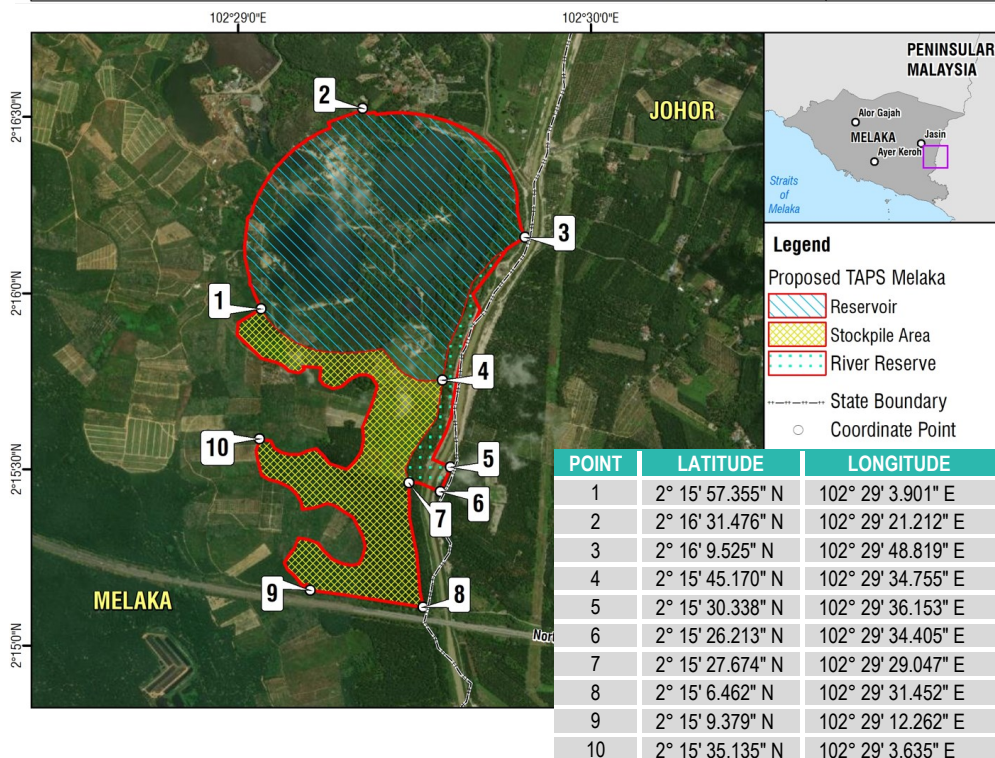


Executive Summary

Chapter 1: Introduction

- **Title:** The Proposed Development of Takungan Air Pinggiran Sungai (TAPS) Melaka, Mukim Chin Chin, Daerah Jasin, Melaka
- **Location:** 4.5 and 6.5 km away from Tangkak and Jasin towns respectively. The project area encompasses three lakes adjacent to the Chin Chin Water Treatment Plant.

Project Location



Chapter 1: Introduction

Project Proponent

Bahagian Bekalan Air
 Kementerian Sumber Asli, Alam Sekitar
 dan Perubahan Iklim,
 Aras 1, Block E4/5, Parcel E, Pusat Pentadbiran
 Kerajaan Persekutuan, 62668 Putrajaya



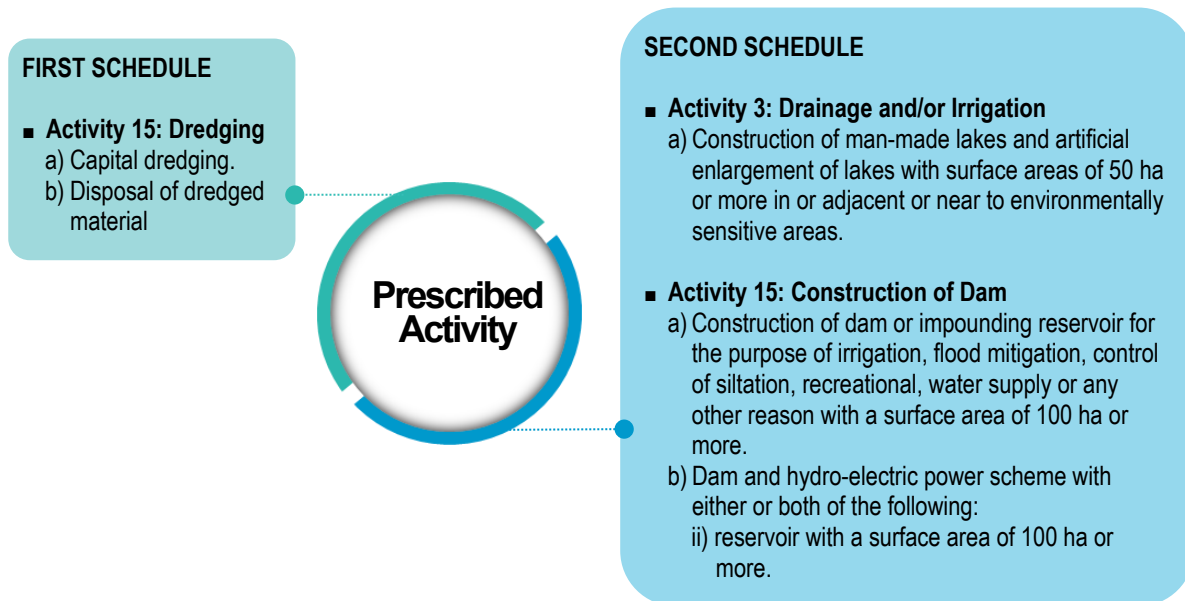
Contact person: Ir. Haji Sulaiman bin Kamisan
Pengarah
 E-mail: sulaiman@jba.gov.my
 Telephone: +603 – 8883 6000
 Facsimile: +603 – 8889 3071

EIA & Design Consultant

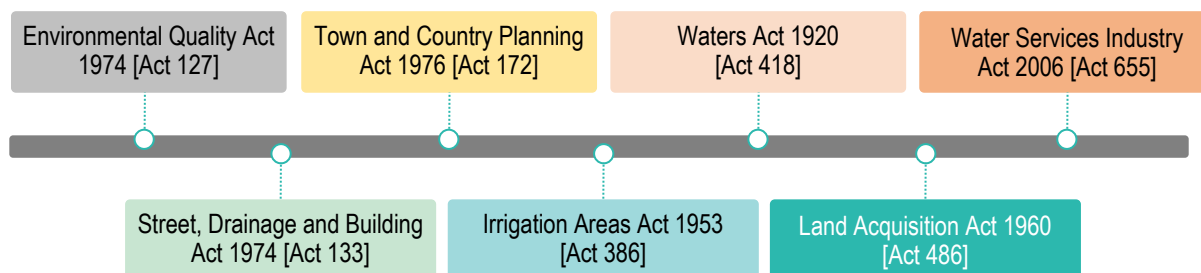
Dr. Nik & Associates Sdn. Bhd.
 No. 22 & 24, Jalan Wangsa Delima 6,
 Kuala Lumpur Suburban Centre (KLSC),
 Section 5, Pusat Bandar Wangsa Maju,
 53300 Kuala Lumpur



