

TABLE OF CONTENT

ABBREVIATION

PROJECT PROPONENT'S PLEDGE

QUALIFIED PERSON'S DECLARATION

RINGKASAN EKSEKUTIF

EXECUTIVE SUMMARY

TABLE OF CONTENT	i
------------------------	---

LIST OF TABLE.....	ix
--------------------	----

LIST OF FIGURE.....	xiv
---------------------	-----

LIST OF PLATE.....	18
--------------------	----

CHAPTER 1: INTRODUCTION	1-1
-------------------------------	-----

1.1 PROJECT TITLE	1-1
-------------------------	-----

1.2 PROJECT PROPONENT AND QUALIFIED PERSON	1-1
--	-----

1.2.1 Project Proponent	1-1
-------------------------------	-----

1.2.2 EIA Consulting Firm	1-2
---------------------------------	-----

1.3 PROJECT LOCATION.....	5
---------------------------	---

1.3.1 Relevant Maps Showing Project Location and Sensitive Receptor	1-12
---	------

1.3.1.1 Environmentally Sensitive Area (ESA).....	1-12
---	------

1.3.1.2 Central Forest Spine (CFS).....	1-12
---	------

1.4 Prescribed Activity is subjected to Section 34A, Environmental Quality Act, 1974.....	1-16
---	------

1.4.1 Conformance of Proposed Project to Government's Development Plan	1-16
--	------

1.4.1.1 Rancangan Tempatan Majlis Daerah Mersing 2030 (Penggantian).....	1-16
--	------

1.4.1.2 Johor Structure Plan 2030	1-16
---	------

1.4.1.3 12 th Malaysia Plan.....	1-18
---	------

1.4.2 Other Regulatory Related to Palm Oil Industry	1-19
---	------

1.5 EIA OBJECTIVES.....	1-20
-------------------------	------

CHAPTER 2: TERMS OF REFERENCE	2-1
2.1 OVERVIEW OF APPROVED TERMS OF REFERENCE	2-1
2.2 TOR CHECKLIST	2-1
2.3 SUMMARY OF TOR	2-8
2.4 STUDY BOUNDARIES AND POTENTIAL IMPACTS	2-8
CHAPTER 3: STATEMENT OF NEED	3-1
3.1 INTRODUCTION	3-1
3.2 OIL PALM PLANTATION	3-1
3.3 COCONUT PALM PLANTATION	3-7
CHAPTER 4: PROJECT OPTIONS.....	4-1
4.1 SITE OPTION	4-1
4.2 PROJECT OPTIONS	4-1
4.2.1 Build-Out Option.....	4-1
4.2.2 No-Build Option.....	4-2
4.3 TECHNOLOGY OPTIONS.....	4-2
4.4 RAW MATERIALS OPTIONS	4-3
4.5 PLANTATION METHOD OPTIONS.....	4-4
4.6 LAYOUT OPTIONS	4-4
4.7 ALIGNMENT OPTIONS.....	4-5
4.8 OPERATION OPTIONS.....	4-6
CHAPTER 5: PROJECT DESCRIPTION	5-1
5.1 PROJECT CONCEPT.....	5-1
5.2 PROJECT LOCATION.....	5-1
5.3 PROJECT BRIEF	5-4
5.4 PROJECT ACTIVITIES AND COMPONENTS	5-7
5.4.1 Pre-Planting Stage	5-10
5.4.2 Site Preparation	5-10
5.4.3 Cover Crop Establishment	5-15

5.4.4	Field Establishment.....	5-15
5.5	ABANDONMENT	5-22
5.6	PROJECT IMPLEMENTATION SCHEDULE	5-22
CHAPTER 6: EXISTING ENVIRONMENT.....		6-1
6.1	LAND USE.....	6-1
6.1.1	Existing Land Use Within Project Site	6-1
6.1.2	Land Use within 5 km Radius.....	6-2
6.1.3	Zoning	6-8
6.1.4	Environmental Sensitive Area	6-8
6.2	TOPOGRAPHY	6-11
6.2.1	Surface Soils	6-14
6.2.2	Soil Suitability.....	6-18
6.3	GEOLOGY.....	6-23
6.3.1	Site Geology	6-24
6.3.2	Structure	6-24
6.3.3	Geology and Mineral	6-24
6.4	HYDROLOGY	6-27
6.4.1	Water Use	6-31
6.4.2	Flood Prone	6-31
6.5	HYDROGEOLOGY	6-31
6.6	METEOROLOGY.....	6-34
6.6.1	Ambient Air Temperature	6-34
6.6.2	Humidity	6-35
6.6.3	Evaporation.....	6-36
6.6.4	Rainfall and Rain days	6-36
6.6.5	Mean Sea Level (MSL) Pressure	6-37
6.6.6	Highest Hourly Mean Wind Speed	6-38
6.6.7	Wind Frequencies	6-39

