

Statement of Needs

- The Federal Government of Malaysia under the Kementerian Pembangunan Luar Bandar (KPLB) received allocation to undertake a Sanitary Landfill project to replace current Solid Waste dumpsite previously located within the Lembaga Kemajuan Johor Tenggara (KEJORA) areas of jurisdiction (currently under PBT Pengerang).
- Development pressure left the existing landfill (Bkt. Tuatau) be at the centre of a tourist attraction

- The SLF will provide proper infrastructure for the disposal of solid waste for PBT Pengerang and will curb the illegal disposal of waste that can pollute the nearby rivers and beach.
- Location chosen is away from development pressure with sufficient buffer
- Spur local economy with participation of local contractor in this Proposed Project as well as its multiplying effect due to the construction contracts.

Project Proponent

- Prescribed Activity: **WASTE MANAGEMENT AND DISPOSAL**
- Activity No. 14 (b) Construction of Sanitary Landfill Facility (SLF)



Location

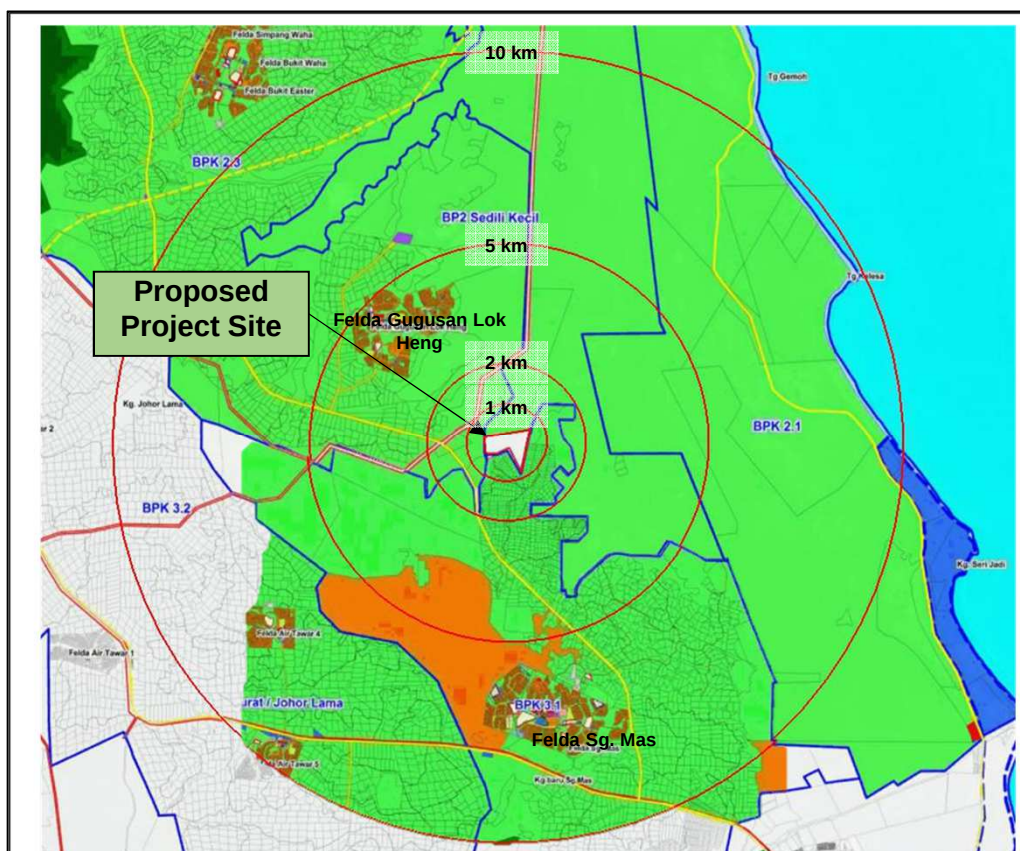
- Lot PTD 1699 is located around 4km away from nearest residential area of Felda Gugusan Lok Heng
- The access to the Proposed Facility will be built offshoot to the existing Jalan Lok Heng (FR99 / JR401)
- The Location is within BP2 Sedili Kecil

EIA Consultant

Minconsult Environmental Sdn Bhd
(617653 – D)
 Lot 6, Jalan 51A/223
 46100 Petaling Jaya.
 Selangor Darul Ehsan



