

CHAPTER 5

ENVIRONMENTAL REQUIREMENT

5.1 EIA APPROVAL CONDITIONS & ENVIRONMENTAL REQUIREMENT

EIA APPROVAL CONDITIONS

The Department of Environment has given a conditional approval for the Environmental Impact Assessment (EIA) Report of the proposed project. Please refer to **Appendix B** for the EIA approval condition and status of compliance.

The planning and implementation of the recommendations and suggestion put forward in the EIA report will be strictly adhered to. The project proponent shall ensure that the design, development and maintenance of the project to be in full compliance with the EIA report, its recommendations on mitigation measures and the Conditions of Approval imposed by the Department of Environment (DOE).

ENVIRONMENTAL REQUIREMENTS

Liput Raya Sdn Bhd as the project developer will ensure that the development activities comply with all applicable laws, regulations, guidelines, terms and EIA approval conditions (**Appendix B**) for “**Cadangan Pembangunan Ladang Hutan Seluas 400 Hektar (988.42 Ekar) di Sebahagian Kompartment 78 & 79 Hutan Simpan Bukit Slim, Mukim Slim, Daerah Muallim, Perak Darul Ridzuan.**” .

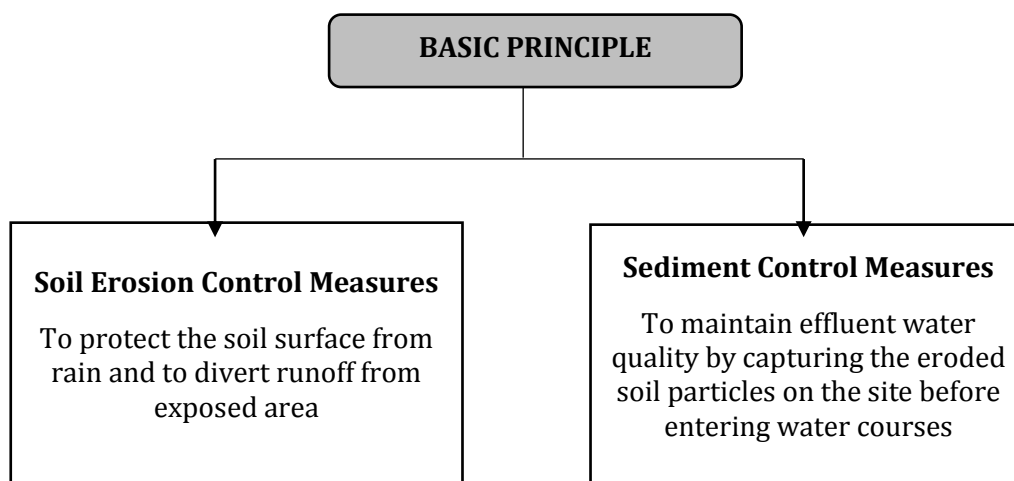
5.2 LAND DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES (LD-P2M2)

The development of the Project site involved land clearing activities; however, massive site clearing will be a major factor to generate soil erosion which in turn may create sedimentation to the receiving canals/water body.

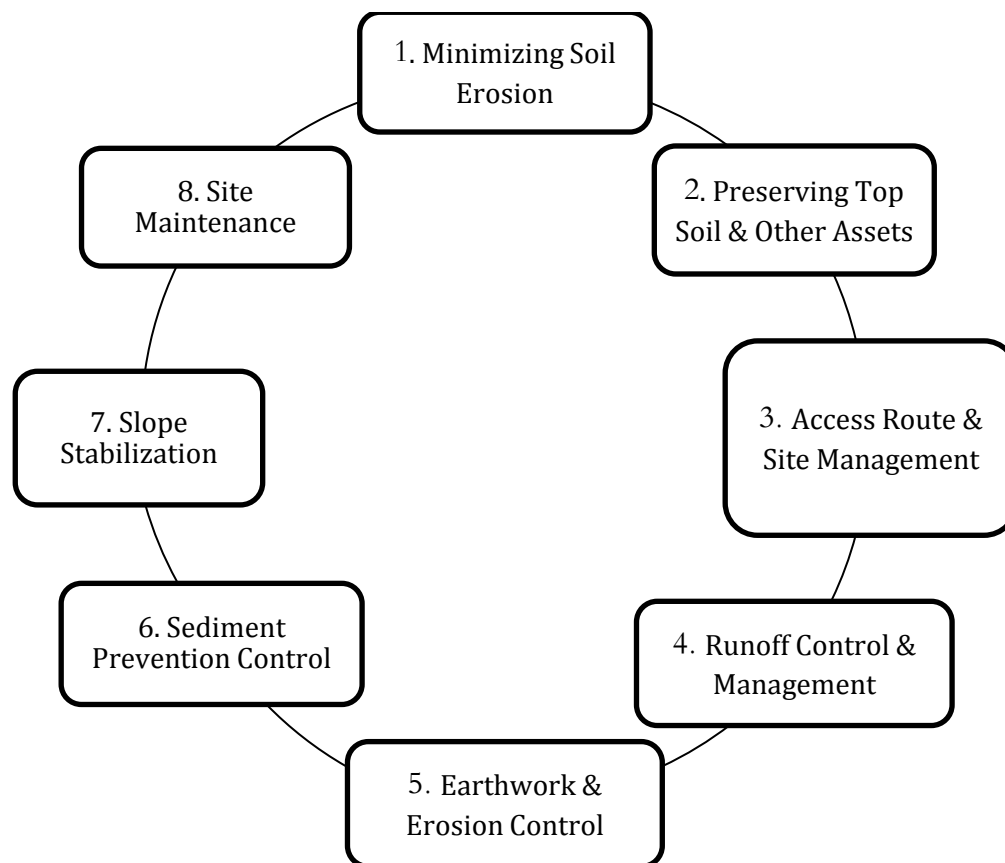
Therefore, the implementation of Land Disturbing Pollution Prevention & Mitigation Measures (LD-P2M2) shall be on great emphasize during the plantation development activities as this gave proper soil conservation and preservation practices, thus ensuring that the amount of potential erosion and soil loss would be able to be controlled to an acceptable level. All control measures should be planned during planning stages and some may require to be implemented and put in-place even before the site clearing activities takes place. The LD-P2M2 plan is as shown in **Appendix G**.

Principles of Soil Erosion and Sediment Control Measures

The soil erosion and sediment control measures can be defined as shown below:



The LD-P2M2 consists of eight (8) elements as shown in **Figure 5.1**. The principles are expected to be very effective in minimizing the soil erosion and to induce on-site sedimentation.



Source: Guidelines for Erosion and Sediment Control in Malaysia, 2010, DID

Figure 5.1: LD-P2M2 Principles

During the development phase, the project proponent is required to carry out environmental monitoring and audit programs as part of the implementation of LD-P2M2 to ensure environmental compliance in term of water quality due to the effects of erosion and sedimentation.

Throughout the entire development period, the environmental monitoring and audit program should be conducted. The monitoring works comprise of field data collection, laboratory analysis, data interpretation, evaluation and assessment of the status of water quality, air quality and noise level which will assist in identifying any adverse impacts related to the project site. In order to review the performance of the implementation of Best Management Practices (BMP's) and its maintenance records as well as to verify the results of the water quality assessment, the audit shall be carried out by experienced and qualified personals who are registered under the Department of Environmental (DOE).

The selection of the Best Management Practices shall be done in such a manner that the stated objectives can be achieved and is applicable to be carried out on site. **Table 5.1** describes the category and objectives of the selected BMP's. Any changes or modifications needs to be carried out in a systematic manner where revision plans shall be issued to all relevant parties to clearly indicate the changes.

Table 5.1: General BMPs Category and Objectives

BMP Category	BMP Objectives						
	Practice Good House Keeping	Contain Waste	Minimise Disturbed Area	Stabilised Disturbed Area	Protect Slope and Channel	Control Site Perimeter	Control Internal erosion
Site Planning Considerations							
Phasing			√				
Preservation of existing vegetation							
Vegetative Stabilization							
Planting Cover Crops				√	√		

BMP Category	BMP Objectives						
	Practice Good House Keeping	Contain Waste	Minimise Disturbed Area	Stabilised Disturbed Area	Protect Slope and Channel	Control Site Perimeter	Control Internal erosion
Mulching and Stacking				√	√		
Physical Stabilization							
Dust Control	√		√	√		√	
Temporary Waterway Crossing	√		√	√	√		
Construction Road Stabilization	√		√	√	√		
Construction Access Stabilization	√		√	√		√	
Diversion of Runoff							
Earth Bank	√				√	√	√
Diversion Channel					√	√	√
Flow Velocity Reduction							
Drainage outlet protection					√		
Sediment Filtering / Trapping							
Drainage Inlet Protection						√	√
Silt Trap							√

Source: MSMA 1st Edition

Proper soil conservation and preservation practices will ensure that the amount of potential erosion and soil loss would be controlled at an acceptable level. All control measures should be planned during the planning stages, however some may require to be implanted and put in place even before the site clearing and earthwork activities take place.

The LD-P2M2 in this report has included the likely measures that are foreseen in the writing of this EMP Report. However, these P2M2's will need to be reviewed and updated accordingly based on further information on the detailed site activities that might be available at a later stage.

5.3 POLLUTION PREVENTION AND MITIGATION MEASURES (P2M2)

Table 5.2 shows the summary of potential impacts, theirs magnitude and its proposed pollution prevention and mitigation measures during construction phase whilst **Table 5.3** shows during operation stage.


Table 5.2: Summary of Potential Impacts, Proposed Pollution Prevention and Mitigation Measures During Development Phase

POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
SOIL EROSION AND SEDIMENTATION 1) Soil erosion and sedimentation. 2) Reduce river depth/drain capacity and aggravate higher flood peak that causes higher flood damages 3) Declining water quality level.	<ul style="list-style-type: none"> Scheduling of the development. Runoff management – Perimeter/earth drain and permanent waterway crossing such as culvert. Retain river buffer zone. Prepare silt trap and sediment basin. Plant cover crop. 	<ul style="list-style-type: none"> LD-P2M2 will be prepared as per guideline on Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2) published by DOE. All BMPs for soil erosion and sediment control must be implemented as per LDP2M2 drawing endorsed by Professional Engineer and approved by DOE. Maintenance for all BMPs component must be recorded and keep in safe for inspection 	Refer to the LDP2M2 drawing (Appendix E) Performance monitoring record will be detail out the maintenance process for BMPs Refer LDP2M2 Drawing (Appendix E)	<ul style="list-style-type: none"> All BMPs for soil erosion and sediment control must be implemented as per LDP2M2 drawing endorsed by Professional Engineer and Approved by DOE Maintenance will be done once the BMPs ability to support the erosion and sediment control are less efficient. Example, desilting of the silt trap, once sediment volume is near 80% inside

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
		<p>purpose</p> <ul style="list-style-type: none"> • Rain gauge will be install at the designated open space at the plantation area • Inspection towards all BMPS component must be done in 24 hours period after rainfall data is equal or exceed 12.5 mm • Access road must be provided as per alignment on LDP2M2 drawing • Perimeter drain / earth drain need to be provided before any commencement of earthwork activity • Direct discharge of any surface run-off from the project site are prohibited and need to be filtered by sediment trap or any suitable BMPs • Sediment trap and sediment basin need to construct as per specification on LD-P2M2 drawing 	<p>Refer LDP2M2 Drawing (Appendix E)</p> <p>Refer to the LD-P2M2 drawing for temporary earth drain</p> <p>Location for silt trap and sediment basin will be refer to LD-P2M2 drawing</p> <p>There are 68 no of sediment trap and 12 sediment basin at project</p>	<p>the trap.</p> <ul style="list-style-type: none"> • Regular maintenance will be twice in one month, depending on wet season or as per directed by DOE Perak. (At the end of weekdays, in every two weeks) • Maintenance at will be done once per week during wet season if rain event can damaged the BMPs in the short time. (At the end of weekdays) • Inspection activities for all BMPs will be mandatory in 24 hours if rainfall data is equal or exceed 12.5 mm • Maintain buffer zone with cover crop • Buffer zones for the riparian reserves can be refer to LDP2M2 drawing • Water quality will be

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
		<ul style="list-style-type: none"> Cover crop will be planted after site clearing in order to reduce the soil erosion potential 	<p>site</p> <p><i>Mucuna bracteata</i> will be planted as cover crops</p>	<p>conducted by accredited laboratory at the end of month (fourth week)</p> <ul style="list-style-type: none"> Cover crop will be planted after site clearing and terracing in order to reduce erosion potential
Waste Generation <ol style="list-style-type: none"> Biomass waste Solid Waste Scheduled Waste 	<ul style="list-style-type: none"> No open burning Provide garbage bins Composting waste approach. Proper storage area. 	<p><u>Biomass Waste</u></p> <ul style="list-style-type: none"> Apply zero burning technique concepts. Prohibition of open burning Felled trees will be reused as mulching 	<p>Any open burning are prohibited as subjected under Section 29A EQA 1974</p>	<ul style="list-style-type: none"> Install “No Burning Signage”  <p>Example of “No Burning Signage”</p> <ul style="list-style-type: none"> Environmental Officer will conducted the inspection around the site on daily

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
		<p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> Handling scheduled waste procedure parallel to <i>Environmental Quality (Scheduled Waste) Regulations 2005</i>. Labelling all containers including an empty container as Scheduled Waste. Providing a proper storage area. Lubricant oil stored compatible container All container shall be closed properly 	<p><u>Scheduled Waste</u></p> <ul style="list-style-type: none"> Storage area can be referred to the example shown in Figure 5.6 Management of scheduled waste must be followed the Guidelines Packaging, Labelling and Storage of Scheduled Wastes in Malaysia, published by DOE Typical details for bund and skid tank must be refer to the LD-P2M2 drawing Calculation of the 110% volume of bund based on the biggest tank must be updated by time to time 	<p>basis in order to prevent the open burning activities</p> <ul style="list-style-type: none"> Environmental Officer must doing the inspection for the waste management at the project site and provided the training and information for workers regarding the waste management. Inspection should be conduct on daily basis. Generation of scheduled waste must be notified to DOE Perak in writing form within one month from the date of generation Daily inspection for the skid tank must be conducted to ensure all chemicals and petroleum materials not spill into the surrounding area Environmental Officer will ensure the capacity of the

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
		<p><u>Solid Waste</u></p> <ul style="list-style-type: none"> • Solid waste segregation by type • Implement recycling campaign at the base camp • Non-degradable waste need to disposed at the approved landfill site • Empty containers are prohibited from being disposed into river system and onto ground. • Eco-friendly and/or organic fertilizer and biological control will be used for pest management 	<ul style="list-style-type: none"> • Waste collection bins must be provided at the plantation area 	<p>biggest tank based on loading and unloading of the fuel material</p> <ul style="list-style-type: none"> • Daily updated of the fuel volume will be recorded by Environmental Officer • Other than that, Environmental Officer will update the generation, transportation and disposal of scheduled waste by E-SWIS application on DOE website • Maintenance for Containment Bund will be done twice per month (At the end of weekdays, in every two weeks)

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
Flood	<ul style="list-style-type: none"> Establishment natural cover. Installation of silt trap, temporary earth drain and check dam. Maintained the drains and culvert. Drainage designed must be practical to cater the volume of water. Adopt proper management practices. 	<ul style="list-style-type: none"> Establishment natural cover Installation of silt trap, temporary earth drain and check dam. Maintained the drains culvert Drainage designed must be practical to cater the volume of water. Adopt proper management practices. 	<ul style="list-style-type: none"> Refer LDP2M2 drawing (Appendix E) Refer LDP2M2 drawing (Appendix E) 	<ul style="list-style-type: none"> Maintenance will be done once the BMPs ability to support the erosion and sediment control are less efficient.

POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
AIR POLLUTION Declining air quality level – Air pollutants produced by vehicles used for plantation preparation. Air pollutants emitted from the exhaust of transport vehicles and other machineries can pose some risks to human health such as asthma, default in breathing, etc. The impacts of air pollution are temporary and short term.	<ul style="list-style-type: none"> Spraying water on road (Water Bowser) Provide wash through Apply crusher run for unsealed road 	<ul style="list-style-type: none"> Ambient air quality monitoring for Particulate Matter (PM₁₀) must be conduct and comply with standard in Malaysia Ambient Air Quality Standard (2020) Any open burning are prohibited as subjected under Section 29A, Environmental Quality Act 1974 Water browser will be provided to mitigate the dust dispersion at site. Wash trough will be provided at the exit point of the project site Temporary access road must be paved by crusher run Using of generator set at will be complied with the Environmental Quality (Clean Air Regulations) 2014 	<ul style="list-style-type: none"> Location for air quality monitoring can be refer to Table 5.20. Warning signage for open burning will be installed at the specific area around the plantation Vehicle wheels need to be clean first before entering the main/public road Location of the wash trough can be refer to the LD-P2M2 drawing Temporary access road for will be construct before the commencement of the clearing activities. 	<ul style="list-style-type: none"> Environmental Officer will conducted the inspection around the site on daily basis in order to prevent the open burning activities Water spraying by water browser must be done twice per day during afternoon and evening. Maintenance of the wash trough must be done on weekly basis. (At the end of the weekdays) Inspection towards the access road will be conduct by Environmental Officer by weekly basis, at the end of weekdays.

