



JL Energy Resources

Lot C34 – Lot C35, Megah Industrial Park, Jalan Tiku,
91000 Tawau, Sabah
Tel No.: 089 – 911 727
E-mail Address: low_chat@hotmail.com



ENVIRONMENTAL IMPACT ASSESSMENT

For

**Proposed Offsite Scheduled Waste Storage and
Recovery Facility at Lots C35 and C36 on Part of
CL.105554676 (0.11 ha), Megah Industrial Park,
Tawau, Sabah**

Final Report (Amended)



**CHEMSAIN
KONSULTANT
SDN BHD** (130904-U)

Our Ref: CK/EV403/0033/23
Date: November 2025

EXECUTIVE SUMMARY

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“PROPOSED OFFSITE SCHEDULED WASTE STORAGE AND RECOVERY FACILITY AT LOTS C35 AND C36 ON PART OF CL.105554676 (0.11 HA), MEGAH INDUSTRIAL PARK, TAWAU, SABAH”

Project Proponent



JL Energy Resources

Lot C35 – Lot C36, Megah Industrial Park, Jalan Tiku, 91000 Tawau, Sabah.



089 – 911 727



Low_Chat@hotmail.com



Low Ming Chat



Project Manager

Environmental Consultant



Chemsain Konsultant Sdn Bhd

No. 2, Lorong Suria Off Lorong Buah Duku 1, Taman Perindustrian Suria, Jalan Kolombong, 88450, Kota Kinabalu, Sabah.



088 – 381 278



088 – 381 280



Joyce Chin / Tommy Liew



EIA Team Leader / Project Coordinator

Location

Lots C35 and C36 in **Megah Industrial Park, Tawau District**, accessible via **Jalan Industri Megah 2** off **Jalan Tiku**.

Brief Description

Establishment of a new offsite scheduled waste facility to cater for storage of 35 scheduled waste codes (71.2 MT/month) and oil recovery of 4 scheduled waste codes (SW305, SW306, SW311 and SW327) with recovery capacity of 260 MT/month via distillation process.

Legislative Requirements

Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 2015. First Schedule – Item 14: Waste Treatment and Disposal.

(a) Scheduled Waste:

- (i) Construction of recovery plant (offsite).
- (iii) Construction of storage facilities (offsite).

Statement of Need

Industrial Growth in Sabah

- Expansion in oil & gas, manufacturing, and SMEs.
- Increase in scheduled waste generation.

Environmental Concerns

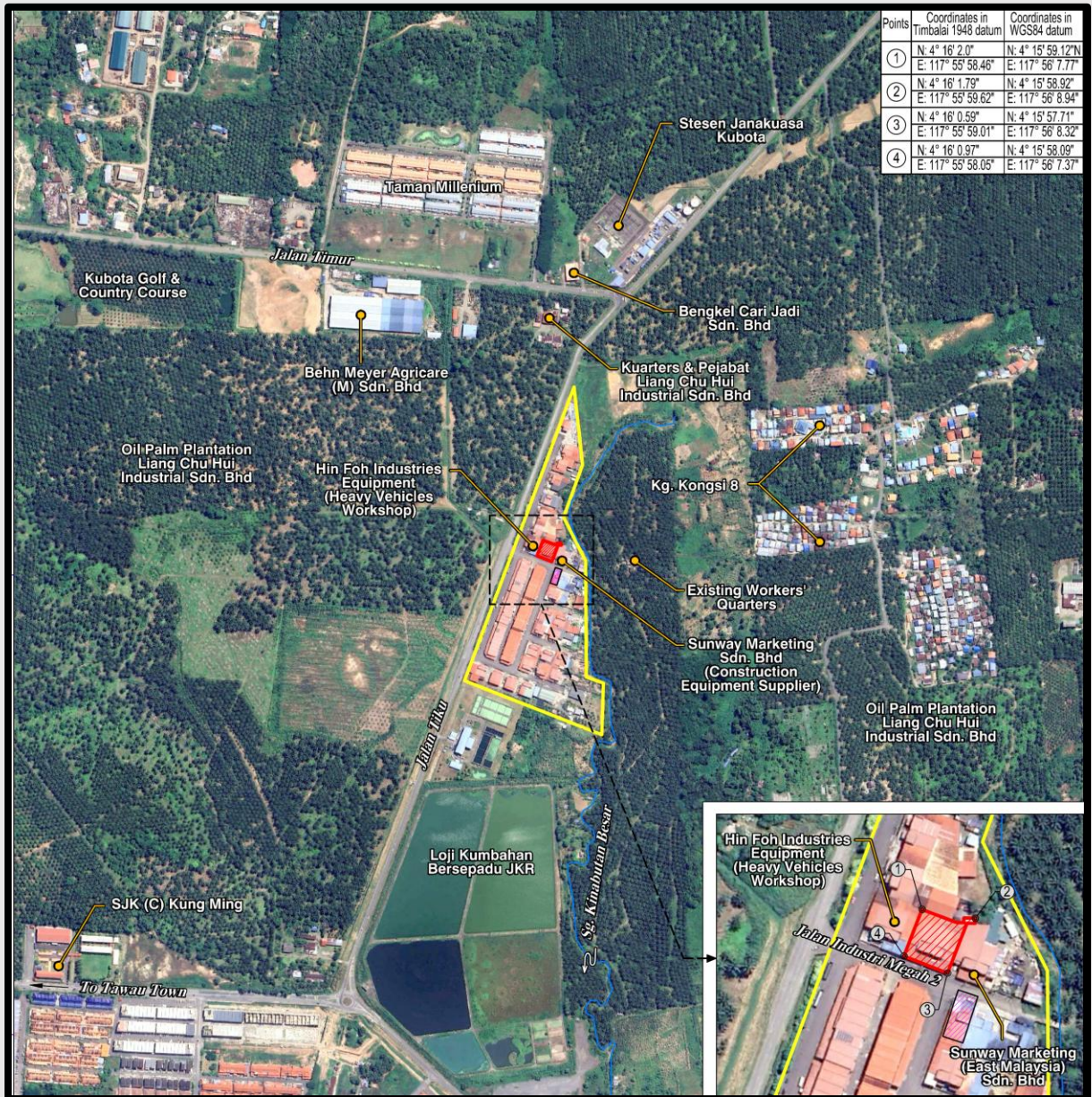
- Toxic & hazardous waste pose risks to ecosystems & human health.
- Currently, some waste must be transported out of the state for treatment.

Current Waste Management Challenges

- 103,767 MT of scheduled waste generated (DOE Sabah, 2022).

PROJECT DESCRIPTION

Site Location



LEGEND:

- Project Site
- Megah Industrial Park
- Existing Recovery Facility
- Flow direction

Lot C35 and Lot C36, Megah Industrial Park, Tawau District.



PROJECT DESCRIPTION

Concept

Renovation and minimal construction on existing warehouse building followed by the installation of an **oil recovery technology facility**.

Component

Storage Facility: 35 scheduled waste codes (max. storage capacity, **71.2 MT/month**)

Oil Recovery Facility: 4 scheduled waste codes:- **SW305, SW306, SW311, SW327** (max. recovery capacity, **10 MT/day or 260 /month**)



Raw Waste Oil
(SW305, SW306, SW311, SW327)



Waste Oil Recovery (Distillation)

Stage 1: Pretreatment (Oil Water Separation & Pre-filtration)

Stage 2: Primary Recovery (heating & distillation / fractionating processes)



Recovered Oil

Environmental Pollution Control

Air Pollution Control System (APCS)

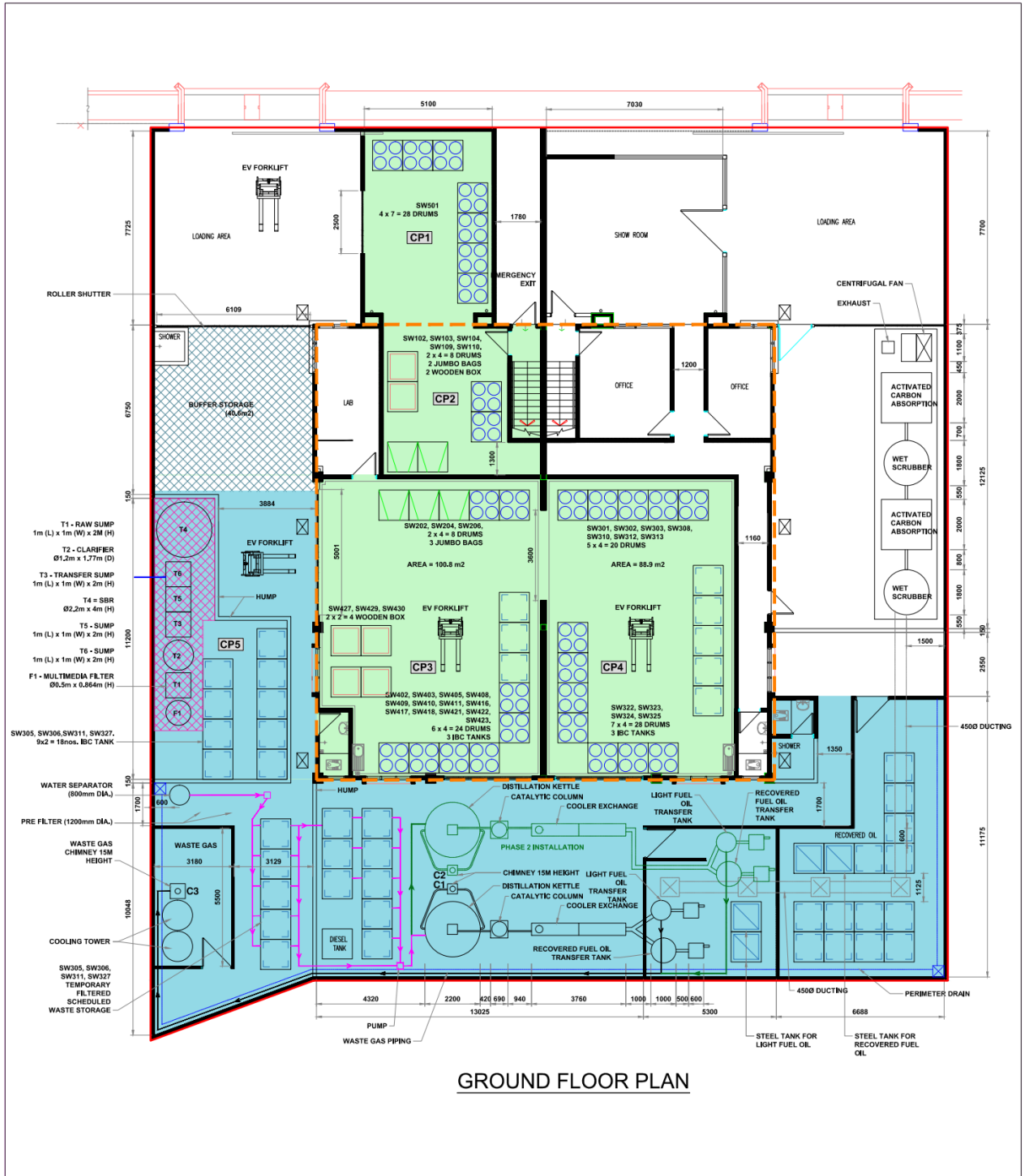
- Waste gas treatment system (Membrane Separation machine)
- Odour removal system (wet scrubber system and activated carbon to reduce the odour generation from the production, handling, and storage of recovered fuel oil)