Contact person: Muhammad Fauzan Pauzi
EIA Study Team Leader
 E-mail: dnasbenvironment@gmail.com
 Telephone: +603 – 4145 8888
 Facsimile: +603 – 4145 8877

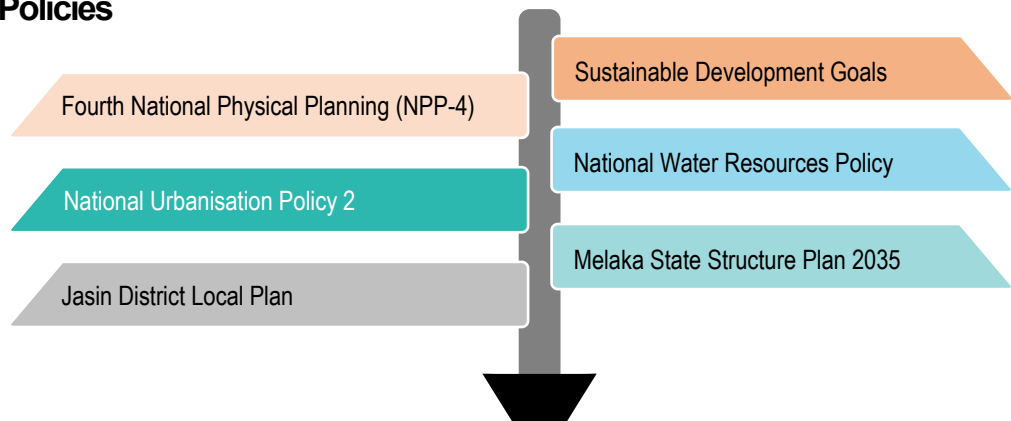


Legal Requirements

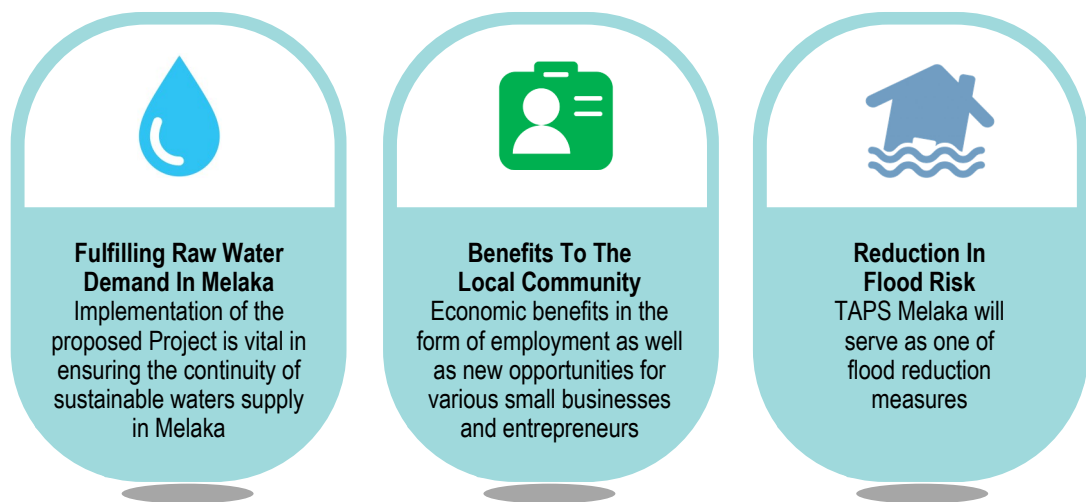


Chapter 1: Introduction

Planning Policies



Chapter 3: Statement of Need



Chapter 4: Project Options

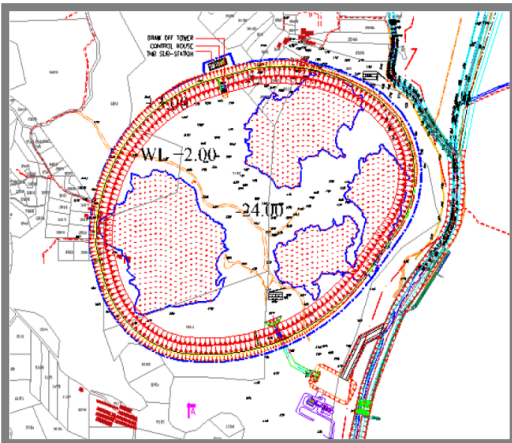
SITE SELECTION	OPTION 1	TASIK BIRU ■ Sg. Kesang Basin	No significant environmental constraint
	OPTION 2	DUYONG ■ Sg. Duyong Basin	Located relatively near urban area
	OPTION 3	AYER MOLEK ■ Sg. Duyong Basin	Located relatively near urban area
	OPTION 4	LINGGI/REMBAU ■ Sg. Linggi Basin	<ul style="list-style-type: none"> ■ Surrounded by mangroves ■ Home of healthy ecosystems ■ Area with high saltwater content

Chapter 4: Project Options

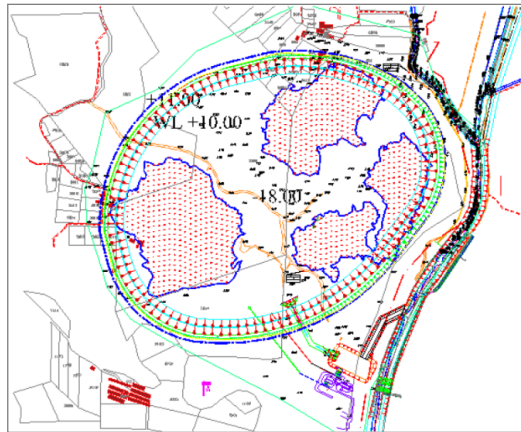
Reservoir Design

DESCRIPTION	CONFIGURATION 1	CONFIGURATION 2	CONFIGURATION 3	CONFIGURATION 4
Details	Small footprint with FSL set at 2 mRL	Small footprint with FSL set at 10 mRL	Large footprint with FSL set at 2 mRL	Large footprint with FSL set at 10 mRL
Water Extraction Method	Gravity flow	Pumping system and gravity flow	Gravity flow	Pumping system and gravity flow
Pond Storage Volume	27 MCM	25 MCM	22 MCM	25 MCM
Raw Water Supply (MLD)	310	270	270	270
Cost (RM)	25.32 million	40.94 million	49.35 million	57.00 million