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
			<ul style="list-style-type: none"> Written notification to be used is Form AS/PUB/N-Jana as shown in Appendix F. Types of information to be submit are general information for notification, generator information, generator house information, exhaust design, drawing and declaration. 	<ul style="list-style-type: none"> Environmental Officer will submit the completed written notification form for to the DOE Perak.
NOISE POLLUTION <ul style="list-style-type: none"> Due to the noise generation by the operation of machineries, equipment and mechanical works. The noise generated is expected to be of short term. 	<ul style="list-style-type: none"> Use quieter and/or silence machineries. Proper PPE on site with ear plug. Regularly servicing and maintaining vehicles and machineries. 	<ul style="list-style-type: none"> Installing silencers for machineries or using quieter machineries. Working hours will be limited to daytime hours from 7.00 am to 7.00 pm only Existing vegetation at the boundary of the project site will be used as natural noise barrier for noise diffusion Noise level monitoring should be conduct at the beginning of the earthwork activities until all the exposed 	<ul style="list-style-type: none"> Specified limit for noise monitoring based on EIA Approval Condition (Appendix B) 	<ul style="list-style-type: none"> Estate Manager will imposed this rule for the entire development activity Environmental Officer will inspect and to ensure the boundary and buffer zone for the phase 1 is not disturbed Requirement for quarterly noise monitoring program based on EIA Approval Condition. However,

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
		area are covered with the cover crop and get approval from DOE Perak.		consultants proposed to conduct on the quarterly basis, at the end of every quarter.
Nuisance during project abandonment	<ul style="list-style-type: none"> Preparing Project Abandonment Plan. Fenced off the abandoned site. Warning signage to be installed. Removes vehicles involved in the project development. Initiate environmental control measures. Regular inspections on site 	<ul style="list-style-type: none"> Preparing Project Abandonment Plan. Fenced off the abandoned site. Warning signage to be installed. Removes vehicles involved in the project development. Initiate environmental 		
Socio Economy 1) Habitat-fragmentation 2) Human-wildlife conflict	<ul style="list-style-type: none"> Phasing/Directional Clearing. Wildlife-Human Conflict Management Strategies. Incident reporting. Prohibition of Wildlife Poaching 	<ul style="list-style-type: none"> Phasing/Directional Clearing. Contractors and workers will be prohibited from wildlife hunting and poaching. Consultation with the Department of Wildlife and 		<ul style="list-style-type: none"> Place “No Hunting” and “No Trespassing” signage at appropriate locations.

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE/ FREQUENCY/ METHODS
	<ul style="list-style-type: none"> Signage on Prohibition of Wildlife Hunting or Trapping. 	<p>National Parks (DWNP)</p> <ul style="list-style-type: none"> Translocation of Problematic Animals Development Any wildlife conflict encountered by residents must be immediately reported to DWNP. Established the demarcated boundary and fences for the determination on working area Encourage locals to participate in jobs that are suitable to the skills Relationship between workers and local people must be monitored 		

Table 5.3: Summary of Potential Impacts, Proposed Pollution Prevention and Mitigation Measures During Operation Stage

POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE /FREQUENCY/METHODS
SOIL EROSION <ul style="list-style-type: none"> The impact of soil erosion during operation would be less significant The soil has been stabilized with existing vegetation , additional cover and batai trees 	<ul style="list-style-type: none"> Well established ground covers that have been planted during the development phase shall be maintained and function efficiently. Withered ground cover must be replanted to ensure there is no gap exposed to the soil surface to the weather All erosion controls tools should be maintained regularly to ensure taht they work efficiently. Retain vegetation along the rivers as buffers to trap eroded material from being carried away by runoff to enter water bodies. Clear and proper signage must beplaced at buffer zone to avoid the invasion of the reserve area that would destroy the vegetation cover along the river banks. The fertilizer and herbicide used shall comply the guidelines established by Department of Agriculture (DOA). Apply wood/branches chips as 	<ul style="list-style-type: none"> Withered ground cover must be replanted to ensure there is no gap exposed to the soil surface to the weather Riparian buffer zones and cover crops must be maintained. Clear and proper signage must beplaced at buffer zone to avoid the invasion of the reserve area that would destroy the vegetation cover along the river banks. Accumulated sediment from the maintenance activity of sediment trap or sediment basin must be disposed to designated area The fertilizer and herbicide used shall comply the guidelines established by Department of Agriculture (DOA). Apply wood/branches chips as mulching material in the plantation area. Road system should be 	<ul style="list-style-type: none"> Final discharge comply with EIA Approval Conditions (Appendix B) 	<ul style="list-style-type: none"> Environmental Officer(EO)/ Supervisor(SV) must be inspect all BMPs during the operational phase on weekly basis Sampling activity for final discharge will be conduct on monthly basis, at the end of the every months EO/SV need to inspect and ensure the accumulated sediment is properly manage and doing the regular monitoring works at the site on weekly basis Inspection towards the implementation of mulching ,buffer zone and cover crops should be condcut by EO/SV on weekly basis

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	<p>mulching material in the plantation area.</p> <ul style="list-style-type: none"> Road system should be inspected at regular intervals, especially after heavy rainfall. 	<p>inspected at regular intervals, especially after heavy rainfall.</p>		
<p>Water Pollution</p> <ul style="list-style-type: none"> Degradation of water quality 	<ul style="list-style-type: none"> Proper storage facility must be built on to store agrochemiclas and fertilizers from being exposed to the weather The chemicals container sepcification must follow the standard established by the Enviornmental Quality (Scheduled Waste) Regulations 2005. LD-P2M2 established from the early stage of project implementation shall be well maintained & monitored efficiently all the time The manuring process must be scheduled and application of fertilizers should be avoided during the rainy days Chemicals for pest and disease control should only be applied when the outberak is severe e.g. leaf blight caused by 	<ul style="list-style-type: none"> Proper storage facility must be built on to store agrochemiclas and fertilizers from being exposed to the weather The chemicals container sepcification must follow the standard established by the Enviornmental Quality (Scheduled Waste) Regulations 2005. LD-P2M2 established from the early stage of project implementation shall be well maintained & monitored efficiently all the time The manuring process must be scheduled and application of fertilizers should be avoided during the rainy days Chemicals for pest and disease control should only be applied when the outberak 		<ul style="list-style-type: none"> Proper storage facility must be built to ensure any worst case scenario such as spillage or leaking of the material (e.g. liquid) can be handling efficiently. EO/SV need to inspect and ensure the all BMPs control are properly manage and doing the regular monitoring works at the site on weekly basis EO should remind workers during the tool box session training to manage the pesticides container

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE /FREQUENCY/METHODS
	<p><i>Rhizoctoniasolani</i>.</p> <ul style="list-style-type: none"> Biological control is highly recommended to be implemented in forest plantations The growth of Leguminous Cover Crop (LCC) should be monitored regularly for preserving its function of retaining soil 	<p>is severe e.g. leaf blight caused by <i>Rhizoctoniasolani</i>.</p> <ul style="list-style-type: none"> Biological control is highly recommended to be implemented in forest plantations The growth of Leguminous Cover Crop (LCC) should be monitored regularly for preserving its function of retaining soil 		
<p>Waste Management</p> <ul style="list-style-type: none"> The operations phase will tend to generate wastes during field maintenance such as solid wastes, biomass wastes, sewage & scheduled wastes (agrochemical & fertilizers containers). 	<ul style="list-style-type: none"> The facilities for sewage management at the project site that been built during project development should be maintained and inspected regularly Project proponent must ensure the workers do not discharge sewage into the river system Solid waste generated from base camp should be disposed at the licensed facility. The biomass generated from the pruning and weeding activities should be stacked on the ground to let for natural decomposed. 	<ul style="list-style-type: none"> The facilities for sewage management at the project site that been built during project development should be maintained and inspected regularly Project proponent must ensure the workers do not discharge sewage into the river system Solid waste generated from base camp should be disposed at the licensed facility. The biomass generated from the pruning and weeding activities should be stacked on the ground to let for natural decomposed. 	<ul style="list-style-type: none"> Discharge samples from the workers house will be collect for testing 	<ul style="list-style-type: none"> Sampling activity of the domestic sewage will be conducted on monthly basis, at the end of the every months.

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Air Quality & Noise - Less significant	<ul style="list-style-type: none"> Usage of pesticides and herbicides only if it is absolutely necessary. The frequency, dosage & timing of chemicals application must be closely monitored. Only approved chemicals registered under the Pesticides Act 1974 with the Pesticides Board of Malaysia should be used. Workers involved in spraying activities must be equipped with appropriate protective gears such as mask, gloves, long sleeves clothes & long pants by the contractors concerned to minimize a direct contact 	<ul style="list-style-type: none"> Monitoring of ambient air quality for Particulate Matter (PM₁₀) will be conduct on quarterly basis. Any open burnung of biomass waste, plantation waste & others on the project site is prohibited as per Section 29A, EQA1974 Provison of personal protective equipment (PPE) for workers who are handling machineries 		<ul style="list-style-type: none"> All vehicles and equipments should be inspect and monirtored in order to ensure the emmision of noise level can be controlled.
Flora & Fauna - No significant impacts on flora as the cover crops and Batai are established - The project site will be fully covered by ground cover.	<ul style="list-style-type: none"> Plant native flowering and fruit-bearing trees in waterways areas & around the office & quarters areas Improve water quality in waterways Apply moderate or reduce agrochemicals use. Encourage usage of of biological control measures to control pests 	<ul style="list-style-type: none"> Plant native flowering and fruit-bearing trees in waterways areas & around the office & quarters areas Improve water quality in waterways Apply moderate or reduce agrochemicals use. Encourage usage of of biological control measures to control pests 		

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POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE /FREQUENCY/METHODS
	<ul style="list-style-type: none"> Control illegal huntung or trapping activitis in and around the plantataion area 	<ul style="list-style-type: none"> Control illegal huntung or trapping activitis in and around the plantatation area 		
Abandonment & Rehabilitation <ul style="list-style-type: none"> Project abandonment can occur at any stage of the project development or post-development, due to a down turn of the nations's economy, social acceptability of the project in the community, or any other unforeseen management and technical problems. 	<ul style="list-style-type: none"> The project proponent must endeavour to vacant the project site in an environmentally responsible manner & prepare a Project Abandonmnet Plan for the main stages of development All abandoned sites must be properly fenced off to prevent to prevent unwarranted entry and encroachment by illegal squatters Warning signs have to be installed at all abandoned sites to prevent unauthorized entry and encroachment by illegal squatters All vehicles involve in the project development must be taken out of the sites 	<ul style="list-style-type: none"> All abandoned sited must be properly fenced off Installed warning signs to prevent unauthorized entry All vehicles involved in the project development must be taken out of the sites All environmental control measures must be inititated Provide regular inspection of the sites and takes necessary measures to ensure their sancity. 		

**CADANGAN PEMBANGUNAN LADANG HUTAN SELUAS 400 HEKTAR (988.42 EKAR) DI SEBAHAGIAN KOMPARTMENT 78 & 79 HUTAN SIMPAN BUKIT SLIM, MUKIM SLIM,
DAERAH MUALLIM, PERAK DARUL RIDZUAN**

POTENTIAL IMPACT	MITIGATING MEASURES RECOMMENDED IN EIA	MITIGATION MEASURES TO BE IMPLEMENTED	SPECIFICATION	MAINTENANCE /FREQUENCY/METHODS
	<ul style="list-style-type: none"> • All environmental control measures must be initiated following the guidelines produced by the DOE & DID. • Provide regular inspection of the sites & take necessary measures to ensure their sancity 			

5.4 METHOD STATEMENT FOR LD-P2M2

1. Minimizing Soil Erosion

Before development begins, the work shall be planned according to the site condition. The development of the project site will be done in phases. Each phase consists of four (4) Petak where the development will start with Petak 1 and Petak 2 in Phase 1 and lastly continue to Petak 3 and Petak 4 in Phase 2.

The development of the project site involves partial clearing which means only the area to be planted with seedling and infrastructure area will be cleared. Therefore, there is no large area to be cleared in the project site.

- The preventive measures shall be planned through the preparation of a LD-P2M2 in order to minimize erosion before development is implemented.
- Within a development site, the working areas shall be reduced as far as is practicable.
- The contractor shall regulate the phase of earthworks and construction through proper development scheduling. All clearing, grading and stabilization operations shall be completed before moving onto the next phase. In order to avoid wet season (monsoon), the major earthwork shall be properly scheduled.
- By maintaining the existing vegetation to the maximum extent, it is possible to filter runoff and provide erosion protection.

2. Riparian Management Plan / Monitoring (RMP)

A Riparian Management System will provide baseline data on existing conditions, offer management strategies for invasive species, recommend specific treatment methods, identify important view sheds, and implement appropriate clearing/pruning strategies and techniques for the specified area. Typical components addressed in a Riparian Management Plan include: riparian vegetation, stream restoration, invasive species management, herbivory management, riparian view shed management and large woody debris management.

The objective of the Riparian Management Plan (RMP) is protecting, enhancing water quality and habitat by restricting construction activities and maintaining existing vegetation along the watercourse. Riparian zone is the area of land (including floodplains) adjacent to watercourses. Riparian vegetation plays a role in controlling erosion through its attributes of water interception, energy dissipation, and soil

stabilization and infiltration enhancement. Soil erosion is also influenced by the ground cover vegetation, which filters storm water runoff to remove sediment, while deep-rooted species affect soil moisture and groundwater levels.

Riparian buffer zones of 10m left and right of the seasonal stream will be proposed for all the seasonal streams at the project site. This is to prevent the project proponent from disturbing the stream. All the disturbed river at project site with riparian buffer zone is 20m both side of the stream. Disturbed area shall be limited to keep soil erosion at its minimum and further, can be stabilized within short duration. All stream and river buffers must be maintained. This buffer may be covered with cut vegetation to act as a damper to erosion forces. Existing vegetation shall be maintained to the maximum extent to filter runoff and provide erosion protection. The buffer (**Plate 5.1**) shall be retained uniformly on both sides of the stream/river in the area covered by the project. The riparian buffer zone post (**Plate 5.2**) must be erected at the proper place so that people will not disturb that reserved area.



Plate 5.1: Example of Riparian Buffer Zone



Plate 5.2: Example of Riparian Reserved

The riparian buffer zone is presented in the LD-P2M2 conceptual map which is attached as **Appendix E**. Stream buffer shall be retained uniformly on both sides of the stream/river in the area covered by the Project. Due the project site is located in a Forest Reserve, the natural waterway reserves should be delineated as recommended by the Jabatan Perhutanan as tabulated in **Table 5.4**. The guideline is applied when the river affected by the project is not listed under Warta Rezab Sungai Negeri Perak.

Table 5.4: Riparian Buffer Zone

River Width	Minimum Buffer Zone Width
More than 40 m	45 m from river bank
Between 20 – 40 m	40 m from river bank
Between 10 – 20 m	20 m from river bank
Less than 10 m	10 m from river bank

Source: Manual Perhutanan Jilid III, Jabatan Perhutanan Semenanjung Malaysia (2005)

- Sensitive ecological areas shall be demarcated and presented in the vicinity of development site.
- All excavated top soil shall be stockpiled, protected from erosion and later use for re-vegetation.
- Vegetation of high ecological or social value should be identified, protected and transplanted if required.

3. Preserving Top Soil and Other Assets

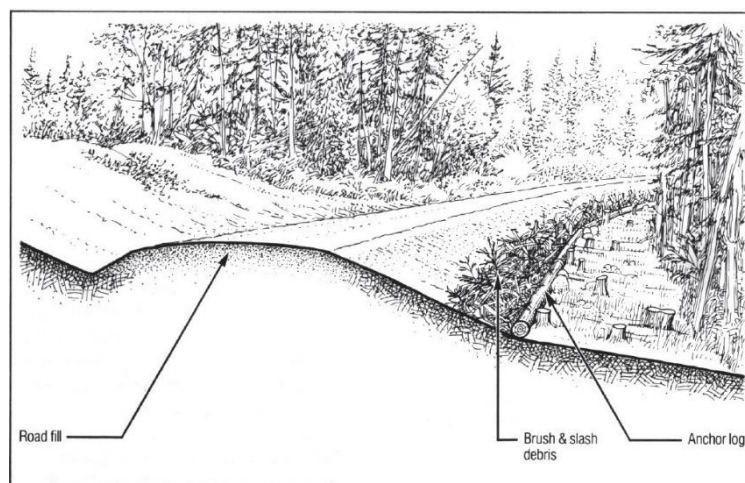
Sensitive ecological areas shall be demarcated and preserved within a development site such as natural spring and unusual rock outcrops. All excavated top soil shall be stockpiled, protected from erosion and later used for revegetation. The PP shall identify, protect and transplant the vegetation of high ecological or social value if required.

The vegetation on the steep slopes and along the river banks will be retained to act as buffer strip to retard any possible erosion potential. Remaining site clearing within the anticipated development area will be carried out once the internal access road is made available. Currently, the project site is accessible using the existing roads that have been used during the logging period previously. The site clearing will be conducted once all the erosion and sediment control measures are in place.

The biomass assessed to be generated during land clearance clearly infers the abundance of vegetation potential resource for erosion and sediment control measure. Slash or chipping of woody and vegetation branches would be initiated appropriately for the use of Brush Barrier (Sediment/Runoff Control BMPs) or Mulch (Erosion Control

BMPs). However, chipping needs to deploy Chipping Machine of which might be costly but slashing can be done by general workers manually. **Figure 5.1.** illustrate the slash used for Sediment/Runoff Control, while **Plate 5.3** and **Plate 5.4** shows the photograph of the use of Brush Barrier BMPs and Mulching BMPs implemented locally in Selangor State.

As soon as possible after felling of any residual trees, any woody materials shall be stacked and used as a natural biomass for erosion control. Large branches and trunks have to be cut to shorter lengths to facilitate stacking. Stacking of debris and biomass from land clearing works can function as a natural filter to surface runoff before discharging into any waterway. This also allows decomposition of debris, creating an ecosystem for soil organisms to proliferate and nutrient re-cycling within.



Brush barrier placed at toe of fill to intercept runoff and sediment
(Ontario MNR, 1990).

Figure 5.1: Illustration of Brush Barrier BMPs use for Runoff/Sediment Control

Brush Barrier may serve as sediment barrier- good for sheet flow similar to silt fence.

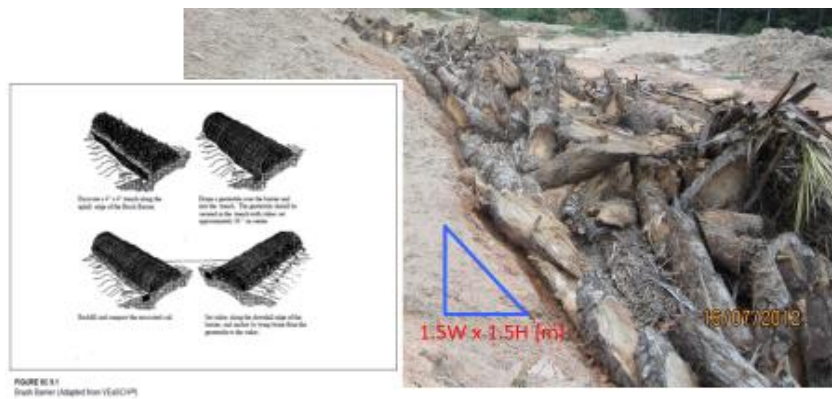


Plate 5.3: Example of Brush Barrier BMPs (biomass) application locally in a land development project



Plate 5.4: Mulching BMPs application locally in a land development project

Site clearance activity shall also practice in stages. Critical areas that prone to erosion or existing vegetated and stable areas that can be used to temporarily act as buffer strip should be retained temporarily and can be attended later whenever permissible. It is understandable many contractor reluctant to adopt the method as it may cost additional cost and logistic to re-visit the area or simply double handling. However, the practice will assist greatly in minimizing the erosion risk and in the bigger picture, the cost for remediation is completely avoid should the problem arise.

