Water Treatment <ul style="list-style-type: none"> NexGuard® 22312 NALCO® 19 PULV NALCO® 8507 NALCO® 356 	1.8kg/day 1.6kg/day 2.8kg/day 0.4kg/day	Nalco Industrial Services Malaysia Sdn Bhd
4	Combustion Air - Needed for combustion of the primary fuel in the gas turbine. Compressed Air - For instrument air, pneumatic controls, or cleaning purposes.	62,858 kg/hr 10 Nm ³ /h @ 4 to 8 BARg	-
5	Lubricant oil - For turbines, generators, gearbox and other rotating equipments.	7130 L	Petronas

MASS BALANCE

Energy Input: The primary energy source is the natural gas (167.92 GJ/hr)

Energy Output: Electricity (14 MW) is the first output from the gas turbine. Thermal energy is the second output, captured by the HRSG to generate steam. The rest of the thermal energy is lost with the lower-temperature exhaust gases that are expelled after the HRSG.



PROJECT ACTIVITIES

Pre-development

- Site investigation survey
- Authority submission & approval (EIA, KM, Building Plan, etc)
- Detail design stage

During Development

- Installation of cogeneration plant

Post-development

- Plant operation
- Maintenance works
- Scheduled waste management
- Closure / abandonment

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EXISTING ENVIRONMENT

LAND USE

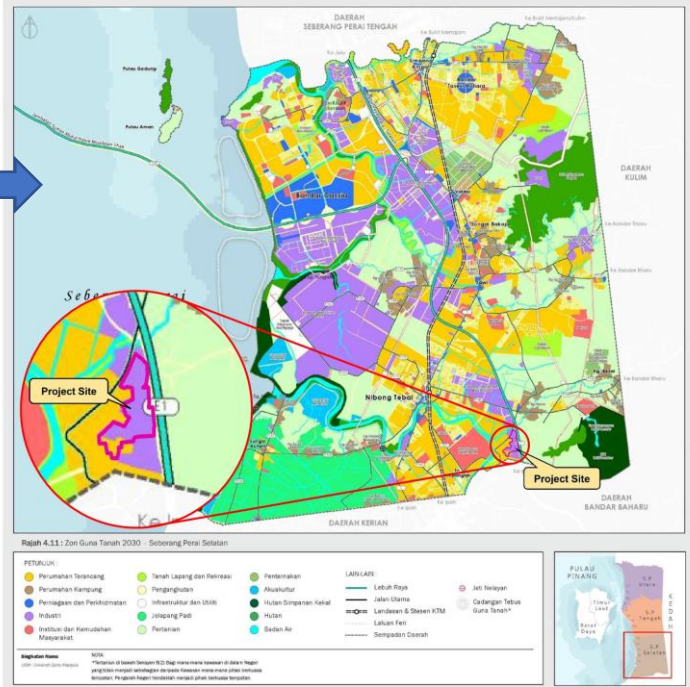
- Project area is already under industrial zoning area
- The surroundings consist of an industrial area, residential areas, commercial and institutional establishments, aquaculture activity area, infrastructure, utilities and water bodies.

HYDROLOGY

- No river within the project site
- A river just next to the project site which is Sg. Kecil.
- Sg. Kechil flows into Sg. Kerian which is the main river which finally discharge into the Straits of Malacca

METEOROLOGY

- The lowest average annual rainfall was recorded in 2022 at 153.5 mm, whilst the highest average annual rainfall was recorded in 2018 at 197.0 mm.
- The dominant winds blow from the east (27.4%)



AMBIENT AIR QUALITY

- 5 sampling stations
- All sampling points complied with the limits prescribed in the New Malaysia Ambient Air Quality Standard 2020.