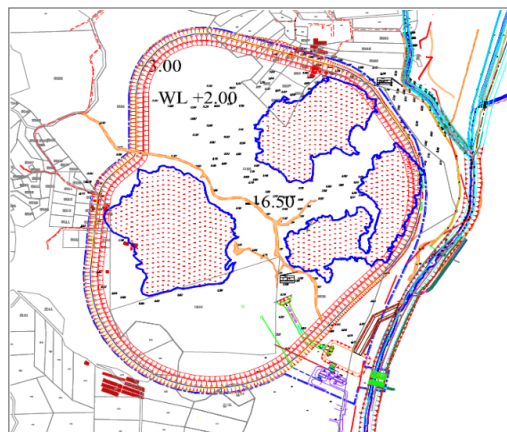
CHOSEN



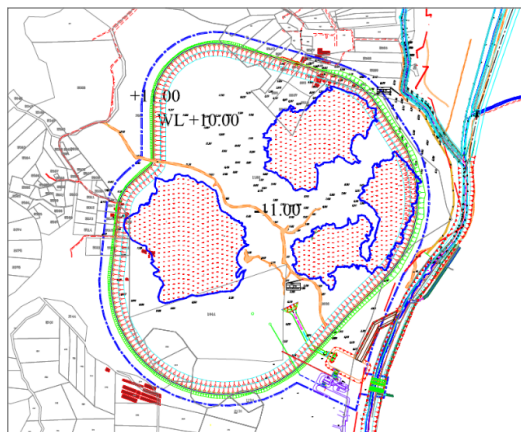
Configuration 1:
Small footprint with Full Supply Level (FSL) at 2 mRL



Configuration 2:
Small footprint with Full Supply Level (FSL) at 10 mRL



Configuration 3:
Large footprint with Full Supply Level (FSL) at 2 mRL



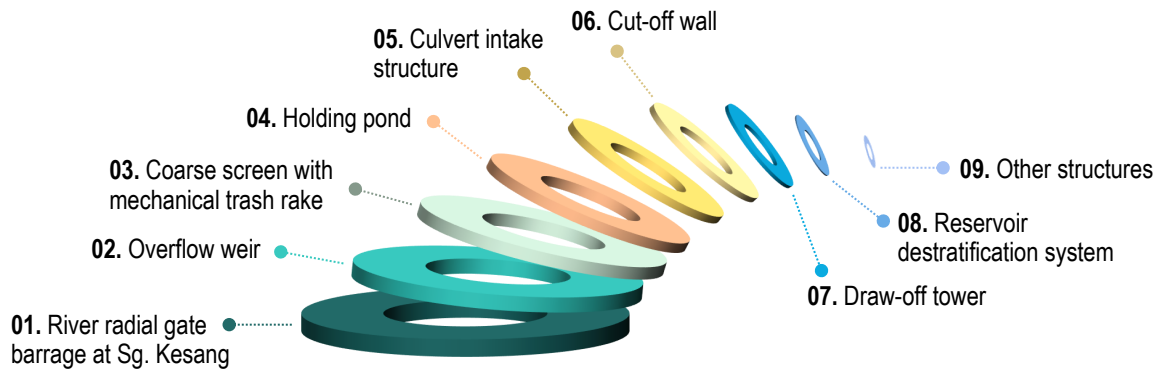
Configuration 4:
Large footprint with Full Supply Level (FSL) at 10 mRL

**NO-BUILD
OPTION**

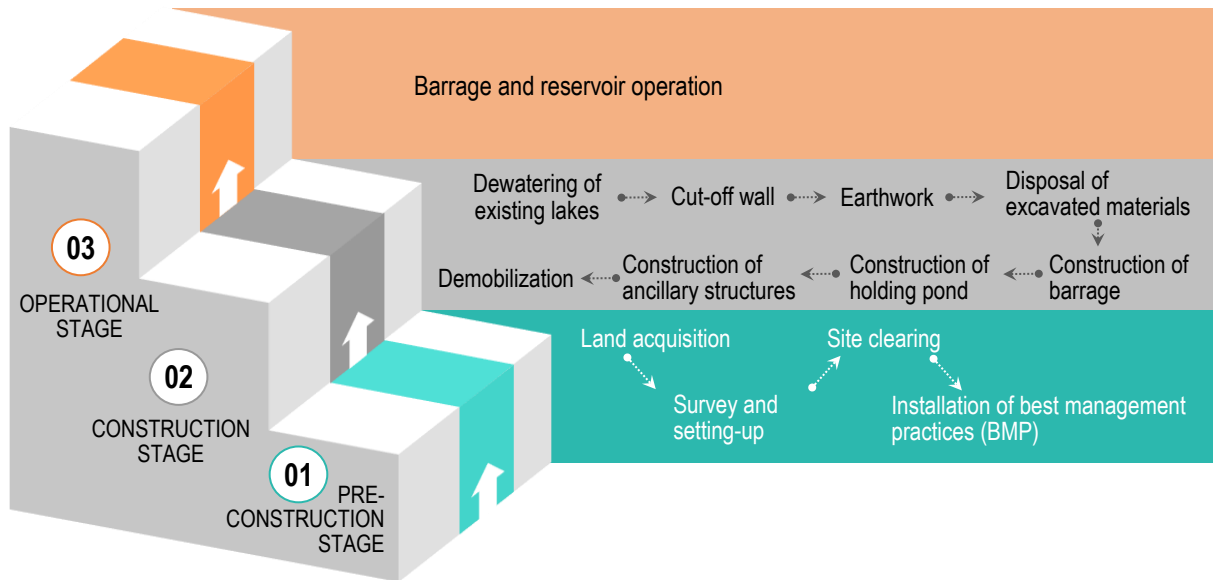
Resulting in Melaka's inability to meet future demand for raw water