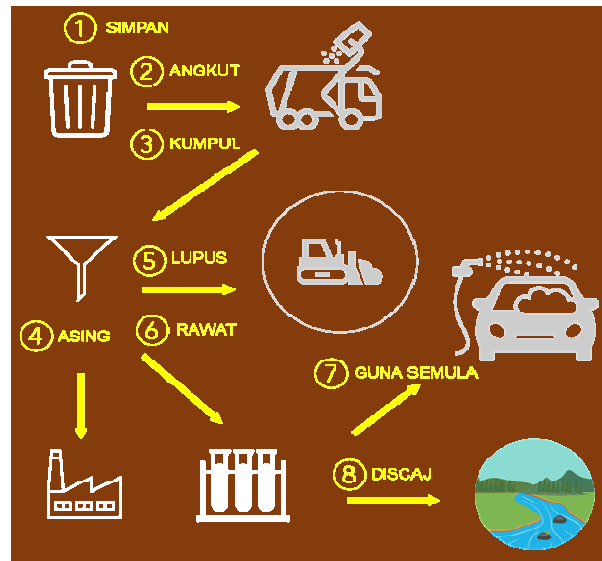
Minconsult



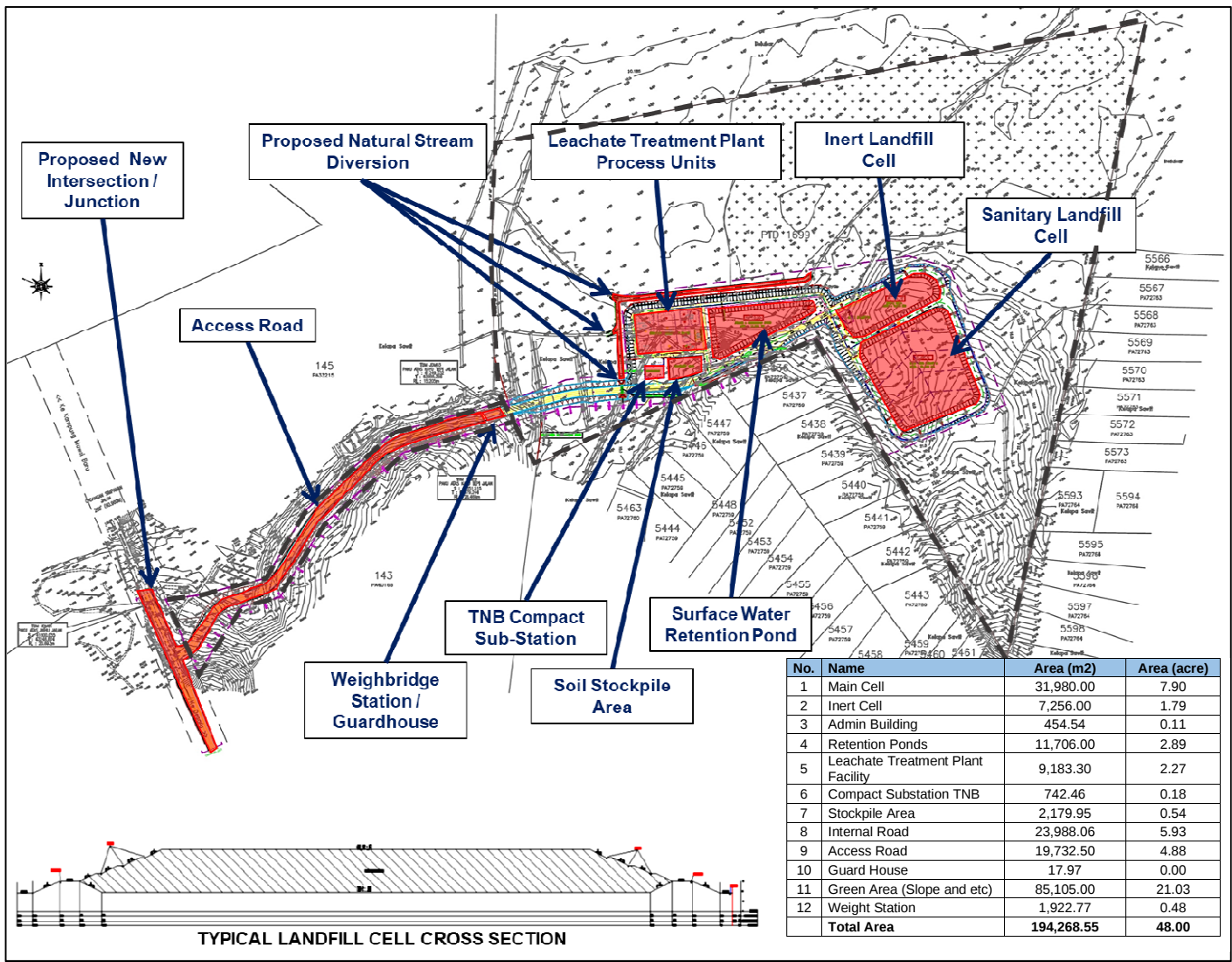
Project Description

- The Proposed Sanitary Landfill Facility (SLF) is designed to Level 4 SLF Category, semi-aerobic and will be able to cater up to 292 tonnes per day of disposal capacity.
- The Design mostly referring to Local best practice as well as the National Solid Waste Management Department Technical Guidelines on Design and Operations of SLF.
- The SLF lifespan will be 3 years.
- Lifecycle of waste starts from **Service Area** in **Kota Tinggi and Pengerang**. Waste is collected and transported to the **Sanitary Landfill Facility (SLF)**. At the SLF, waste is **separated** into two (2) types (**MSW and Inert Waste**) and dumped at designated area within the SLF. MSW left in the cell will generate leachate which will be treated in the **Leachate Treatment Plant (LTP)**. Prior to discharge, **treated effluent** will be **reused** for operations purposes.