WATER QUALITY

- 5 sampling points were selected

Point	Description	WQI	Class	Status
WQ1	Sg. Kechil (Upstream)	78.40	II	SP
WQ2	Sg. Kechil (Intermediate)	78.20	II	SP
WQ3	Sg. Kechil (Downstream)	62.76	III	SP
WQ4	Sg. Kerian (Upstream)	82.78	II	C
WQ5	Sg. Kerian (Downstream)	82.39	II	C

NOISE LEVEL

- 5 sampling stations

	Parameters	Point 1 (N1) Industrial Zone	Point 2 (N2)	Point 3 (N3)	Point 4 (N4)	Point 5 (N5)
Day time	Leq (dBA)	70.0	64.9	62.6	56.6	58.1
	DOE Standard (dBA) (Leq)	<70	<60	<60	<60	<60
Night time	Leq (dBA)	67.2	59.9	58.4	50.1	51.7
	DOE Standard (dBA) (Leq)	<65	<55	<55	<55	<55

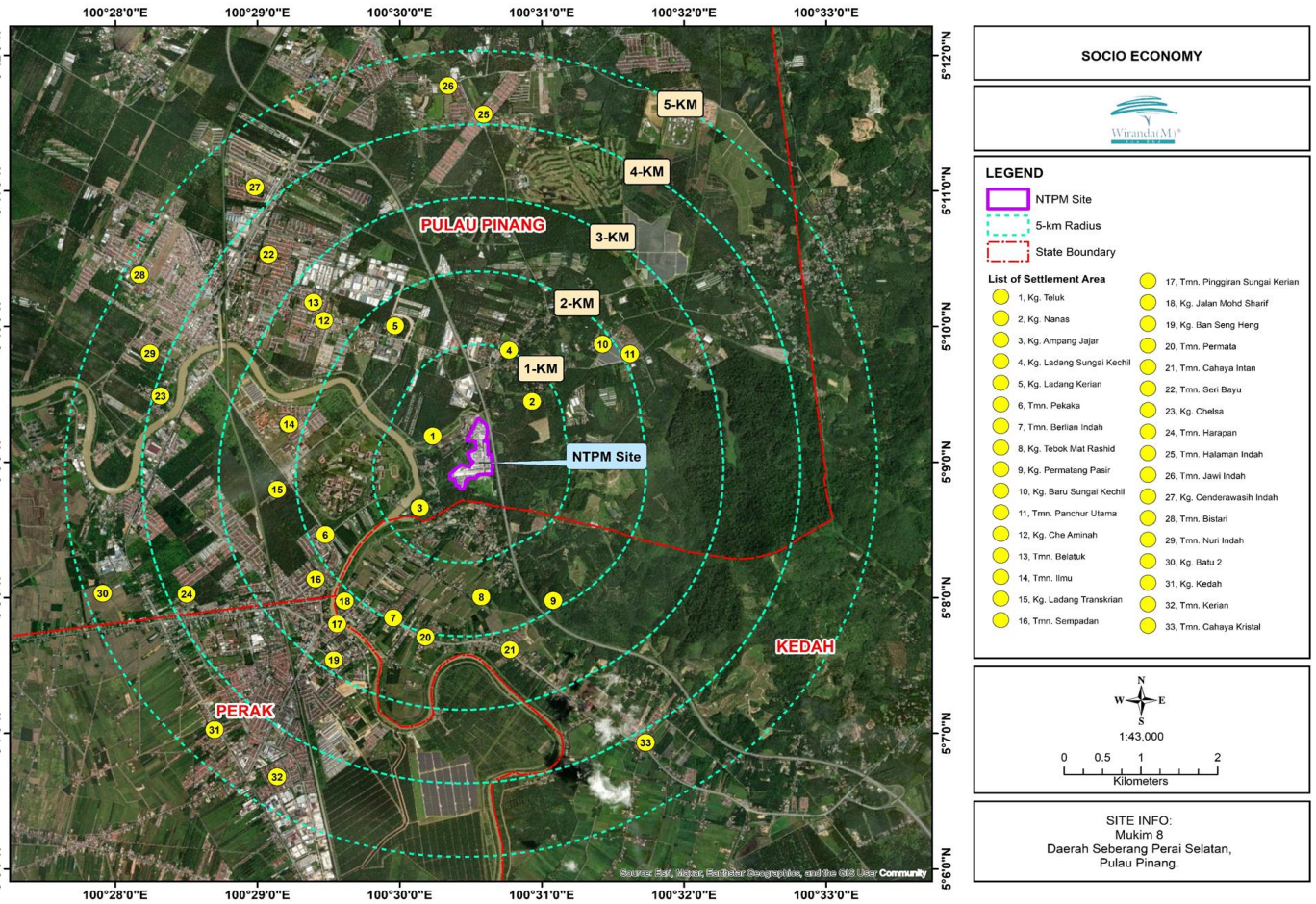
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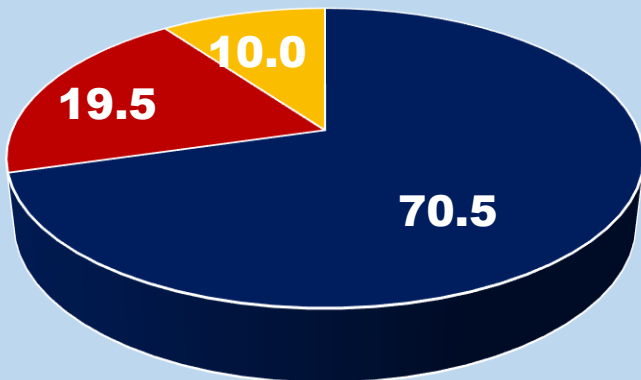
EXISTING ENVIRONMENT

