FIRST SCHEDULE

CORRECTED EIA

ENVIRONMENTAL IMPACT ASSESSMENT FOR DEVELOPMENT OF A 650 MWp/500 MWac LARGE SCALE SOLAR PHOTOVOLTAIC (LSSPV) POWER PLANT ON LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 OF MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN



FEBRUARY 2026

PROJECT PROPONENT:

TKMS TNB KUALA MUDA SOLAR

TNB KUALA MUDA SOLAR SDN. BHD.

TNB Platinum Tower, Level 16, 3 Jalan Bukit Pantai, 59100 Bangsar, Kuala Lumpur.

EIA CONSULTANT:

TNB Labs

TNB LABS SDN. BHD.
No. 1, Lorong Ayer Itam,
43000 Kajang,
Selangor Darul Ehsan

In Collaboration with:

ES ECO SMART SDN. BHD.
Menara ES, No.9,
Persiaran Industri,
Bandar Sri Damansara,
52200 Kuala Lumpur.

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DECLARATION OF PROJECT PROPONENT

TNB Kuala Muda Solar Sdn. Bhd. (1537685-P)
Tingkat M, Bangunan Warisan,
Tenaga Nasional Berhad,
No. 129, Jalan Bangsar,
59200 Kuala Lumpur, W.P.

Tel: +603 21082355
Fax: +603 79590494

www.tnbrenewables.com

DECLARATION BY PROJECT PROPONENT

"I hereby declare that the entire EIA Report is the product of the Qualified Person (i.e. the EIA Consultant) engaged by my company and all the facts stated in the Report and the accompanying information are to the best of my knowledge and belief true and correct, and that I have not withheld or distorted any material facts. I agree and I undertake the responsibility to implement all the Pollution Prevention and Mitigation Measures (P2M2s) described in the EIA Report, in the Environmental Management Plan (EMP), and in the Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2) as proposed by the EIA Consultant. I have allocated sufficient funds for the above purpose."

Name of Project Proponent	:	Hanif bin Siraf
NRIC Number	:	781020-01-5221
Designation	:	Director

Signature : 

Date: 13/02/2026

Company's stamp : 

DECLARATION OF QUALIFIED PERSON

TNB Labs Sdn. Bhd. (979289-M)
(A Wholly owned subsidary of TNB Research SDN. BHD)
No. 1, Lorong Ayer Itam, Kawasan Institusi Penyelidikan, 43000 Kajang, Selangor, Malaysia.
+6 03 8922 5000 +6 03 8922 1873 www.tnblabs.com.my

DECLARATION BY QUALIFIED PERSON

"I declare that the entire EIA Report is the product of my own work and the work of my team members (i.e. other consultants who are also Qualified Persons) who worked under my supervision and all the facts stated in the Report and the accompanying information are to the best of my knowledge and belief true and correct and that I have not withheld or distorted any material facts. I have briefed the Project Proponent on the content of the Report and highlighted to him all the Pollution Prevention and Mitigation Measures (P2M2s) described in it, and in the Environmental Management Plan (EMP), and in the Land Disturbing Pollution Prevention and Mitigation Measures (LD-P2M2), and the Project Proponent has agreed to implement them (i.e.P2M2)."

Name of EIA Consultant Team Leader	:	Ts. Ahmad Nazri Bin Saidin (CEP-C0346)
NRIC Number	:	870721-49-5437
Designation	:	Team Leader
Signature	:	

Date: 13/02/2026

Company's stamp : TNB Labs Sdn. Bhd. (979289-M)
No. 1, Lorong Ayer Itam,
Kawasan Institusi Penyelidikan,
43000 Kajang, Selangor.

RINGKASAN EKSEKUTIF

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PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

PENGGERAK PROJEK

TNB KUALA MUDA SOLAR SDN BHD
Alamat : TNB Platinum Tower, Level 16, 3 Jalan Bukit Pantai, 59100 Bangsar, Kuala Lumpur.
Telefon : 03 21082355
Pegawai Dihubungi : Mr. Gopalkrishnan a/l Sekharan
Email : sekharan@tnb.com.my

PERUNDING EIA

TNB Labs Sdn. Bhd.
No. 1, Lorong Ayer Itam,
43000 Kajang, Selangor
Ts. Ahmad Nazri Bin Saidin
Ketua Perunding)
016-6650 549
nazri.saidin@tnb.com.my

Dengan kerjasama:

ES Eco Smart Sdn. Bhd.
Level 5, No. 9, Menara ES, Persiaran Industri, Bandar Sri Damansara,
52200 Kuala Lumpur
Wazfarina Abdul Wahid (Perunding)
03-6273 6013
waw@esecosmart.com

Ringkasan Projek

KEPERLUAN PERUNDANGAN



Jadual Pertama : Aktiviti 13

Aktiviti pembangunan atau pembersihan tanah yang melibatkan kawasan kurang daripada 50 peratus keluasan tanah yang mempunyai kecerunan cerun sama atau melebihi 25 darjah (≥25°) tetapi kurang daripada 35 darjah (<35°).

RINGKASAN



Untuk pembangunan ladang solar fotovoltaik berskala besar (LSSPV) dengan kapasiti terpasang sebanyak 650 MWp (DC) dan kapasiti penghantaran keluar sebanyak 500 MWac ke grid nasional

PENGEZONAN



PERTANIAN
(Aktiviti yang dibenarkan bekalan elektrik)
Rancangan Tempatan Daerah (RTD) Kuala Muda 2035

LOKASI



Terletak di Mukim Sungai Petani in Daerah Kuala Muda, Kedah Darul Aman.
Di atas Lot 3373, 3374, 3386 - 3395, 3399 - 3404, 3637- 3639, and 4690
Luas: 1,187.244 ekar (480.46 ha)

KEPERLUAN PROJEK

POLISI DAN PELAN KERAJAAN

Projek selaras dengan:

- *National Energy Transition Roadmap (NETR) 2023*
- Rancangan Malaysia Ke-12 (RMK-12) 2021-2025
- *Malaysia Renewable Energy Roadmap (MyRER)*
- *National Energy Policy (DTN) 2022-2040*
- *Large-Scale Solar (LSS) Programme*
- Rancangan Struktur Negeri Kedah 2035
- Garis Panduan Pembangunan Ladang Solar Negeri Kedah 2018
- RTD Kuala Muda, Kedah 2035 (Penggantian)

MANFAAT EKONOMI

- Projek ini merupakan pelaburan strategik dan tepat pada masanya dalam infrastruktur tenaga boleh diperbaharui Malaysia.
- Projek ini bertujuan untuk meningkatkan pelaburan di rantau ini, dan akan mewujudkan peluang pekerjaan, merangsang ekonomi tempatan, serta menyumbang kepada pertumbuhan ekonomi keseluruhan Negeri Kedah