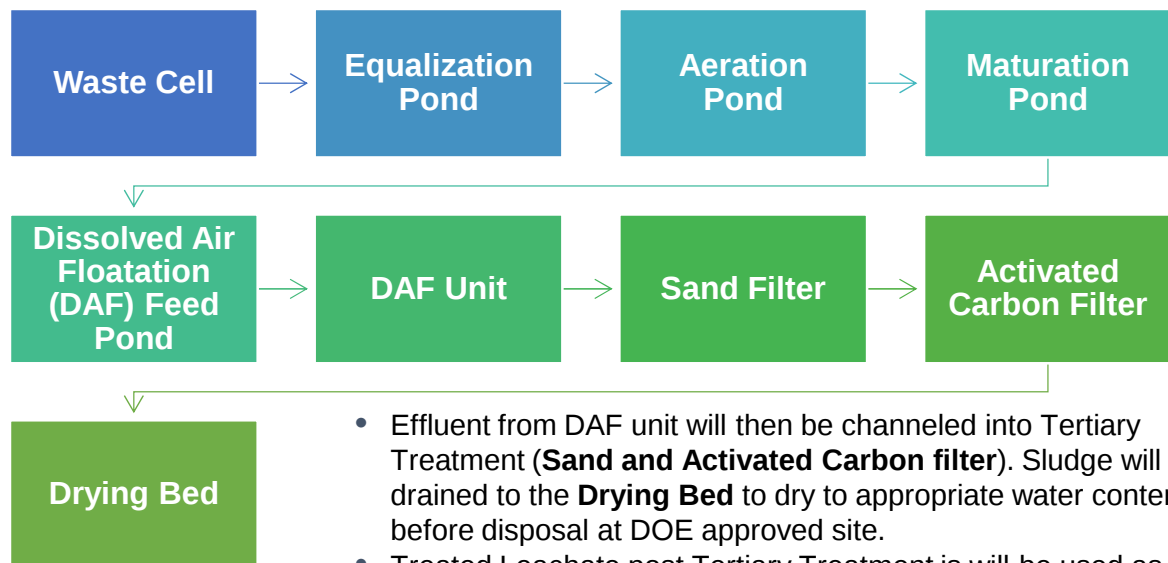
SLF Activity / Operation



Principle Project Components

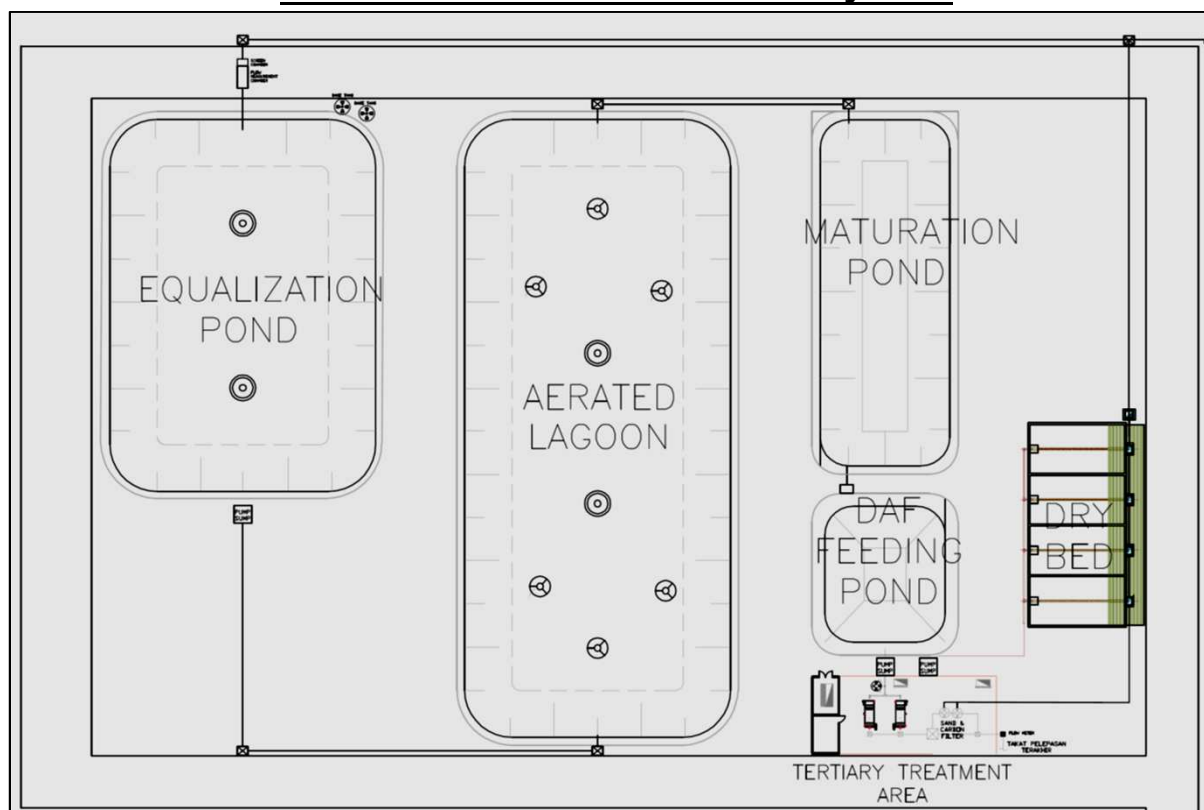


Leachate Treatment Plant Process



- Effluent from DAF unit will then be channeled into Tertiary Treatment (**Sand and Activated Carbon filter**). Sludge will be drained to the **Drying Bed** to dry to appropriate water content before disposal at DOE approved site.
- Treated Leachate post Tertiary Treatment is will be used as process water. Only insignificant volume will be discharged to Final Discharge Point.

Leachate Treatment Plant Layout



Project Activities

Planning Stage

- Land Survey
- Soil Investigation
- Groundwater Study

Construction Stage

- Site Clearing
- Earthworks
- Access Road
- Drainage
- Landfill Liner Lay
- Pipe Laying works

Operations Stage

- Sanitary Landfill and Inert Landfill Operations
- Leachate Treatment Plant O&M
- Closure and Abandonment

Existing Environment



Landuse

- 1 km – Agriculture, Utility
- 5 km – Agriculture, Utility, Residential



Topography

- Elevation 8-20m (87%), 20-31m (13%)
- Slope <25° (99.85%) , > 25° (0.15%)



Socio-Economy

- **Project Acceptability (N = 400)**
- Agree - 67%
- Agree but not the location - 18%
- Does not Agree - 1%
- Does not Agree (current landfill to be upgraded) - 10%
- Not Sure, need further info - 4%



Marine Ecology

- **Phytoplankton (Overall)**
- Shanon-Wiener Diversity Index (H') ranges from 2.02 to 2.38 (moderate to high diversity)
- **Zooplankton – (Overall)**
- Shanon-Wiener Diversity Index (H') ranges 0 – 2.15 (lower to moderate diversity)
- Fish – 6 Species , 5 Families



Climate and Meteorology

- **Wind**
- North / Southwest Prevalent Wind
- **Rainfall (1985 – 2019)**
- 178 Raindays
- 2552 mm (mean)



Air Quality

- 5 Nos. of Sampling Stations
- Baseline at PM10, PM2.5, SO2, H2S, CH4 is below the New Ambient Air Quality Standards (2020)



Noise

- 5 Nos. Sampling Stations
- Daytime Avg. L_{Aeq} (46.8 – 57.5 dBA)
- Nighttime Avg. L_{Aeq} (47.4 – 57.0 dBA)



Odour

- Neutral and noticeable w/out offensive smell
- Traces of Oil Palm based and Fertilizer Smell



Water Quality