6.7	BASELINE DATA.....	6-40
6.7.1	Ambient Air Quality	6-40
6.7.1.1	Methodology	6-43
6.7.1.2	Result and Discussion	6-43
6.7.2	Noise Level	6-44
6.7.2.1	Methodology	6-47
6.7.2.2	Result and Discussion	6-47
6.7.3	River Water Quality	6-48
6.7.3.1	Methodology	6-52
6.7.3.2	Result and Discussion	6-53
6.7.3.3	Water Quality Index (WQI).....	6-65
6.7.4	Groundwater Quality	6-67
6.7.4.1	Methodology	6-72
6.7.4.2	Result and Discussion	6-74
6.7.4.3	Groundwater Quality Index	6-85
6.8	FLORA AND FAUNA	6-86
6.8.1	Methodology	6-87
6.8.2	Flora Composition	6-89
6.8.3	Fauna Composition	6-91
6.8.3.1	Mammalian Fauna	6-94
6.8.3.2	Avian Fauna.....	6-98
6.8.3.3	Reptilian Fauna.....	6-108
6.9	SOCIO ECONOMIC.....	6-113
6.9.1	Methodology	6-113
6.9.2	Zone of Influence (ZOI)	6-114
6.9.3	Proposed Site in Context of the Zone of Influence	6-114
6.9.4	Socio Economic Survey	6-118
6.9.5	Background of the Respondent.....	6-119

6.9.5.1	Gender	6-119
6.9.5.2	Age Structure	6-120
6.9.5.3	Marital Status of Respondent.....	6-121
6.9.5.4	Educational Level.....	6-121
6.9.5.5	Status of Employment and Occupation.....	6-122
6.9.5.6	Household Income	6-124
6.9.5.7	Property Ownership Status and Residency Period	6-124
6.9.5.8	Perception towards the Proposed Development ...	6-125
6.9.5.9	Public Acceptance	6-125
6.9.5.10	Perceived Impact from the Project	6-126
6.9.6	Public Awareness and Acceptance	6-129
6.10	FISHERIES	6-130
6.10.1	Fisheries Assessment	6-131
6.10.2	Data analysis.....	6-131
6.10.3	Result And Discussion	6-131
6.10.4	Inland Fisheries.....	6-136
6.10.5	Output Value and Socioeconomics	6-137
CHAPTER 7: EVALUATION OF IMPACT		7-1
7.1	IDENTIFICATION AND PREDICTION ASSESSMENT OF IMPACTS....	7-1
7.2	OIL PALM AND COCONUT PALM PLANTATION DEVELOPMENT.	7-3
7.2.1	Pre-Development Stage	7-3
7.2.2	Development Stage.....	7-3
7.2.2.1	Logging	7-3
7.2.2.2	Transportation of Machinery and Materials	7-3
7.2.2.3	Land-Disturbing Pollution Prevention Mitigating Measures (LD-P2M2)	7-4
7.2.2.4	Water Quality	7-27
7.2.2.5	Groundwater Quality	7-96

7.2.2.6 Air quality	7-97
7.2.2.7 Noise Level	7-98
7.2.2.8 Biomass Management	7-101
7.2.2.9 Solid Waste Management.....	7-102
7.2.2.10 Scheduled Waste Management.....	7-102
7.2.2.11 Flora.....	7-103
7.2.2.12 Fauna.....	7-103
7.2.2.13 Social and Health.....	7-104
7.2.2.14 Hydrology.....	7-104
7.2.2.15 Fisheries	7-148
7.3 OPERATIONS STAGE	7-149
7.3.1 Water Quality	7-149
7.3.2 Ambient Air Quality	7-158
7.3.3 Noise Level	7-158
7.3.4 Scheduled Waste	7-158
7.3.5 Flora	7-159
7.3.6 Fauna	7-159
7.3.7 Fisheries	7-159
7.3.8 Social Health.....	7-159
7.3.9 Application of Fertilisers and Pest Control	7-161
7.3.10 Harvesting	7-161
7.4 REPLANTING STAGE.....	7-161
7.5 ABANDONMENT STAGE.....	7-162
CHAPTER 8 : MITIGATION MEASURES	8-1
8.1 ADHERENCE TO DOE GUIDELINES	8-1
8.2 PROPOSED MITIGATION MEASURES FOR OIL PALM PLANTATION	8-2
8.2.1 Pre-Development Stage.....	8-2