Chapter 5: Project Description

Project Components





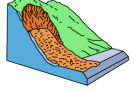

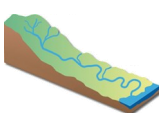







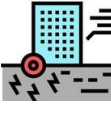
Project Activities








Project Schedule and Phases



Chapter 6: Existing Environment

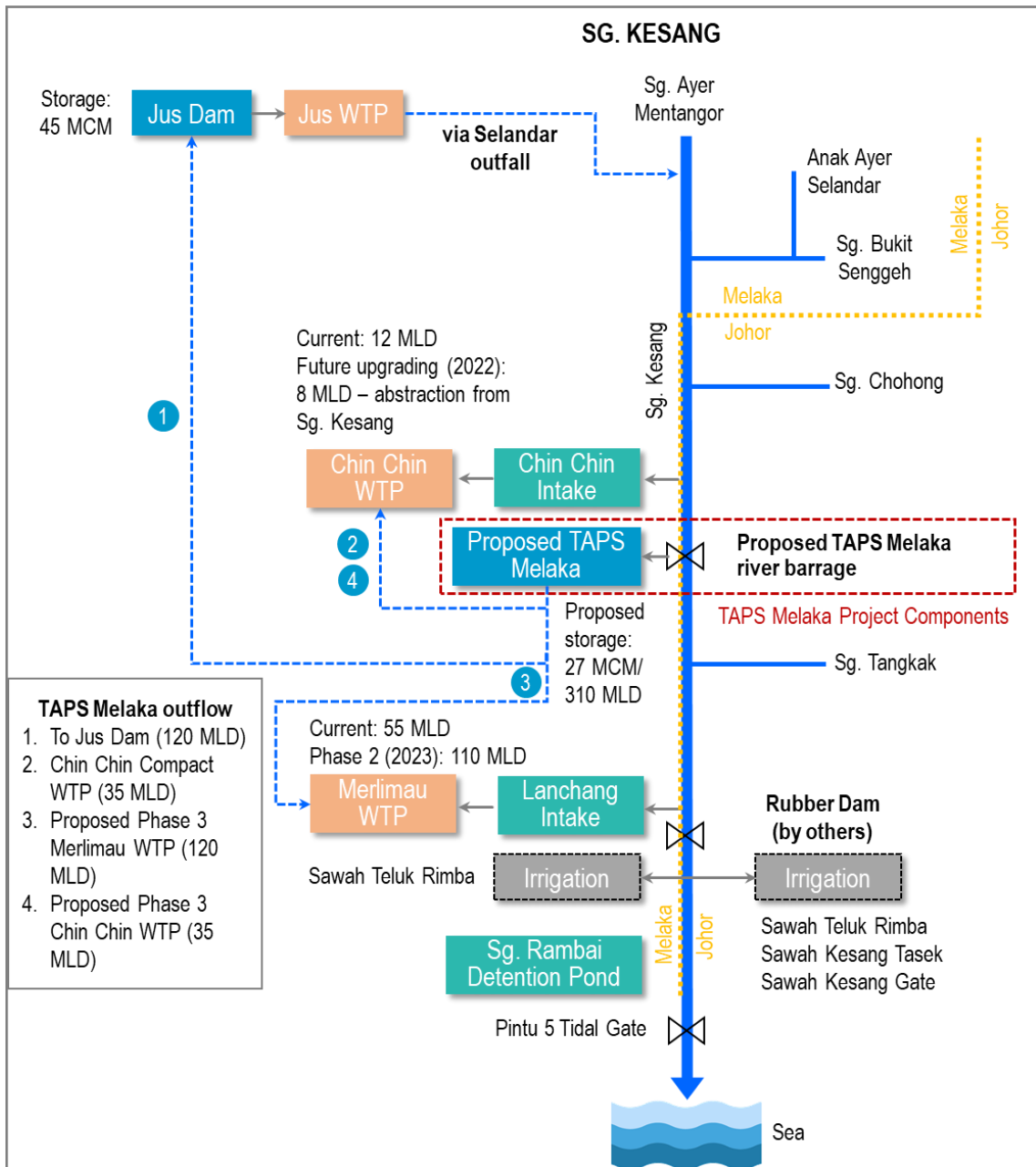
<p style="text-align: center;">TOPOGRAPHY</p>  <ul style="list-style-type: none"> Project area is surrounded by secondary jungle and plantation. 	<p style="text-align: center;">ELEVATION</p>  <ul style="list-style-type: none"> Elevation of less than 150 m Suitable for development activities. 	<p style="text-align: center;">SLOPE</p>  <ul style="list-style-type: none"> Mainly dominated by an area with a slope of below 15° (Class 1).
<p style="text-align: center;">CLIMATE & METEOROLOGY</p>  <ul style="list-style-type: none"> Uniform temperature, high humidity and heavy rainfall with two major monsoon seasons; Southwest and Northeast Monsoons. Average rainfall about 2,000 mm per year. 	<p style="text-align: center;">HYDROLOGY & DRAINAGE</p>  <ul style="list-style-type: none"> 8 rainfall stations, 1 water level station, 1 streamflow station. 3 major tributaries (i.e. Sg. Tangkak, Sg. Kesang, Sg. Chohong). Flood-prone areas are mostly on the downstream portions of Sg. Kesang. 	<p style="text-align: center;">NOISE</p>  <ul style="list-style-type: none"> 5 sampling stations. Existing ambient noise levels are well below stipulated limits of Schedule 2: Recommended Permissible Sound Level (LAEQ) by Receiving Land Use for Existing Built-up Areas.
<p style="text-align: center;">WATER QUALITY</p>  <ul style="list-style-type: none"> 8 sampling stations; 5 rivers and 3 lakes stations. Overall, river and lakes water quality are considered moderate to clean. 	<p style="text-align: center;">AIR QUALITY</p>  <ul style="list-style-type: none"> 5 sampling stations. Existing air quality is generally good and complied with New Malaysia Ambient Air Quality Standard (DOE, 2020). 	<p style="text-align: center;">SEDIMENT QUALITY</p>  <ul style="list-style-type: none"> 5 sampling stations; 2 rivers and 3 lakes stations. Several heavy metals values comply with US EPA Standard.
<p style="text-align: center;">LAND USE</p>  <ul style="list-style-type: none"> Administration: Jasin Municipal Council. Main land use pattern; agriculture (70.02%), residential (23.46%). 	<p style="text-align: center;">GEOLOGY</p>  <ul style="list-style-type: none"> Project area is mainly comprised of alluvium unit, Jelevu schist and Semantan formation. Stockpile area is underlain by Silurian-Devonian geological formation which consist of argillaceous, slate, phyllite, schist and pelitic hornfels, calc-silicate facies, calc-silicate hornfels, and impure limestone. 	<p style="text-align: center;">VIBRATION</p>  <ul style="list-style-type: none"> 5 sampling stations Existing vibrations are well within the limit set under the Third Schedule: Recommended Vibration Limits for Human Response and Annoyance from Intermittent Vibrations.
<p style="text-align: center;">SEISMICITY</p>  <ul style="list-style-type: none"> Nearest fault zone is the Seremban Fault Zone. Intermediate potential of seismic hazard at 5-6%g. 		