- 7 Nos. Monitoring Points at Sg. Lukah
- All Stations parameters within Class III of NWQS
- E. Coli at downstream areas of Sg. Lukah (range 10 – 30 counts/100ml)



Geology

- Lithology - Alluvium sediment of Quaternary deposits with sandy-silty CLAY to clayey-silty SAND materials
- Overall, soil/sediment formation consists of Sand, Silt and Clay layers with minor occurrence of gravel



Hydrogeology

- 5 Nos. Monitoring Points
- All points as Moderate according to NGWQI
- Total Coliform present at all points with value ranging from 100 to 2,800 CFU/100ml



Hydrology

- Surface water drains into Sg. Lukah ~ 95 km² (sub-catchment of Sg. Sedili Kecil)
- Sg. Sedili Catchment ~ 271 km²
- Not within flood prone area



Terrestrial Ecology (Fauna)

- IUCN-RLDB – King Cobra
- MyBis – None
- No record of species with critically endangered status



Terrestrial Ecology (Flora)

- Type of forest – Disturbed Forest
- Red Data Flora – moderate floristic variation and suitability
- Moderate conservation importance



Public Health

- Areas are mostly free from garbage.
- Pest problem mainly due to flies, rats, ants, mosquitos and others.



Traffic

- Site access through JR 401 (Jalan Lok Heng) on FR99 at LOS A
- Traffic to increase for JKR 401 @ FR99 at 0.022% / year (CAGR)

Potential Impacts and Mitigating Measures

Evaluation of Impacts

Hydrogeology

Pre-Construction and Construction Stage

- Potential of direct connection to groundwater during earthworks and ground excavation.

Hydrogeology

Operations Stage

- Change in permeability of the ground may result in change in groundwater levels and flow patterns.
- Degradation of groundwater and surface water due to movement of contaminants from landfill through groundwater system (low probability).

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Maintain adequate separation between base of landfill and water table.
- 2) Layering of clay liner or any other low permeable barriers to prevent direct contact of groundwater and the overlying landfill.
- 3) Carry out groundwater monitoring via the monitoring wells.
- 4) Establish appropriate drainage system to drain out water from project site.