8.2.2 Development Stage.....	8-2
8.2.2.1 Logging	8-2
8.2.2.2 Transportation of Machinery and Materials	8-3
8.2.2.3 Land-Disturbing Pollution Prevention Mitigating Measures (LD-P2M2)	8-3
8.2.2.4 Water Quality	8-11
8.2.2.5 Groundwater Quality	8-13
8.2.2.6 Air Quality	8-13
8.2.2.7 Noise Level	8-14
8.2.2.8 Biomass Management	8-14
8.2.2.9 Solid Waste Management.....	8-15
8.2.2.10 Scheduled Waste Management.....	8-15
8.2.2.11 Flora.....	8-16
8.2.2.12 Fauna.....	8-17
8.2.2.13 Social and Health.....	8-17
8.2.3.1 Hydrology.....	8-19
8.2.3.2 Fisheries	8-20
8.2.3 Operation Stage	8-20
8.2.3.3 Water Quality	8-20
8.2.3.4 Ambient Air Quality	8-22
8.2.3.5 Noise Level	8-22
8.2.3.6 Scheduled Waste.....	8-23
8.2.3.7 Flora.....	8-23
8.2.3.8 Fauna.....	8-24
8.2.3.9 Fisheries	8-24
8.2.3.10 Social and Health.....	8-24
8.2.3 Application of Fertilisers and Pest Control	8-25
8.2.3.11 Harvesting.....	8-25

8.2.4 Replanting	8-26
8.2 PROJECT ABANDONMENT	8-26
8.3 SUMMARY OF IMPACT AND MITIGATION MEASURES.....	8-27
CHAPTER 9: ENVIRONMENTAL MANAGEMENT PLAN.....	9-1
9.1 OBJECTIVE OF EMP	9-1
9.2 LAND DISTURBING POLLUTION PREVENTION AND MITIGATION MEASURES.....	9-2
9.3 PROPOSED MANAGEMENT PLAN.....	9-9
9.3.1 Waste Management Plan.....	9-9
9.3.2 Biomass Management Plan	9-9
9.4 PROPOSED MONITORING PROGRAMME	9-10
9.4.1 Performance Monitoring (PM)	9-10
9.4.1.1 Total Suspended Solid (TSS).....	9-10
9.4.1.2 Sediment and Erosion Control BMPs.....	9-11
9.4.1.3 Site Inspection	9-12
9.4.1.4 Maintenance Program.....	9-14
9.4.1.5 Record Keeping	9-15
9.4.2 Compliance Monitoring (CM)	9-16
9.4.3 Impact Monitoring (IM)	9-20
9.5 ENVIRONMENTAL AUDIT	9-20
9.6 GUIDED SELF REGULATION.....	9-21
CHAPTER 10: STUDY FINDINGS.....	10-1
REFERENCES	
APPENDICES	

LIST OF TABLE

Table 1-1: List of Consultant	1-3
Table 1-2: List of Assistant Consultants/ Team Members	1-4
Table 1-3 : Geographical Coordinates.....	1-9
Table 2-1: Item to be Included in the EIA Study	2-2
Table 2-2: Summary of Study Boundaries.....	2-8
Table 3-1: Oil Palm planted area as of December 2020 (Hectares).....	3-4
Table 3-2: Gross Domestic Products of Agricommodity-Based Activities at.....	3-5
Table 3-3: Planted Area and Production of Industrial Crops by State, Malaysia, 2019	3-10
Table 3-4: Main Information of Coconut, 2013 – 2018	3-11
Table 3-5: Average Productivity for Different Variety of Coconut	3-11
Table 3-6: Potential Production for Different Type of Coconuts	3-12
Table 3-7: Differences of Pandan and Matag Coconut.....	3-12
Table 3-8: Malaysia Export Value of Coconut Product, 2014-2019.....	3-13
Table 3-9: Malaysia Export Value of Coconut Product, 2014-2019	3-14
Table 5-1: Existing Land Used within the Project Site	5-2
Table 5-2: Logging License Obtained from Forestry Department.....	5-4
Table 5-3 : Coconut Palm and Oil Palm Area To Be Planted	5-5
Table 5-4: Project Phasing and Activities	5-12
Table 5-5: List of Equipment	5-14
Table 5-6: Proposed Project Implementation Schedule for Oil Palm and Coconut Palm Plantation	5-23
Table 6-1 : Details Land Use within 5 km radius from Project Site	6-6
Table 6-2 : Environmental Sensitive Area from Project Site.....	6-8
Table 6-3: Summary of Soil Series.....	6-14
Table 6-4 Percentage of Soil Suitability for Palm Oil.....	6-19
Table 6-5: Soil Type and suitability within Project Site	6-19
Table 6-6: Summary of Wind Frequencies of Occurrence and Directions.....	6-39
Table 6-7: Ambient Air Quality Sampling Stations.....	6-40
Table 6-8: List of Parameters and Method Sampling for Ambient Air Quality.....	6-43
Table 6-9: Results for Ambient Air Quality	6-43
Table 6-10: Noise Level Sampling Stations.....	6-44
Table 6-11: List of Parameters and Methodology for Noise Level Measurement ..	6-47
Table 6-12: Results for Noise Level Measurement (Day Time).....	6-47
Table 6-13: Results for Noise Level Measurement (Night Time).....	6-48