Industrial Effluent Treatment System (IETS)

- Wastewater Treatment Plant (WWTP)
 - Design capacity: 2 m³/day
- Combination of physical, biological, and chemical treatment technologies
- Compliance with Standard B of the Environmental Quality (Industrial Effluent) Regulations 2009

PROJECT DESCRIPTION

Site Layout Plan



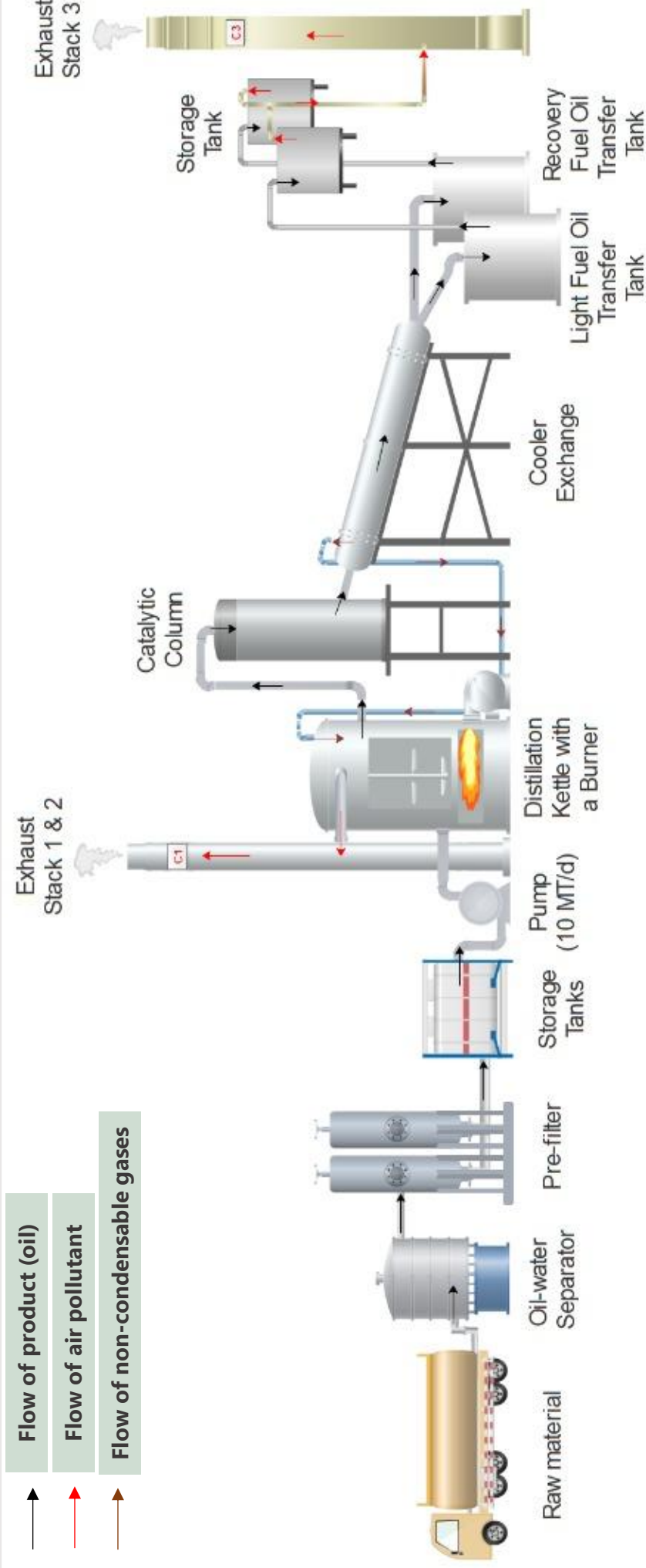
LEGEND:

- | | |
|-------------------------------|-------------------|
| Project Site | Drum |
| Original Warehouse Area | Wooden Box |
| Storage Area | Jumbo Bag |
| Recovery Area | IBC Tank |
| Wastewater Treatment Plant | Chimney Locations |
| CP1-CP5 Compartment (CP1-CP5) | |
| Buffer Storage | |
| Perimeter Drain | |



PROJECT DESCRIPTION

Process Flow Diagram:



PROJECT ACTIVITIES

Pre-Renovation Stage

- Site survey works.
- Conducting baseline environmental samplings.
- EIA study.
- Obtain approvals from relevant stakeholders.

Renovation/ Construction Stage

- Mobilization of workers and machineries/ equipment.
- Renovation/ Construction of facility.
- Installation/ Setting up of storage, recovery facility and WWTP.
- Waste generation and management.

Operational/ Maintenance Stage

- Collection of scheduled waste.
- Waste segregation.
- Handling and storage of scheduled waste.
- Transportation of scheduled waste and products.
- Manpower requirement and operational hours.
- Utilities and water Supply.
- Maintenance Requirement.


Project Abandonment

- Preparation of Abandonment Plan and submission to DOE Sabah.

EXISTING ENVIRONMENT

Physical


Topography

 Concreted flat ground with existing 1 and a half storey industrial building

Hydrology


- ❖ Surrounding grounds are fully concreted
- ❖ Surface runoff from the site is directed into the internal closed drainage system within the Megah Industrial Estate
- ❖ Nearest natural waterway: Sg. Kinabutan Besar (100 m east)
- ❖ Top drain cover observed at the adjacent building

Meteorology


 North-westerly with wind speed up to 3.3 m/s

 1,957.8 mm

Geology

 Recent lithology
Consists of coastal and riverine alluvium

Soil

 Kinabatangan Association
Main soil: gleyic acrisol; gleyic luvisol; humic, dystric and eutric gleysols

EXISTING ENVIRONMENT

Baseline Environmental Sampling



- **Surface water quality sampling** at 3 locations: upstream (W1), midstream (W2) & downstream (W3) of Sg. Kinabutan Besar.
- Results complied with Class III NQWSM, except for DO, FE and Al.
- High level of DO is considerably good for aquatic lifeform.
- Higher Fe and Al level may be attributed by the industrial activities within Megah Industrial Park and/ or adjacent oil palm plantation activities that discharges runoff into Sg. Kinabutan Besar.
- Water sampling was not carried out at the roadside drain of Jalan Industri Megah 2 due to dry condition of the drain.

- **Groundwater sampling** was conducted within the project site boundary (GW1).
- The groundwater quality results are compared to NGQS.
- All the parameters tested are within the stipulated standard limit, except for Fe due to corrosion of iron or steel well casing.



- **Ambient air sampling** (PM₁₀, PM_{2.5}, SO₂, NO₂, CO, O₃ and VOC) conducted at 2 points: project site boundary (A1) and existing Plantation's Workers Quarters (A2).
- PM₁₀, PM_{2.5}, SO₂, NO₂, CO and O₃ complied with MAAQS (2020).
- VOC complied with OSHA's PEL.

- **Noise Level Monitoring:** L_{eq} at project site boundary (N1) and existing Plantation's Workers Quarters (N2) complies to the First Schedule of the Guidelines for Environmental Noise Limits and Control, 2019 for Industrial Zones and Suburban Residential, respectively except for higher nighttime noise level at N2, 58.4 dB(A).
- The main noise contributors are from the surrounding industrial activities as well as human communication, movement of vehicles and wind blowing.