Sensitive ecological areas shall be demarcated and preserved within a site clearing activities site such as natural spring and unusual rock outcrops. All excavated top soil shall be stockpiled, protect from erosion and later used for revegetation. Identified, protected and transplanted the vegetation of high ecological or social value if required. **Plate 5.5** shows the example of preserved area.



Plate 5.5: Example of Preservation of Top Soil Area at Project Site

4. Access Route & Site Management

Soil erosion is highly likely to occur on un-stabilized skid trails, feeder roads, access roads and abandoned log yards that are not covered by vegetation or other materials such as branches and leaves. Therefore, during plantation development, it is a **MUST** do to rehabilitate the area to reduce the potential impacts of erosion and excessive flow of surface runoff.

- Paved roads or at least formation of roads made by gravel upon achieving the required level for the access road and internal road.
- Runoff velocity shall be reduced to protect the sub-grade and reduce the amount of potential erosion from the open surfaces and to promote infiltration. **Plate 5.6** shows an example of a stabilized access road.
- Spray unpaved roads with water to reduce dust pollution during dry periods (**Plate 5.7**).

- Installed a wash trough at the entrance of the project site to prevent dust pollution. All vehicle tires must be cleaned before entering public roads and all the vehicles should enter and exit the development site at a limited number of points.
- Direct overflows and storm water from the wash through to a sediment trap.
- Removed materials and collected sediment must be disposed in a suitable manner that will not cause erosion or pollution hazard to river water quality.



Plate 5.6: Example of Stabilized Access Road with Crusher Run






Plate 5.7: Example of Water Bowser

5. Runoff Control & Management

Runoff management is a process to control the direction, volume and velocity of the transport medium and safely convey storm water so that its potential to cause erosion is reduce. They help to direct storm water away from exposed soils.

Transport control should direct the flow to areas where the sediment can be trapped and removed. This will decrease the amount of runoff, detain to reduce its velocity and divert runoff from erodible areas. The examples of the runoff control and management that can be applied in development site are earth drain and culvert (**Table 5.5**).

Table 5.5: Examples of Runoff Control and Management

<p style="text-align: center;">Internal Road</p> 	<p>The road does not control erosion or remove sediment from runoff itself but it prevents erosion by directing runoff to an erosion control device such as sediment trap or basin or act as containment to the runoff and sediment within the project site.</p> <p>The proposed internal road will act as earth bank and divert the surface runoff to a desired location.</p>
<p style="text-align: center;">Earth Drain /Perimeter Drain</p>  	<p><u>Earth Drain</u></p> <p>Proposed earth drains direct the runoff into sediment traps or basin and it shall divert runoff from stabilised areas around disturbed areas. The provision of the earth drain may increase the potential for infiltration and divert sediment-laden runoff into trapping devices. The channel will require regular inspection and after each rainfall, the sediment builds up in the channel and restricts its flow capacity need to be removed.</p> <p><u>Perimeter Drain</u></p> <p>Perimeter drain (large drain) is a form of trench constructed around the project boundary that redirects the surface water and groundwater away from project area. During rainy days, water runoff will accumulate in the perimeter drains and it will avoid the project site from flooding.</p> <p><u>Road Side Drain</u></p> <p>Road side drain is a drain that were constructed on both sides of the road. It shall be constructed along the access road and internal road that divert the water runoff from the road.</p>

**Temporary or Permanent Waterway
Crossing (Bridge/Culvert)**



Temporary or permanent waterway crossing such as culvert shall be provided for access purposes. Its provide erosion free access point. The outlet may composed of rock, grouted riprap, or concrete rubble which is placed at the outlet of a culvert, conduit, or channel to prevent scour of the soil caused by high flow velocities, and to absorb flow energy to produce no erosive velocities. Outlet protection and velocity dissipation reduce the velocity and energy of the runoff water, thereby preventing the flow from eroding the receiving downstream reach.

6. Earthwork & Erosion Control

Once an earthwork is completed, land cover by both, structural or vegetative methods shall be immediately employed. At certain instance, partial cover may be provided where stage earthwork construction is applied.

Biomass Management

- **Stacking**

As soon as possible after felling of any residual trees, any woody materials shall be stacked and used as natural biomass filter for sediment. Large branches and trunks have to be cut to shorter lengths to facilitate stacking. The zero burning of biomass shall be strictly enforced.

In order to minimize the loss of topsoil and reduce the effects of erosion, the windrow stacking method for biomass is recommended to be utilised on-site. Stacking of debris and biomass from land clearing works (**Plate 5.8**) can function as natural filter to surface runoff before discharging into any waterways. This allows decomposition of debris, creating an ecosystem for soil organisms to proliferate and nutrient re-cycling within.



Plate 5.8: Example of Biomass Stacking at the Project Site

- **Mulching**

The felled branches and twigs of existing vegetation can be cut into 3 to 4 cm or shredded and piled up and left to rot. Biomass also can be left to mulch on site and applied over the bared and exposed areas. Mulching were used as a temporary ground covering to protect the soil from rainfall impacts. Mulching that were used as soil cover has the potential to reduce erosion. Mulching also increases infiltration, conserves moisture around trees, shrubs, and seeding. The compaction and cracking of soil can be prevented, and aids the growth of seeding and plantings by holding the seeds, fertilisers, and topsoil in place until growth occurs when used mulching. Mulching used as soil cover has the potential to reduce erosion by as much as 90%. Mulching shall be used either to temporarily or permanently stabilize cleared or freshly seeded areas. Organic materials, wood fibres, decomposed granite and gravel protect the soil from rainfall impacts, increase infiltration, conserves moisture and aids the growth of vegetation by holding the seeds, fertilizers and topsoil in place until growth occur.

Cover Crops

Cover crop (**Plate 5.9**) can be used as ground cover in plantations since they are easy to establish and the most desirable species of plants are known. By planting the cover crop, the soil structure and fertility can be improved and maintained.




They also increase the rate of decomposition of stacked woody vegetation after land clearing and reduce the number of potential breeding sites for rhinoceros beetles (*Oryctes rhinoceros*). Legumes have the ability to reduce weeds, root disease and decrease maintenance cost. They also have the ability to increase organic material and replenish the soil condition.



Cover crops are established and maintained in insight, the symbiotic process with certain bacteria known as *Rhizobia* found in the root nodules of these plants will able to fix the atmospheric nitrogen and reduce fertilizer costs. **Table 5.6** shows the recommended type of cover crops and combinations.



Plate 5.9: Example of Cover Crops

Table 5.6: Various Types of Legume Cover Crops

<p><i>Pueraria javanica</i></p> <p>A very popular cover crop worldwide. It is a vigorous deep-rooted twiner and a creeper that can be spread by seeds and cutting. The plant can stand strong sun and smoothers weeds. Wide adaptation to soil types. Moderately shade tolerant. Ability to spread rapidly once the legume has established. Tolerance of soil acidity. High nutritive value.</p>	
<p><i>Mucuna bracteata</i></p> <p>It is a deep-rooted, shade tolerant and long term legume. It forms a thick luxuriant cover and suppresses most weeds in oil palm plantations. Tolerant to most pests and diseases. Nitrogen fixing capacity of this legume was found to be high. Good control against soil erosion.</p>	
<p><i>Calopogonium mucunoides</i></p> <p>Establishes rapidly from seed to provide early ground. Grows on a wide range of soil types. Good tolerance of inundation. Will spread naturally under favorable conditions. Useful cover crop as pioneer legume, but has a short life span.</p>	

<p><i>Calopogonium caeruleum</i></p> <p>Excellent cover crop in humid-tropical tree plantations. Will grow productively in mature oil palm plantations, and is tolerant of heavy shade. Adapted to a wide range of soil textures. Grows best on well-drained soils. One of the most shade tolerant tropical legumes.</p>	
<p><i>Centrosema pubescens</i></p> <p>It is a shade tolerant legume, and slow starter. It can survive under stiff competition from Calopogonium and Pueraria.</p>	

Source: Sime Darby

7. Sediment Prevention and Control Facilities

It is well known that storm water runoff is the principal cause of soil erosion. Proper storm water handling for erosion control can be accomplished by a combination of the following methods: i.e. reduction and detention of runoff, interception, and diversion of runoff. Under the development, the following are proposed as measures to minimize erosion and sedimentation as well as other environmental issues:

Sediment Basin

A sediment basin (**Plate 5.10 and Plate 5.11**) is a temporary pond built on a construction site to capture eroded or disturbed soil that is washed off during rain storms. Sediment basins protect the water quality of a nearby stream, river, lake, or bay where constructed by excavation or by erecting an earthen embankment across a low area or drainage swale. Sediment basins are larger than sediment traps, but the construction approach is similar.

It is typically consists of an impoundment, a dam, a riser pipe outlet, and an emergency spillways. Usually, sediment basins have more spillway protection because of their larger flows. Most have risers and outlet pipes rather than rock spillways to handle the



larger flows. Sediment basins are often designed to serve later as storm water treatment ponds. Before the runoff is discharge, the sediment-laden soil settles in the pond.

Plate 5.10: Example of Sediment Basin



Plate 5.11: Example of Sediment basin at valley area

Sediment Trap

A sediment trap that was formed by excavation and/or construction of an earthen embankment is known as a small temporary ponding area and usually made with a gravel outlet. **Plate 5.12** shows the example of sediment trap.

The purpose of sediment trap is to detain the runoff from disturbed areas for long enough period of time. This is because to allow for a majority of the coarse suspended soil particles in the runoff to settle out. It was constructed as a first step in any land

disturbance activity. It must be maintained until the area is permanently protected against erosion by vegetation and/or structures.



Plate 5.12: Example of Sediment Trap

Sediment markers (**Plate 5.13**) make it easy to determine when the sediment depth is between 3 and 6 feet and needs to be removed. A vertical silt marker shall be installed for the purpose of measuring the depth of accumulated sediment to facilitate maintenance program. Sediment trap and basins are required and to be maintained until the site area is permanently protected against erosion. All sediment trap and basin must be constructed inclusive of the riser pipe which will be connected to the final discharge point.



Plate 5.13: Sediment Marker

8. Slope Stabilization

- All slopes shall be protected against erosion.
- Bare areas shall be stabilized at the hilly or slope area and planted with vegetation after completion of timber harvesting. Vegetation will help to reduce runoff velocity and improve water quality as well as reducing erosion and sedimentation.
- Terracing shall be done and maintained for hilly land (12° and greater). After commencement of earthworks, cover plants shall be established on the slopes of the platforms and walls of the terrace immediately.
- There shall be no obstruction or interferences with the natural waterways. Temporary or permanent waterways crossing (bridges/culverts) shall be constructed and maintained where a road is to be cut across a river or stream.

9. Site Maintenance

- A maintenance program shall be prepared to include plans for the removal and disposal of unwanted sediments, the repair of structural damages, and improvement or modification of BMP's.
- Regular inspection should also be planned before and after each storm event on a fixed interval.
- The developer should construct and maintained all the LD-P2M2 tools.
- All necessary temporary drainage shall be provided for keeping the site and other areas free of standing water.
- Final discharge from the development site shall comply with ambient standards for TSS and turbidity for the designated beneficial use of receiving water.

Proposed Best Management Practices (BMP's)

The selection of the Best Management Practices shall be done in such a manner that the stated objectives can be achieved and workable to be carried out on site. The number of the proposed best management practices at Project site is presented in **LD-P2M2 (Appendix E)** is shown in **Table 5.7**.

Table 5.7: Number of Best Management Practices (BMPs)

No.	Types of BMP	Number of Proposed BMP (Development)	Number of Proposed BMP (Operation)
1.	Sediment Trap	68	19
2.	Sediment Basin	10	7
3.	Temporary or Permanent Waterway Crossing (Culvert/Bridge)	31	31

Source: LD-P2M2 Drawing

5.5 WATER POLLUTION CONTROL

5.5.1 Regulation Related To Water Quality

- Government Regulatory Requirements

Effluent discharges into the inland waters of the country are governed by the provisions and standards stipulated in the *Environmental Quality Act 1974* and the *Environmental Quality (Sewage) Regulations 2009* (refer **Table 5.8**). Standards are set in these regulations, i.e. *Standard A* and *Standard B*. The domestic sewage from the worker base camp or office shall be treated and comply with **Standard A** Second Schedule (Regulation 7), under the *Environmental Quality (Sewage) Regulations 2009 Amendment 432*, before being released into the inland waters. It is noted that total suspended solids are a critical parameter with regard to land development activities and construction works for this Project.

Classes of water quality of inland surface waters as recommended in the *Proposed National Water Quality Standards for Malaysia (NWQS)* are presented in **Table 5.9**.

Under the *Environmental Quality (Scheduled Waste) Regulations 2005*, spent lubricants such as oil and grease, hydraulic oil from machineries and solvents are categorized as scheduled waste. These are prohibited from being discharged into streams and rivers. Such wastes must have proper storage and handling on site.

Table 5.8: Environmental Quality (Sewage) Regulations 2009

**Standard A and B of Parameter Limits of Effluent Environmental Quality (Sewage)
Regulations 2009**

Parameter	Unit	Class	
		A	B
Temperature	°C	40	40
pH	-	6.0-9.0	5.5-9.0
Biochemical Oxygen Demand (BOD ₅)	mg/l	20	50
Chemical Oxygen Demand (COD)	mg/l	120	200
Suspended Solid	mg/l	50	100
Oil and Grease	mg/l	5.0	10.0
Ammoniacal Nitrogen (Enclosed water body)	mg/l	5.0	5.0
Ammoniacal Nitrogen (River)	mg/l	10.0	20.0
Nitrate – Nitrogen (River)	mg/l	20.0	50.0
Nitrate – Nitrogen (Enclosed water body)	mg/l	10.0	10.0
Phosphorus (Enclosed water body)	mg/l	5.0	10.0

Source: Department of Environment, Malaysia

Note:

Standard A : For discharge into inland waters in a catchment area listed in the third schedule.

Standard B: For discharge into other inland waters.

Table 5.9: Environmental Quality Standards [National Water Quality Standards]




PARAMETERS	CLASS					
	I	IIA	IIB	III	IV	V
Ammonical Nitrogen (mg/l)	0.1	0.3	0.3	0.9	2.7	>2
BOD (mg/l)	1	3	3	6	12	>12
COD (mg/l)	10	25	25	50	100	>100
DO (mg/l)	7	5-7	5-7	3-5	<3	<1
pH	6.5-8.5	6.5-9.5	6.0-9.0	5-9	5-9	-
Total Suspended Solids (mg/l)	25	50	50	150	300	>300
Temperature (°C)	-	Normal +2°C	-	Normal +2°C	-	-
Feacal Coliform (Counts/100ml)	10	100	400	5000 (2000 ^a)	5000 (2000) ^a	-
Total Coliform (Counts/100ml)	100	5000	50000	50000	50000	>50000
O & G (mineral) (ug/l)	ENL	40:Nf	NR	ENL	NR	NR
NOTES						
<p>Conservation of natural environmental</p> <p>CLASS I : Water Supply 1 – Practically no treatment necessary Fishery 1 – very sensitive aquatic species</p> <p>CLASS IIA : Water supply II – conventional treatment required Fishery II – sensitive aquatic species</p> <p>CLASS IIB : Recreational use with body contact</p> <p>CLASS III : Water Supply III – extensive treatment required</p> <p>CLASS IV : Irrigation</p> <p>CLASS V : None of the above</p> <p>^a : Maximum, Not to be exceeded</p> <p>NR : No Recommendation</p> <p>NF : Free from visible film sheen discoloration and deposits</p> <p>ENL : Expected Natural Level</p>						





Source: Department of Environment, Malaysia





5.5.2 Water Quality Monitoring Program

Water quality sampling station has been located at twelve (12) points around the proposed project area (**Table 5.10 and Figure 5.2**). Images of the sampling site can be seen in **Table 5.11**.