Chapter 6: Existing Environment

<p style="text-align: center;">TERRESTRIAL FAUNA</p>  <ul style="list-style-type: none"> ■ Almost all terrestrial fauna recorded are categorized under the Least Concerned status of IUCN. ■ 3 avifauna species and 1 mammals species are considered as Near Threatened (NT). ■ 1 species of herpetofauna and avifauna considered as Vulnerable (VU). 	<p style="text-align: center;">TERRESTRIAL FLORA</p>  <ul style="list-style-type: none"> ■ 170 plant species encompass 15 types of flora from 138 genera and 74 families recorded. ■ Based on MyBIS database, 1 Vulnerable (VU) species identified in Merlimau Forest Reserve, namely Anodendron candolleianum (Akar Kikat). 	<p style="text-align: center;">LAND TRAFFIC</p>  <ul style="list-style-type: none"> ■ 5 junctions identified within the Project area. ■ 3 junctions are identified as priority junctions. ■ All junctions are operating at LOS A. ■ The main roadways are operating between LOS A to LOS D.
<p style="text-align: center;">FRESHWATER ECOLOGY</p>  <ul style="list-style-type: none"> ■ Phytoplankton: <ul style="list-style-type: none"> * Population dominated by Chlorophyta. * Low diversity index recorded across all stations. ■ Zooplankton: <ul style="list-style-type: none"> * Hexanauplia and Branchiopoda is the only phylum recorded. * Copepods are more abundant in lake stations compared to river stations. ■ Macrobenthos: <ul style="list-style-type: none"> * Phylum Arthropoda was the most abundant with 82.2% of total macrobenthos sampled (198 individuals). * Number of taxa in river stations are significantly higher than lake stations. ■ Fish: <ul style="list-style-type: none"> * Both Tasik Biru and Tasik Chin Chin are dominated by invasive species. * All fishes recorded are considered common species. 	<p style="text-align: center;">SOCIO-ECONOMY</p>  <ul style="list-style-type: none"> ■ Social Profile/Demography: <ul style="list-style-type: none"> * Malay constitutes the largest group, comprising 459 individuals (97.9%). * Mixed education background (with 66.2% with at least Secondary Education). * Main occupations comprised of private sectors and small businesses. ■ Perception towards Land Acquisition: <ul style="list-style-type: none"> * Worried after relocating, not being in the same neighbourhood with friends (94.1%). * Anxious about moving to the new area (88.2%). * Worried about disproportionate compensation (82.4%). * Fearful about losing source of income from current real estate (58.8%). * Anxious to live life in a new place (82.4%). ■ Perception on Project Implementation: <ul style="list-style-type: none"> * Agreeable (64.4%). * Do not agree (11.1%). * Unsure (21.7%). * Do not care (2.8%). ■ Perception on Potential Impacts During Construction Phase: <ul style="list-style-type: none"> * Road damage due to ingress and egress of heavy vehicles – Level of Significant 4. * Increase the number of heavy vehicles in local traffic, particularly during ingress and egress from the project site – Level of Significant 4. 	

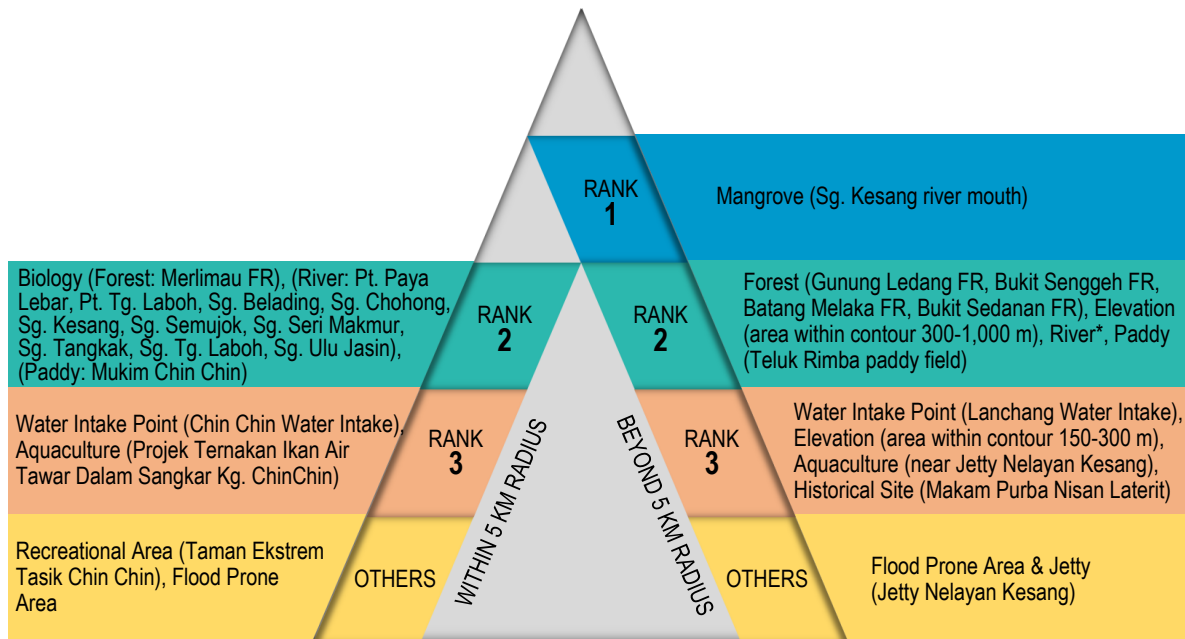
Chapter 6: Existing Environment

Hydraulic Components



Chapter 6: Existing Environment

Environmentally Sensitive Areas (ESA)



Notes:


Pt = Parit; Sg. = Sungai; FR = Forest Reserve

*List of river:




- | | |
|------------------------------|-------------------------|
| ■ Anak Ayer Batu Buaya | ■ Sg. Bekoh |
| ■ Anak Ayer Chambai | ■ Sg. Belading |
| ■ Anak Ayer Kandis | ■ Sg. Bt. Buloh |
| ■ Anak Ayer Kangkong | ■ Sg. Bukit Senggeh |
| ■ Anak Ayer Kemengkang | ■ Sg. Chohong |
| ■ Anak Ayer Kuning | ■ Sg. Dok |
| ■ Anak Ayer Merbau | ■ Sg. Dua Air Kang Rong |
| ■ Anak Ayer Talan | ■ Sg. Kesang |
| ■ Anak Pondok Limau | ■ Sg. Lubok Bandong |
| ■ Anak Sg. Meriang | ■ Sg. Mantai |
| ■ Pt. Paya Lebar | ■ Sg. Meriang |
| ■ Pt. Tg. Laboh | ■ Sg. Meriang Kiri |
| ■ Sg. Air Beberas | ■ Sg. Merlang |
| ■ Sg. Anak Ayer Batu Hampar | ■ Sg. Nyalas |
| ■ Sg. Anak Ayer Titi Meranti | ■ Sg. Paya Lebar |
| ■ Sg. Anak AyerSelandar | ■ Sg. Relau |
| ■ Sg. Ayer Chak Laras | ■ Sg. Rim |
| ■ Sg. Ayer Dua | ■ Sg. Semujok |
| ■ Sg. Ayer Jeram | ■ Sg. Seri Makmur |
| ■ Sg. Ayer Mentangor | ■ Sg. Tangkak |
| ■ Sg. Ayer Merbau | ■ Sg. Tekah |
| ■ Sg. Ayer Telan | ■ Sg. Tg. Laboh |
| ■ Sg. Batang Chohong | ■ Sg. Ulu Bekoh |
| ■ Sg. Batu Asahan | ■ Sg. Ulu Jasin |
| ■ Sg. Batu Lebar | ■ Sg. Ulu Relau |
| ■ Sg. Batu Tiga | ■ Solok Ulu Chembong |

Chapter 7 & 8: Summary of Potential Impacts and Its Associated P2M2

A. Pre-Construction: Land Acquisition


 <p>SOCIO-ECONOMY</p>	IMPACTS	<ul style="list-style-type: none"> Land acquisition may jeopardize the livelihood and future incomes of the involved land owners. Possibility of being unable to afford new house and/or land for agriculture as a result of inadequate compensation. Problems in assimilating at the new place.
	P2M2	<ul style="list-style-type: none"> Project Proponent shall follow land acquisition process as gazetted in Land Acquisition Act 1960. Project Proponent shall conduct continuous engagement between affected stakeholders, Pejabat Tanah dan Daerah Jasin and Pejabat Tanah dan Galian, Melaka. Compensation should be in the form of monetary compensation and non-monetary compensation. Facilitating land acquisition process by disseminating early information towards affected land owners. Providing legal assistance for land owners in land acquisition processes i.e. documentation. Establishing Grievance Committee (GC) and Consultative Community Committee (CCC) to manage complaints and monitor implementation of social impact measures.

Site Clearing




 <p>WATER QUALITY</p>	IMPACTS	Surface runoff may result in adverse impacts by causing elevated concentrations of suspended solids and other pollutants.
	P2M2	<ul style="list-style-type: none"> Soft BMPs must be implemented prior to the start of any land disturbing works. Disposal of biomass and debris must be done properly at the designated area within the Project site. Site clearing activities are to be conducted within working area only. Minimised site clearing activities during wet or rainy season. Provision for trash and garbage bins must be established to manage solid wastes produced from site-clearing activities.
 <p>AIR QUALITY</p>	IMPACTS	Vehicles movements on unpaved roads and construction sites can churn dust into the atmosphere.
	P2M2	<ul style="list-style-type: none"> Site clearing should not be conducted or minimized during strong wind conditions and dry seasons. Crusher run or other suitable material must be laid to cover any exposed roads. Areas that are not being worked on to be covered with turfing or any other suitable coverings.
 <p>TERRESTRIAL FLORA & FAUNA</p>	IMPACTS	<ul style="list-style-type: none"> Site clearing activities would remove all existing biomass, causing a total loss of habitat and food resources. Refugee wildlife could encroach into cultivated areas and human settlements, causing human-wildlife conflicts.
	P2M2	<ul style="list-style-type: none"> Site clearing, biomass removal and earthwork activities should be restricted to the designated footprint area as much as possible. The Project Proponent (and the respective contractors) shall comply with the stipulated rules and regulations regarding tree cutting and biomass removal. Clearing of the site should be conducted in stages starting from the residential areas; outwards in a single direction towards and into the plantation and forest areas. A secure fence is recommended to be constructed to prevent encroachment of wildlife into the worksite during construction.

Chapter 7 & 8: Summary of Potential Impacts and Its Associated P2M2



A. Pre-Construction: Site Clearing

NOISE & VIBRATION 	IMPACTS	Site clearing works will involve noisy heavy machineries.
	P2M2	<ul style="list-style-type: none"> Site clearing must only be limited during daytime and must be minimised during weekends and public holidays. Heavy vehicles and machineries must be properly maintained to reduce noise and vibration. Properly design routing of access routes to minimise noise and vibration.

B. Construction: Dewatering of the Existing Lakes




WATER QUALITY 	IMPACTS	Pollutants presents in the existing lakes will be introduced to Sungai Kesang.
	P2M2	No P2M2 proposed as the impact is considered insignificant based on the analysis of grab samples.
RIVERBANK EROSION 	IMPACTS	Water flowing out from the outlet pipe may cause scouring at where the pipe is located.
	P2M2	Riprap, sheet pile or sandbag must be constructed and prepared at the outlet structure (discharge into Sungai Kesang).
AQUATIC ECOLOGY 	IMPACTS	<ul style="list-style-type: none"> Existing lakes will be completely dewatered causing a total loss of aquatic habitat present in the lakes. Introduction of invasive species into Sungai Kesang.
	P2M2	Water pump shall be properly maintained to prevent any existing invasive species within the lakes from entering Sungai Kesang.

Earthworks

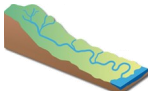


WATER QUALITY/ AQUATIC ECOLOGY 	IMPACTS	Excavation activities may cause a severe impact on the surrounding water quality if not mitigated.
	P2M2	<ul style="list-style-type: none"> Key runoff control measures in the LD-P2M2 must first be constructed and made operational. Earthwork activities must be conducted in phases to minimise the quantum of impacts to the environment. Stop Work order is compulsory if the rainfall exceeds 12.5 mm. Maintenance of BMPs need to be done before any earthwork activities to continue. Perimeter drain should be prepared to avoid any chemical and oil and diesel leaks to nearby water body. Best management practice (BMP) for materials stockpile should be implemented. Regular monitoring on water quality parameters i.e. TSS should be regularly conducted. Lake's trophic state index (TSI) should also be regularly monitored.
AIR QUALITY 	IMPACTS	Exposed soil and slope as well as exhaust fumes from machineries will generate dust and suspended particulates that degrade air quality.
	P2M2	Wheels and undercarriage of lorries/vehicles must be cleaned at the wash trough prior existing the Project site.