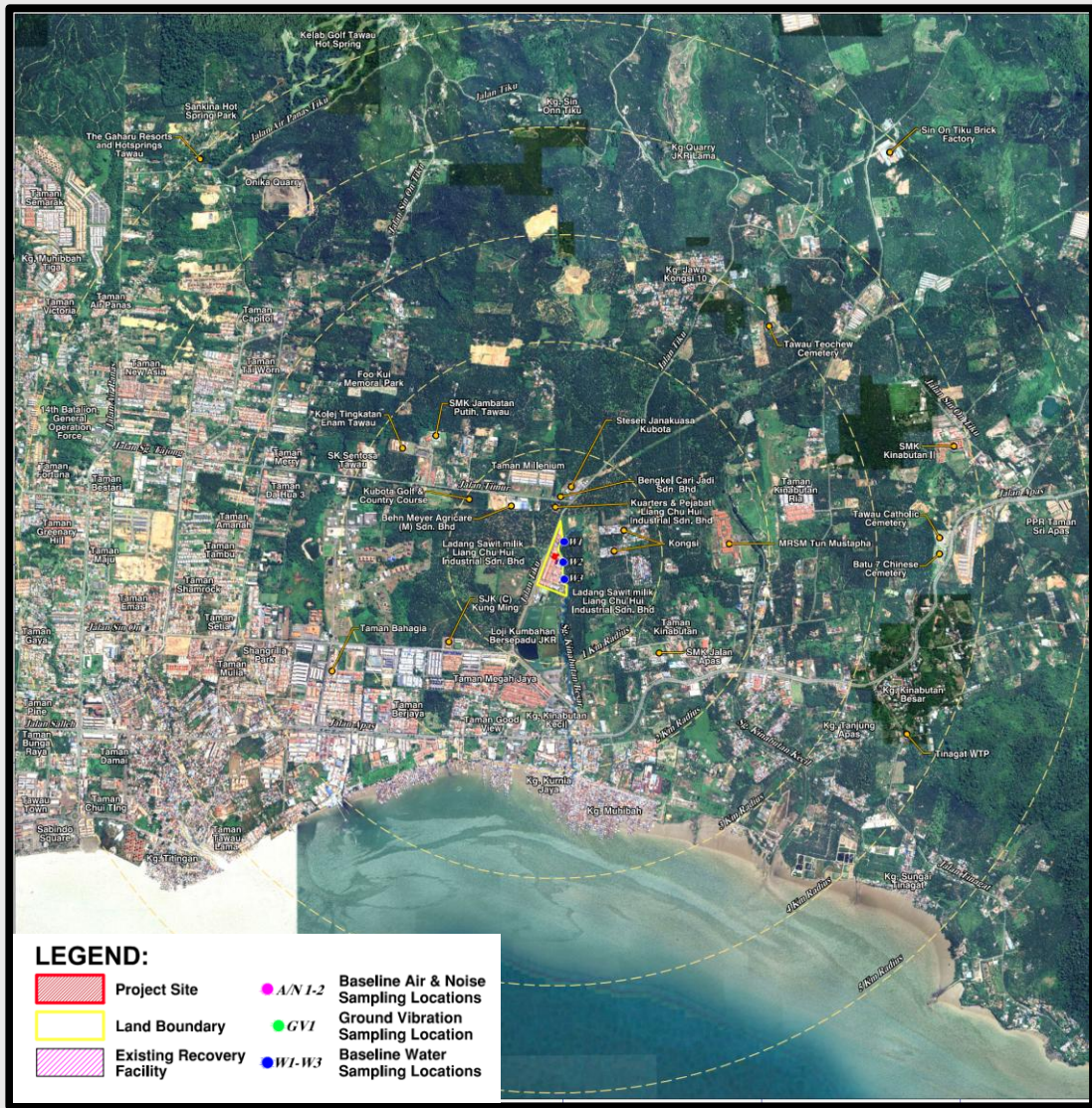


Biological

- ❖ The absence of natural vegetation precludes the presence of any protected species observed as the surrounding area is also a much-developed area for industries.

EXISTING ENVIRONMENT

EIA Zone of Study & Environmental Baseline Samplings



Land Use Type	Land Use	Distance/Direction
Industrial Buildings within Megah Industrial Park	Hin Foh Industries Equipment Sdn Bhd	Immediate West
	Sunway Marketing (East Malaysia) Sdn Bhd	Immediate East
	Other Industrial lots	Immediate South; North
Others	JKR Sabah's Tawau Sewerage Scheme Phase 2	300 m South
	Liang Chu Hui Industries Sdn Bhd Oil Palm Plantation	100 m East



IMPACT ASSESSMENT & MITIGATION MEASURES

Renovation / Installation Stage



Noise Pollution

Impact: Low

- ❖ Selection & usage of low sound power level equipment/ machinery.
- ❖ Provision of PPE to all workers working in high noise level areas.
- ❖ Regular vehicles and machinery maintenance.

Reference: Page C8-2 to Page C8-3



Air Pollution

Impact: Low

- ❖ No open burning.
- ❖ Maintain the construction vehicles regularly.
- ❖ Strictly observed the speed limits stipulated for public roads.

Reference: Page C8-3



Water Pollution

Impact: Low

- ❖ Practice good housekeeping.
- ❖ Proper stack or stockpile all wastes at a strategic location.
- ❖ Conduct awareness programs on importance of cleanliness at working area amongst workers.

Reference: Page C8-3



Socio-Economic Impacts

Impact: Medium/ Beneficial

- ❖ Prioritize locals for employment/ business opportunities.
- ❖ Undergo health screening prior to employment.

Reference: Page C8-4

IMPACT ASSESSMENT & MITIGATION MEASURES

Operation & Maintenance Stage



Risk Assessment

Impact: Low

- ❖ Prepare and implement Emergency Response Plan (ERP).
- ❖ Regular inspection on emergency response equipment and supplies.
- ❖ Conduct regular emergency response drills.

Reference: Page C8-4 to C8-5



Air Pollution

Impact: Moderate

- ❖ Install APCS (wet scrubber and activated carbon adsorption).
- ❖ Regular inspection and maintenance work by CePSO.
- ❖ Conduct regular stacks and ambient air quality monitoring.

Reference: Page C8-6 to C8-7



Noise Pollution

Impact: Moderate

- ❖ Proper installation/ regular maintenance of air pollution control system.
- ❖ Install warning signs and proper PPE for workers.
- ❖ Conduct regular noise level monitoring.

Reference: Page C8-7



Water Pollution

Impact: Moderate

- ❖ Provision of perimeter drains with sump pits within the facility.
- ❖ Provision of WWTP.
- ❖ Regular inspection and maintenance on the existing concrete drain.
- ❖ Practice good housekeeping.
- ❖ Engagement of CePIETSO-PCP, CePIETSO-BP and CEP SWAM.
- ❖ Conduct regular water quality monitoring.

Reference: Page C8-7 to C8-9

IMPACT ASSESSMENT & MITIGATION MEASURES

Operation & Maintenance Stage



Traffic & Transportation Impacts

Impact: Low

- ❖ Proper scheduling of transportation activities.
- ❖ Strictly observed the speed limits stipulated for public roads.
- ❖ Install a proper traffic signage within the facility.

Reference: Page C8-9 to C8-10



Socio-Economic Impacts

Impact: Moderate/ Beneficial

- ❖ Prioritize locals for employment/ business opportunities.
- ❖ Undergo health screening prior to employment.

Reference: Page C8-4



Soil Contamination

Impact: Low

- ❖ Provide impervious flooring at the storage and recovery facility.
- ❖ Regular inspection and maintenance on flooring and leakage/spillage.

Reference: Page C8-10



Health Impacts

Impact: Low

- ❖ Conduct CHRA during operation stage.
- ❖ Conduct regular medical surveillance for workers onsite.
- ❖ Conduct regular fogging.

Reference: Page C8-11



Potential Abandonment

Impact: Low

- ❖ Proper disposal of all wastes (solid and scheduled wastes).
- ❖ Conduct site inspection 3 months after abandonment.
- ❖ Prepare and submit Abandonment Plan to DOE Sabah no less than 6 months prior to actual abandonment.

Reference: Page C8-11

MONITORING PROGRAMME

Performance Monitoring

- ❖ CePIETSO-BP & CePIETSO-PCP competent person for management of industrial effluent treatment.
- ❖ CePSO competent person for management of APCS (Scrubber).
- ❖ Includes periodic preventive maintenance and corrective actions.
- ❖ CePSWAM competent person for scheduled waste management

Compliance Monitoring

Aspect	Parameter	Monitoring Location	Frequency	Compliance Standard/ Guidelines
Operation and Maintenance Stage				
Air Quality (Stack Emission)	Total Particulate Matter (PM), Non-Methane Volatile Organic Compound (NMVOC), Sulphur Dioxide (SO ₂), Nitrogen Dioxide (NO ₂)	Refer to ST1 – ST2 in Figure 9.5.1 . ST1: Chimney Outlet (Burner – Ph1) N 4° 15'58.77", E 117°56'8.42" ST2: Chimney Outlet (Burner – Ph2) N 4° 15'58.81", E 117°56'8.42" Note: Stack monitoring for ST-2 will start upon commencement of Phase 2.	Yearly	Second Schedule of Environmental Quality (Clean Air) Regulations 2014. Total PM: 50 mg/m ³ Fifth Schedule (Category 3 – Class 1) of Environmental Quality (Clean Air) Regulations 2014. NMVOC: 20 mg/m ³ Fifth Schedule (Category 4 – (b)) SO ₂ & NO ₂ : 400 mg/m ³
	Non-Methane Volatile Organic Compound (NMVOC)	Refer to ST3 in Figure 9.5.1 . ST3: Chimney Outlet (Waste Gas Treatment) N 4° 15'58.68", E 117°56'8.76"	Yearly	Fifth Schedule (Category 3 – Class 1) of Environmental Quality (Clean Air) Regulations 2014. NMVOC: 20 mg/m ³
Treated Effluent Quality	pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solids (SS), Oil and Grease (O&G), Ammoniacal-Nitrogen (AN), Lead (Pb), Copper (Cu), Iron (Fe)	Refer to EF1 in Figure 9.5.1 . EF1: Final Discharge Outlet N 4° 15' 58.49", E 117° 56' 8.71"	Monthly	Standard B, Fifth & Seventh Schedule of the Environmental Quality (Industrial Effluent) Regulations, 2009. Temp: 40°C pH: 5.5 - 9.0 BOD at 20°C: 50 mg/L SS: 100 mg/L COD: 200 mg/L Cu: 1.0 mg/L Pb: 0.5 mg/L AN: 20 mg/L Oil & Grease: 10 mg/L