SOCIO – ECONOMY

- Total of respondents = 220



PROJECT ACCEPTANCE



■ Acceptance ■ Non-Acceptance ■ No Opinion



EXECUTIVE SUMMARY

PROPOSED CONSTRUCTION AND OPERATION OF COGENERATION PLANT FOR NIBONG TEBAL PAPER MILL SDN BHD

POTENTIAL IMPACT & MITIGATION MEASURES

POTENTIAL IMPACTS

MITIGATION MEASURES

AIR QUALITY

Construction stage

- Fugitive dust from construction activities

Operation stage

- Emission from diesel and petrol engines from vehicles
- Stack of cogeneration plant that emits particulates matter, nitrogen dioxide and carbon monoxide

- Materials should not be loaded to a level higher than the side and tail boards, and should be dampened or covered before transport
- All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet
- The load carried by the vehicle should be covered by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle
- Installation of Fuel Burning Equipment and Air Pollution Control Systems for the design of the fuel burning equipment and chimney
- Conduct regular inspection, monitoring and maintenance of abatement equipment
- Periodic ambient air quality and stack emission monitoring.

AIR QUALITY MODELLING

NORMAL SCENARIO

ABNORMAL SCENARIO

- GLCs for identified criteria air pollutants at the identified off-site ASRs i.e. ASR2, ASR3, ASR4 and ASR5 met the Malaysian Ambient Air Quality Standards 2020 (MAAQS 2020).
- Further assessment on the contribution of the Plant to the airshed based on 25% threshold of the adopted IFC standard indicates that the predicted MAICs for the MAAQS 2020 criteria pollutants were within the calculated thresholds.

- GLCs for identified criteria air pollutants at the identified off-site ASRs i.e. ASR2, ASR3, ASR4 and ASR5 complied with the Malaysian Ambient Air Quality Standards 2020 (MAAQS 2020). The contribution of identified criteria air pollutants from the Plant to the surrounding environment was assessed to be minimal.
- Abnormal situation refers to when the Heat Recovery Steam Generator (HRSG) is not operational due to temporary operational adjustment, such as shutdowns or maintenance activities.

POTENTIAL IMPACTS

MITIGATION MEASURES

SOCIO-ECONOMY

- Job opportunities
- Influx of foreign workers
- Environmental nuisance and impact

- To hire local residents as a manpower either during construction or operation stage
- Provide adequate utilities and facilities to the workers and health examination
- Conducting environmental monitoring program
- Implementation of CSR program

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POTENTIAL IMPACT & MITIGATION MEASURES

POTENTIAL IMPACTS

MITIGATION MEASURES

NOISE LEVEL

Construction stage

- Movement of vehicles and operation of equipment such as electric drills and hoist equipment, and hammers are possible source of intermittent noise

Operation stage

- Plant and machineries operation

- Maintenance of equipment and machineries
- Provision of Ear Protective Safety Equipment (ear plug & ear muff)
- Construction activities limited to day time only
- Environmental monitoring for noise

NOISE MODELLING

- Predicted noise levels at N2 slightly exceed the DOE limits for both daytime and nighttime, indicating that the maximum sound power levels generated by the cogeneration plant must not exceed 115 dBA.
- Noise levels at the property boundary remain below the DOE guideline limit of 75 dBA, ensuring compliance with regulatory requirements for industrial areas.