➤ Operational and Post-Operational Phase

- 1) Maintain natural permeable surfaces on the areas out site of the landfill.
- 2) Carry out continuous groundwater monitoring via the monitoring wells.
- 3) Construct a few groundwater monitoring wells at the locations along the potential path lines of groundwater/particle from the landfill site towards the main discharge point of Sg. Sedili Kecil

Evaluation of Impacts

Water Quality

Pre-Construction and Construction Stage

- Land clearing and earthworks operations promote surface erosion devegetation and dislodgement of soil particles which may then be transported to surrounding drainage systems by surface water flows.
- Biomass produced from the site clearing will contaminate the water quality through the decomposing.

Water Quality

Operations Stage

- Failure in any part of the Leachate Treatment Plant (LTP) could result in discharge of partially treated leachate into downstream rivers.

Potential Impacts and Mitigating Measures

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Minimization of exposed soil, the time it is exposed, terracing of exposed slopes and construction of anti-erosion berms.
- 2) Provision of detention ponds or sediment basins as well as appropriate traps for the purpose to prevent sediments and other debris from being washed into the adjacent watercourse.
- 3) Provision of appropriate waste and sewage collection as well as disposal procedures and facilities.

➤ Operational Phase

- 1) Equip the landfill with leachate collection pipe, collection pond and leachate treatment plant facility and ensure proper maintenance of the facilities.
- 2) Carry out continuous groundwater monitoring to ensure no leakage of liners.
- 3) Close monitoring of treated effluent and LTP process.

Soil Erosion Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Install temporary earth drains, silt traps, sediment basin and check dams to prevent runoff from site.
- 2) Stabilize construction site with water bowser, wash trough and regular sweeping / washing.
- 3) Stabilize exposed areas with turfing.
- 4) Storage of stockpiles at least 20m away from water courses.
- 5) Maintain a riparian buffer between project site and watercourses.
- 6) Provision of culvert for any temporary waterway crossing.

➤ Operational Phase

- 1) Ensure the sediment-laden runoff from unpaved road is collected in the drainage system and channelled to detention system prior to discharging into receiving watercourse.

Evaluation of Impacts

Air Quality & Odor

Pre-Construction and Construction Stage

- Fugitive dust generation due to land clearing, excavation, earthworks, fill and grading, movement of construction vehicles and construction of structures.

Air Quality & Odor

Operations Stage

- Emission of landfill gases (methane, NMOC, hydrogen sulphide, benzene, toluene) and PM10 by landfill activities.
- Dust emission due to movement of waste transportation vehicles on unpaved roads.

Potential Impacts and Mitigating Measures

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Soil loads on construction vehicles will be kept covered during transit on public roads.
- 2) Topsoil stockpiles will be kept covered or have a suitable dust palliative applied.
- 3) Watering or a suitable dust palliative should be applied to unsealed roads if dust rises above acceptable levels.
- 4) Regular suspended particulate monitoring should be conducted.

➤ Operational Phase

- 1) Capture and flaring of landfill gas to prevent fires or explosion.
- 2) Hardsurface roadways and any other areas where there is regular movement of vehicles.
- 3) Use of wheel and truck wash facilities at site exits, and the introduction of vehicle speed limits.
- 4) Loads on transport vehicles should be kept covered during transit on public roads to reduce wind blown pollution and spillage.
- 5) Exposed areas should be covered where practical either by paving or turfing.
- 6) Regular suspended particulate matter ambient air monitoring should be conducted.
- 7) Use of environmentally safe, non-corrosive and biodegradable detergent to wash off spilled waste material that will potentially cause foul odor.
- 8) To prevent spillage from trucks transporting solid waste, especially spillage in liquid form, collection containers should be installed on the trucks at a drainage point to collect the liquids.
- 9) To prevent solid waste spillage, all trucks should be properly covered and this is made mandatory in the standard operating procedures.
- 10) Cover landfill cells with cover materials as soon as it is filled to prevent exposure of the waste which results in malodours

Evaluation of Impacts

Noise Quality

Pre-Construction and Construction Stage

- Noise generation due to movement of construction vehicles into and out of the construction site.
- Use of heavy machinery and construction equipment for earthworks, piling, drilling etc.

Noise Quality

Operations Stage

- Noise generation due to use of specialized landfill equipment (bulldozers, trucks, compressors, excavators etc)

Mitigating Measures

➤ Pre- Construction, Construction and Operational Phase

No mitigation needed as noise levels are contained within the landfill area and within the limits specified.

Potential Impacts and Mitigating Measures

Evaluation of Impacts

Terrestrial Ecology

Pre-Construction and Construction Stage

- Habitat transformation and loss of species due to land clearing, construction of structures and generation of noise.
- Possibility of human wildlife conflicts, illegal trapping and roadkill.

Terrestrial Ecology

Operations Stage

- Possibility of human wildlife conflicts, illegal trapping and roadkill.