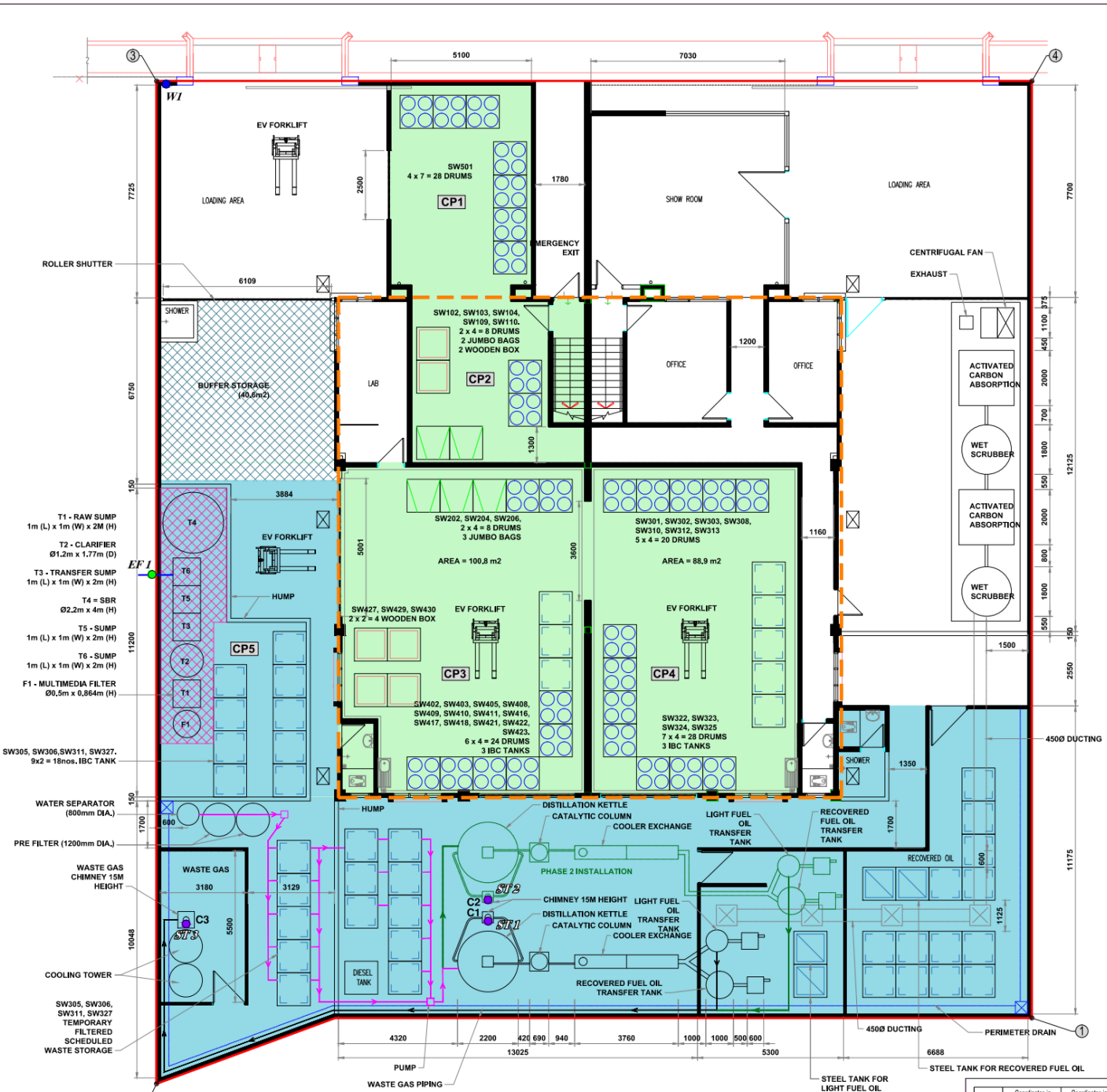
MONITORING PROGRAMME

Impact Monitoring

Aspect	Parameter	Monitoring Location	Frequency	Compliance Standard/ Guidelines
Operation and Maintenance Stage				
Surface Water Quality	pH value, Temperature, Dissolved Oxygen, BOD, COD, Ammoniacal-Nitrogen, Oil & Grease	Refer to W1 and W2 in Figure 9.5.1 W1: Discharge outlet of perimeter drain N 4° 15' 57.76", E 117° 56' 8.43" W2: Sg. Kinabutan Besar N 4° 15' 56.70", E 117° 56' 10.90"	Quarterly	Class III of the National Water Quality Standards for Malaysia Temperature: Normal+2°C pH: 5 - 9 DO: 3 - 5 BOD: 6 mg/L COD: 50 mg/L Ammoniacal-Nitrogen: 0.9 mg/L Oil & Grease: N
Noise Level	L _{eq} (day time & night time)	Refer to N1 and N2 in Figure 9.5.1 N1: Southern site boundary N 4° 15' 57.7", E 117° 56' 8.1"	Quarterly	Second Schedule: Designated Industrial Zone Land Use of Guidelines for Environmental Noise Limits and Control [75 dB(A) during day time; 75 dB(A) during night time]
Air Quality	PM ₁₀ , PM _{2.5} , CO, SO ₂ , NO ₂ , VOC	Refer to A1 and A2 in Figure 9.5.1 A1: Southern site boundary N 4° 15' 57.7", E 117° 56' 8.1"	Quarterly	<ul style="list-style-type: none"> Malaysia Ambient Air Quality Standards, 2020. <ul style="list-style-type: none"> PM₁₀: 100 µg/m³ (24-hour averaging time) PM_{2.5}: 35 µg/m³ (24-hour averaging time) SO₂: 250 µg/m³ (1-hour averaging time) NO₂: 280 µg/m³ (1-hour averaging time) CO: 30 mg/m³ (1-hour averaging time) OSHA PELs (refer to Appendix 6.8) is referred to for VOC standard limit.
Groundwater	pH value, BOD, COD, Total Dissolved Solids (TDS) Chloride (Cl), Iron (Fe), Manganese (Mn), Silica, Sulphate, Cadmium (Cd), Arsenic (As), Lead (Pb), Chromium (Cr), Copper (Cu), Zinc (Zn), Nickel (Ni), Phenol, E.coli, Oil & Grease	Refer GW1 in Figure 9.5.1 GW1: Existing groundwater well within the site N 4° 15' 57.8", E 117° 56' 08.2"	Yearly	<ul style="list-style-type: none"> Comparison to baseline data National Groundwater Quality Standards for Industrial Use. <ul style="list-style-type: none"> pH: 6.5 - 8.0 Si: 20.0 mg/L COD: 30 mg/L Sulphate: 200 mg/L Cl: 100 mg/L Manganese : 0.2 mg/L Fe: 0.3 mg/L TDS: 450 mg/L E.coli: - Oil & Grease: -

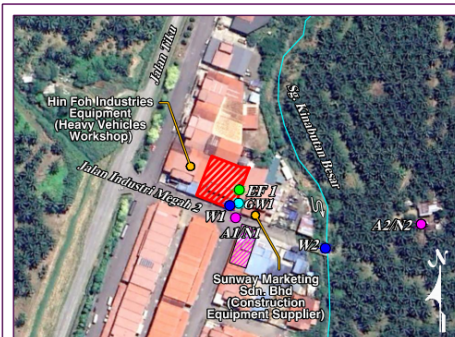
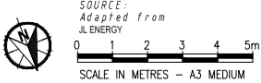
MONITORING PROGRAMME

Proposed Monitoring Locations



LEGEND:

- Project Site
- Original Warehouse Area
- Storage Area
- Recovery Area
- Wastewater Treatment Plant
- CP1-CP5 Compartment (CP1-CP5)
- Buffer Storage
- Perimeter Drain
- Drum
- Wooden Box
- Jumbo Bag
- IBC Tank
- C1-C3 Chimney Locations
- ST1-3 Proposed Stack Monitoring Points
- AN1-2 Proposed Air and Noise Monitoring Points
- W1-W2 Proposed Water Monitoring Points
- GW1 Proposed Groundwater Monitoring Point
- Existing Recovery Facility
- EF1 Proposed Treated Effluent Monitoring Point



Point	Coordinates in Timbala '948 datum	Coordinates in WGS84 datum
①	N: 4° 18' 27.0"	N: 4° 18' 56.70"
②	E: 117° 59' 58.86"	E: 117° 59' 57.97"
③	N: 4° 18' 16.88"	N: 4° 18' 58.81"
④	E: 117° 59' 59.44"	E: 117° 59' 8.76"
A1/N1	N: 4° 18' 05.99"	N: 4° 18' 57.71"
A2/N2	E: 117° 59' 59.31"	E: 117° 59' 8.32"
W1	N: 4° 18' 03.97"	N: 4° 18' 58.02"
W2	E: 117° 59' 58.05"	E: 117° 59' 7.39"
GW1	N: 4° 18' 03.77"	N: 4° 18' 57.89"
GW2	N: 4° 18' 04.77"	N: 4° 18' 57.49"
EF1	E: 117° 59' 59.38"	E: 117° 59' 8.38"
ST1	N: 4° 18' 16.88"	N: 4° 18' 58.81"
ST2	E: 117° 59' 58.11"	E: 117° 59' 8.42"
ST3	N: 4° 18' 15.56"	N: 4° 18' 58.88"
	E: 117° 59' 59.44"	E: 117° 59' 8.76"

RINGKASAN EKSEKUTIF

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“PROPOSED OFFSITE SCHEDULED WASTE STORAGE AND RECOVERY FACILITY AT LOTS C35 AND C36 ON PART OF CL.105554676 (0.11 HA), MEGAH INDUSTRIAL PARK, TAWAU, SABAH”

Penggerak Projek



JL Energy Resources

Lot C35 – Lot C36, Megah Industrial Park, Jalan Tiku, 91000 Tawau, Sabah.



089 – 911 727



Low_Chat@hotmail.com



Low Ming Chat



Pengurus Projek

Perunding Alam Sekitar



Chemsain Konsultant Sdn Bhd

No. 2, Lorong Suria Off Lorong Buah Duku 1, Taman Perindustrian Suria, Jalan Kolombong, 88450, Kota Kinabalu, Sabah.



088 – 381 278



088 – 381 280



Joyce Chin / Tommy Liew



Ketua Pasukan EIA / Penyelaras Projek

Lokasi

Lot C35 dan C36 di Taman Perindustrian Megah, Daerah Tawau, boleh diakses melalui Jalan Industri Megah 2, dari Jalan Tiku.

Penerangan Ringkas

Pembangunan kemudahan buangan terjadual luar tapak yang baru untuk penyimpanan 35 kod buangan terjadual (71.2 MT/bulan) dan pemulihan minyak bagi 4 kod buangan terjadual (SW305, SW306, SW311 and SW327) dengan kapasiti pemulihan sebanyak 260 metrik tan sebulan.

Keperluan Perundangan

Perintah Kualiti Alam Sekeliling (Aktiviti yang Ditetapkan) (Penilaian Kesan Kepada Alam Sekeliling) 2015. Jadual Pertama – Aktiviti 14: Pengolahan dan Pelupusan Buangan.