Table 6-14: River Water Quality Sampling Stations	6-49
Table 6-15: List of Parameters, Storage Container and Method of Preservation for River Water Quality	6-52
Table 6-16: Results of Surface Water Samplings during Low Tide	6-54
Table 6-17: Results of Surface Water Samplings during High Tide	6-55
Table 6-18: Results of Surface Water Samplings for Tasik Labong	6-56
Table 6-19: Water Quality Index and its Status	6-66
Table 6-20: Water Quality Index during Low Tide	6-66
Table 6-21: Water Quality Index during High Tide	6-67
Table 6-22: Water Quality Index at Tasik Labong	6-67
Table 6-23: Groundwater Quality Sampling Stations	6-67
Table 6-24 : List of Parameter and Method Used for Groundwater Quality.....	6-73
Table 6-25: Results for Groundwater Quality	6-75
Table 6-26: Groundwater Quality Index Scale.....	6-86
Table 6-27: Groundwater Quality Index.....	6-86
Table 6-28: Location of the Survey Plots for Flora and Fauna Assessment.....	6-87
Table 6-29: Checklist of Common Plant Species Recorded and Expected to be found in the Study Area.....	6-90
Table 6-30: List of Mammal Species Found or Expected to be found at	6-94
Table 6-31: List of Birds Species Found or Expected to be Found at Project Site	6-99
Table 6-32: List of Birds that were sighted along Transect Line	6-107
Table 6-33: Calculation for Birds Density	6-108
Table 6-34: List of Reptile Species (Snakes, Monitor Lizards & Tortoises) Found or Expected to be Found at Project Site	6-110
Table 6-35: Affected Communities within 5km ZOI	6-115
Table 6-36: Distribution of Respondents by Surveyed Settlement	6-118
Table 6-37 Etnicity of Respondents by Gender.....	6-119
Table 6-38: Population Breakdown of Mersing District (2010)	6-120
Table 6-39: Respondent by Age Group.....	6-121
Table 6-40: Respondents by Marital Status	6-121
Table 6-41: Respondent by Educational Attainment	6-122
Table 6-42: Respondent by Occupation Status.....	6-122
Table 6-43: Working Respondent by Occupation Type	6-123
Table 6-44: Respondents by Monthly Income	6-124
Table 6-45: Respondents by Property Ownership Status.....	6-125
Table 6-46: Respondents by Residency Period	6-125
Table 6-47: Perception towards the Proposed Development	6-126

Table 6-48: Perception toward Proposed Project.....	6-126
Table 6-49: Breakdown of Endanger Residents' Safety According to Settlements	6-127
Table 6-50: Breakdown of Forest and Environmental Destruction	6-127
Table 6-51: Checklist of Freshwater Recorded from Sg. Endau and Tributaries.	6-132
Table 6-52: Selling Prices for Important Fish from The Study River.....	6-134
Table 6-53: Boat-Based Angling Effort at The Study Area	6-137
Table 7-1: Impact Identification Matrix.....	7-2
Table 7-2: Project Development Phases	7-6
Table 7-3: Results of K Value.....	7-11
Table 7-4: LS Calculated using MSMA Approach	7-11
Table 7-5: CP Factors for Various Scenarios	7-13
Table 7-6: Estimated Erosion Rate for the Proposed Project (Phase 1).....	7-14
Table 7-7: Estimated Erosion Rate for the Proposed Project (Phase 2).....	7-15
Table 7-8: IDF Curves for Various Stations in Johor	7-21
Table 7-9: Rainfall Intensity (mm/hr) for Various Duration (minutes).....	7-22
Table 7-10: Rainfall Depth (mm) for Various Duration (minutes).....	7-22
Table 7-11: Recommended Runoff Coefficients for Various Land Use	7-23
Table 7-12: Estimated Sediment Yield for The Sediment Basins	7-24
Table 7-13: Estimated Sediment Yield for The Sediment Basins	7-24
Table 7-14: Estimated Sediment Yield for The Sediment Basins	7-25
Table 7-15: Estimated Sediment Yield for The Sediment Basins	7-25
Table 7-16: Estimated Sediment Yield for The Sediment Basins	7-26
Table 7-17: Estimated Sediment Yield for The Sediment Basins	7-26
Table 7-18: Sampling Time and Data Collection	7-28
Table 7-19: Sampling Activities for Data Collection during High Tide and Low Tide	7-30
Table 7-20: Average Concentration of Water Quality Data for Sg. Endau at Station Jambatan Pekan Endau and Station Jeti Sg. Endau, Kg. Orang Asli Tanah Abang	7-50
Table 7-21: Water Quality for In-Situ Parameters and Lab Analysis	7-53
Table 7-22: Modeling scenarios	7-57
Table 7-23: Pollutants concentration based on previous studies	7-59
Table 7-24: Hydraulic properties during low tides (Input for Segment Flow in WASP)	7-63
Table 7-25: Hydraulic properties during high tides (Input for Segment Flow in WASP)	7-63