Chapter 7 & 8: Summary of Potential Impacts and Its Associated P2M2

Haulage and Disposal of Excavated Material

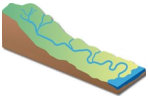

LAND TRAFFIC 	IMPACTS	Existence of construction traffic and their access to the site may possibly cause a temporary bottleneck as well as pose some safety risks to vulnerable road users.
	P2M2	<ul style="list-style-type: none"> ■ Flagmen/temporary traffic lights must be installed to control traffic movement. ■ Proper blinkers and lighting must be installed at dangerous points of the road. ■ Signboards and traffic diversions must be properly erected along the road. ■ Alternative roads must be provided to avoid slowdown of traffic and bottlenecks. ■ Movement of trucks in and out of the construction site shall be restricted to off-peak periods between 10 a.m. to 4 p.m. and 8 p.m. to 6 a.m.
AIR QUALITY 	IMPACTS	Transportation of excavated material is expected to generate fugitive dust and deteriorate the surrounding and along the transportation route ambient air quality.
	P2M2	<ul style="list-style-type: none"> ■ Excavated material must be transported in a tarpaulin-covered truck. ■ Hoarding must be erected along the perimeter of the Project site. ■ Water trucks to be used to suppress dust on construction roads, especially during dry and windy period.
NOISE & VIBRATION 	IMPACTS	Several settlements along the haulage route may be affected by the noise produced by the movement of heavy vehicles and machineries moving to and from the Project site.
	P2M2	<ul style="list-style-type: none"> ■ No structural/equipment P2M2 proposed. ■ Transportation activities must be limited between 7 a.m. to 7 p.m. and minimised during weekends and public holidays.

Construction of Barrage and Cut-off Wall and Other Ancillary Structures

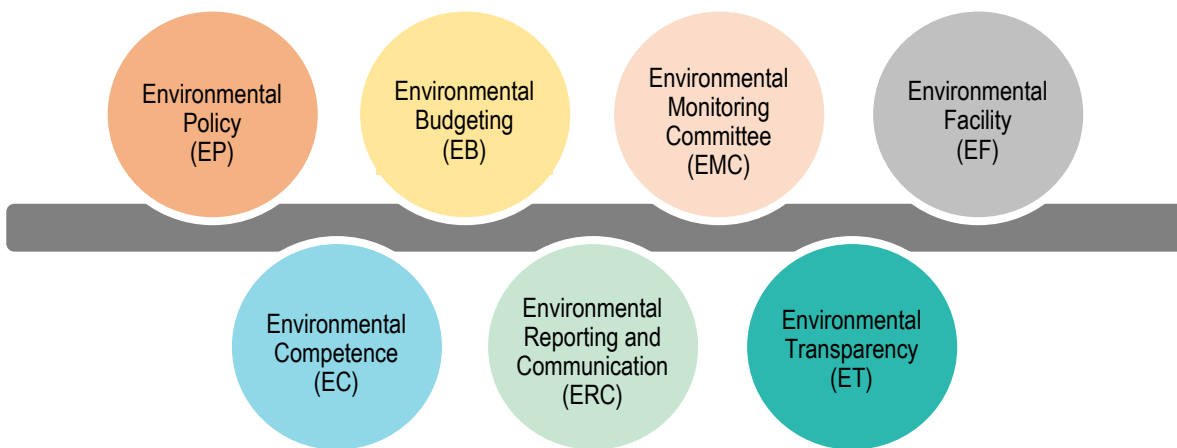
HYDROLOGY & HYDRAULIC 	IMPACTS	Improper diversion of Sungai Kesang may impede the river water flow and cause heightened flood risk for the upstream area and affect the environmental flow for the downstream area.
	P2M2	River diversions works (cofferdam) must be designed and properly executed to ensure Sungai Kesang hydrologic regime is not permanent altered.
WATER QUALITY 	IMPACTS	Concrete slurries used during the construction may spill into Sungai Kesang.
	P2M2	<ul style="list-style-type: none"> ■ Proper installation of ESCP ■ Installation of slurry collection pond/dedicated concrete washout area (if appropriate). ■ Concrete washout/effluent collected must be treated prior to being discharged into the nearby waterways.
NOISE & VIBRATION 	IMPACTS	Construction of barrage (cofferdam), cut-off wall and other ancillary structures will involve noisy heavy machineries.
	P2M2	Limit construction activities between 7 a.m. to 7 p.m. and minimised during weekends and public holidays.

Chapter 7 & 8: Summary of Potential Impacts and Its Associated P2M2

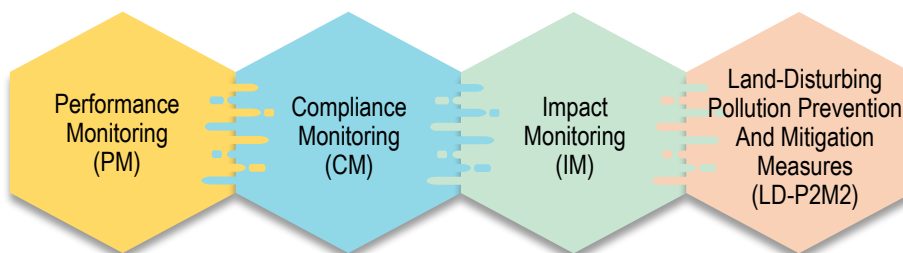
C. Operation

HYDROLOGY & HYDRAULIC 	IMPACTS <ul style="list-style-type: none"> ■ The installation of a barrage across Sungai Kesang may impede the water flow causing floods in the upstream and downstream area. ■ Changes in water velocity flowing through the river may cause erosion and/or sedimentation on the river bed and the riverbank. ■ Water will be abstracted from Sungai Kesang, thus reducing the amount of water flowing through it at the downstream section.
	P2M2 <ul style="list-style-type: none"> ■ No P2M2 is proposed based on modelling result shows no significant impact on water level at upstream and downstream area. ■ No P2M2 is proposed as water will be abstracted from Sungai Kesang during high flow condition i.e. upstream water flow rises above 2.44m R.L.
WATER QUALITY 	IMPACTS <p>Contaminants present in Sungai Kesang will be introduced into the reservoir via water abstracted from Sungai Kesang.</p>
	P2M2 <ul style="list-style-type: none"> ■ Water quality of water abstracted should be regularly monitored to avoid contaminations. ■ Pond trophic state index (TSI) must be regularly monitored for eutrophication status.