Table 5.10: Location of Water Quality Sampling Stations

SAMPLING STATION	COORDINATE	PICTURE
WQ1	<p>101° 34' 5.373" E 3° 56' 12.659" N (Sg. Kabut (Tributary of Sg Gesau) – Within project boundary)</p>	
WQ 2	<p>101° 34' 17.166" E 3° 55' 43.715" N (Sg. Gesau – Upstream)</p>	
WQ 3	<p>101° 33' 24.075" E 3° 56' 12.171" N (Tributary of Sg. Gesau – Within project boundary)</p>	

WQ 4	<p>101° 33' 0.546" E 3° 56' 25.972" N (Tributary of Sg. Gesau – Within project boundary)</p>	
WQ 5	<p>101° 33' 25.163" E 3° 55' 40.535" N (Tributary of Sg. Gesau – Within project boundary)</p>	
WQ 6	<p>101° 32' 41.528" E 3° 55' 40.229" N (Sg. Padi (Tributary of Sg. Gesau) – Within project boundary)</p>	
WQ 7	<p>101° 32' 29.218" E 3° 55' 20.555" N (Sg. Merdu (Tributary of Sg. Gesau) – Within project boundary)</p>	

WQ 8	101° 32' 9.234" E 3° 55' 57.623" N (Sg. Gesau – Downstream)	
WQ 9	101° 31' 11.980" E 3° 55' 16.347" N (Sg. Gesau – Downstream)	
WQ 10	101° 30' 22.776" E 3° 55' 9.567" N (Sg. Slim – Upstream)	
WQ 11	101° 30' 28.477" E 3° 54' 54.150" N (Sg. Gesau – Downstream)	

**CADANGAN PEMBANGUNAN LADANG HUTAN SELUAS 400 HEKTAR (988.42 EKAR) DI SEBAHAGIAN KOMPARTMENT 78 & 79
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WQ 12	<p>101° 30' 15.875" E</p> <p>3° 54' 16.092" N (Sg. Slim – Downstream)</p>	
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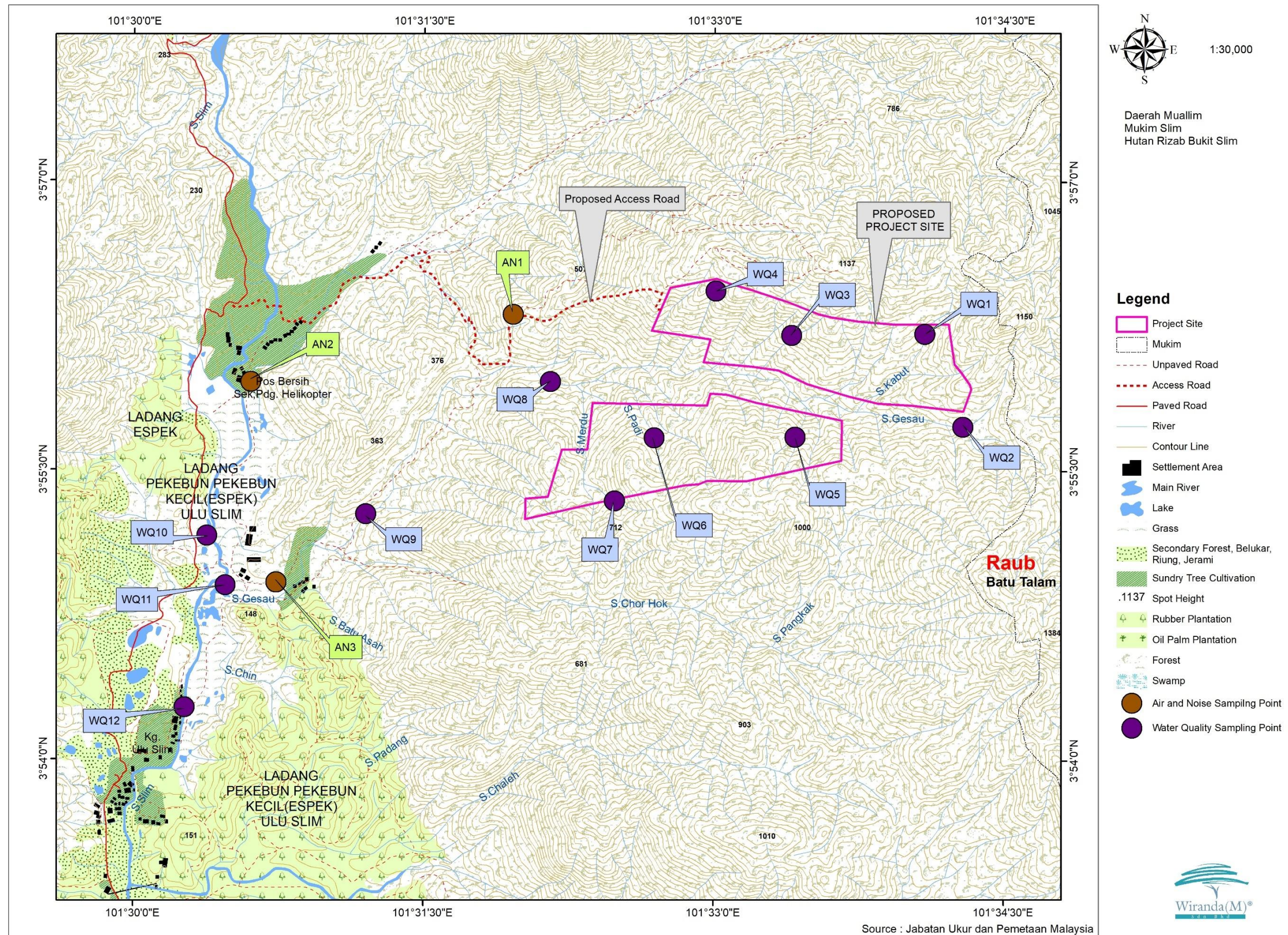


Figure 5.2: Location of the Water, Air and Noise Sampling stations

5.5.2.1 Sampling / Analysis Procedures

Water temperature, pH, dissolved oxygen (DO) and turbidity shall be measured in situ using YSI 556MPS and portable turbidity meter (HACH DR/2000). The analysis of the other parameter was done in an accredited laboratory. Samples will be temporarily stored in clean airtight bottles kept cool in an icebox to delay biological and / or chemical decay of the test parameters. Sampling and test procedures for O & G and TSS will be conducted in accordance with APHA 5520D, 1992 and APHA 2540 D, 1992.

Procedures for sample analysis of biological oxygen demand (BOD) and Chemical Oxygen Demand (COD) will be carried out in accordance with APHA 5520D, 1992 and APHA 2540 D, 1992 methods. Sampling and test procedure for turbidity will be carried out in accordance with APHA 2130B, 1998 and Ammoniacal Nitrogen (NH-N) samples will be analysed in accordance with APHA 4560-NH3C, 1992 (**Table 5.11**).

Table 5.11: Analysis Procedure for Water Sampling

Category	Parameter	Unit	Method Used
Water	Temperature	°C	APHA 2550 B
	pH	-	APHA 4500 H ⁺ B
	Dissolved Oxygen	mg/l	APHA 4500 O-G
	Total Suspended Solid	mg/l	APHA 2540 D
	BOD ₅ at 20°C	mg/l	APHA 5210 B
	COD	mg/l	APHA 5220 C
	Oil and Grease	mg/l	APHA 5520 B
	Total Coliform	CFU/100ml	AOAC 989.12
	Ammoniacal Nitrogen	mg/l	APHA 4500 NH ₃ -C & F

5.5.2.2 Baseline Result for Water Quality

The baseline sampling during EMP and development phase has been conducted on 2nd until 3rd December 2020. The results are as follows.

Table 5.12: Result of Water Quality

SAMPLING STATION	Temperature (°C)	pH	DO (mg/L)	Turbidity (NTU)	BOD ₅ (mg/L)	COD (mg/L)	TSS (mg/L)	Oil & Grease (mg/L)	NH ₃ N (mg/L)	Total Coliform (cfu/100 mL)
WQ1	25.4	7.12	9.05	7.30	1	<4	2	ND(<1)	ND(<0.2)	1800
WQ2	25.3	6.45	9.12	5.11	3	6	2	ND(<1)	ND(<0.2)	1100
WQ3	24.9	7.00	8.78	8.26	3	8	40	ND(<1)	ND(<0.2)	2100
WQ4	24.8	6.84	8.97	6.60	3	10	7	ND(<1)	ND(<0.2)	920
WQ5	24.8	5.20	6.74	7.40	2	7	19	ND(<1)	ND(<0.2)	670
WQ6	24.9	6.63	6.95	9.24	3	10	3	ND(<1)	ND(<0.2)	230
WQ7	25.1	6.32	6.88	8.33	2	5	2	ND(<1)	ND(<0.2)	310
WQ8	24.5	6.68	8.09	6.44	1	4	12	ND(<1)	ND(<0.2)	360
WQ9	25.5	5.13	7.25	28.2	2	5	11	ND(<1)	ND(<0.2)	2500
WQ10	25.6	6.90	6.98	24.2	1	<4	5	ND(<1)	ND(<0.2)	780
WQ11	25.3	6.80	7.43	16.2	1	4	16	ND(<1)	ND(<0.2)	1100
WQ12	25.7	6.20	7.15	28.1	2	5	13	ND(<1)	ND(<0.2)	1400
Class IIB of NWQS	-	6-9	5-7	50	3	25	50	40;N	0.3	5000

Source: ERALab Sdn Bhd

Note: ND = Not Detected; N = Free from visible sheen, discolouration and deposits. **BOLD** means not comply with NWQS Class IIB

5.5.2.3 Discussion of Water Quality Analysis

The existing water quality at the project site was investigated via in-situ sampling and laboratory analysis. The sampling was conducted on 2 until 3 December 2020. Twelve (12) water samples were collected within and outside the Project site for both seasons. The grab sampling technique was used to collect the water samples. The samples were kept in ice and sent to ERA Lab Sdn. Bhd to be analysed. The water quality sampling locations are shown in **Figure 5.2** and **Table 5.10**.

In-situ measurements for selected water quality parameters were carried out using pre-calibrated portable meters, namely for temperature, pH, dissolved oxygen (DO), turbidity, Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil & Grease, Total Coliform and Ammoniacal Nitrogen. **Table 5.12** shows the results of the water quality measurements at the selected stations.

Temperature

Variations of temperature at the river water quality stations ranged from 24.5 °C to 25.7 °C. The variation of temperature basically is influenced by the size of the respective water bodies, soil type and cover, wind, cloud cover, water vapor, and moisture on the ground.

pH

The pH values for all water quality stations recorded in the ranged pH 5.20 to 7.12. Based on this in-situ analysis, all the sampling stations comply with the acceptable range except for WQ1 and WQ3 with 7.12 and 7.00 respectively.

Dissolved Oxygen (DO)

The DO concentration ranged from 6.74 to 9.12 mg/L. Due to the natural condition, oxygen enters the water mostly via diffusion at the water-air interface. DO is an important water quality parameter that influences the living conditions of all aquatic organisms that require oxygen. Only WQ5, WQ6, WQ7 and WQ10 comply with the acceptable range.

Turbidity

This physical characteristic of water is a measurement of the water clarity. The turbidity values at all of the water quality stations ranged from 5.11 NTU to 28.2 NTU. Basically, the turbidity component consists of suspended solids in the form of clay, silt, and sand from soils, phytoplankton (suspended algae) and bits of decaying vegetation. All water sampling stations recorded turbidity value within the acceptable range.

Biochemical Oxygen Demand (BOD₅) and Chemical Oxygen Demand (COD)

The organic loading of the water bodies can be measured by its Biochemical Oxygen Demand (BOD₅) and Chemical Oxygen Demand (COD) values. The lowest and highest levels for BOD are 1 mg/L and 3 mg/L respectively. While for COD parameter, the lowest and highest levels for this parameter are 4 mg/L and 10 mg/L respectively.

BOD is the total dissolved oxygen required by bacteria for the decaying process under aerobic conditions. It also the best indicator in determine oxygen pressure in consequence of organic pollution of aquatic organisms living. All sampling stations recorded BOD and COD value within the acceptable range.

Total Suspended Solid (TSS)

TSS is a measure of the mass of suspended material in a given volume of water. It acts as an indicator to soil erosion and is linked to transport in rivers; it includes nutrients, metals and chemicals associated with agricultural activities (Un GEMS/Water, 2005). The TSS values for all water quality stations in the ranged of 2 mg/L to 40 mg/L. All sampling stations recorded TSS value within the acceptable range.

Oil & Grease, Ammoniacal Nitrogen & Total Coliform

All the recorded values for these parameters in all sampling stations are within acceptable range.

NPK

Some water quality stations were selected for NPK (total nitrogen, Phosphate and Potassium as K) analysis. The selected water stations and the results are shown in **Table 5-13**.

The certificates of analysis for the water quality are attached in **Appendix D**.

Table 5-13: NPK Content in the Water Sampling Stations

Metals	Total Nitrogen as N (mg/L)	Phosphorus as P (mg/L)	Potassium as K (mg/L)
WQ9	1	0.11	1.24
WQ12	2	0.09	1.36

Water Quality Index

The study utilized a system of classifying river water quality based on the water quality Index (WQI). The WQI relates a group of water quality parameters to a common scale and combines them into a single number. WQI is a method of combining numerous water quality parameters into one concise and objective value representing the state of the water quality trend. In this study, the WQI value of water sample was calculated using the method developed by Norhayati (1981) that has been adopted by DOE. Six parameters used for the evaluation of WQI value are COD, BOD, DO, TSS, pH and N-NH₃. The sub-indices for the chosen parameters are named SICOD, SIBOD, SIDO, SISS, SIPH and SIAN, and the formula used in the calculation WQI is:

$$\text{WQI} = 0.16 * \text{SICOD} + 0.19 * \text{SIBOD} + 0.22 * \text{SIDO} + 0.16 * \text{SISS} + 0.12 * \text{SIPH} + 0.15 * \text{SIAN}$$

Where, SI is the sub index of each parameter. The sub index for each parameter is derived from a system of best-fit equations as shown in **Table 5.14**.

In the Environmental Quality Report of 1990, the DOE had appraised the water quality data based on five water quality parameters: - BOD₅, COD, NH₃-H, SS and pH. The data was then compared to the National Water Quality Standard for class IIB water use (Recreational use with body contact).

The DOE's classification of the status of a particular river is based on the three important parameters of BOD, AN, SS and deriving an overall water index as shown in **Table 5.15**.

Table 5.14: Best-fit Equations for the estimation of the Various Sub-index values

PARAMETER	SUB-INDEX FORMULA	CONDITION
DO	SIDO = 0 SIDO = $-0.395 + 0.030x^2 - 0.00020x^3$ SIDO = 100	For $x \leq 8$ For $8 < x < 92$ For $x \geq 92$
BOD	SIBOD = $100.4 - 4.23x$ SIBOD = $108 * e^{-0.055x} - 0.1x$	For $x \leq 5$ For $x > 5$
COD	SICOD = $-1.33x + 99.1$ SICOD = $103e^{-0.0157x} - 0.04x$	For $x \leq 20$ For $x > 20$
N-NH ₃	SIAN = $100.5 - 105x$ SIAN = $94 * e^{-0.573x} - 5 * x - 2$ SIAN = 0	For $x \leq 0.3$ For $0.3 < x < 4$ For $x \geq 4$
SS	SISS = $97.5 * e^{-0.00676x} + 0.05x$ SISS = $71 * e^{-0.0016x} - 0.015x$ SISS = 0	For $x \leq 100$ For $100 < x < 1000$ For $x \geq 1000$
PH	SIPH = $17.2 - 17.2x + 5.02x^2$ SIPH = $-242 + 95.5x - 6.67x^2$ SIPH = $-181 + 82.4x - 6.05x^2$ SIPH = $536 - 77.0x + 2.76x^2$	For $x < 5.5$ For $5.5 \leq x < 7$ For $7 \leq x < 8.75$ For $x \geq 8.75$

NOTE: x - concentration in mg/l for all parameters except for pH and DO

* - Multiply by

Table 5.15: Water Quality Classification Based On Water Quality Index

Range	Class	Status	Useful
> 92.7	Class I	Clean	No Treatment
76.5 – 92.7	Class II	Clean	2 nd Treatment
57.9 – 76.5	Class III	Slightly Polluted	3 rd Treatment
31.0 – 57.9	Class IV	Polluted	Irrigation
< 31	Class V	Very Polluted	Not Useful

Source: National Water Quality Standard (NWQS)

A water body with a high WQI value indicates a cleaner water body. Water quality refers to the characteristics of a water body that will influence its suitability for a specific use, i.e. how well the water quality meets the need of the user. Water quality status indicates

the level of pollutant composition and thus can be related to human activities (Anhar et al., 1998).

Based on the calculations of the WQI in **Table 5.16**, it shows the range of WQI is ranged from 85.88 to 94.49. All sampling stations are categorized as 'clean' and fall under Class I (WQ1, WQ8, WQ10 and WQ11) and the rest of the sampling stations fall under Class II.

Table 5.16: Water Quality Index (WQI)

STATION	WQI	CLASS	STATUS
WQ1	94.49	I	Clean
WQ2	92.15	II	Clean
WQ3	88.89	II	Clean
WQ4	91.15	II	Clean
WQ5	85.88	II	Clean
WQ6	90.42	II	Clean
WQ7	91.92	II	Clean
WQ8	93.48	I	Clean
WQ9	87.57	II	Clean
WQ10	93.34	I	Clean
WQ11	93.21	I	Clean
WQ12	91.18	II	Clean

Source: Consultant's Calculation

5.5.4 Mitigating Measures for Water Quality Control

Some mitigation measures are recommended to reduce the potential for water pollution:

- Implementation of LD-P2M2 tools as stated such as sediment traps, earth drains, check dam and etc. Must be constructed in the proposed project site at the early stage before starting the plantation development activities.
- The LD-P2M2 tools must be inspected and maintained regularly in order to maintain their working effectiveness. Measures include regular desilting of the sediment traps, earth drains and wash troughs.
- The sediment collected from the wash trough must be disposed of at suitable areas which are not exposed to erosion risks.
- Maintain riparian reserves along watercourses populated by native species. Plant native trees where they are absent. The size (width) of the reserve should follow the river reserve guidelines by the Department of Irrigation and Drainage (DID) Malaysia.
- Water quality monitoring at the end of the silt trap discharge for Total Suspended Solids (TSS) has been conduct on monthly basis starting from the commencement of earthwork activities until all the exposed area are planted with cover crop and get approval from DOE Perak.
- Local sewage from site office and base camp need to treat and comply with Standard A Second Schedule (Regulation 7), Environmental Quality Act (Sewage) 2009 before discharge into the water stream.
- Water quality monitoring has been conduct on monthly basis starting from the commencement of earthwork activities until all the exposed area are planted with cover crop and get approval from DOE Perak.

5.5.5 Provision of Temporary Toilet Facility

Temporary toilet facility is considered as on-site sewage treatment systems which by installation of septic tanks and holding tanks. As the activities and the workforce increase on site during construction period, a temporary toilet with sewage treatment system should be installed.

Typically, septic tanks work as following:

- a) When water leaves the toilet plumbing, it flows directly into the first chamber of the septic tank, where the primary treatment occurs or solid settling takes place.
- b) A secondary chamber does more of the same, allowing more time for solids to settle to the bottom of the tank.
- c) The wastewater (effluent) is then discharged into the drain field, where the effluent will permeate into the ground and is treated or to inland water.
- d) After this absorption and purification process, the effluent will then, eventually reach groundwater.

Septic tanks built should comply with Department of Health and also should have approval from Suruhanjaya Perkhidmatan Air Negara (SPAN) (**Plate 5.14**). The effluent discharge from the project site also should comply with **Standard A, Table 5.8, Environmental Quality (Sewage) Regulations 2009**. The septic tank will also be sufficient to cater up to 70 people usage. The septic tank will be serviced three times a week to keep the portable hygiene. Besides that, good house-keeping rules will always be practiced at construction sites . Improper management and disposal of sewage discharge can lead to serious contamination of the soil and watercourses.

The temporary toilet for workers currently was still in progress. Two location of proposed temporary toilet was at the workers camp and at the site office.



Plate 5.14: Example of Septic Tank approved by SPAN

5.5.5.1 Portable Toilet

Portable toilet (**Figure 5.3**) is a simple enclosure containing a chemical toilet which is typically used as a temporary toilet for construction because of their durability and convenience. Most portable toilets have black open-front U-shaped toilet seats with a cover. This portable toilet will use chemical named formaldehyde in which it will neutralize the odour created from the toilet.