Table 7-26: Kinetic Constant for WASP Model.....	7-66
Table 7-27: Identified Significant Noise Generating Sources during Site Clearing Stage	7-99
Table 7-28: Summary of Predicted Noise Levels for The Simulation During the Development Phase	100
Table 7-29: MAM for Every Catchment Outlets.....	7-113
Table 7-30: Annual Minimum Flow for the Study Area Based on Ungauged Site Estimation	7-114
Table 7-31: Estimated $Q_{7,10}$ for various catchments in Johor.....	7-117
Table 7-32: Low Flow Estimation Based on Regional Analysis (Johor)	7-118
Table 7-33 : Lists of Rainfall Stations Used to Derive Annual Average Rainfall and Monthly Average Rainfall	7-124
Table 7-34: Annual Rainfall for Various Station.....	7-125
Table 7-35: Annual Average Rainfall for Various Stations (Mersing)	7-126
Table 7-36: MAR for All Stations	7-126
Table 7-37: MAR for Station 3825001 (LABONG DAM ENDAU)	7-127
Table 7-38: MAR for Station PUSAT PERTANIAN ENDAU (2636169).....	7-127
Table 7-39: MAR for Station 2636170 (STOR JPS ENDAU).....	7-127
Table 7-40: MAR for Station Stor JPS Batu 3 di Mersing (2438001).....	7-128
Table 7-41: MAR for Station 2636170 (STOR JPS ENDAU).....	7-129
Table 7-42: MAR for Station 2438001 (Stor JPS Batu 3 di Mersing).....	7-130
Table 7-43MAR for Station 2534160 (Kg. Peta Ulu Sg. Endau).....	7-130
Table 7-44: Monthly Rainfall Data for Station STOR JPS ENDAU (2636170)	7-132
Table 7-45Annual Rainfall Data Obtained from Station STOR JPS ENDAU (2636170)	7-133
Table 7-46:Estimated Runoff (mm/month)	7-134
Table 7-47: Evaporation Rate Measured in Muadzam Shah.....	7-134
Table 7-48: Monthly Groundwater Recharge (mm/month)	7-134
Table 7-49: Estimated t_c values.....	7-136
Table 7-50: IDF Curves for Various Stations Within Johor	7-139
Table 7-51: Storm Pattern for Region 2: Pahang, Negeri Sembilan, Melaka and Johor	7-139
Table 7-52: Rainfall Intensity (mm/hr) for various duration (minutes).....	7-140
Table 7-53: Rainfall depth (mm) for various duration (minutes)	7-140
Table 7-54: Temporal Pattern for 6-hour Storms.....	7-140
Table 7-55: Tc and R for the Study Area.....	7-141

Table 7-56: Comparison of estimated Pre-Development flow using Time-Area Method with Rational Method (50 Year ARI).....	7-142
Table 7-57: Preliminary Estimation of storage volume Based on 50 Year ARI....	7-144
Table 7-58: Proposed Design of Storage Volume (In-Line Pond)	7-144
Table 7-59: Outlet Design for Detention Ponds	7-145
Table 7-60: Pre- and Post-Development Flows with and without Ponds (50 Year ARI)	7-145
Table 7-61: 50 Year Discharge from Detention Pond.....	7-146
Table 7-62: River Cross-Sections at Catchment Outlets.....	7-147
Table 7-63: Summary of Observed Water Level at Kuala Sedili	7-147
Table 7-64: Estimated Sedimentation Within River System	7-148
Table 7-65: Manpower Required.....	7-161
Table 8-1: Summary of Potential Impact and Mitigation Measures	8-27
Table 9-1: Land Disturbing Pollution Prevention and Mitigation Measures	9-3