(a) Buangan Terjadual:

- (i) Pembinaan loji pulih guna (luar tapak).
- (iii) Pembinaan kemudahan penstoran (luar tapak).

Penyataan Keperluan

Pembangunan Industri di Sabah

- Perkembangan dalam minyak & gas, pembuatan dan PKS (Perusahaan Kecil dan Sederhana).
- Peningkatan dalam penghasilan buangan terjadual.

Isu Alam Sekitar

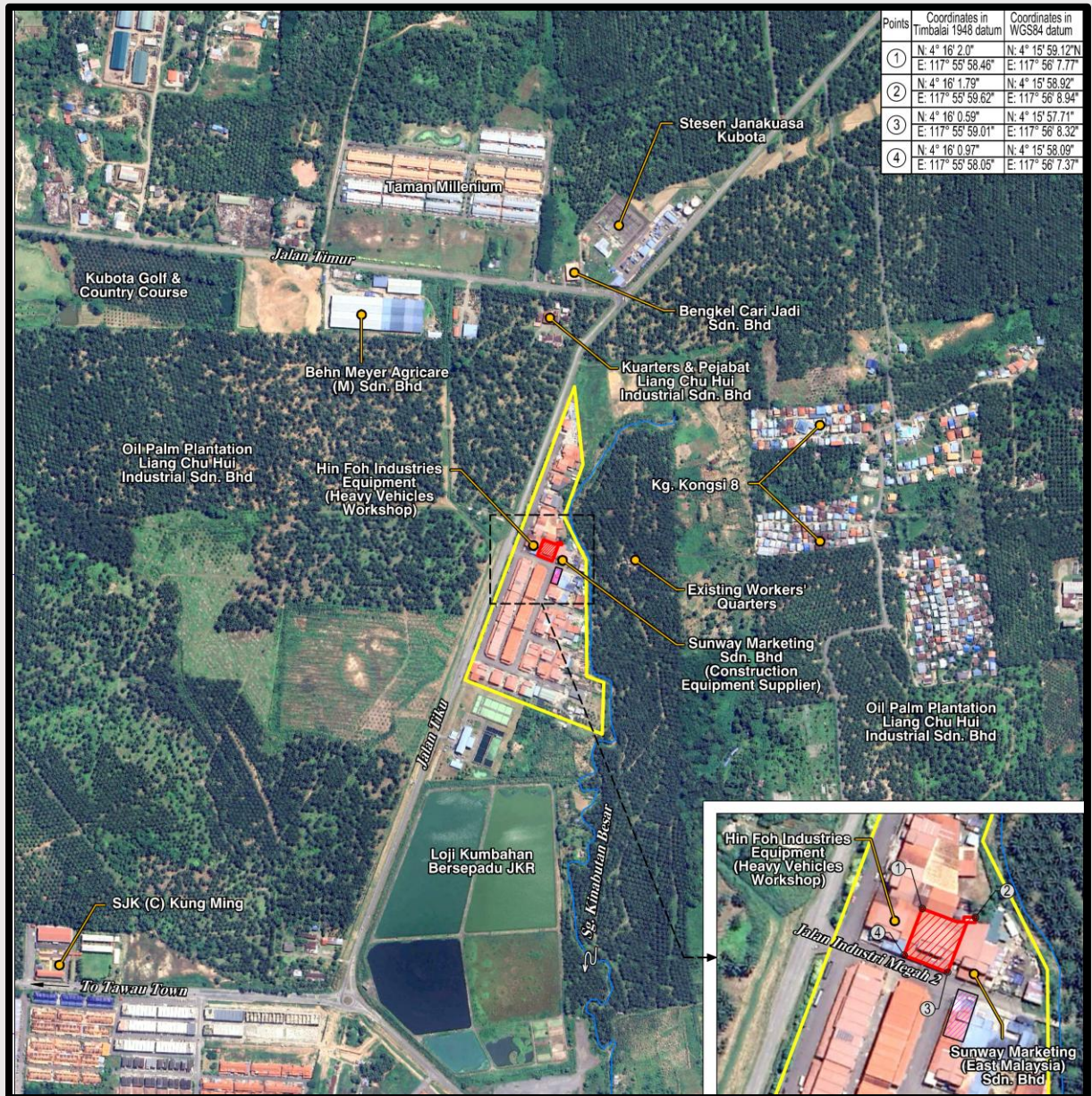
- Buangan toksik & berbahaya menimbulkan risiko kepada ekosistem & kesihatan manusia.
- Pada masa ini, sesetengah buangan perlu diangkut keluar dari negeri untuk rawatan.

Cabaran Pengurusan Sisa Buangan Terjadual

- 103,767 MT buangan terjadual dihasilkan (JAS Sabah, 2022).

PENERANGAN PROJEK

Lokasi Tapak



LEGEND:

- Project Site
- Megah Industrial Park
- Existing Recovery Facility
- Flow direction

Lot C35 dan Lot C36, Taman Perindustrian Megah, Daerah Tawau.



PENERANGAN PROJEK

Konsep

Pengubahsuaian dan pembinaan minima bangunan gudang sedia ada diikuti dengan **pemasangan loji pulih guna.**

Komponen

Kemudahan Penstoran:
35 kod buangan terjadual
(71.2 MT/bulan)

Kemudahan Loji Pulih Guna: 4
kod buangan terjadual:- SW305,
SW306, SW311, SW327 (10
MT/sehari)



**Minyak Terpakai/
Bahan Mentah**
(SW305, SW306,
SW311, SW327)



**Pemerolehan Kembali Minyak Buangan
(Penyulingan)**

**Peringkat 1: Pra-rawatan (Pemisahan
Minyak dan Air & Pra-penurasan)**
**Peringkat 2: Pemerolehan Kembali (proses
pemanasan & penyulingan / fractionation)**



**Produk Akhir
(Recovered fuel oil)**

Kawalan Pencemaran Alam Sekitar

Sistem Kawalan Pencemaran Udara (SKPU)

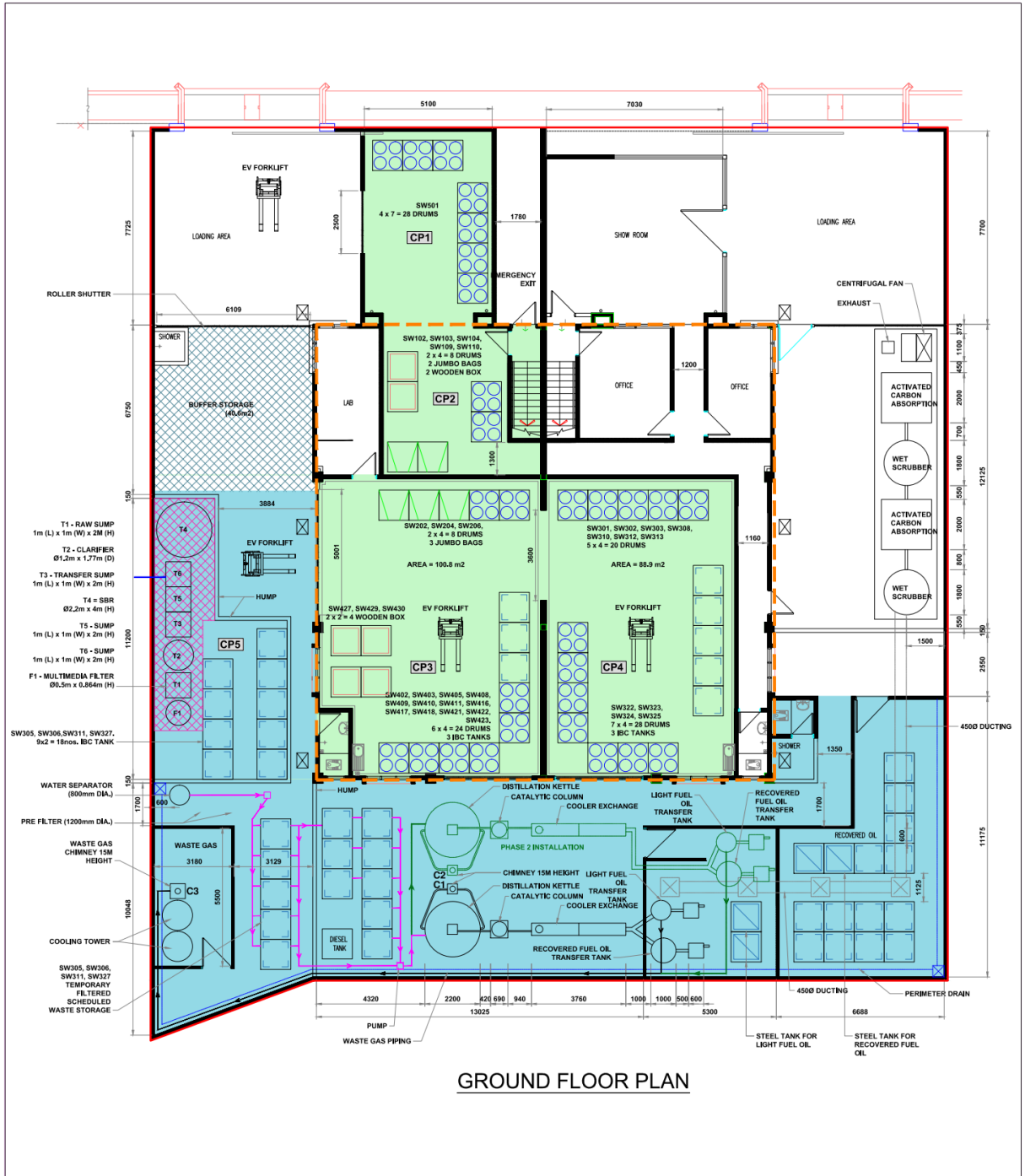
- Sistem rawatan gas buangan (mesin Pemisahan Membran)
- Sistem penyingkiran bau (sistem *wet scrubber* dan *Activated Carbon* untuk mengurangkan penghasilan bau daripada pengeluaran, pengendalian dan penyimpanan minyak diperolehi kembali)