Portable toilet is large enough for a single occupant, usually about 90 cm (35 Inches) in square by 210 cm (83 Inches) high. While the units are typically free standing structures, their stability is augmented by the weight of the waste tank, which usually contains an empty liquid disinfectant dispenser and deodorizer. Some include both a seated toilet and a urinal. Most include lockable doors, ventilation near the top, and a vent pipe for the holding tank. When the wind is blowing over the vent pipe, it creates a low pressure area sucking the door out, leaving the toilet lid open that will reverse the flow of the venting of the tank.



Figure 5.3: Example of Portable Toilet

5.6 AIR QUALITY CONTROL

5.6.1 Regulations Related to Air Quality

Project Proponent will follow the Department of Environment (DOE) recommended guideline level Malaysia Ambient Air Quality Standard (2020) for Particulates Matter less than 10 micron (PM₁₀) (**Table 5.17**).

The Environmental Quality (Clean Air) Regulations, 2014 prohibits the burning of any combustible material or refuse unless a licence is granted by the Director-General of Environment (Regulation 11). This would include a variety of waste materials (e.g. trees/other vegetation and waste generated by construction crew) during both the construction and operational phases of the project. The installation of fuel burning equipment e.g. temporary generator sets is prohibited without prior written approval from the DOE (Regulation 36).

Emissions of black smoke from diesel powered vehicles and construction equipment must comply with the emission limits specified under the Environmental Quality (Control of Emissions from Diesel Engines) Regulations 1996.

Open burning is prohibited under the law (Environmental Quality Act, 1974 Amendment 1998). The new amendment of control burning is allowed (Environmental Quality Order (Prescribed Activities) (Open Burning) 2000). However, the project proponent must immediately apply for permission so that proper actions and methods of disposal of biomass can be taken care of by the operator as well as the authority.

Malaysia Ambient Air Quality Standard

Malaysia Ambient Air Quality Standard was established in order to replace the older Malaysia Ambient Air Quality Guideline that has been used since 1989. The New Ambient Air Quality Standard adopts 6 air pollutants criteria that include 5 existing air pollutants which are particulate matter with the size of less than 10 micron (PM₁₀), sulfur dioxide (SO₂), carbon monoxide (CO), nitrogen dioxide (NO₂), and ground level ozone (O₃) as well as 1 additional parameter which is particulate matter with the size of less than 2.5 micron (PM_{2.5}). The air pollutants concentration limit will be strengthened in stages until 2020.

There are 3 interim targets set which include interim target 1 (IT-1) in 2015, interim target 2 (IT-2) in 2018 and the full implementation of the standard in 2020.

As mentioned earlier, the Project Proponent will follow the Department of Environment (DOE) recommended guideline levels for Ambient Air Quality Standard (2020) for Particulates Matter less than 10 micron (PM₁₀). **Table 5.17** shows the Malaysia Ambient Air Quality Standard.

Table 5.17: Malaysia Ambient Air Quality Standard

Pollutants	Averaging Time	Ambient Air Quality Standard		
		IT-1 (2015)	IT-2 (2018)	Standard (2020)
		µg/m ³	µg/m ³	µg/m ³
Particulate Matter with the size of less than 10 micron (PM ₁₀)	1 Year	50	45	40
	24 Hour	150	120	100
Particulate Matter with the size of less than 2.5 micron (PM _{2.5})	1 Year	35	25	15
	24 Hour	75	50	35
Sulfur Dioxide (SO ₂)	1 Hour	350	300	250
	24 Hour	105	90	80
Nitrogen Dioxide (NO ₂)	1 Hour	320	300	280
	24 Hour	75	75	70
Ground Level Ozone (O ₃)	1 Hour	200	200	180
	8 Hour	120	120	100
*Carbon Monoxide (CO)	1 Hour	35	35	30
	8 Hour	10	10	10

*mg/m³



5.6.2 Baseline Data for Air Quality

The project site is located in a forest reserve. The ambient air quality study was carried out on 2nd to 4th December 2020. The parameter measured is Particulate Matter less than 10 micron (PM₁₀) using the Portable Air Volume Sampler. This monitoring was conducted for 24 hours at all sampling stations. The details of the sampling stations and the results of analysis are shown in **Figure 5.2** and **Table 5.16**. Photos of the sampling locations are shown in **Plates 5.10** to **Plate 5.12**.


The result of the analysis (**Table 5.18**) shows baseline values for Particulate Matter (PM₁₀) ranging between 13.6 µg/m³ to 21.3 µg/m³. There are no industrial activities or significant air pollution sources in the vicinity that may adversely contribute to air pollutants in the study area. Only vehicular movements that produce exhaust emissions can contribute to temporary air pollution in the area.

The certificates of analysis for the air quality are attached in **Appendix D**.

Table 5.18: Ambient Air Quality Results for All Sampling Stations

A1			
	Location	Access Road	
	Coordinate	101° 31' 57.616" E 3° 56' 18.476" N	
	Sampling Date	2/12/2020	
	ANALYSIS DATA		
	Test Parameter	Result	Recommended Limit**
	PM ₁₀ (µg/m ³)	13.6	100
A2			
	Location	Nearest settlement, Pos Bersih	
	Coordinate	101° 30' 36.330" E 3° 55' 57.425" N	
	Sampling Date	4/12/2020	

**CADANGAN PEMBANGUNAN LADANG HUTAN SELUAS 400 HEKTAR (988.42 EKAR) DI SEBAHAGIAN KOMPARTMENT 78 & 79
HUTAN SIMPAN BUKIT SLIM, MUKIM SLIM, DAERAH MUALLIM, PERAK DARUL RIDZUAN**

	ANALYSIS DATA		
	Test Parameter	Result	Recommended Limit**
	PM ₁₀ (µg/m³)	21.3	100
A3			
	Location	Nearest settlement, Kg Sg Gesau	
	Coordinate	101° 30' 44.199" E 3° 54' 55.048" N	
	Sampling Date	3/12/2020	
	ANALYSIS DATA		
	Test Parameter	Result	Recommended Limit**
	PM ₁₀ (µg/m³)	18.5	100

*Malaysia Ambient Air Quality Standard (2020)

Source: EHSANLAB

5.6.3 Potential Impacts and Mitigation Measures

There will be no major considerable pressure on the environment due to this project development. However, there is temporary impact and short term on air quality is predicted due to the airborne dust arising during development phase caused by vehicle movement. There could be existence of pollutants gaseous produced by heavy vehicles used for plantation preparation. The concentration of dust particles usually depend on various activities such as the frequency and speed of vehicles movement. The wind speed will also influence the dust concentration in the air.

During site clearing, there will be significant amount of biomass. Burning of trees residues and other wastes could create health hazards and be nuisance to the surrounding populations. Open burning is strictly prohibited under the Environmental Quality Act 1974, Section 29A (1). Smokes from large scale burning of vegetation may result in hazy conditions, causing poor visibility, accidents, annoyance and possibly a temporary hazard to human health within zone of impacts.

Air pollutants such as particulate matter (PM), sulphur oxides (SO_x), nitrogen oxide (NO_x), and carbon monoxide (CO) emitted from the exhaust of transport vehicles and other machineries during the construction phase can pose significant risk to the human health effect such as asthma, default in breathing etc.



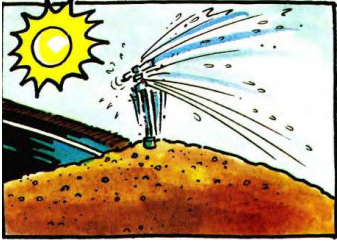
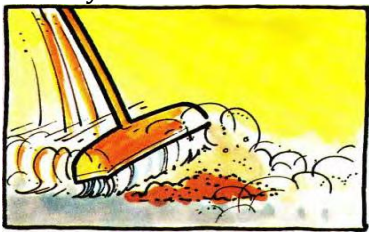

Overall, the impact of air pollutants that might arise from the forest plantation development would be a temporary short term impact if it is managed in responsible manner.

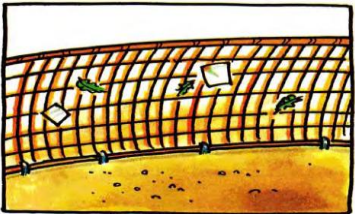
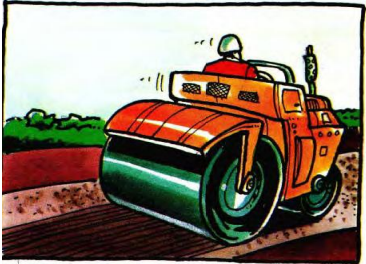
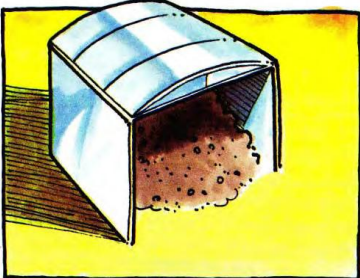
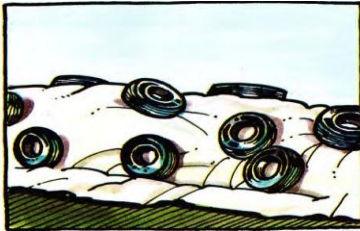
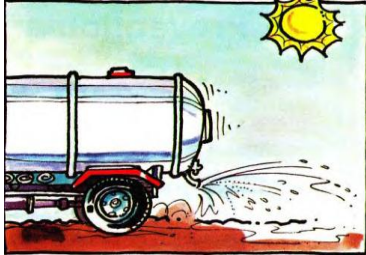
Mitigation Measures




The proposed mitigation measures for air pollution are as follows:

- Wash trough must be constructed at the access points of the project site. The body and wheels of the vehicles need to be washed before leaving the site.
- Water jet system as washing equipment should to be installed at the entrance of proposed project site and must be conducted by professional workers.
- Vehicle speeds should be limited to reduce the dispersion of dust from unpaved roads. Temporary road humps / speed bumps should be installed at the road system in the proposed project site.
- Vehicles should be regularly serviced and maintained to reduce undesirable emissions.
- Maintain the paved road with crusher run or gravel to protect the earth surface from precipitation and dry weather.
- Open burning is strictly prohibited under the Environmental Quality Act, 1974, Section 29A (1). Notwithstanding anything to the contrary contained in this act, no person shall allow or cause open burning on any premises.
- Workers are strictly prohibited to carry out open burning at site. Any incidents must be reported and the offender must be fined.
- The usage of generator set in the site has to comply with the Environmental Quality (Clean Air Regulations) 2014, Third Schedule, Regulation 13. Written notification must be forwarded to the DOE (Refer to **Appendix F**). Workers involved in spraying activities must be equipped with appropriate protective gears such as mask, glove, long sleeve clothes, long pant to minimize the direct impacts.
- Ambient air quality monitoring need to conduct on quarterly basis and comply with Malaysia Ambient Air Quality Standard (2020).

Table 5.18: Best Management Practice for Control of Fugitive Dust during Construction Activity

Best Management Practice (where applicable and deemed practical – depending on the condition of the project site)	Description
<p>Minimize the surface area distributed.</p> 	<p>The less ground disturb, the less dust will rise in every works and less clean up works needed.</p>
<p>Limit dusty work on windy days</p> 	<p>Introduce extra dust suppression measures as needed.</p>
<p>Apply dust suppression measures when needed</p> 	<p>Even if the regular schedule is thrown off. It may be a one-time occurrence, or the schedule may need adjusting to more frequent application intervals.</p>
<p>Clean Up Those Dusty Spills Immediately</p> 	<p>Don't wait for the next scheduled housekeeping - the mess will just get bigger and will take longer.</p>
<p>Grow Vegetative Ground Cover</p> 	<p>Growing grasses or legumes is the most effective, easiest and most economical control because these plants provide a dense, complete cover. Even when the vegetation dries up, the roots will help hold the soil in place.</p>

Best Management Practice (where applicable and deemed practical – depending on the condition of the project site)	Description
<p>Use Wind Erosion Controls</p> 	<p>Plant bushes or trees, erect wood or rock walls or earthen banks as permanent wind-breaks, or install porous wind fences as more temporary measures. Using controls with 50% porosity is ideal; the reduced wind velocity provided allows larger particles to settle to the ground.</p>
<p>Pave Haul Roads and Storage Areas</p> 	<p>Heavy vehicles pulverize the surface material and create a constant source of dust. If wholesale paving is too costly, pave just the entrance and exit to minimize carryout, and gravel the remainder to reduce the amount of surface silt.</p>
<p>Enclose Storage, Handling Areas</p> 	<p>If dusty materials are frequently loaded and unloaded. Storage silos, 3-sided bunkers and open-ended buildings are some enclosures used. If handling is less frequent, wind fencing can be used. Conveyor loading may require enclosure or the use of water spray bars both above and below the belt surface to reduce emissions.</p>
<p>Keep Storage Piles Covered</p> 	<p>Piles should be covered with a physical cover or with a dust suppressant spray. Limit the working face of the pile to the downwind side. Most emissions come from loading the pile, load out from the pile, and truck and loader traffic in the immediate area, if the pile is batch loaded. Keep the drop height low to reduce dust, and keep the ground at the base of the pile clear of spills.</p>
<p>Water and/or Sweep Often</p> 	<p>Ensure that vehicle traffic is not picking up dust for wind action and carryout. Fewer treatments are necessary in cool, wet weather. "Reasonable dust control measures" are required by some local fugitive dust rules, as are an adequate water supply and keeping dust control equipment in good working order.</p>

Best Management Practice (where applicable and deemed practical – depending on the condition of the project site)	Description
<p>Reduce Speed</p> 	<p>Speed Limits on unpaved surfaces to 10 or 15 miles per hour (~15 or ~25 km per hour) for well-travelled areas and heavy vehicles, never to exceed 25 mph (~40 kmh) for any vehicle on any unpaved surface.</p>
<p>Minimize Trips</p> 	<p>Minimize trips by carpooling and grouping jobs and errands. Keep exposed areas adjacent to roads undisturbed by posting, fencing, installing gates or otherwise limiting access to vehicle traffic.</p>
<p>Prevent Transport of Dusty Material Offsite</p> 	<p>Rinsing vehicles before they leave the property and tightly covering loaded trucks.</p>

5.7 NOISE LEVEL

5.7.1 Regulations Related to Noise Level

Noise generated by the clearing, construction and operations phases of the Project area is governed by The Planning Guidelines for Environmental Noise Limits and Control. Protection of site personnel from the effect of excessive exposure to noise falls under the Department of Occupational Health and Safety (DOSH) via the Factories and Machinery (Noise Exposure) Regulations, 2019. The noise emitted from motor vehicles is controlled under the Environmental Quality (Motor Vehicle Noise) Regulations, 1987.

5.7.2 Baseline Data for Noise Level




Noise level monitoring was carried out near the Project site to delineate the existing noise levels and also to obtain baseline data for the EMP report. . Noise level monitoring was carried out on 2nd to 5th December 2020. Three (3) ambient noise level stations were selected as shown in **Table 5.19**.

The noise measurements were performed using the following equipment

- ✓ Sound Level Meter : RION NL- 52 Integrating Sound Level Meter (comply the performance criteria for the IEC 804 – 1985 and ANSI S1.4 – 1983 Standards for Integrating Sound Level Meter type 1).

Ambient noise level was conducted for 24 hours at all sampling stations. The details of the sampling stations and the results of analysis are shown in **Table 5.19**. The Certificate of Laboratory Analysis is attached in **Appendix D**.

Table 5.19: Ambient Noise Levels for All Sampling Stations

N1				
	Location	Access Road		
	Coordinate	101° 31' 57.616" E 3° 56' 18.476" N		
	Sampling Date	2/12/2020 – 3/12/2020		
	Result	Day Time	Night Time	*Recommended Limit
	L _{Aeq}	48.6	35.8	Day Time: 55 dBA Night Time: 50 dBA
N2				
	Location	Nearest settlement, Pos Bersih		
	Coordinate	101° 30' 36.330" E 3° 55' 57.425" N		
	Sampling Date	4/12/2020 – 5/12/2020		
	Result	Day Time	Night Time	*Recommended Limit
	L _{Aeq}	53.1	42.6	Day Time: 55 dBA Night Time: 50 dBA
N3				
	Location	Nearest settlement, Kg Sg Gesau		
	Coordinate	101° 30' 44.199" E 3° 54' 55.048" N		
	Sampling Date	3/12/2020 – 4/12/2020		
	Result	Day Time	Night Time	*Recommended Limit
	L _{Aeq}	54.5	43.8	Day Time: 55 dBA Night Time: 50 dBA
* Suburban Residential (Medium Density) Areas, Public Spaces, Parks, Recreational Areas. (Source: Annex A, Schedule 1: Maximum Permissible Sound Level (L _{Aeq}) by Receiving Land Use for Planning and New Development. The Planning Guidelines for Environmental Noise Limits and Control, 2019)				

Source: ERALab Sdn Bhd

5.7.3 Potential Impacts and Mitigation Measures

Potential Impacts

Noise pollution takes place when there is either an excessive amount of noise or unpleasant sound that causes temporary disruption in the natural balance that will cause impact to human comfort, health and efficiency as well as to animals.

The noise generated during preparation of the forest plantation will cause very minimal impacts to the surrounding area. The noise generated may be contributed by the movement of vehicles, tractors and machineries use for land preparation, development of access road and transportation of invaluable woods. The noise levels of these machineries and equipment are usually between 70-85 dB (A) and more at the receptor point at the working site. Hence, during these activities the ambient noise level in the project site will be increased.

However, the project site is located deep into the woods which are surrounded by forest reserve that will act as natural noise barrier to restrict the spread of noise annoyance. Operators or workers who are handling machineries on site will be exposed to the noise pollution. However, these impacts are only for short term and restricted to daytime hours only. Once the plantation area is in operation, noise pollution and noise annoyance is relatively insignificant.

Mitigation Measures

- Noise or high sound levels from machineries can be reduced by installing silencers or using quieter machinery.
- Modifying existing old equipment with damping materials and mufflers.
- Work should be limited to daytime hours (0700 to 1900) only.
- Noise barriers such as existing vegetation at the boundary of the project site shall be maintained to minimize noise diffusion.
- Vehicles and machineries shall be regularly serviced and maintained.
- The supervisor for the proposed project site must keep a log book to compile all complaints from the surrounding dwellers and address the issues immediately.
- Proper mitigation measures for the personnel likely to be exposed to high noise level like provision of Ear Protective Safety Equipment (ear plug & ear muff) (Figure 5.4).