Noise station	Existing Noise Levels (dBA)		Predicted total noise levels, (dBA)	
	Day time	Nighttime	Daytime	Nighttime
N1	70.0	67.2	75.0	74.4
N2	64.9	59.9	65.2	60.8
N3	62.6	58.4	62.7	58.7
N4	56.6	50.1	57.0	51.8
N5	58.1	51.7	60.0	57.0

WATER QUALITY

Operation Stage

- Wastewater discharge

- Optimize cooling and steam generation processes to reduce wastewater volume.
- Use treated or recycled water to minimize contaminants in the wastewater.
- Use environmentally friendly treatment chemicals to reduce hazardous waste.
- Minimize water discharge by reusing cooling water.
- Reuse steam condensate to reduce fresh water demand
- To conduct monthly compliance monitoring at the final discharge point to ensure complying with the Standard B of Environmental Quality (Industrial Effluent) Regulation 2009.

WASTE GENERATION

- Solid Waste (Construction & operation stage)
- Construction waste (Construction stage)
- Scheduled waste (Construction & operation stage)

- Prohibition of open burning
- Provide designated area for temporary construction waste disposal / construction waste bin
- Promoting the 3R concept (Reduce, Reuse & Recycle)
- Providing the scheduled waste storage area / building
- Disposed out the scheduled waste by licensed scheduled waste contractor

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POTENTIAL IMPACT & MITIGATION MEASURES

POTENTIAL IMPACTS

MITIGATION MEASURES

RISK

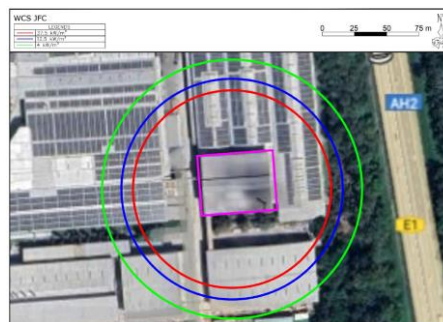
- Pool Fire
- Jet Fire
- Flash Fire
- Explosion

- Conduct fire and gas detection mapping
- Prepare detail Emergency Response Plan (ERP)
- Design changes during the subsequent engineering phases post EIA should be analysed
- Ensure the implementation of an effective health and safety management system

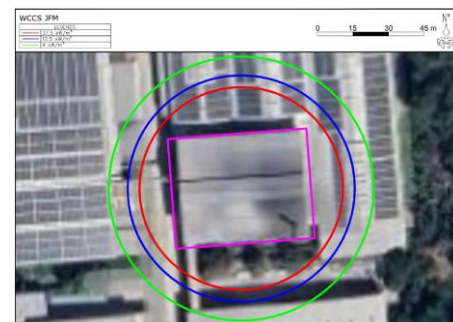
QUANTITATIVE RISK ASSESSMENT MODELLING



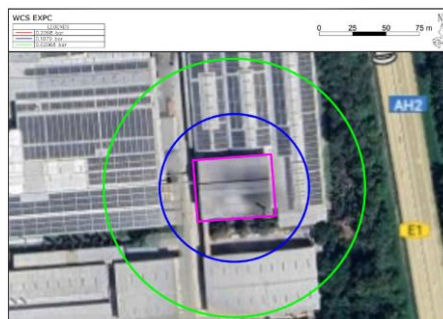
Individual Risk (IR) Contour



WCS for Fire Event (Jet Fire from Catastrophic Release)



WCS for Fire Event (Jet Fire from Medium Release)



WCS for Explosion Event (VCE from Catastrophic Release)



WCS for Explosion Event (VCE from Medium Release)

- IR contour of the proposed project remains largely within the NTPM's site boundary and does not encompass involuntary recipients
- The WCS for fire event is jet fire arising from the catastrophic release of Natural Gas from Gas Turbine extends a maximum of 86.00 m and 101.00 m, respectively for 12.5 kW/m² and 4 kW/m² heat radiation hazard zone
- The WCS for fire event is jet fire arising from the medium release of Natural Gas from Gas Turbine extends a maximum of 48.00 m and 56.00 m, respectively for 12.5 kW/m² and 4 kW/m² heat radiation hazard zone
- The WCS for explosion event originates from the vapour cloud explosion (VCE) from catastrophic release extends a maximum of 98 m
- The WCS for explosion event originates from the vapour cloud explosion (VCE) from medium release extends a maximum of 40 m