LIST OF FIGURE

Figure 1-1 : Project Site Location	1-6
Figure 1-2 : Access Road to Project Site.....	1-7
Figure 1-3 : Demarcation Plan	1-8
Figure 1-4: Project Boundary Coordinates	11
Figure 1-5: Environmental Sensitive Area (ESA) Plan of Johor	1-13
Figure 1-6: ESA Map for Cultural Heritage.....	1-14
Figure 1-7: ESA Map for Livelihood.....	1-15
Figure 1-8 : <i>Gambar Rajah Utama Johor 2030</i>	1-17
Figure 3-1: Oil Palm Efficiency vs Other Major Oil Crops.....	3-2
Figure 3-2: Benefit from Palm Oil Industries.....	3-6
Figure 3-3: Market Value of the Coconut and Related Products Production Industry in Malaysia from 2011 to 2015 and forecast from 2016 to 2020	3-8
Figure 5-1: Proposed Distribution Area of Coconut Palm and Oil Palm Plantation .	5-6
Figure 5-2: Layout Plan	5-8
Figure 5-3: Overall Flow of the Plantation Process	5-9
Figure 5-4: Access Road to Proposed Project	5-11
Figure 5-5: Phasing Plan for Site Clearing and Planting	5-13
Figure 6-1 : Existing Land Use within the Project Site.....	6-3
Figure 6-2: Existing Land Use in 500 m radius from Project Site	6-4
Figure 6-3: Existing Land Use Within 5 km radius from the Project Site	6-5
Figure 6-4: Zoning Map	6-9
Figure 6-5: Environmental Sensitive Area (ESA)	6-10
Figure 6-6: Topography Map	6-12
Figure 6-7: Elevation Map	6-13
Figure 6-8 Soil Terrain Map of Study Area	6-15
Figure 6-9: Geology of Study area and its surrounding	6-25
Figure 6-10: Geology and Mineral Distribution of Mersing Area.....	6-26
Figure 6-11: Sg. Endau Catchment Area	6-28
Figure 6-12: Elevation map for Sub-catchment Sg. Endau	6-29
Figure 6-13: River Network Surrounding the Project Site.....	6-30
Figure 6-14: Flood Prone Area.....	6-32
Figure 6-15: Hydrogeology Map.....	6-33
Figure 6-16: Mean Minimum Temperature at Mersing Station	6-34
Figure 6-17: Mean Maximum Temperature at Mersing Station	6-35
Figure 6-18: Mean Relative Humidity at Mersing Station	6-35
Figure 6-19: Mean Evaporation at Mersing Station	6-36

Figure 6-20: Mean Monthly Rainfall at Mersing Station.....	6-37
Figure 6-21: Mean Number of Rain days at Mersing Station.....	6-37
Figure 6-22: 24 Hour Mean MSL Pressure at Mersing Station.....	6-38
Figure 6-23: Highest Hourly Mean Wind Speed at Mersing Station	6-38
Figure 6-24: Annual Wind Rose Summary	6-39
Figure 6-25: Sampling Stations for Ambient Air Quality	6-41
Figure 6-26: Sampling Stations for Noise Level	6-45
Figure 6-27: Location of Water Quality Sampling	6-50
Figure 6-28: Temperature in Surface Water Quality.....	6-57
Figure 6-29: pH Level in Surface Water Quality	6-58
Figure 6-30: Dissolved Oxygen in Surface Water Quality	6-58
Figure 6-31: Total Suspended Solid (TSS) in Surface Water Quality	6-59
Figure 6-32: Turbidity in Surface Water Quality	6-60
Figure 6-33: Chemical Oxygen Demand in Surface Water Quality	6-60
Figure 6-34: Ammoniacal Nitrogen in Surface Water Quality	6-61
Figure 6-35: Faecal Coliform in Surface Water Quality	6-62
Figure 6-36: Total Dissolved Solid in Surface Water Quality	6-62
Figure 6-37: Metals in Surface Water Quality; (a) Aluminium, (b) Iron,	6-64
Figure 6-38: Location of Groundwater Quality Sampling.....	6-69
Figure 6-39: pH Level for Groundwater Quality	6-76
Figure 6-40: Temperature for Groundwater Quality	6-77
Figure 6-41: Conductivity for Groundwater Quality	6-77
Figure 6-42: Total Dissolved Solid (TDS) for Groundwater Quality	6-78
Figure 6-43: Chemical Oxygen Demand (COD) for Groundwater Quality	6-79
Figure 6-44: Chloride for Groundwater Quality.....	6-79
Figure 6-45: Ammonia for Groundwater Quality	6-80
Figure 6-46: Iron for Groundwater Quality.....	6-81
Figure 6-47: Hardness (CaCO_3) for Groundwater Quality	6-81
Figure 6-48: Manganese for Groundwater Quality	6-82
Figure 6-49: Zinc for Groundwater Quality	6-83
Figure 6-50: Magnesium for Groundwater Quality	6-83
Figure 6-51: Sodium for Groundwater Quality	6-84
Figure 6-52: Sulphate for Groundwater Quality	6-85
Figure 6-53: Location of Survey Plots for Flora Fauna Assessment	6-88
Figure 6-54: Affected Communities within Study Area	6-116
Figure 6-55: Proposed Access Road and FELDA Nitar 1 & 2	6-117
Figure 6-56: Fishing Area along Endau River (highlighted in orange colour)	6-123
Figure 6-57: Potential Negative Impact Perceived by Respondents	6-126