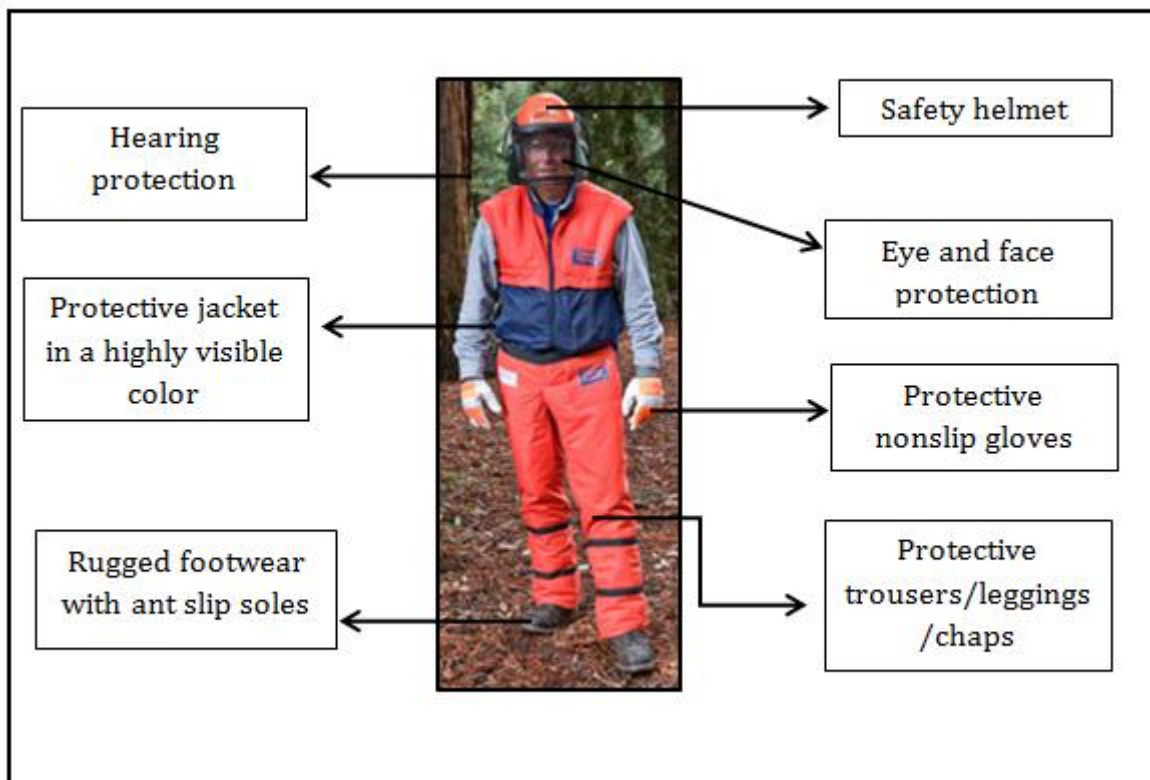


Figure 5.4: Proper Personal Protective Equipment (PPE) during Working Hours

5.8 WASTE AND BIOMASS MANAGEMENT

5.8.1 Potential Impacts and Mitigation Measure

Potential Impacts

Biomass Waste

In the development of the forest plantation, site preparation involves land preparation activities. This activity will result in the generation of large quantities of biomass. The biomasses are in the form of re-usable/marketable trees and non-economic vegetative wastes. If not properly managed, it may cause blockage of the natural drainage system. In Malaysia, open burning is prohibited under law. The Environmental Quality Act, 1974 Schedule 29A (1) states that "Notwithstanding anything to the contrary contained in this Act, no person shall allow or cause open burning on any premises".

Meanwhile, during operation, generally the harvest residues comprising hardwood and softwood from forest plantations are considered to be a source of biomass. During the operations phase, managing forest plantations involves thinning and pruning and also managing wastes generated from fallen leaves, branches and twigs. Most of these wastes are left to rot on the plantation ground, even though some of the branches and twigs can be used for other usage.

Improper management of the biomass wastes could result in clogged rivers and water bodies. The clogged river with branches and stems will create stagnant water and disturb the water flow. When raining season or heavy rains occur, the water will overflow the river bank and cause flood. However, during drought season, the clogged water system will create water shortage at the downstream area. River system disorders will affect the importance of aquatic ecosystem. Best management practices need to be adopted in order to avoid the blockage in the natural river, water bodies as well as in the drainage.

Scheduled Wastes

The use of heavy vehicles and machinery during the land preparation such as tractors and bulldozers may produce scheduled wastes such as lubricant oil, grease and contaminated soil, etc. Improper storage, handling and disposal of used agrochemicals

containers and packaging will cause ground contamination, potential water pollution and toxicity to soil organisms. These pollutants can accumulate in animals that eat contaminated pests and soil organisms.

The activities carried out during the operation phase of the project site will generate a variety of scheduled wastes. During breakdowns and minor on-site repairs and maintenance of heavy vehicles and machineries used in operations phase, oil and grease pollution can occur due to improper handling or accidentally spillage of fuels, waste oils, and lubricants. Improper management of scheduled waste can lead to degradation of water quality during heavy downpours that carries all of these waste into the waterways.

Solid Wastes

Generally, two types of solid wastes will be generated from the workers camp namely degradable and non-degradable wastes. Degradable solid waste is categorized as organic materials such as food wastes, paper and wood wastes. Non-degradable solid wastes (non-organic material) include plastics, food containers, food and drink cans, glass, and bottle drinks.

The cleanliness of the workers quarters is vital in order to avoid any proliferation of disease vector occurrence which might also affect the local community. The solid wastes have to be collected and kept in the proper bins; otherwise they will be scavenged by rodents that could carry diseases such as *leptospirosis* in the water. Mosquitoes can also cause diseases such as malaria and dengue.

Meanwhile during the operation stage, solid waste will absolutely be produce once the worker's quarters are in operation. Improper of handling waste management will prolong their impacts until the operations phase. Besides the serious health hazard which could lead to the spreading of disease, the aesthetic sensibility will also be offended. This is due to the hideousness of wastes piles on the roadside, on the dumping area and at the water surface. The situation has made worse by the presence of disease and always become feeding places for dogs and cats. Waste always carelessly and irresponsibly discarded in public, river bank, along the roads, and around communal bins. This scenario has become a common things which public should realize that the important to handling the waste in a proper way (Viraraghavan and Pokhrel 2005).

Mitigation Measure

Implementation of a sustainable oil palm plantation is best management practiced from the beginning during the first and early stages of development. The best management practices for waste management at the project site are as shown in **Table 5.20**.

Table 5.20: Waste Management

NO	TYPE OF WASTE	MITIGATION MEASURES	BENEFIT
1	Biomass or wood waste	<ul style="list-style-type: none"> • Apply zero burning method at all time. • Felled trees must be shredded or cut into small pieces and piled in between planting rows and left to rot. • Signage “No Burning” shall be erected at the place that can be seen by the workers. 	<ul style="list-style-type: none"> • Zero burning method improves nutrient cycling, soil fertility and maintains soil moisture. • Reduce inorganic fertilizer consumption. • Minimizes risk of water pollution through leaching or surface wash of nutrients. • Reduce management cost and faster plantation establishment. • Increase economic and sustain ecology.
2	Containers of agrochemical	<ul style="list-style-type: none"> • Proper storage area must be built to store empty agrochemical containers. • Agrochemical must be kept from heat to prevent explosion. • All empty containers must be labelled as scheduled waste. • Empty containers are prohibited from being disposed into the river system and onto the 	<ul style="list-style-type: none"> • Proper storage and disposal of empty containers avoid soil and water contamination. • Reduce cost of oil palm plantation management.

NO	TYPE OF WASTE	MITIGATION MEASURES	BENEFIT
		<p>ground.</p> <ul style="list-style-type: none"> • Use only eco-friendly and/or organic fertilizer and biological control of pest management. • All remaining fertilizer and chemical containers need to be cleaned before they are disposed. The containers cannot be used for other purposes. 	
3	Solid waste from quarters camp	<ul style="list-style-type: none"> • Contractors shall provide garbage bins to collect solid waste. • Solid waste segregated by the waste type. • Composting is recommended to dispose food waste from worker base camp. • Un-degradable waste such as plastic, food container, drink can, glass and bottles must be disposed at approved landfill site. • The un-degradable waste also can be sold to recycle premise. • Wastes are prohibited from being discharged into the river system. • Contractors should notify workers not to burn the solid waste 	<ul style="list-style-type: none"> • Composting will help to improve soil fertility. • Recycling will help to sustain the environment. • Recycling will help to increase workers economy.

NO	TYPE OF WASTE	MITIGATION MEASURES	BENEFIT
4	Scheduled Waste (Lubricant oil)	<ul style="list-style-type: none"> • Built proper storage area to store use lubricant oil. • Label all the containers as scheduled waste with clear label according to type of waste. • Lubricant oil must store in containers which are compatible with the schedules waste to be stored, durable, and able to prevent spillage or leakage. • The containers shall always be closed during storage period. • Scheduled waste generated may store for 180 days or less with the quantity must not exceed 20 metric tons. • Disposed at the licensed premise. 	<ul style="list-style-type: none"> • Avoid contamination to soil and water

5.8.2 Handling of Scheduled Waste

The handling and disposal of scheduled wastes is covered under the Environmental Quality (Scheduled Wastes) Regulations, 2005.

Improper management and disposal of used oils can lead to serious contamination of watercourses. The types of oil wastes generated are classified as follows:

- ▶ SW103: Waste of batteries containing cadmium and nickel or mercury or lithium
- ▶ SW305: Spent lubricating oil
- ▶ SW408: Contaminated soil resulting from scheduled wastes
- ▶ SW425: Waste from production, formulation, trade or use of pesticides, herbicides or biocides

The Regulations introduce the "cradle to the grave" waste management concept whereby a historical record is maintained providing documented details of the life-cycle of the waste from its generation through to its ultimate disposal. Specific requirements include:

Notifications of Scheduled Waste Generation

Any scheduled waste generated must be notified to the Department of Environment in writing form (Second Schedule, Regulation 3) to be completed within one month of its generation.

Waste generators must immediately notify the DOE of new categories and changes in the quantities of waste which are or which may be generated as a result of any alteration in the operation conducted at the plan.

Records of Scheduled Waste Generation

Scheduled wastes must be stored in containers which are sufficiently durable to prevent spillage or leakage into the environment.

Waste generators must maintain an up-to-date inventory of scheduled wastes generated, treated and disposed.

Storage of Scheduled Wastes

Waste storage areas and containers must be clearly labelled for identification and warning purposes.

Waste generator may store scheduled wastes generated by him for 180 days or less after its generation provided that the quantity of scheduled wastes accumulated on site shall not exceed 20 metric tonnes.

Incompatible wastes must be segregated for storage. Areas for the storage of containers must be designed, constructed and maintained adequately to prevent spillage/leakage of scheduled wastes into the environment.

Transport of Scheduled Waste (Consignment Note System)

Transportation of waste from the waste generator to the treatment and disposal facilities must conform to the consignment note system; this system provides a documented record of the movement of waste from the generator to its approved destination.

The waste generator is responsible for monitoring the transport of waste to its approved destination and must also inform any transport contractor as to the nature of the waste and the actions to be taken in the event of an accident during transportation.

Disposal of Scheduled Waste

Scheduled wastes can only be disposed of at licensed premises. At present, the DOE has only licensed a few treatment and recovery facilities for scheduled wastes; these sites will not accept all types of scheduled wastes. The Main Contractor should obtain an updated list of licensed scheduled waste disposal contractors and disposal facilities from DOE; and liaise with these facilities for disposal options.

The contractor shall ensure that the scheduled wastes generated at the project site are properly stored. Scheduled wastes shall be stored in containers which are compatible with the scheduled waste to be stored, durable and which are able to prevent spillage or leakage of the scheduled wastes to the environment.

Areas for the storage of the containers shall be designed, constructed and maintained adequately in accordance with the guidelines to prevent spillage or leakage into the environment. The contractor may store scheduled wastes generated for 180 days or less after its generation provided that the quantity of scheduled wastes accumulated on site shall not exceed 20 metric tons.

Any scheduled wastes identified will need to be disposed of by licensed transporters at a recycling facility operated by a licensed scheduled waste contractor.



Figure 5.6: Example of Scheduled Waste Storage

5.9 MATERIALS AND STOCK MANAGEMENT

5.9.1 Chemical (Pesticides and Fertilizers)

➤ General Best Management Practices (BMPs)

1. Follow all label directions for storing and mixing of agricultural chemicals and for disposing of empty containers.
2. Keep accurate fertilizer and pesticide use records. Maintain a log book to document storage facility inspection and maintenance.
3. Handling and using the pesticides must be followed the Pesticide Act 1974 and any regulation under this act and followed the limit and method which had been set by the manufacturer. Pesticides materials must be of selective type toward the target species and organically and can be shed.
4. Pest control method must be followed the Integrated Pest Management Concept which including the practice of using the biological control.
5. Type of fertilizers that suitable must be from organic or degradable and have a slow release characteristic for its discharge.

➤ Site Selection BMPs

1. Assess the storage site and the loading areas to determine appropriateness of the site in terms of human safety
2. The proposed location for storage of chemical used on sites such as pesticides and fertilizers.

➤ Chemical Storage BMPs

1. Store all agricultural chemicals in a locked, well-marked building with impermeable floors, located a safe distance from any water source (minimum of 100 feet from water and 50 feet from any other building suggested).
2. Store pesticides in their original containers with labels intact, visible, and legible.
3. Store products by type and size. Keep fertilizers and pesticides in separate containments. Store small volume containers on metal shelving with a retainer lip at the front of each shelf.

4. The proposed location for chemical should be located nearby the site office.

➤ **Secondary Containment for Liquids BMPs**

1. Equip pesticide and fertilizer storage facilities with secondary containment dikes designed to contain liquid spills or leaks. Recover any spill in the storage area immediately and reuse or dispose of appropriately.
2. Separate containment of pesticides and fertilizers.
3. Construct secondary containment systems out of chemical-resistant, impermeable material. Do not use exposed earthen berms for secondary containment of pesticides.

➤ **Mixing and Loading BMPs**

1. Mix and load at the application site (in the field) whenever possible.
2. Construct impermeable mixing/loading pads at permanent pesticide loading sites. Design pads to handle traffic loads of the largest vehicle, plus the spray load. Consider roofing or enclosing the pad to reduce storm water accumulation.
3. Site permanent and field mixing areas a minimum of 100 feet, or the necessary safe distance, from any water source or well.
4. Install backflow prevention devices on supply lines or be sure an air gap is established when using hoses connected to a water supply. Using nurse tanks for water supplies ensures protection from backflow.
5. Recover any spill at the mixing site immediately and reuse. Do not let spilled chemical soak into the soil. Keep granular absorbent material available at the mixing site to clean up small spills.
6. Clean loading pads and sumps after daily use. Do not allow accumulation of fertilizers or pesticides in the sump. Keep the sump covered when not in use to keep out trash, dirt, and debris.

➤ **Waste Management BMPS**

1. Mix only the amount of pesticide that will be used for the current job.
2. Use products by age, so that older product gets used first. If containers are deteriorating, use the product as soon as possible or contact your chemical dealer.
3. Purchase the correct amount of product needed and return unopened containers for credit. Whenever available, use mini-bulks or small-volume refillable containers to avoid container waste.

4. Recover rinsates and wash water from the mixing pad for reuse as make-up water or apply to the field as a dilute solution in accordance with the label directions.
5. Clean spray tanks and spray equipment at the application site. Take care to rinse equipment in areas where water will not run off toward wells or surface water.
6. Triple rinse or pressure rinse one-way pesticide containers immediately after emptying. Rinse container caps and the outside of containers to remove pesticide residues. Puncture containers prior to disposal.
7. Recycle empty pesticide containers whenever possible. Do not burn or dispose of containers on-farm.

➤ **Worker Safety BMPs**

1. Provide worker safety features such as gloves, showers, protective clothing, fire extinguishers, and spill clean-up kits. Keep Material Safety Data Sheets available at the mixing station.
2. Train all employees in proper pesticide handling and safety procedures. Employees should have a clear understanding of your operation's emergency response plan in case of any spill or fire. Emergency response plans should include records of products stored and provisions for notification of the proper local authorities.

5.9.2 Fuel Bulk

1. General

- a) The contractor shall keep fuel storage (diesel, petrol) in proper bulk storage tanks/skid tanks. This tank should be placed in one location only for each work package and must be within the maintenance yard area. The tanks must be properly bunded and maintained properly.
- b) The Contractor shall store all chemicals and hazardous materials in suitable containers with appropriate labelling. A copy of the Material Safety Data Sheet (MSDS) must be kept on Site at all times.
- c) The Contractor must comply with the Classification, Labelling & Packaging (CLP) Regulations under the OSHA.

2. Location

- a) In general, the storage tanks cannot be sited near the following areas
 - i) Close to waterways (rivers/drains) or drinking water sources
 - ii) Close to welding workshops/naked flames
 - iii) Close to public areas
 - iv) Close to labour camps
 - v) Close to overhead high tension cables
- b) All tanks shall be above ground. Underground tanks are strictly prohibited.
- c) Tanks must be located at least 25m away from the site office and 50m away from labour camp. Where multiple tanks are present, the tanks must be spaced at least 2m apart.

3. Containment bund

- a) The Contractor must construct a perimeter bund around the storage tank to contain the contents of the tank in the event of spillage. The bund should be made of concrete or bricks and should be at least 0.5m high. Currently, the construction of containment bund for skid tank is still in progress.
- b) The floor area within the bund wall must be constructed using impermeable material to prevent the product from seeping into the ground. Concrete flooring is recommended. The Floor must be even.
- c) The bund-wall around the storage tanks should have a capacity to contain the worst spillage condition (110% of the capacity of the largest container).
- d) The bunded area shall be graded to a sump where an oil-water separator should be installed and regularly maintained. There should not be any opening in the bund wall that may allow surface water run-off from the entering the storage site.
- e) A safety barrier should be erected between the bund-wall and discharge bay to prevent trucks from knocking into the bund wall.



Figure 5.7: Example of proper storage skid tank with bund wall

4. Hazard identification

- a) At the entrance to the storage site, a signboard should be set up with the words “BAHAYA” and “DANGER”, painted with a letter size of 30 cm on a bright yellow background. The words “DILARANG MEROKOK” and “NO SMOKING” must also be clearly displayed.
- b) The Contractor must comply with the Classification, Labelling & Packaging (CLP) Regulations under the Occupational Safety and Health Act 1994 (OSHA).