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MONITORING PROGRAMME

INSTALLATION STAGE

Impact / Monitoring Aspect	Parameter	Compliance Limit	Monitoring Frequency	IM	CM	PM
Surface Water Quality	pH Temperature DO COD BOD TSS Oil & Grease Ammoniacal Nitrogen Faecal Coliform Turbidity	6.0 – 9.0 - 5 – 7 mg/l 25 mg/l 3 mg/l 50 mg/l 7;N 0.3 mg/l 100 CFU/100ml 50 NTU (NWQS Class IIB Standards)	Monthly	√	√	Not Applicable
Ambient Air Quality (A)	PM10 PM2.5	100 µg/m ³ 35 µg/m ³	Quarterly	√	√	Not Applicable
Noise Level (N)	L10 L50 L90 Lmin Lmax Laeq	Laeq, Daytime – 55.0 dBA Nighttime – 50.0 dBA				

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MONITORING PROGRAMME

OPERATIONAL STAGE

Impact / Monitoring Aspect	Monitoring Parameter	Compliance Limit	Monitoring Frequency	Impact Monitoring (IM)	Compliance Monitoring (CM)	Performance Monitoring (PM)
Surface Water Quality	pH	6.0 – 9.0	Monthly	√	√	Not Applicable
	Temperature	-				
	DO	5 – 7 mg/l				
	COD	25 mg/l				
	BOD	3 mg/l				
	TSS	50 mg/l				
	Oil & Grease	7;N				
	Ammoniacal Nitrogen	0.3 mg/l				
	Faecal Coliform	100 CFU/100ml				
	Turbidity	50 NTU				
		(NWQS Class IIB Standards & Baseline)				
Final Discharge from Cogeneration Plant	Temperature	40°C	Monthly	√	√	√
	pH value	5.5 – 9.0				
	BOD	50 mg/l				
	TSS	100 mg/l				
	Mercury	0.05 mg/l				
	Cadmium	0.02 mg/l				
	Chromium, Hexavalent	0.05 mg/l				
	Chromium, Trivalent	1. mg/l				
	Arsenic	0.10 mg/l				
	Cyanide	0.10 mg/l				
	Lead	0.5 mg/l				
	Copper	1.0 mg/l				
	Manganese	1.0 mg/l				
	Nickel	1.0 mg/l				
	Tin	1.0 mg/l				
	Zinc	2.0 mg/l				
	Boron	4.0 mg/l				
	Iron (Fe)	5.0 mg/l				
	Silver	1.0 mg/l				
	Aluminium	15 mg/l				
	Selenium	0.5 mg/l				
	Barium	2.0 mg/l				
	Fluoride	5.0 mg/l				
	Formaldehyde	2.0 mg/l				
	Phenol	1.0 mg/l				
	Free Chlorine	2.0 mg/l				
Sulphide	0.50 mg/l					
O&G	10 mg/l					
AN	20 mg/l					
Colour	200 ADMI					

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MONITORING PROGRAMME

OPERATIONAL STAGE

Impact / Monitoring Aspect	Monitoring Parameter	Compliance Limit	Monitoring Frequency	Impact Monitoring (IM)	Compliance Monitoring (CM)	Performance Monitoring (PM)
Stack Emission – Cogeneration Plant	NO ₂ CO Total PM	600 mg/m ³ 650 mg/m ³ 80 mg/m ³	Monthly / Periodic	√	√	√
Ambient Air Quality	PM10 PM2.5 SO ₂ NO ₂ CO O ₃	100 µg/m ³ 35 µg/m ³ 80 µg/m ³ 70 µg/m ³ 10 µg/m ³ 100 µg/m ³	Quarterly	√	√	Not Applicable
Noise Level (N)	L10 L50 L90 Lmin Lmax Laeq	Laeq, Daytime – 55.0 dBA Nighttime – 50.0 dBA				