Mitigating Measures

➤ Pre- Construction, Construction and Operational Phase

- 1) Minimising habitat removal, modification and fragmentation.
- 2) Retaining selected area of natural vegetation and habitat areas as biodiversity
- 3) Ex-situ conservation plan is strongly recommended where unique plants are to be collected and established within a suitable site of the project area or another allocated location.
- 4) The vegetation along rivers, streams and drains must be retained as a buffer to minimize the ingress of sediments into the watercourses to protect the quality of water and aquatic life..
- 5) A Wildlife Management Plan (WMP) if required, needs to be established to provide detailed action related to wild life issue.
- 6) The contractors, and workers must be prohibited from illegal wildlife trapping or hunting.
- 7) Site clearing shall be done phase by phase to allow wildlife to move from the working area to adjacent secondary growth to avoid human wildlife conflicts.
- 8) Project Proponent need to fence the landfill site to prevent entering of wildlife to the areas.
- 9) The project proponent through WMT shall seek consultation with the PERHILITAN for developing a contingency plan to resolve potential macaque and wild boar entering to the landfill areas.
- 10) Management for elephant conflicts must be tackled by various parties within the range of elephant roaming areas in Kota Tinggi District. The WMT should immediately inform the PERHILITAN if elephant is sighted.
- 11) If a tree containing an active nest of a specially protected species is felled (usually raptors because their nest is relatively big), the incident should be informed and reported to the PERHILITAN.
- 12) Proper signage on prohibition of bird hunting or trapping must be placed at suitable conspicuous locations for workers and contractors.

Evaluation of Impacts

Marine Ecology

Pre-Construction and Construction Stage

- Deterioration of water quality due to site clearance, earthworks, movement of construction vehicles, equipment maintenance base and discharge of wastes from worker's camps cause increase in SS and decrease in DO, affecting phytoplankton, algae, macrophytes and fish population.

Marine Ecology

Operations Stage

- Degradation of water quality due to discharge of leachate containing heavy metals during rainfall etc will increase the DO and reduce the BOD of receiving water courses, thus impacting aquatic life and causing an imbalance of aquatic ecosystem, impacting downstream aquaculture activities and downstream mangrove and riverine vegetation.

Potential Impacts and Mitigating Measures

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Ensure that soil erosion control measures are fully implemented, and their efficiency maintained.
- 2) Provision of appropriate waste and sewage collection as well as disposal procedures and facilities (rubbish bins and toilet facilities).
- 3) The vegetation along rivers, streams and drains must be retained as a buffer to minimize the ingress of sediments into the watercourses to protect the quality of water and aquatic life.

➤ Operational Phase

- 1) Equip the landfill with leachate collection pipe, collection pond and leachate treatment plant facility and ensure proper maintenance of the facilities.
- 2) Carry out continuous groundwater monitoring to ensure no leakage of liners.
- 3) Close monitoring of treated effluent and LTP process.
- 4) The vegetation along rivers, streams and drains must be retained as a buffer to minimize the ingress of sediments into the watercourses to protect the quality of water and aquatic life..

Evaluation of Impacts

Social

Pre-Construction and Construction Stage

- Low awareness on the purpose and operations of a sanitary landfill.
- Generation of noise due to construction activities and use of machinery.
- Concern for public safety due to presence of foreign workers and movement of construction vehicles on the road.

Social

Operations Stage

- Public health concerns due to the potential presence of flies, rats and pests.
- Generation of foul odor from the landfill.
- Water pollution and contamination due to discharge of leachate.
- Concern for public safety and security due to movement of garbage transportation vehicles on the roads, and risk of fire at the landfill.

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) Address low level of awareness on operations of landfills via a series of engagements.
- 2) Place hoardings around site or appropriate places to reduce sounds and disturbances during construction and avoid construction activity at night.
- 3) Schedule movement of construction vehicles to within non-peak hours.
- 4) Ensure construction site is clean and free from debris that could lead to breeding grounds for mosquitos and other pests in order to avoid outbreaks of diseases and to protect public health in the local community.
- 5) Ensure foreign construction workers undertake health examinations, especially for communicable diseases, and are trained for safety procedures.
- 6) Manage construction site and ensure disposal of waste materials from construction is properly done.

Potential Impacts and Mitigating Measures

➤ Operational Phase

- 1) Establish a hotline for residents in surrounding communities to provide feedback, complains or obtain clarifications on the landfill operations and any arising matters.
- 2) Establish procedures to have workers' health screened regularly.
- 3) Establish training programmes to raise competency level of workers and to ensure they follow operational guidelines, keep the site safe and to adhere to safety and sanitary guidelines.
- 4) Establish proper guidelines on the vehicle flows and safety of garbage trucks moving on local roads that adhere to local authority's guidelines.
- 5) Ensure regulations and rules to promote proper garbage disposal methods and recycling are in place and establish a system to monitor the situation for compliance.
- 6) Outline a recruitment programme to employ locals in the sanitary landfill.
- 7) Set up a monitoring system to monitor (a) improvement level in overall cleanliness of the surrounding area (b) job and business opportunities available and take up rate, and (c) ability of the sanitary landfill to extend its services to numerous settlements and new developments.