5. Routine maintenance

- a) Surface oil from the sump/oil interceptor shall be skimmed off at regular intervals. The skimmed oil must be transferred to the waste oil storage drums.
- b) The Contractor must ensure that all joints, pipes and hoses used to load and unload the fuel from the tanks are not leaking. All leaks should be repaired immediately.
- c) The tanks must be checked weekly for leakage. Any leakage so detected shall be attended to immediately.
- d) Truck movement near the tanks shall be controlled. The truck speed shall be limited to no more than 5 km/hr. All trucks parking next to the tanks shall be supervised. Lorry drivers should not be allowed to reverse or park their vehicles without supervision from the ground.
- e) If the tanks are placed on an earth mound, regular checks must be carried out to ensure that soil beneath the tanks is not eroding.

6. Fire prevention & fire fighting

- a) Dry powder fire extinguishers shall be made readily available at the storage tank area for use in the event of a fire.
- b) No welding/ hot works should be carried out within 50m of the storage tanks. No naked flame should for any reason be brought close to the tanks.
- c) The telephone numbers of Jabatan Bomba shall be displayed prominently at the site office and on the tanks.
- d) In the event of a fire, the Contractor shall activate Emergency Response Plan.

7. Oil and chemical spillage

- a) All spillage incidents of oil, diesel, petrol and chemicals must be reported to the DOE within 24 hours of their occurrence.
- b) If the spill involves large quantities of petrol or diesel spillage, it should be considered as an Emergency and the Emergency Response Plan should be activated.
- c) If a minor spill occurs, efforts must be made to contain the spill immediately. Sawdust or sand should be used to contain the spill from spreading. When the spill has been contained, the spilled material must be removed immediately using appropriate means and stored in storage drums. None of the spill shall be flushed into the drainage system.
- d) For the purpose of spill containment 20kg pails containing sand or sawdust must always be placed next to all bulk storage tanks.
- e) Soil contaminated by fuel and oil must not be washed with water. The contaminated soil should be removed and stored in waste storage drums and labelled accordingly.

5.10 FLORA AND FAUNA

5.10.1 Potential Impact

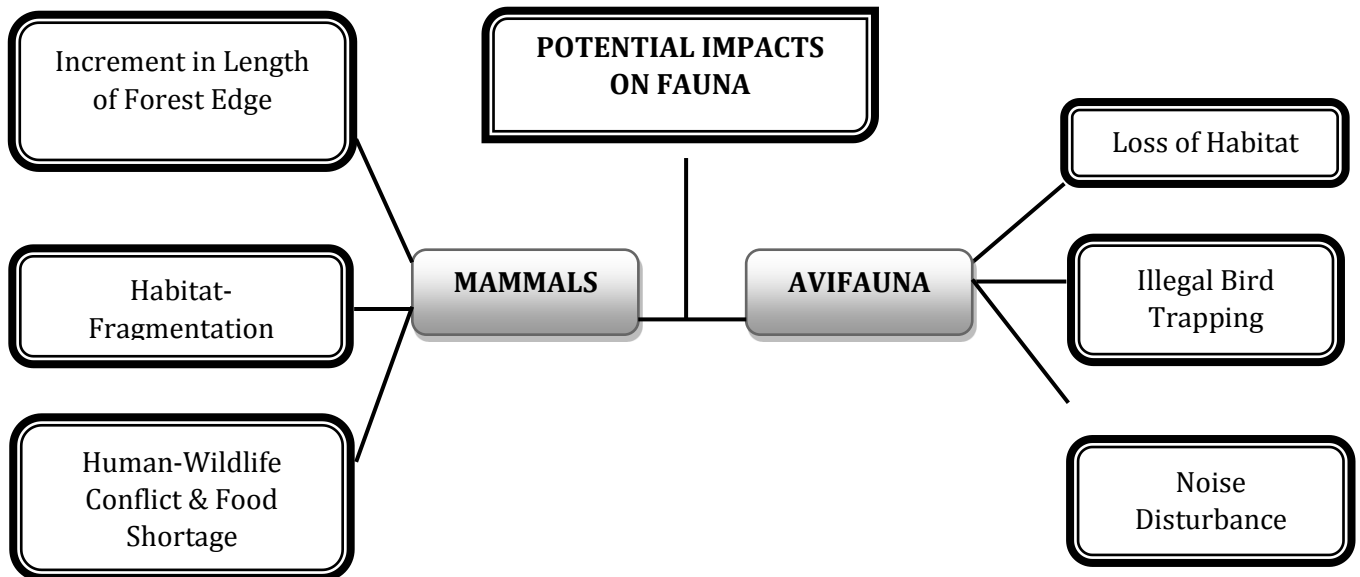
Flora

The project site is a secondary forest that will be conducted for timber harvesting before forest plantation take place. Forest plantation development is a program to develop the logged over forest with replanting of forest species with good management practice. The forest plantation development process will require removal of existing trees such as shrubs and leave the soil uncovered which consequently destroys wildlife habitats.

The direct impacts of vegetation removal are soil erosion, sedimentation, elevated surface runoff and water flow which affect the river water quality.

Fauna

Mammals and avian will face significant impacts during the development phase as mention below:



The potential impacts on fauna are discussed in following paragraphs

Potential Impacts on Mammals and Herpetofauna

I. Loss of Ecosystems and Habitat

Tropical ecosystems are known as the richest and diverse in the world with Malaysia being one of the 17 mega biodiversity countries in the world. Tropical forests are perhaps the most dominant of all the ecosystems in the tropics. The proposed project is part of Slim Forest Reserve which as the name implies should be reserved with natural forests. To meet economic needs, selective and sustainable logging or less destructive eco-tourism should be applied. As reported in the existing environment chapter, the proposed project is habitat for some mega fauna such as leopard, Malayan tapir, pig-tailed macaque, and sun bear as well as home to myriad of medium and small sized fauna species. The establishment of the proposed project inevitably would lead to clearing of vegetation and habitat. It would result in loss of the rich ecosystem and habitats present at the site i.e. forest and associated habitat. The loss of habitat will lead to loss and displacement for many fauna as described below. The deforestation and opening of earth tracks also opens up other impacts such as poaching as described further below.

II. Wildlife and Fauna Loss

There were numerous totally protected and vulnerable species recorded at the site such as;

1. Leopard;
2. Malayan Tapir;
3. Sun bear;

As a result of the forest and habitat loss, fragmentation and degradation, loss in wildlife and fauna population would be another impact. During the construction stage, slow moving and many medium and small sized wildlife and fauna most probably will not be able to make their escape effectively such as turtles, tortoises, lizards, amphibians,

burrowing and nocturnal (active by night) species. Strictly arboreal (tree canopy dwelling) species namely monkeys and squirrels would be affected if no contiguous tree canopy is available linking to safer habitat. They would also face competition and conflict with the existing fauna as there are carrying capacities for each habitat. During the competition and conflict, some might sustain injury and even die. Though certain species are able to make their escape without much problem, they might be reluctant to leave in situations like having nests with young, hatchlings or chicks.

III. Illegal Wildlife Hunting and Collecting

Without strict regulation and monitoring, illegal wildlife hunting and collecting is another likely impact to be experienced by the fauna component. It is not only possibly done by certain labours at the site but also outsiders whom would take the opportunity. Illegal collecting is possibly could happen during the clearing works where the machine operators sometimes might find fauna trapped, exposed, in nest etc. Without strict regulation and supervision certain workers would definitely take the opportunity to collect them to be eaten, kept as pet, sell etc. Although the project developer and contractors may claim that they never let such activities to happen, in reality it is difficult to assure this on the ground on daily basis with many workers including foreign ones unless a knowledgeable and dedicate personnel is employed for this purpose.

IV. Human-Wildlife Conflict

The Department of Wildlife and National Parks Peninsular Malaysia (PERHILITAN) defines human-wildlife conflict as follow:

“Behaviours or acts of wildlife species that may cause death, injury, property destruction, damage of crops, depredation of livestock or could cause fear on public safety.”

The habitat loss experienced by fauna could cause some species to cause human-wildlife conflict especially by pig tailed macaque and wild boar which were recorded at the proposed project. Conversion of their natural ecosystem could cause these species to feed on the crops and fruits. Due to the disturbance, the workers at the site may try to harm them. Additionally, the conflict is also likely to occur within the proposed project itself and other committed plantations nearby.

V. Open Burning and Forest Fires

There is also possibility of fire to occur intentionally or accidentally from the workers and contractors at the site from burning of wastes at their *kongsi*, cigarette butts, sparks from machines etc. which may spread to the forested habitat not only within the proposed project but also to the surroundings. **Figure 5.8** shows examples of open burning involving projects converting forests into plantations. This would further jeopardize the wildlife and fauna surviving in already shrinking, fragmented and degrading habitats. While it is a serious offence to do open burning in Malaysia which carries penalty up to RM 500,000, it is keep on happening especially in projects converting forests into plantations. This is due to, among other, difficulty to monitor it at all times, lack of staff and resources, and the vast areas involved for the forest conversions.



Figure 5.8: Examples of open burning involving projects converting forests into plantations etc. which may also destroy remaining forests and habitats in the surroundings.

Potential Impacts on Avifauna

i) Loss of Habitat

- Most birds built their nests on or in trees or nearby shrub while some on the ground. With such diverse use of trees and its surroundings by the avifauna, tree felling imposes a significant impact to their habitat and survivability.
- This is because a tree and its nearby surroundings provide not just shelter or protection against elements of nature but also provide food (fruits and insects), socializing venues (meeting, gathering, mating), and focal point (navigation, territory) also known as niche.

ii) Illegal Bird Trapping

- During land preparation, the avifauna will face the threat of illegal bird hunting or trapping which may cause species extinction.
- By having the access roads built, accessibility and visibility for the poachers to certain places in the forest area will ultimately increase.
- Most species of birds found in the study area are Totally Protected or Protected by the which means that any attempt to collect these birds from the area must have permission from the local authority i.e. Department of Wildlife and National Parks, or be faced with a fine or jail-term.

iii) Noise Disturbance

- The noise will inevitably increase the existing noise levels and hence directly or indirectly cause a disturbance to the existing bird's community due to the movement of heavy vehicles during the development phase.
- Birds are known to guard their territory via calls and sounds (territorial call). Territorial song is only effective if it is heard by the other birds, and noise from heavy vehicles can be so loud that the bird song may be distorted resulting in difficulties. There also may be a chance that other individuals of the same or other species might intrude their territories which later on induce quarrels and fights. When quarrels and fights endure for a period of time, their survivability (gaining food to raise young and mating) can be dramatically reduced.

5.10.2 Mitigation Measures

A. Flora

- Vegetative cover along rivers and streams must be retained to act as buffer zones to protect river banks and river ecosystems.
- Bare areas shall be stabilized with terracing at the hilly or slope area and planted with cover crops after completion of land clearing works. The cover crop will help to maintain soil nutrient that needed by the crops and sustain soil moisture that plays an important role in the development of weather patterns and the production of precipitation.
- Start the land clearing near the existing roads and moving towards the forest areas

B. Fauna

Mitigating Measures for Terrestrial Vertebrate Fauna

I. Mitigation Measures – Loss and Displacement of Fauna

As highlighted in impact section, many of the fauna recorded and expected were those of smaller and slow moving ones which are often taken lightly compared to mega fauna. Some of them won't be able to make escape for factors mentioned above in the impact section. Without relocation effort for them, they are likely to sustain injury or die. Reptiles and amphibians are anticipated to be the most in need of rescue and relocation. As such, it is necessary to;

- Employ knowledgeable and experienced environmental officer to look into this matter. Among the responsibilities of this person is to ensure the facilitation of safe fauna escape and no or very minimal loss in fauna. Despite the fact that almost all of the habitat and vegetation had been cleared, the remaining or any further clearing works must be monitored. Any fauna which became trapped, disoriented, injured and having problem to make escape must be managed through rescue and relocation to suitable and secured habitats nearby. The appointed person is also to work closely with the authorities especially Department of Wildlife and National Parks (DWNP) locally known as Jabatan PERHILITAN. Active nests especially belonging to large raptors (bird of prey

such as eagles) must be preserved temporarily until the young or chick develop and leave the nest.

- The clearing should be heading towards the remaining forest and habitats in the surroundings and must not be fragmented.

II. Prohibition of Wildlife Poaching and Trapping

- The contractors and workers must be prohibited from wildlife hunting and poaching. The Wildlife Conservation Act 2010 [Act 716] states that any person who commits an offence (illegal poaching and hunting) be liable to a fine and imprisonment for a term (**Plate 8.7.1**). Offences pertaining to totally protected species carry a mandatory jail term and a fine of up to RM 500 000 if convicted



Plate 8.7.1: Offence & Penalty for Wildlife Trapping or Hunting

- Access roads must be constructed for the purpose of the forest plantation development only. Unauthorized individuals shall prevent from using these roads to prevent illegal hunting and trapping.
- Place “No Hunting” and “No Trespassing” signage at appropriate locations that can be seen by the contractors and workers (**Plate 8.7.2**).



Plate 8.7.2: No Hunting Signage



Plate 8.7.3: Example of Warning Sign for Wildlife Poaching

- 24 hours surveillance at the entrance of the access road to the project site will prevent the intrusion by poachers and other intruders hunting or trapping of wildlife species (Plate 8.7.4).



Plate 8.7.4: Example of Permanent Guard House

- Any information related to illegal hunting and poaching should be reported to the contractors and/or the plantation management immediately and that information must be channeled to the relevant enforcement authority, e.g. Department of Wildlife and National Parks, Police Department and etc.
- A Wildlife Management Plan (WMP) needs to be established to counter potential negative impacts of the project. The proposed environmental monitoring and auditing program will ensure that environmental requirements are observed and abided by the project proponent.
- Wildlife Monitoring Team should be established to monitor the encroachment of wildlife (eg: Elephant, Sunbear , Tapir and etc.) with the cooperation of PERHILITAN.

Reporting to Department of Wildlife and National Park

- Any human-wildlife conflict occur on site should be reported to the Department of Wildlife and National Park (DWNP).
- Cooperate and seek advices with the DWNP on any plans involving the mitigation of encroachment by mammals (eg. Installations of LED light for mitigating elephant disruption)

Development of Ditch

The project proponent/plantation management shall seek advice from the PERHILITAN for the development of a ditch or fencing at the boundary of project site taking into account the most efficient protection measure and costs. The size of the trench is usually 3m x 2m. Once constructed, the ditch or any other structural control system shall be well maintained to ensure its' effectiveness.

Figure 8.7.1 shows the mitigation strategies for wildlife. **Plate 8.7.5** shows the example of animal trench to protect from wildlife encroachment.

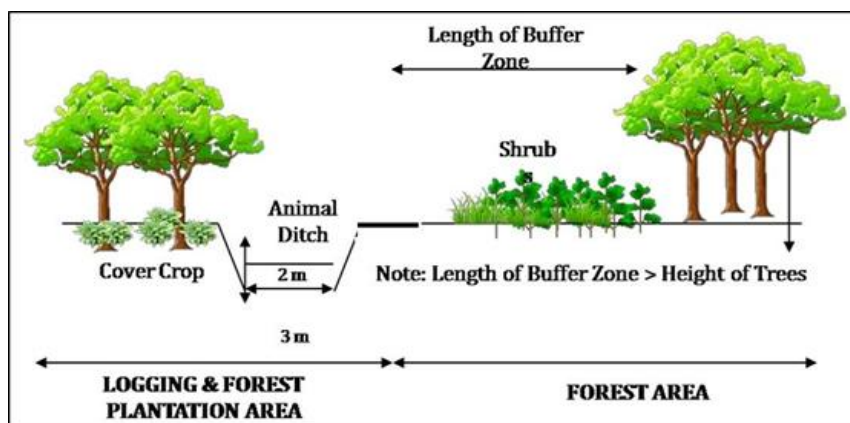


Figure 8.7.1: Ditch for Human-Wildlife Conflict Prevention



Plate 8.7.5: Example of Animal Trench

Avifauna

Mitigation Measures for avifauna

i. Incident Reporting

- If a tree containing an active nest of a specially protected species is felled, the incident should be informed and reported to the wildlife custodian, the Department of Wildlife and National Parks.
- In this case the advice on what practical steps might be possible should be sought in order to provide necessary aids to translocation by employing proper handling procedure.

- Furthermore, if the workers are able to see a suspicious individual, with a trap in hand and able to see his/her vehicles, attempt to get a license plate number and a description of the individual so that the authority will take an action regarding this matter.

ii. Signage on Prohibition of Bird Hunting or Trapping

A warning post must be erected in order to remind the poachers about the offense and the penalty they have to face if committed breaking the law. Proper signage on prohibition of bird hunting or trapping must be placed at suitable conspicuous locations for workers and contractors (**Figure 8.7.2**). Violators will be prosecuted if they break the law.



Figure 8.7.2: Example of No Hunting Sign

5.11 FLOOD RISK

5.11.1 Potential Impacts and Mitigation Measure

Potential Impacts

In the worst case scenario, a significant impact of land preparation activities and other acts such as removing the surface ground cover will decrease rain interception and surface retention of rain water. An inversely proportional relationship between the amount of runoff and time of concentration (collection) of rain water in catchments will occur. The amount of runoff will increase and the time of concentration (collection) of rain water in catchments will decrease. Other than that, improper management of biomass will cause clogging of the drainage systems, hence increase the potential for flood occurrence.

Unsuitable drainage design can also contribute to overflow i.e. the drainage system may fail to cater for the volume of water during the rainy season thus causing floods to occur in the proposed plantation area. However, if proper mitigation measures are applied and best management practices to be used during the project development, it will help to improve the water flow.

Mitigation Measure

- Preservation of the river reserve and vegetation (riparian zone) in accordance to guidelines by authorities must be followed
- Encroachment and destruction of natural vegetation on “buffer zones” should be strictly prohibited.
- Frequent ambient water quality monitoring during the land-clearing and operational phases of the project should be captured in the Environmental Management Plan (EMP) of the site, for both low flow and high flow conditions.
- Environmental Audit (EA) throughout the land-clearing phase is recommended to monitor the actual impacts from the project site.