Sistem Pengolahan Efluen Perindustrian

- Loji Pengolahan Air Buangan
 - Kapasiti reka bentuk: 2 m³/hari
- Gabungan teknologi rawatan fizikal, biologi dan kimia
- Pematuhan dengan Standard B, Peraturan-Peraturan Kualiti Alam Sekeliling (Efluen Perindustrian) 2009

PENERANGAN PROJEK

Pelan Susunatur Tapak



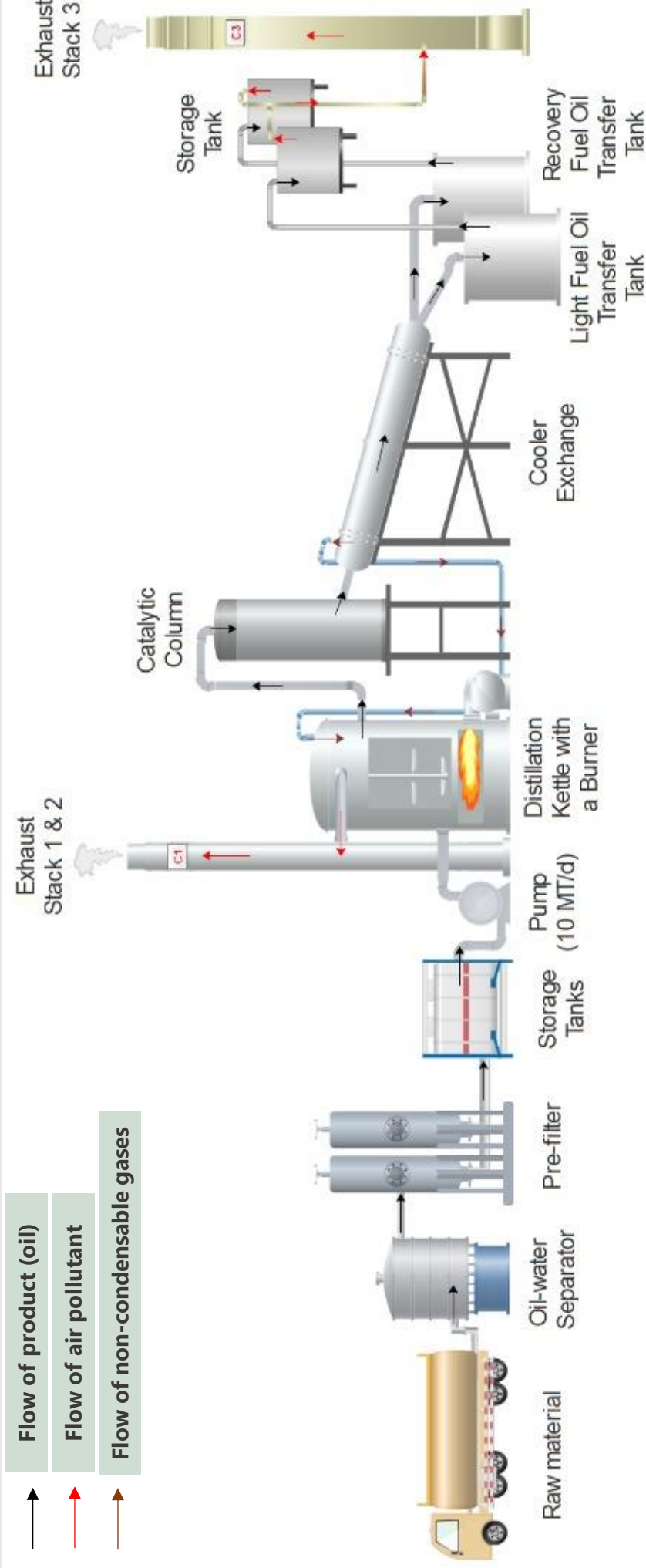
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- C1-C3 Chimney Locations



PENERANGAN PROJEK

Carta Alir Proses:



AKTIVITI PROJEK



Peringkat Pra-Pengubahsuaian

- Kerja-kerja tinjauan tapak
- Menjalankan pensampelan garis dasar alam sekitar
- Kajian EIA
- Mendapatkan kelulusan daripada pihak berkepentingan yang berkaitan.



Peringkat Pengubahsuaian/Pembinaan

- Kemasukan pekerja dan jentera/peralatan di tapak.
- Pengubahsuaian/pembinaan kemudahan fasiliti.
- Pemasangan/penyediaan kemudahan Penstoran, Pemerolehan kembali dan Loji Pengolahan Air Buangan.
- Penjanaan dan Pengurusan Sisa



Peringkat Operasi/Penyelenggaraan

- Pengangkutan sisa terjadual.
- Pengasingan sisa.
- Pengendalian dan penstoran sisa terjadual.
- Pengangkutan sisa dan produk akhir.
- Keperluan tenaga kerja dan masa operasi.
- Bekalan utiliti dan air.
- Keperluan penyelenggaraan.



Peringkat Pengabaian Projek

- Penyediaan Pelan Penutupan dan penyerahan kepada JAS Sabah.

PERSEKITARAN SEDIA ADA

Fizikal

Topografi



Tanah rata berkonkrit dengan bangunan industri sedia ada

Hidrologi

- ❖ Tanah di sekelilingnya berkonkrit sepenuhnya
- ❖ Aliran air permukaan dari tapak mengalir ke dalam sistem perparitan tertutup dalam kawasan Taman Perindustrian Megah
- ❖ Alur air semula jadi terdekat: Sg. Kinabutan Besar (100 m timur)
- ❖ Penutup longkang atas diperhatikan di bangunan bersebelahan

Meteorologi



Angin bertiup dari arah barat laut dengan kelajuan sehingga 3.3 m/s



1,957.8 mm

Geologi



Litologi *Recent*

Terdiri daripada aluvium pantai dan sungai

Tanah



Asosiasi Kinabatangan

Jenis tanah utama: *gleyic acrisol*; *gleyic luvisol*; *humic*, *dystric* and *eutric gleysols*

PERSEKITARAN SEDIA ADA

Persampelan Garis Dasar Alam Sekitar



- **Persampelan kualiti air** di 3 lokasi: hulu (W1), tengah (W2) & hilir (W3) Sg. Kinabatangan Besar.
- Keputusan mematuhi Kelas III NWQSM, kecuali untuk DO, FE dan Al.
- Tahap DO yang tinggi adalah sangat baik untuk hidupan akuatik.
- Tahap Fe dan Al yang lebih tinggi mungkin disebabkan oleh aktiviti perindustrian di dalam Taman Perindustrian Megah dan/ atau aktiviti ladang kelapa sawit bersebelahan yang melepaskan aliran air larian ke dalam Sg. Kinabatangan Besar.
- Persampelan air tidak dijalankan di longkang tepi jalan Jalan Industri Megah 2 disebabkan keadaan longkang yang kering.

- **Persampelan air bawah tanah** telah dijalankan di dalam sempadan tapak projek (GW1).
- Keputusan kualiti air bawah tanah dibandingkan dengan NGQS.
- Semua parameter yang diuji berada dalam had piawai yang ditetapkan, kecuali Fe mungkin disebabkan oleh kakisan/karat pada bahagian dalam paip.



- **Persampelan udara ambien** (PM₁₀, PM_{2,5}, SO₂, NO₂, CO, O₃ dan VOC) di 2 lokasi: sempadan tapak projek (A1) dan kuarters pekerja ladang sedia ada (A2).
- Keputusan parameter PM₁₀, PM_{2,5}, SO₂, NO₂, CO dan O₃ mematuhi MAAQS (2020).
- VOC mematuhi PEL OSHA.

- **Pemantauan Tahap Bunyi Bising:** L_{eq} di sempadan tapak projek (N1) dan kuarters pekerja ladang sedia ada (N2) mematuhi Jadual Pertama *Guidelines for Environmental Noise Limits and Control, 2019* bagi Zon *Industrial* dan *Suburban Residential (Medium Density)*.
- Penyumbang utama bunyi bising adalah daripada aktiviti perindustrian di sekeliling serta aktiviti komunikasi manusia, pergerakan kenderaan dan tiupan angin.