Chapter 9: Environmental Management Plan

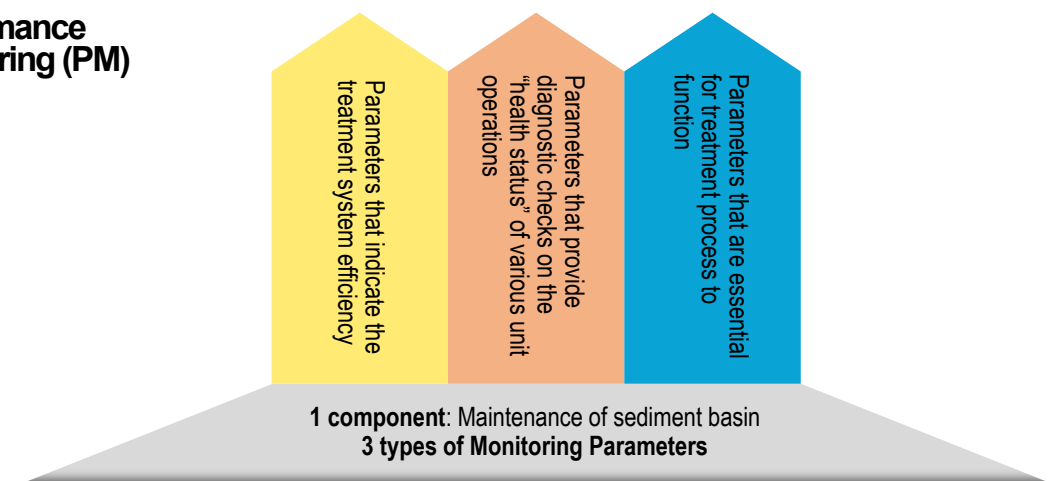


Environmental Monitoring



Chapter 9: Environmental Management Plan

Performance Monitoring (PM)



Compliance Monitoring (CM)

COMPONENT	PARAMETER	LOCATION	PROPOSED COMPLIANCE LIMIT	FREQUENCY
Water quality ■ River ■ Lake	TSS and turbidity	Discharge outlets of sediment basins	Trigger limit (above ambient concentration): ■ TSS: 50 mg/L ■ Turbidity: 250 NTU	■ Monthly ■ Within 24 hours after a rainfall event exceeding 12.5 mm
Sediment quality	Heavy metals	As presented in Section 6.2.10	As presented in Table 6.37	Monthly
Air quality	PM ₁₀	As presented in Section 6.2.11	100 µg/m ³	Quarterly
Noise	L _{Aeq}	As presented in Section 6.2.12	■ Day time: 60 dBA ■ Night time: 55 dBA	Quarterly
Vibration	mm/s (peak vector sum)	As presented in Section 6.2.13	■ Day time: 0.8 to 1.6 mm/s ■ Night time: 0.4 mm/s	Quarterly

Impact Monitoring (IM)

COMPONENT	PARAMETER	LOCATION	ENVIRONMENTAL QUALITY CRITERIA	FREQUENCY
Water quality	pH, temperature, salinity, conductivity, turbidity, DO, TSS, ammoniacal nitrogen, phosphate, nitrate, sulphate, Al, As, Cd, Cr, Cu, Fe, Pb, Mg, Mn, Hg, Ni, Se, Ag, Na, Zn, BOD, COD, oil & grease, <i>E. coli</i> , faecal coliform	As presented in Section 6.2.9	River Baseline data, NWQS and National Drinking Water Quality Standard	Monthly
			Lake Baseline data, National Lake Water Quality Criteria and National Drinking Water Quality Standard	
Sediment quality	Heavy metals (Ni, Cu, Cr, Pb, As, Cd, Zn, Mn, Fe, Sn)	As presented in Section 6.2.10	Baseline data and US EPA Standard	Monthly
Air quality	PM _{2.5} , PM ₁₀ , SO ₂ , NO ₂ , O ₃ , CO	As presented in Section 6.2.11	Baseline data and New Malaysia Ambient Air Quality Standard	Quarterly
Noise	L _{eq} , L _{max} , L _{min} , L ₁₀ , L ₅₀ , L ₉₀	As presented in Section 6.2.12	Baseline data and Guidelines for Environmental Noise Limits and Control	Quarterly
Vibration	mm/s (peak vector sum)	As presented in Section 6.2.13	Baseline data and Guidelines for Environmental Vibration Limits and Control	Quarterly

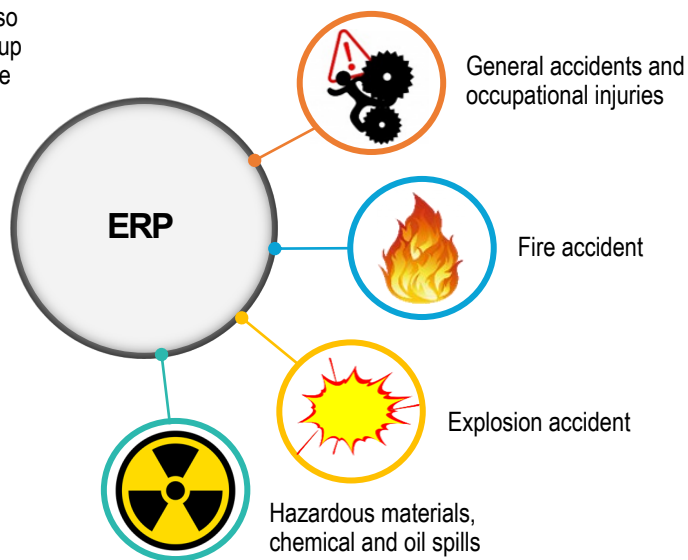
Chapter 9: Environmental Management Plan

Environmental Audit

PARAMETER	FREQUENCY	ENVIRONMENTAL QUALITY CRITERIA	REPORTING REQUIREMENT
To audit the compliances with the EIA approval conditions and the relevant environmental regulations and guidelines	Quarterly	Environmental Audits shall be carried out by a third-party Environmental Auditor (registered with DOE)	Report to be submitted to DOE quarterly

Emergency Response Plan

ERP is a plan to avoid pollution which also includes emergency holdings and clean-up procedures as well as actions to minimize adverse environmental effects.



Chapter 10: Study Finding

From the overall assessment, it can be concluded that:

The proposed development is expected to cause various degree of impacts on the environment as well as the surrounding land uses.

However, with proposed mitigation measures and BMPs fully implemented, the impacts of the Project may be mitigated.