Figure 6-58: Potential Positive Impact Perceived by Respondents	6-128
Figure 6-59: Respondents' Acceptance toward Proposed Project	6-129
Figure 7-1: Rainfall Erosivity Map for Johor	7-9
Figure 7-2: Location of Bore Holes.....	7-10
Figure 7-3: Length Slope Map.....	7-12
Figure 7-4: Soil Erosion Risk Map (Existing)	7-17
Figure 7-5: Soil Erosion Risk Map (Without Control).....	7-18
Figure 7-6: Soil Erosion Risk Map (Control)	7-19
Figure 7-7: Study Area and the Selected Design Storm Station.....	7-22
Figure 7-8: Water Quality Sampling Station	7-29
Figure 7-9: Initial Surface Elevation during High Tide and Low Tide along Sg. Endau	7-33
Figure 7-10: Bottom elevation during high tide and low tide along Sg. Endau	7-34
Figure 7-11: Reference depth during high tide and low tide along Sg. Endau.....	7-35
Figure 7-12: River cross section at WQ 1 sampling station.....	7-36
Figure 7-13: River cross section at WQ 3 sampling station.....	7-37
Figure 7-14: River cross section at WQ 4 sampling station.....	7-38
Figure 7-15: River cross section at WQ 5 sampling station.....	7-39
Figure 7-16: River Cross Section at WQ 6 Sampling Station	7-40
Figure 7-17: River Cross Section at WQ 7 Sampling Station	7-41
Figure 7-18: River cross section at WQ 8 sampling station.....	7-42
Figure 7-19: Water level at Tanjung Gading.....	7-43
Figure 7-20: Discharge at Tanjung Gading	7-44
Figure 7-21: Stage-discharge relationship at Tanjung Gading	7-44
Figure 7-22: Flow input in WASP	7-45
Figure 7-23: Flow input in WASP	7-45
Figure 7-24: Elevation of Mukim Endau and Project Site	7-47
Figure 7-25: Landuse of Mukim Endau and Project Site	7-48
Figure 7-26: Raw Water Quality Data for Sg. Endau at Station Jambatan Pekan Endau	7-51
Figure 7-27: Raw Water Quality Data for Sg. Endau at Station Jeti Sg. Endau, Kg. Orang Asli Tanah Abang	7-52
Figure 7-28: WASP Compartment Model (Segmental) Approach	7-54
Figure 7-29: Phases of Land Clearing and Planting.....	7-59
Figure 7-30: Proposed Locations of the Flood Pond	7-60
Figure 7-31: Schematic diagram of Sg. Endau Modeling Stretch.....	7-61
Figure 7-32: Dynamic flow as input in WASP	7-62
Figure 7-33: Solar radiation as input in WASP	7-64