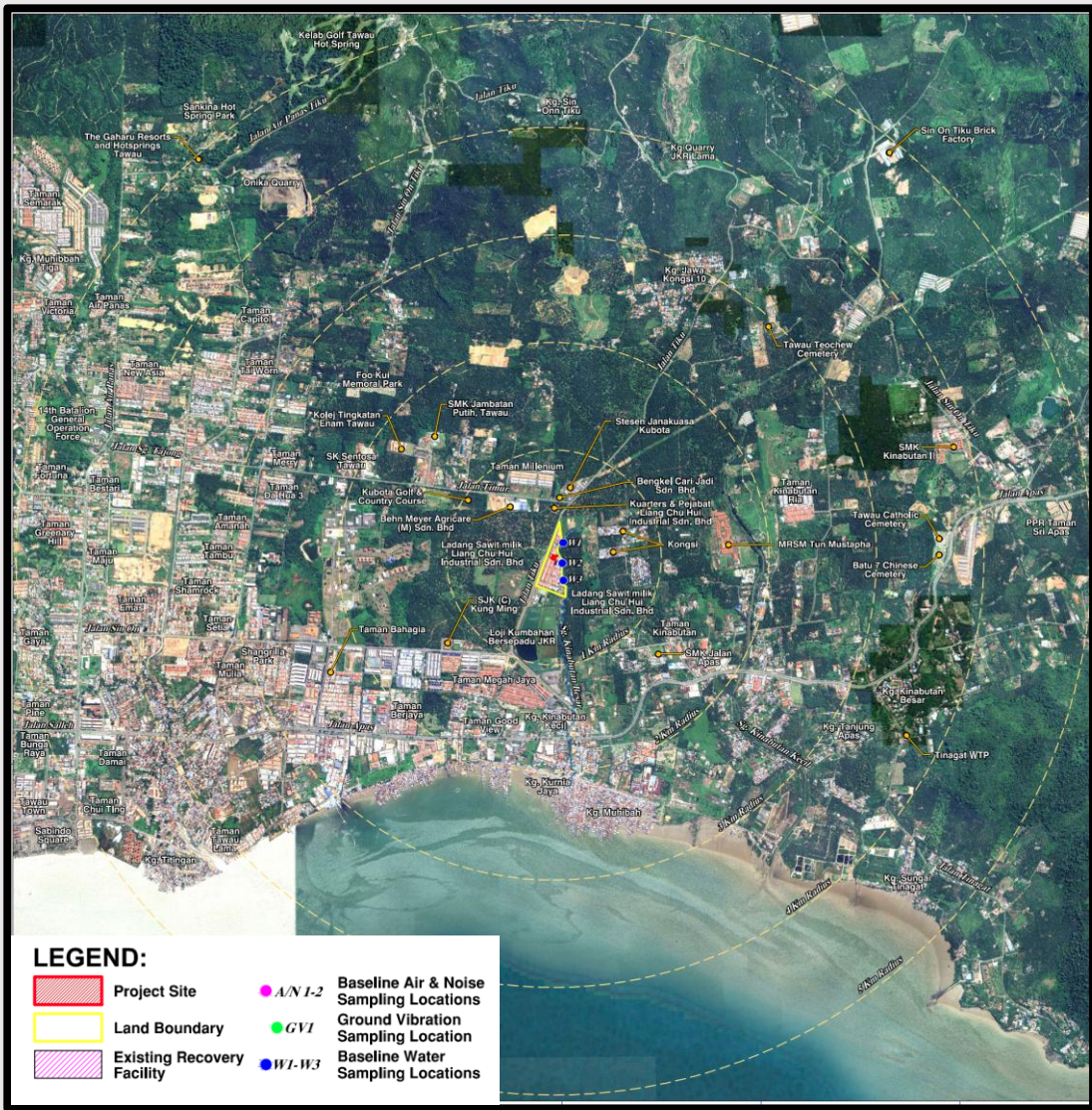


Biologikal

- ❖ Tiada tumbuh-tumbuhan semula jadi atau mana-mana spesies terlindung yang kelihatan kerana kawasan sekitar tapak juga merupakan kawasan perindustrian.

PERSEKITARAN SEDIA ADA

Zon Kajian EIA & Lokasi Persampelan Alam Sekitar



Jenis Guna Tanah	Guna Tanah	Jarak/ Arah
Bangunan Industri dalam Taman Perindustrian Megah	Hin Foh Industries Equipment Sdn Bhd	Sempadan Barat
	Sunway Marketing (East Malaysia) Sdn Bhd	Sempadan Timur
	Lot Perindustrian lain	Sempadan Selatan; Utara
Lain-lain	JKR Sabah's Tawau Sewerage Scheme Phase 2	300 m Selatan
	Liang Chu Hui Industries Sdn Bhd Oil Palm Plantation	100 m Timur



PENILAIAN IMPAK DAN LANGKAH MITIGASI

Peringkat Pengubasuan/ Pemasangan



Pencemaran Bunyi

Impak: Rendah

- ❖ Pemilihan & penggunaan peralatan jentera yang mempunyai tahap kuasa bunyi rendah.
- ❖ Penyediaan PPE kepada semua pekerja yang bekerja di kawasan tahap bunyi yang tinggi.
- ❖ Penyelenggaraan berkala kenderaan dan jentera.

Rujukan: Mukasurat C8-2 ke C8-3



Pencemaran Udara

Impak: Rendah

- ❖ Tiada pembakaran terbuka.
- ❖ Kenderaan pembinaan perlu diselenggara secara berkala.
- ❖ Had laju yang ditetapkan untuk jalan raya awam perlu dipatuhi dengan ketat.

Rujukan: Mukasurat C8-3



Pencemaran Air

Impak: Rendah

- ❖ Mengamalkan *housekeeping* yang baik.
- ❖ Menyimpan semua sisa di lokasi strategik.
- ❖ Menjalankan program kesedaran tentang kepentingan kebersihan di kawasan kerja dalam kalangan pekerja.

Rujukan: Mukasurat C8-3



Impak Sosio-Ekonomi

Impak: Sederhana/ Manfaat

- ❖ Utamakan penduduk tempatan untuk peluang pekerjaan/ perniagaan.
- ❖ Menjalankan pemeriksaan kesihatan sebelum diambil bekerja.

Rujukan: Mukasurat C8-4

PENILAIAN IMPAK DAN LANGKAH MITIGASI

Peringkat Operasi/ Penyelenggaraan



Penilaian Risiko/ Bahaya

Impak: Rendah

- ❖ Sediakan dan laksanakan Pelan Tindakan Kecemasan.
- ❖ Pemeriksaan berkala terhadap peralatan dan bekalan kecemasan.
- ❖ Menjalankan latihan kecemasan secara berkala.

Rujukan: Mukasurat C8-4 hingga C8-5



Pencemaran Udara

Impak: Sederhana

- ❖ Memasang SKPU (*wet scrubber* dan *activated carbon adsorption*).
- ❖ Kerja-kerja pemeriksaan dan penyelenggaraan yang kerap oleh CePSO.
- ❖ Menjalankan *stack monitoring* dan pemantauan kualiti udara ambien secara berkala.

Rujukan: Mukasurat C8-6 hingga C8-7



Pencemaran Bunyi

Impak: Sederhana

- ❖ Memasang papan tanda amaran dan menyediakan PPE bagi pekerja.
- ❖ Menjalankan pemantauan tahap bunyi bising secara berkala.

Rujukan: Mukasurat C8-7



Pencemaran Air

Impak: Sederhana

- ❖ Penyediaan longkang perimeter dengan *sump* di dalam fasiliti.
- ❖ Penyediaan Loji Pengolahan Air Buangan.
- ❖ Pemeriksaan dan penyelenggaraan berkala ke atas longkang konkrit sedia ada.
- ❖ Mengamalkan *housekeeping* yang baik.
- ❖ Melantik CePIETSO-PCP, CePIETSO-BP dan CEPWAM.
- ❖ Menjalankan pemantauan kualiti air secara berkala.

Rujukan: Mukasurat C8-7 hingga C8-9

PENILAIAN IMPAK DAN LANGKAH MITIGASI

Peringkat Operasi/ Penyelenggaraan



Impak Trafik & Pengangkutan

Impak: Rendah

- ❖ Penjadualan aktiviti pengangkutan dengan baik.
- ❖ Mematuhi peraturan keselamatan jalan raya.
- ❖ Pasang papan tanda yang betul di dalam fasiliti.

Rujukan: Mukasurat C8-9 hingga C8-10



Impak Sosio-Ekonomi

Impak: Sederhana/ Manfaat

- ❖ Utamakan penduduk tempatan untuk peluang pekerjaan/ perniagaan.
- ❖ Menjalankan pemeriksaan kesihatan sebelum diambil bekerja.

Rujukan: Mukasurat C8-4



Pencemaran Tanah

Impak: Rendah

- ❖ Sediakan lantai kalis air di fasiliti kemudahan penstoran dan pemerolehan kembali.
- ❖ Pemeriksaan dan penyelenggaraan berkala pada lantai serta kebocoran/tumpahan.

Rujukan: Mukasurat C8-10



Impak Kesihatan

Impak: Rendah

- ❖ Melaksanakan Penilaian Risiko Kesihatan Kimia.
- ❖ Melaksanakan pemantauan perubatan berkala dan pemeriksaan berkala.
- ❖ Melaksanakan *fogging* secara berkala.

Rujukan: Mukasurat C8-11



Potensi Peninggalan

Impak: Rendah

- ❖ Pelupusan semua buangan (buangan pepejal dan terjadual) yang betul.
- ❖ Lakukan pemeriksaan tapak 3 bulan selepas peninggalan.
- ❖ Sediakan dan kemukakan pelan peninggalan kepada JAS Sabah tidak kurang 6 bulan sebelum peninggalan sebenar.

Rujukan: Mukasurat C8-11

PROGRAM PEMANTAUAN

Pemantauan Prestasi

- ❖ Perlantikan orang berwibawa CePIETSO-BP & CePIETSO-PCP bagi pengurusan efluen.
- ❖ Perlantikan orang berwibawa CePSO bagi pengurusan SKPU (*Scrubber*).
- ❖ Perlantikan orang berwibawa CePSWAM bagi pengurusan buangan terjadual.
- ❖ Termasuk penyelenggaraan pencegahan berkala dan tindakan pembetulan.

Pemantauan Pematuhan

Aspect	Parameter	Monitoring Location	Frequency	Compliance Standard/ Guidelines
Operation and Maintenance Stage				
Air Quality (Stack Emission)	Total Particulate Matter (PM), Non-Methane Volatile Organic Compound (NMVOC), Sulphur Dioxide (SO ₂), Nitrogen Dioxide (NO ₂)	Refer to ST1 – ST2 in Figure 9.5.1 . ST1: Chimney Outlet (Burner – Ph1) N 4° 15'58.77", E 117°56'8.42" ST2: Chimney Outlet (Burner – Ph2) N 4° 15'58.81", E 117°56'8.42" Note: Stack monitoring for ST-2 will start upon commencement of Phase 2.	Yearly	Second Schedule of Environmental Quality (Clean Air) Regulations 2014. Total PM: 50 mg/m ³ Fifth Schedule (Category 3 – Class 1) of Environmental Quality (Clean Air) Regulations 2014. NMVOC: 20 mg/m ³ Fifth Schedule (Category 4 – (b)) SO ₂ & NO ₂ : 400 mg/m ³
	Non-Methane Volatile Organic Compound (NMVOC)	Refer to ST3 in Figure 9.5.1 . ST3: Chimney Outlet (Waste Gas Treatment) N 4° 15'58.68", E 117°56'8.76"	Yearly	Fifth Schedule (Category 3 – Class 1) of Environmental Quality (Clean Air) Regulations 2014. NMVOC: 20 mg/m ³
Treated Effluent Quality	pH, Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solids (SS), Oil and Grease (O&G), Ammoniacal-Nitrogen (AN), Lead (Pb), Copper (Cu), Iron (Fe)	Refer to EF1 in Figure 9.5.1 . EF1: Final Discharge Outlet N 4° 15' 58.49", E 117° 56' 8.71"	Monthly	Standard B, Fifth & Seventh Schedule of the Environmental Quality (Industrial Effluent) Regulations, 2009. Temp: 40°C pH: 5.5 - 9.0 BOD at 50 mg/L SS: 100 mg/L 20°C: COD: 200 mg/L Cu: 1.0 mg/L Pb: 0.5 mg/L AN: 20 mg/L Oil & Grease: 10 mg/L