Evaluation of Impacts

Public Health

Pre-Construction and Construction Stage

- No impacts.

Public Health

Operations Stage

- Potential exposure to methane generated at the landfill.

Mitigating Measures

➤ Pre- Construction, Construction and Operational Phase

No mitigation needed.

Evaluation of Impacts

Risk Assessment

Pre-Construction and Construction Stage

- No impacts.

Risk Assessment

Operations Stage

- Chances of explosion or fire at the landfill due to methane gas generated.

Potential Impacts and Mitigating Measures

Mitigating Measures

➤ Pre- Construction, Construction and Operational Phase

- 1) The sanitary landfill must be properly designed and constructed to ensure the possible risks are minimized to the acceptable level.
- 2) Leachate treatment, gas collection and monitoring and groundwater monitoring must be carried out effectively.
- 3) All trucks/vehicles must follow the safety procedures and traffic movement guidelines.
- 4) Only site workers should be allowed to be onsite.

Evaluation of Impacts

Waste Management

Pre-Construction and Construction Stage

- Open burning of vegetation can lead to release of GHG and generation of ashes.
- Improper storage of cleared vegetation may impede surface drainage system, localized flooding episodes, degradation in water quality and breeding of pests.
- Discharge of untreated sewage from worker's camps will cause degradation of water quality.

Waste Management

Operations Stage

- Discharge of untreated leachate into the waterways will cause degradation in water quality.

Mitigating Measures

➤ Pre- Construction and Construction Phase

- 1) All construction waste will be collected in designated waste bins before sending out for disposal at approved landfills or dumping sites.
- 2) Where possible, suitable wastes shall be recovered for recycling.
- 3) Temporarily stockpile biomass and vegetation at specific areas for decomposition. The locations of these stockpiles shall be away from drainage canals, rivers and other water bodies.
- 4) Open burning of biomass, vegetation or stockpiles will be prohibited.
- 5) Surrounding areas need to be adequately protected against dust dispersions, noise and vibrations, and potentially flash floods caused by the silting of drains by earthworks operations and land clearing activities.
- 6) Excavated material which cannot be re-used on the site or at nearby areas will require disposal at landfill or at approved disposal areas. In the case of excavated material that is contaminated, segregation and storage of the material in designated areas which are bunded will be conducted to prevent discharge of contaminated material through water runoffs from rainfall.
- 7) Scheduled wastes generated from the construction vehicles maintenance activity and spillage from the diesel drums/tank shall be managed according to the requirements of the Environmental Quality (Schedule Wastes) Regulations 2005.
- 8) Proper collection and disposal of domestic wastes generated by the worker's camps.

Potential Impacts and Mitigating Measures

➤ Operational Phase

- 1) Scheduled waste such as oil, fuel and grease residues from equipment and maintenance Activities will be managed in accordance to the Environmental Quality (Scheduled Waste) Regulations 2005.
- 2) General refuse shall be collected on a daily basis by assigned personnel in proper garbage bags and delivered to the appropriate refuse point to be removed regularly by licensed waste collectors.

Evaluation of Impacts

Traffic

Pre-Construction and Construction Stage

- No impacts.

Traffic

Operations Stage

- No impacts.

Environmental Management Plan (EMP)

Objective & Purpose of the EMP:

To ensure the predicted environmental impacts during the construction and operation phases area monitored, recorded and analysed.

The objectives are to protect, restore and enhance the environmental quality within areas likely to be impacted upon constructions and operations.

Scope of the EMP:

Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2)

Performance Monitoring Programme (PMP)

Impact Monitoring Programme (IMP)

Environmental Auditing Programme (EAP)

Environmental Mainstream

Monitoring During Construction Phases:

Component	Regulated Parameters	Compliance Limit	Frequencies
Water Quality <i>National Water Quality Standards for Malaysia (NWQS), DOE</i>	pH TSS Turbidity DO BOD ⁵ COD Oil & Grease <i>E.Coli</i> NH ₃ N	6.0 – 9.0 50 mg/L 250 NTU 5 – 7 mg/L 3 mg/L 25 mg/L 0.04;N 400 0.3 mg/L	Monitoring: monthly basis Report: Submit to DOE once every 3 months
Air Quality and Odour <i>New Malaysian Ambient Air Quality Standard, 2020 (DOE)</i>	TSP PM ₁₀ NO _x CO	100 µg/m ³ 70 µg/m ³ 30 µg/m ³	Monitoring: monthly basis Report: Submit to DOE once every 3 months
Noise and Vibration <i>Guidelines for Environmental Noise Limits and Control, 2019</i>	L _{max} L ₁₀ L ₅₀ L ₉₀ L _{eq} mm/s	*Guidelines for Environmental Noise Limits and Control, 2019	Monitoring: monthly basis Noise level to be monitored during day and night time, 24-hr basis Report: Submit to DOE once every 3 months