Figure 7-34: Air temperature as input in WASP	7-65
Figure 7-35: Wind speed as input in WASP	7-65
Figure 7-36: Result of Ammoniacal Nitrogen (AN)	7-67
Figure 7-37: Result of Nitrate	7-67
Figure 7-38: Result of Total Phosphorus.....	7-68
Figure 7-39: Result of BOD	7-68
Figure 7-40: Result of TSS.....	7-70
Figure 7-41: Result of Al.....	7-72
Figure 7-42: Result of As.....	7-74
Figure 7-43: Result of Fe.....	7-76
Figure 7-44: Result of Mn.....	7-78
Figure 7-45: Arrows Showing the Groundwater Flow	7-97
Figure 7-46: Predicted Noise Level during Development Stage at SK Labong ...	7-101
Figure 7-47: River Network Within the Project Site	7-107
Figure 7-48: Sampling Location	7-115
Figure 7-49: Location of Rainfall Stations Within and Surrounding Project Area.....	7-122
Figure 7-50: Selected Rainfall Stations Within and Near Study Area (Pahang and Johor).....	7-123
Figure 7-51: Trend of Groundwater Recharge	7-135
Figure 7-52: Sub Catchments Within the Project Area	7-136
Figure 7-53: Study Area and the Selected Design Storm Station.....	138
Figure 7-54: Proposed Locations of the Flood Pond	7-143
Figure 7-55: Representation of Sub-catchments and Flood Pond.....	7-143
Figure 7-56: Layout of the Existing Drainage System Within the Proposed Oil palm plantation site	7-146
Figure 7-57: Result of Ammoniacal Nitrogen (AN)	7-150
Figure 7-58: Result of Nitrate	7-151
Figure 7-59: Result of Total Phosphorus.....	7-152
Figure 7-60: Result of BOD	7-153
Figure 7-61: Result of Total Suspended Solids	7-154
Figure 8-1: Proposed Erosion and Sediment Control Plan.....	8-6
Figure 8-2: Proposed Locations of the Flood Pond	8-19
Figure 9-1: LD-P2M2 Layout.....	9-8
Figure 9-2: Sampling Station for Compliance Monitoring	9-19
Figure 9-3: Seven (7) Elements of EMT	9-22

LIST OF PLATE

Plate 5-1: View at PTD 4118 (Forest area)	5-2
Plate 5-2: View at PTD 4117 (Abandonment Land)	5-3
Plate 5-3: View at PTD 4882 (The Land was Intruded)	5-3
Plate 5-4: View at PTD 4963 (the land was Intruded)	5-4
Plate 5-5: Seednuts.....	5-19
Plate 6-1: The Existing Environment from Project Site.....	6-7
Plate 6-2: Sampling Station for Air Quality	6-42
Plate 6-3: Sampling Stations for Noise Level	6-46
Plate 6-4: Sampling Station for Water Quality	6-51
Plate 6-5: Groundwater Sampling Stations	6-71
Plate 6-6: Method for Flora Survey	6-91
Plate 6-7: Method for Fauna Survey	6-93
Plate 6-8: Shows the photographs of mammalian caught in the project area.....	6-97
Plate 6-9: Show the photographs of birds caught in the project area	6-106
Plate 6-10: Social Survey	6-119
Plate 6-11: Some of High Commercial Fishes Available in Sg. Endau.....	6-135
Plate 6-12: Some of Catching Gear Used by Inland Fisherman.....	6-136
Plate 7-1: Natural decomposition and decay of biomass.....	7-102
Plate 8-1: Check Dam	8-8
Plate 8-2: Sediment Basin.....	8-9
Plate 8-3: Rock Outlet Protection	8-9
Plate 8-4: Silt Fence	8-10

LIST OF APPENDICES

- Appendix 1-1 : Letter from Majlis Daerah Mersing (Ref. No.: MD.MG.JPPL.BP BHN II(1) dated 12th April 2022)
- Appendix 2-1 : Term of Reference (TOR) Report and Approval Letter from DOE Putrajaya
- Appendix 2-2 : Extension Letter of Term of Reference (TOR) (Ref. No.: JAS. 600-2/1/1Jilid4(4) dated 3rd February 2022)
- Appendix 5-1 : Temporary Land Title (Hak Milik Sementara Borang 11AK)
- Appendix 5-2 : Logging Licences issued by Forestry Department Negeri Johor (PTD 4085 and PTD 4118)
- Appendix 6-1 : Letter and Soil Suitability Report from Department of Agriculture (Ref. No.: JP BPSTAH-300-1/40 (6) dated on 3rd June 2021)
- Appendix 6-2 : Letter from Department of Irrigation and Drainage (Ref. No.: dlmJPS.MG.02/2013 dated on 28th November 2019)
- Appendix 6-3 : Certificate of Analysis for Ambient Air Quality
- Appendix 6-4 : Certificate of Analysis for Noise Level
- Appendix 6-5 : Certificate of Analysis for Surface Water Quality
- Appendix 6-6 : Installation Monitoring Well Report by Geoscience Solutions Sdn. Bhd.
- Appendix 6-7 : Certificate of Analysis for Groundwater Quality
- Appendix 6-8 : Socio Economy Study Report
- Appendix 6-9 : Letter from Department of Fisheries Mersing District (Ref. No.: Prk.MG.1036 Bg.2(18) dated 20th July 2020)
- Appendix 6-10 : Letter from Department of Fisheries Mersing District (Ref. No.: PRK.MG.1000 (38) dated 13th November 2019)
- Appendix 8-1 : Design of Sediment Basin