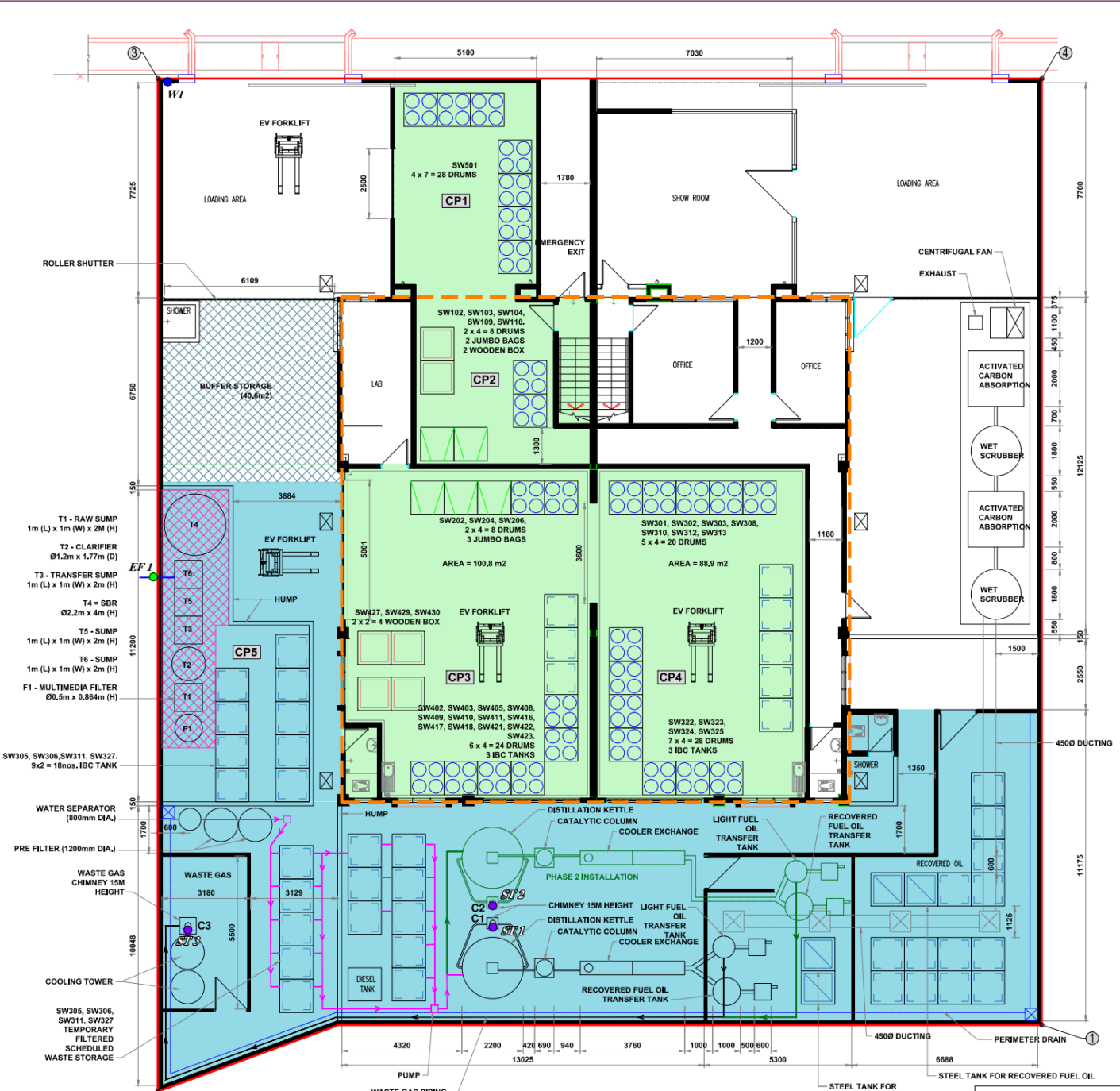
PROGRAM PEMANTAUAN

Pemantauan Impak

Aspect	Parameter	Monitoring Location	Frequency	Compliance Standard/ Guidelines
Operation and Maintenance Stage				
Surface Water Quality	pH value, Temperature, Dissolved Oxygen, BOD, COD, Ammoniacal-Nitrogen, Oil & Grease	Refer to W1 and W2 in Figure 9.5.1 W1: Discharge outlet of perimeter drain N 4° 15' 57.76", E 117° 56' 8.43" W2: Sg. Kinabutan Besar N 4° 15' 56.70", E 117° 56' 10.90"	Quarterly	Class III of the National Water Quality Standards for Malaysia Temperature: Normal+2°C pH: 5 - 9 DO: 3 - 5 BOD: 6 mg/L COD: 50 mg/L Ammoniacal-Nitrogen: 0.9 mg/L Oil & Grease: N
Noise Level	L _{eq} (day time & night time)	Refer to N1 and N2 in Figure 9.5.1 N1: Southern site boundary N 4° 15' 57.7", E 117° 56' 8.1"	Quarterly	Second Schedule: Designated Industrial Zone Land Use of Guidelines for Environmental Noise Limits and Control [75 dB(A) during day time; 75 dB(A) during night time]
Air Quality	PM ₁₀ , PM _{2.5} , CO, SO ₂ , NO ₂ , VOC	Refer to A1 and A2 in Figure 9.5.1 A1: Southern site boundary N 4° 15' 57.7", E 117° 56' 8.1"	Quarterly	<ul style="list-style-type: none"> Malaysia Ambient Air Quality Standards, 2020. <ul style="list-style-type: none"> PM₁₀: 100 µg/m³ (24-hour averaging time) PM_{2.5}: 35 µg/m³ (24-hour averaging time) SO₂: 250 µg/m³ (1-hour averaging time) NO₂: 280 µg/m³ (1-hour averaging time) CO: 30 mg/m³ (1-hour averaging time) OSHA PELs (refer to Appendix 6.8) is referred to for VOC standard limit.
Groundwater	pH value, BOD, COD, Total Dissolved Solids (TDS) Chloride (Cl), Iron (Fe), Manganese (Mn), Silica, Sulphate, Cadmium (Cd), Arsenic (As), Lead (Pb), Chromium (Cr), Copper (Cu), Zinc (Zn), Nickel (Ni), Phenol, E.coli, Oil & Grease	Refer GW1 in Figure 9.5.1 GW1: Existing groundwater well within the site N 4° 15' 57.8", E 117° 56' 08.2"	Yearly	<ul style="list-style-type: none"> Comparison to baseline data National Groundwater Quality Standards for Industrial Use. <ul style="list-style-type: none"> pH: 6.5 - 8.0 Si: 20.0 mg/L COD: 30 mg/L Sulphate: 200 mg/L Cl: 100 mg/L Manganese : 0.2 mg/L Fe: 0.3 mg/L TDS: 450 mg/L E.coli: - Oil & Grease: -

PROGRAM PEMANTAUAN

Lokasi Cadangan Pemantauan

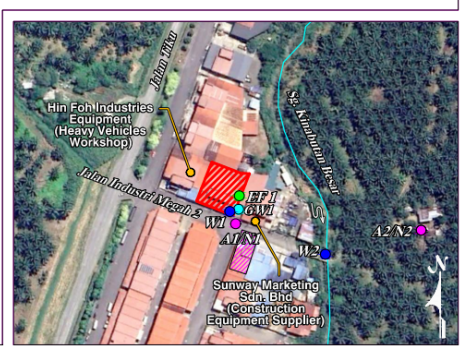


LEGEND:

- Project Site
- Original Warehouse Area
- Storage Area
- Recovery Area
- Wastewater Treatment Plant
- Compartment (CP1-CP5)
- Buffer Storage
- Perimeter Drain
- Drum
- Wooden Box
- Jumbo Bag
- IBC Tank
- Chimney Locations
- Proposed Stack Monitoring Points
- Proposed Air and Noise Monitoring Points
- Proposed Water Monitoring Points
- Proposed Groundwater Monitoring Point
- Existing Recovery Facility

SOURCE: Adapted from JLENERGY

SCALE IN METRES - A3 MEDIUM



Point	Coordinates in Timbala '948 datum	Coordinates in WGS84 datum
①	N 4° 18' 27.0"	N 4° 18' 56.70"
②	E 117° 59' 58.86"	E 117° 59' 57.97"
③	N 4° 18' 16.88"	N 4° 18' 58.81"
④	E 117° 59' 59.44"	E 117° 59' 8.76"
A1/N1	N 4° 18' 03.59"	N 4° 18' 57.91"
A1/N2	E 117° 59' 59.31"	E 117° 59' 8.32"
A2/N1	N 4° 18' 03.77"	N 4° 18' 57.93"
A2/N2	E 117° 59' 59.33"	E 117° 59' 8.24"
W1	N 4° 18' 03.59"	N 4° 18' 57.72"
W2	E 117° 59' 59.07"	E 117° 59' 8.31"
G/W1	N 4° 18' 58.56"	N 4° 18' 56.70"
G/W2	E 117° 59' 1.58"	E 117° 59' 10.90"
EF1	N 4° 18' 07.75"	N 4° 18' 57.87"
ST1	N 4° 18' 17.77"	N 4° 18' 56.49"
ST2	E 117° 59' 59.30"	E 117° 59' 8.42"
ST3	N 4° 18' 16.88"	N 4° 18' 58.78"
	E 117° 59' 59.10"	E 117° 59' 8.47"
	N 4° 18' 16.88"	N 4° 18' 58.81"
	E 117° 59' 59.31"	E 117° 59' 8.42"
	N 4° 18' 15.56"	N 4° 18' 58.88"
	E 117° 59' 59.44"	E 117° 59' 8.76"