Environmental Management Plan (EMP)

Monitoring During Operation Phases:

Component	Regulated Parameters	Compliance Limit	Frequencies
Water Quality <i>National Water Quality Standards for Malaysia (NWQS), DOE</i>	Flowrate		Monitoring:
	pH	6.0 – 9.0	Monthly basis
	TSS	50 mg/L	Report: Submit to
	Turbidity	250 NTU	DOE quarterly
	DO	5 – 7 mg/L	
	BOD ⁵	3 mg/L	
	COD	25 mg/L	
	Oil & Grease	0.04;N	
Air Quality and Odour <i>New Malaysian Ambient Air Quality Standard, 2020 (DOE)</i>	<i>E.Coli</i>	400	
	NH ₃ N	0.3 mg/L	
	H ₂ S	-	Monitoring: monthly basis
	CH ₄	-	Report: Submit to
	SO ₂	80 µg/m ³	DOE quarterly
Noise and Vibration <i>Guidelines for Environmental Noise Limits and Control, 2019</i>	NO ₂	70 µg/m ³	
	Odour	Refer baseline data for the reference limits	
	L _{max}	*Guidelines for Environmental Noise Limits and Control, 2019	Monitoring: monthly basis
	L ₁₀		Noise level to be monitored during day and night time, 24-hr basis
	L ₅₀		Report: Submit to DOE once every 3 months
	L ₉₀		
	L _{eq}		
	mm/s		

Environmental Audit:

Appoint the registered third-party auditor and carry out in accordance to the Environmental Audit Guidance Manual published by DOE Malaysia

Study Findings and Conclusion

Construction Phase

Hydrogeology

- Insignificant impact due to inherent characteristic of soil that is impermeable. Movement of particle in the groundwater system is at **2.1m/year**

Water Quality

- Impact will be minimal and short term. P2M2 and proper site waste and wastewater management is required

Soil Erosion and Sedimentation

- Impact to soil erosion due to land clearing prior to installation P2M2 may be significant but able to be mitigated.

Air Quality

- Impact to Air Quality will be moderate, localised and short term. Mitigation measures will further alleviate the impact of air pollution due to dust

Noise

- Impact to surrounding noise level localised, transient and temporary and limited to within the site boundary.

Odour Quality

- No Impact – current baseline odour quality noticeable of palm oil processing activities and fertilizer.

Terrestrial Flora

- Impact may be significant due to land clearing. Lost of species and genetic resource apparent. Mitigation measure able to reduce the impact

Terrestrial Fauna

- Impact may be significant due to site clearing and earthworks. Habitat and loss of species anticipated. Mitigation measures able to reduce impact and disturbance to wildlife.

Marine Ecology

- Moderate short term impact due to discharge of wastewater and waste into nearest river from construction camp

Social Impact

- Impacts to social wellbeing anticipated to be moderate, short term and localise. Foreign labour, health and safety can be mitigated.

Public Health

- No significant impact based on current public health profile and proper mitigation at site.

Waste Management

- Moderate and short term impact is expected can be alleviated with proper site management and disposal

Operations Phase

Hydrogeology

- Insignificant impact due to inherent characteristic of soil that is impermeable. Movement of particle in the groundwater system is at **2.1m/year**

Water Quality

- The Leachate Treatment Plant designed discharge load into Sg. Lukah is lower than the river's TMDL. With proper maintenance, significant impact can be mitigated

Soil Erosion and Sedimentation

- Minimal impact is expected with less erosion rates and lower sediment yield expected

Air Quality

- Landfill Gas (LFG) emission significant and pose risk of fire and explosion. Mitigation measure including flaring of LFG can reduce these risk

Noise

- Impact to surrounding noise due to operation is limited to within 177m distance the center of plot (within site boundary)

Odour Quality

- Impact to odour quality can be reduced but not eliminated entirely through sound housekeeping and management techniques

Terrestrial Flora

- Severe Loss of species within the site can be reduced with the implementation of ex-situ conservation

Terrestrial Fauna

- Loss of habitat is unavoidable, with continual human wildlife conflict without proper regional wildlife management plan

Marine Ecology

- No significant impact on mangrove, riverine vegetation, marine capture and aquaculture expected. Potential impact may be mitigated with proper installation and operations of systems at site

Social Impact

- Potentially significant impact can be mitigated with proper operation and maintenance of the Sanitary Landfill according to standard operations manual

Public Health

- No significant impact with proper operation and maintenance of the Sanitary Landfill

Risk Assessment

- Risk to fire and explosion is within tolerable level. Minimum safe area is above 300 meter from site boundary. Proposed a buffer zone of 300 meter from site boundary

Waste Management

- Minimal impact to surrounding due to waste is expected with the implementation of mitigation measures listed in the EMP

Overall Conclusion

It expected that the project will induce minimal, short term impacts during construction and potentially significant impact to the environment during operations phase. However, it can be concluded that the proposed project may offer bigger environmental benefit with the implementation of all mitigation measures proposed within this Report.