5.12 SOCIO ECONOMY

5.12.1 Potential Impacts and Mitigation Measure

Potential Impacts

During the **development phase**, there are several potential impacts that would require mitigation measures. The followings are some of the impacts identified:

a. Job Opportunities

The proposed project is expected to generate employment opportunities both for the local people and foreign workers. However, they hope the Project Proponent will prioritize and hiring locals instead of foreign workers. The type of employment such as guard, driver lorry and a few planters during development activities.

b. Human-Wildlife Conflict

Human-wildlife conflict is expected to be encountered mainly outside the proposed project site. The project proponent has to look into this matter and undertake appropriate actions such as work closely with the Department of Wildlife and National Parks (DWNP). This is to ensure that any interference of wildlife can be reduced and minimize the impacts of the workers on-site and the nearest settlement area and their crops.

c. Orang Asli Roaming Area

There are two Orang Asli villages found within 5km from the proposed project site: Kampung Orang Asli (Pos Bersih) and Kampung Orang Asli Sungai Gesau. These Orang Asli do depend, and their roaming area is most likely within the Bukit Slim Forest Reserve boundary to find forest products such as petai and rattan (seasonal). It is inconvenient for them to roam elsewhere as they are already familiar with the existing forest. Some of these Orang Asli works as rubber tappers.

d. Risk of flooding around the village

During the socio survey, the villagers mentioned that flood issues happened during monsoon season, especially in the lowland village area and the Orang Asli settlement's access road.

The following are some of the potential impacts **during operations stage**:

a. Human Wildlife Conflicts

There would be an encroachment of wildlife on and off to the plantation area even though mitigation measures have been taken to minimize their occurrence. The project proponent and the Department of Wildlife and National Parks have to work together to ensure that the conflict is minimized.

b. Employment Opportunities

The plantation is expected to employ at least 8 professionals in the management of the estate and more than 10 full- time workers.

Mitigation Measures

a) Job Opportunities

The Project Proponent should sincerely approach local community heads and advertise to the community to encourage locals to participate in jobs suitable to locals' skills.

b) Management of Wildlife

Project proponent should follows as proposed by consultant in section for wild management. Awareness should be conduct to workers and locals on illegal and wildlife encroachment to make them aware of the laws and potential risks. Before conducting any actions, consultation from the Department of Wildlife and National Parks is essential before conduct any activities.

c) Orang Asli Roaming Area

Orang Asli roaming area covers the area of Bukit Slim Forest Reserve. The forest products could also be found at other adjacent forest areas where Orang Asli can find other sources of petai, rattan and forest products. Their livelihood would not be totally destroyed and they can still find them in other areas beside the proposed project site. But the Orang Asli may have travel further distances. Further, Orang Asli is still a concern as the proposed project would destroy their roaming areas.

d) Flood

The project proponent needs to emphasize the importance of building a drainage system prior to starting the project. Implement mitigation measures and best management practices (BMP) (e.g., turfing, temporary earth drains, check dams, sandbags, sediment basin, sediment fence) on-site to control peak discharge to the water bodies and control erosion sediment removal at surface dumps following EMP, ESCP and MASMA guidelines. The proposed sediment basin at project site will be used as a temporary detention pond for flood control at downstream project.

e) Corporate Social Responsibility (CSR)

CSR is one of the approaches that help those affected people to be appreciated and improved their social wellbeing. Example of CSR can be community service such as gotong royong, tree planting and maintenance of access road (paved / tar road).

f) Public Engagement

Annual community meetings between the communities affected and project proponents need to be carried out. The project proponent should always update the progress or problem from developing the proposed project to prevent any misunderstanding and ensure the development of the proposed project can be operated smoothly.

g) Other mitigation measures

- The project site must also have demarcated boundary markers and fences to determine the working area and to avoid unnecessary trespassing from local people and wildlife that can cause incidents.
- Existing road condition needs to be upgraded by having proper signage and traffic guides.
- Suppose there is a case of disturbance from wildlife. In that case, the Department of Wildlife and National Park involvement is essential for any advice and suitable actions based on the management's inventory records.
- The Project Proponent must visually observe, monitor and control all the machinery used in the site preparation phase. The Project Proponent must also have time limits

(8 am to 6 pm daily) to operate heavy machinery to minimize the noise annoyance, especially during the late evening.

- Project Proponent also needs to monitor air pollution i.e., fugitive dust generation that the proposed activities may cause. It may help the local people to live in a more comfortable condition during this phase.
- The Project Proponent and his contractors must observe the following aspects:
 - Workers must be given sufficient instructions, training, advice and information of good work procedures, work ethics, and code of conduct and safety rulings during working hours. The work/ base camps must be sited away nearby local settlement area.
 - The relationship between the worker and local people must also be monitored to avoid any problem generated by a poor understanding of local culture and values.

5.13 SAFETY AND HEALTH

Occupational safety and health is controlled under the Occupational Safety and Health Regulations 1994 and the Factories and Machinery Act, 1967. The provisions apply to workers as well as to others who are likely to be affected by acts at the work place.

Accidents may occur at work place and these may range slight injuries to loss of life. Particular concerns are accidents during the construction phase at the work site and on the road during transport/haulage. With regard to the project safety is also associated with potential danger of encounter with large mammals and snakes.

Mitigation Measure

Safety must be maintained at all times. Safety signs shall be installed at strategic places within and outside the project site (**Figure 5.13**). The contractors appointed are to undertake the works that would take the necessary precautions in the movement and operation of heavy machinery within the site for the safety of both the workers and the nearby residents.



Figure 5.13: Example of Safety Warning Sign

The contractors/sub-contractors shall ensure that occupational safety and health of the project workforce are safeguarded, by the provision of safety equipment/systems, personal protection equipment (PPE) and /or effective site safety procedures. These provisions shall be in accordance with the Occupational Safety and Health Act 514, 1994 and the requirements of the Department of Occupational Safety and Health (DOSH).

5.14 PROJECT ABANDONMENT AND REHABILITATION

Project abandonment can occur at any stage of the Project development or operation, which may due to the down turn of the nation's economy, social acceptability of the project in the community, or unforeseen management and technical problems. During project abandonment, it may happen an incident especially the intrusions of poachers and wildlife encroachment.

During project abandonment and rehabilitation, the following mitigation measures shall be implemented:

- The project proponent must endeavor to vacant the project site in an environmentally responsible manner and prepare a Project Abandonment Plan for the main stages of development.
- Warning signs have to be installed at all abandoned sites to prevent unauthorized entry and encroachment by illegal squatters.
- All vehicles involved in the project development must be taken out of the sites.
- All environmental control measures (control of erosion, drainage disruptions, and accumulation of rotting biomass) must be initiated following the guidelines produced by the Department of Environment, and Department of Irrigation and Drainage.
- Provide regular inspection of the sites and take necessary measures to ensure their sanctity.

5.15 ENVIRONMENTAL MONITORING PROGRAM

The EMP will incorporate monitoring programs to inspect and monitor pollution sources include water, air and noise monitoring and analyses, to be undertaken through the construction and operation phases of the Project. Environmental monitoring forms the basis upon which the effectiveness of the EMP and the implementation of the EMP are assessed. Environmental monitoring also provides information against which compliance to the relevant conditions and regulations can be checked to help identifying areas for improvement. The main objectives of the monitoring should include:

- Obtaining baseline data of environmental parameters within the project site;
- Assessment of environmental compliance to conditions and regulations required for the project;
- Assessment of the effectiveness of the EMP identifies any changes needed to meet the compliance standard recommended.

5.15.1 Environmental Monitoring Sampling Stations

For environmental program monitoring, Water Quality have twelve (12) sampling stations, air and noise level stations monitoring have three (3) sampling stations (same as baseline). **Table 5.20** shows the description and location of sampling stations. **Table 5.21** shows the Summary of Monitoring Program Schedule.

Table 5.20: Location of Sampling Station for Environmental Monitoring Program

Sampling Location	GPS Coordinate	Description
WQ1	101° 34' 5.373" E 3° 56' 12.659" N	(Sg. Kabut (Tributary of Sg Gesau) – Within project boundary)
WQ 2	101° 34' 17.166" E 3° 55' 43.715" N	(Sg. Gesau – Upstream)
WQ 3	101° 33' 24.075" E 3° 56' 12.171" N	(Tributary of Sg. Gesau – Within project boundary)
WQ 4	101° 33' 0.546" E 3° 56' 25.972" N	(Tributary of Sg. Gesau – Within project boundary)
WQ 5	101° 33' 25.163" E 3° 55' 40.535" N	(Tributary of Sg. Gesau – Within project boundary)
WQ 6	101° 32' 41.528" E 3° 55' 40.229" N (Sg. Padi	(Tributary of Sg Gesau) – Within project boundary)
WQ 7	101° 32' 29.218" E 3° 55' 20.555" N	(Sg. Merdu (Tributary of Sg Gesau) – Within project boundary)
WQ 8	101° 32' 9.234" E 3° 55' 57.623" N	(Sg. Gesau – Downstream)
WQ 9	101° 31' 11.980" E 3° 55' 16.347" N	(Sg. Gesau – Downstream)
WQ 10	101° 30' 22.776" E 3° 55' 9.567" N	(Sg. Slim – Upstream)
WQ 11	101° 30' 28.477" E 3° 54' 54.150" N	(Sg. Gesau – Downstream)
WQ 12	101° 30' 15.875" E 3° 54' 16.092" N	(Sg. Slim – Downstream)
AN1	101° 31' 57.616" E 3° 56' 18.476" N	Access Road
AN2	101° 30' 36.330" E 3° 55' 57.425" N	Nearest settlement, Pos Bersih
AN3	101° 30' 44.199" E 3° 54' 55.048" N	Nearest settlement, Kg Sg Gesau

*Note

WQ = Water Quality Sampling Station

AN = Air and Noise Level Sampling Stations

The location of sampling stations can be referred to **Figure 5.2**.

Table 5.21: Summary of Monitoring Program Schedule (During Construction Stage)

Standard Compliance

Water Quality : Class IIB of National Water Quality Standards (NWQS)

NO.	ENVIRONMENTAL REQUIREMENT	LOCATION OF SAMPLING		PARAMETER	FREQUENCY	COMPLIANCE STANDARD*
		DURING CONSTRUCTION	DURING OPERATIONAL			
1.	Water Quality	WQ1, WQ2, WQ3, WQ4, WQ5, WQ6, WQ7, WQ8, WQ9, WQ10, WQ11 & WQ12	-	1. pH 2. Temperature(°C) 3. Biochemical Oxygen Demand (BOD ₅) 4. Chemical Oxygen Demand 5. Dissolved Oxygen 6. Total Suspended Solid 7. Ammoniacal Nitrogen (NH ₃ -N) 8. Oil and Grease (O&G) 9. Turbidity 10. <i>Total Coliform</i>	Monthly	6.0 – 9.0 - 3 mg/l 25 mg/l 5 - 7mg/l 50 mg/l 0.3 mg/l - 50 NTU 400 (count/100 ml)
2.	Sediment Trap/Basin	Refer LDP2M2		Total Suspended Solid (TSS)	Monthly, & based on conditions at project site	50 mg/l
3.	Air Quality	A1, A2, A3	-	Particulate Matter <10 micron (PM ₁₀)	Quarterly	100 ug/m3
4.	Noise Level	N1, N2, N3	-	LAeq, Lmin, Lmax, L10, L90	Quarterly	LAeq Daytime- 55 dBA Night-time- 50 dBA

Standard Compliance

Water Quality	:	Class IIB of National Water Quality Standards (NWQS)
Air Quality	:	Malaysia Ambient Air Quality Standard and EIA Approval
TSS	:	EIA Approval Conditions
Noise Level	:	The Planning Guidelines for Environmental Noise Limits and Noise

5.15.2 Environmental Mainstreaming Tools

Environmental mainstreaming is a tool for accomplishing the goal of cultivating self-regulation cultured in the regulated sectors. Environmental mainstreaming refers to the integration of environmental concern, aspects and considerations in all business processes.

The following are the mainstreaming elements which are required to be implemented:

- Environmental Policy (EP)
- Competent Person (CP)
- Performance Monitoring (PM)
- Environmental Performance Monitoring Committee (EPMC)
- Environmental Regulatory Compliance Monitoring Committee (ECRMC)
- Record Keeping
- Data Analysis and Interpretation
- Mini Laboratory
- Discharge and Emission Monitoring
- Reporting and Communication

Environmental Mainstreaming must be reported to DOE within six months from the commencement of the implementation.

5.15.3 Proposed Environmental Mainstreaming

Customarily all the elements for Environmental Mainstreaming stated above are subjected to the industrial manufacturing project only. For non-manufacturing projects, the mainstreaming elements discussed can be modified to suit their own particular situation.

Proposed Environmental Mainstreaming for this project is as follows:

Performance Monitoring (PM)

This Project site will apply Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2) in order to avoid disturbance on the environment in the project area. A performance monitoring (PM) is applied to monitor the effectiveness of the LD-P2M2. **Table 5.25** summarized the description on PM parameters.

Table 5.22: The Performance Monitoring (PM) Components

LD-P2M2 TOOLS	PERFORMANCE MONITORING (PM) PARAMETERS/ STATUS	RECOMMENDED LIMITS	MONITORING LOCATIONS	FREQUENCIES
Sediment Basin / Trap	Silt Marker	2/3 depth from sediment	The locations refer to the LD-P2M2	Weekly or after rain event (in-situ). Take photo.
Perimeter Drain	Performance	-		Quarterly
Earth Drain with Check Dam	Sediment level			Quarterly
Cover Crop	Performance			Quarterly
Temporary or permanent waterway crossing (culvert/bridge)	Structure and Performance	-		Quarterly

As part of the EIA Improvement Package, an application software for online BMPs reporting called “**ESC ON LINE**” has been developed by the Department of Environment and is now ready for use. The Project Proponents or their authorized personnel are now required to utilize the software for reporting BMPs inspection to the DOE. The reporting must be made only through the **ESC ON LINE** and not through any other means.

CADANGAN PEMBANGUNAN LADANG HUTAN SELUAS 400 HEKTAR (988.42 EKAR) DI SEBAHAGIAN KOMPARTMENT 78 & 79 HUTAN SIMPAN BUKIT SLIM, MUKIM SLIM, DAERAH MUALLIM, PERAK DARUL RIDZUAN

Figure 5.8: Online Reporting of BMPs Inspection for Erosion and Sediment Control

Compliance Monitoring (CM)

Compliance monitoring (CM) program is being employed in the Project site, in order to assess the overall project compliance and opportunity for optimization and further improvement in environmental management of the Project. The CM program is used to monitor the effluent discharge and noise level. **Table 5.26** shows the proposed parameters for monitoring.

Table 5.23: The Compliance Monitoring (CM) Descriptions

ACTIVITY	REGULATED PARAMETERS	APPLICABLE STANDARDS	MONITORING LOCATIONS	FREQUENCIES
Noise	L _{Aeq}	Day: < 55 dBA Night: < 50 dBA	Three (3) points may refer to Figure 5.2	Quarterly
Water Quality *(Discharged from Sediment Basin)	Total Suspended Solids (TSS)	50 mg/L	Twelve (12) points refer to Figure 5.2 and LD-P2M2 Plan (Appendix E)	After 12.5 mm rainfall (using rain gauge)
	Turbidity	250 NTU		

Impact Monitoring

The establishment of forest plantation may result in some impacts on the condition of the area. The description on the monitoring parameters is shown in **Table 5.24**

Table 5.24: The Impact Monitoring Component (IM)

IMPACTS	MONITORING PARAMETERS	MONITORING LOCATIONS	FREQUENCIES
Air pollution	PM ₁₀	Three (3) points refer to Figure 5.2	Quarterly
Noise Annoyance	LAeq	Three (3) points refer to Figure 5.2	Quarterly
Water Pollution	Total Suspended Solids (TSS)	Twelve (12) points refer to Figure 5.2	Monthly
	Biochemical Oxygen Demand (BOD)		
	pH		
	Ammoniacal Nitrogen (NH ₃ -N)		
	Dissolved Oxygen (DO)		
	Chemical Oxygen Demand (COD)		
	Temperature		
	Oil and Grease (O&G)		
	Turbidity		
	Total Coliform		

Environmental Officer

Environment Officer (EO) who is competent and fully responsible for matters relating to environmental management and the implementation of all control measures during land work, construction and operation shall be appointed. The full name, post and contact details of the officer should be submitted to the Department of Environment no later than fourteen (14) days prior to the earthwork and construction commences. Among the duties of this officer are:

- i. Supervise erosion control and sediment control at site as specified in the LDP2M2 and Environmental Management requirements of the project;
- ii. Updating Site Daily Book;
- iii. Updating Rainfall Record;
- iv. Take and Record the Record of Rainfall Record;
- v. Conduct inspections on pollution control measures as well as Best Management Practices (BMPs) structures, erosion control and sediment projects including drainage perimeter, check damn, silt trap, wash through, slope protection and others daily;
- vi. Conduct in-situ management of turbidity parameters at the point of departure within a period not exceeding 30 minutes after rain. If rainfall lasts more than 24 hours, measurements should be carried out once daily. (Failure to comply with these terms should be noted for a sound and reasonable reason)

* Note: Erosion control and erosion control should have CESSWI (Certified Erosion Sediment and Stormwater Inspector) or CISEC (Certified Inspector on Sediment and Erosion Control) or any competent certificate recognized by the Director General of Environmental Quality.

5.15.3 Report Deliverables

There are reports and form need to be submitted throughout the project development as follows:

Environmental Monitoring Report

The Environmental Monitoring Reports have to be submitted by monthly to Jabatan Alam Sekitar Negeri Perak. The content of the report consist of monthly water quality data and quarterly air and noise monitoring data.

EIA 1-18 and 2-18 Forms

The E 1-18 and 2-18 forms have to be submitted to Jabatan Alam Sekitar Negeri Perak by quarterly. Summary of work progress must be submitted using the EIA 1-18 forms and compliance report for EIA Approval Condition must be submitted using the EIA 2-18 forms. **Appendix C** shows the EIA 1-18 and EIA 2-18 Forms that will be submitted to Jabatan Alam Sekitar Negeri Perak.

Online Report

- Report for BMPs inspection if rain data is more than 12.5 mm need to submit in 24 hours after inspection
- Report for BMPs maintenance after 7 days of maintenance work

Aerial View

The Project Proponent shall engage a service provider to provide aerial photography and videography throughout the duration of development phase. The photography and videography shall be conducted and submit to Jabatan Alam Sekitar Negeri Perak once a month