MANFAAT SOSIAL

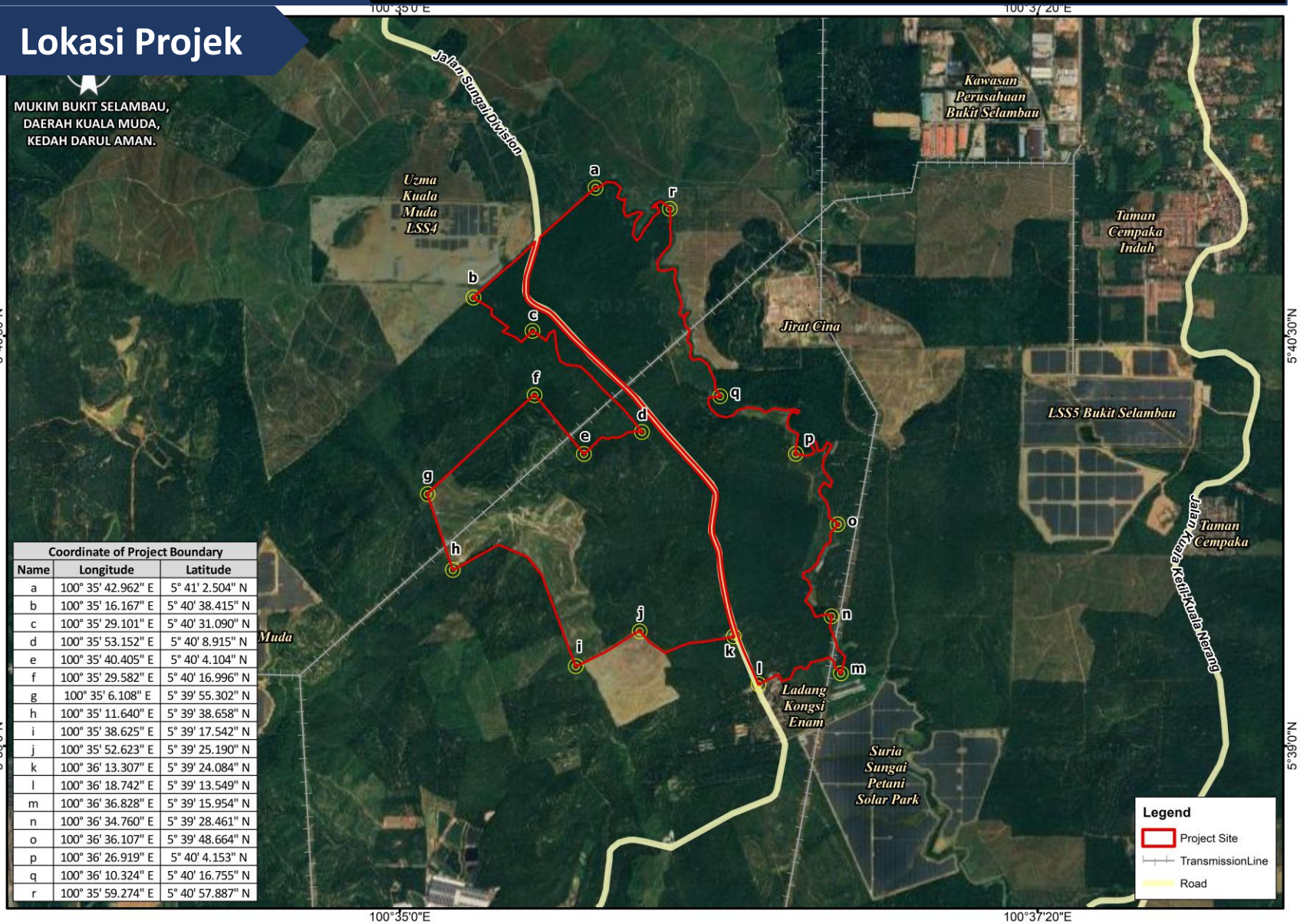
- Permintaan elektrik di Malaysia menunjukkan trend peningkatan yang berterusan, didorong oleh pertumbuhan penduduk, proses pembandaran, perkembangan industri, serta peningkatan taraf hidup.
- Unjuran oleh Suruhanjaya Tenaga Malaysia menunjukkan permintaan elektrik nasional dijangka meningkat pada kadar purata tahunan sekitar 3 - 4% sehingga tahun 2035, menunjukkan pembangunan ekonomi dan sosial yang berterusan.

RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Lokasi Projek



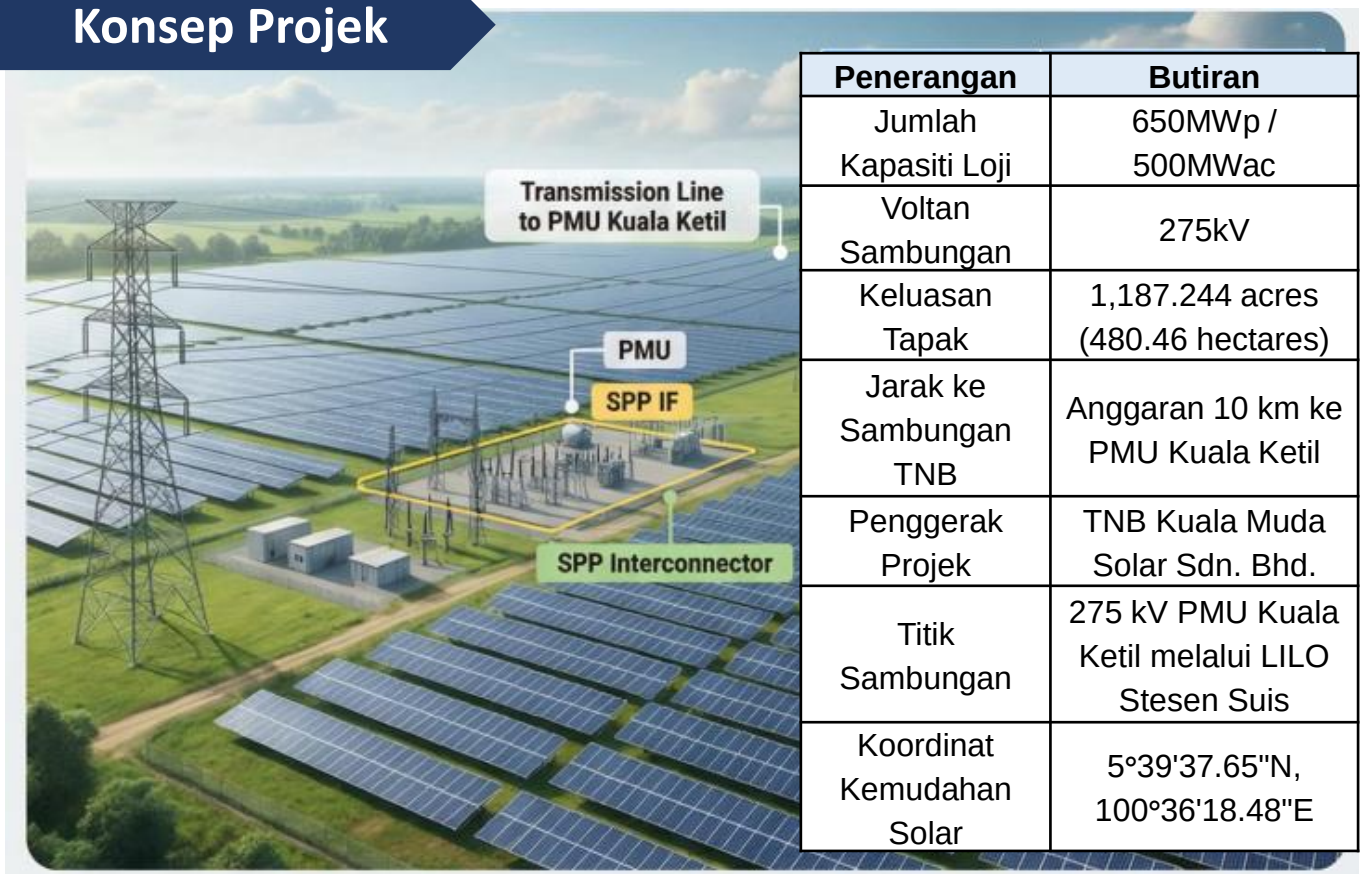
Coordinate of Project Boundary		
Name	Longitude	Latitude
a	100° 35' 42.962" E	5° 41' 2.504" N
b	100° 35' 16.167" E	5° 40' 38.415" N
c	100° 35' 29.101" E	5° 40' 31.090" N
d	100° 35' 53.152" E	5° 40' 8.915" N
e	100° 35' 40.405" E	5° 40' 4.104" N
f	100° 35' 29.582" E	5° 40' 16.996" N
g	100° 35' 6.108" E	5° 39' 55.302" N
h	100° 35' 11.640" E	5° 39' 38.658" N
i	100° 35' 38.625" E	5° 39' 17.542" N
j	100° 35' 52.623" E	5° 39' 25.190" N
k	100° 36' 13.307" E	5° 39' 24.084" N
l	100° 36' 18.742" E	5° 39' 13.549" N
m	100° 36' 36.828" E	5° 39' 15.954" N
n	100° 36' 34.760" E	5° 39' 28.461" N
o	100° 36' 36.107" E	5° 39' 48.664" N
p	100° 36' 26.919" E	5° 40' 4.153" N
q	100° 36' 10.324" E	5° 40' 16.755" N
r	100° 35' 59.274" E	5° 40' 57.887" N

RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Konsep Projek



Penerangan	Butiran
Jumlah Kapasiti Loji	650MWp / 500MWac
Voltan Sambungan	275kV
Keluasan Tapak	1,187.244 acres (480.46 hectares)
Jarak ke Sambungan TNB	Anggaran 10 km ke PMU Kuala Ketil
Penggerak Projek	TNB Kuala Muda Solar Sdn. Bhd.
Titik Sambungan	275 kV PMU Kuala Ketil melalui LILO Stesen Suis
Koordinat Kemudahan Solar	5°39'37.65"N, 100°36'18.48"E

Carta Alir Proses

1. Sinaran Suria
2. Panel Solar Fotovoltaik (PV) (Penjanaan elektrik arus terus - DC)
3. Kotak Penggabung Rentetan / Susunan (Pengumpulan dan perlindungan DC)
4. Penyongsang (Inverter) (Penukaran DC kepada AC)
5. Pengubah Penaik Voltan (Voltan rendan AC → voltan sederhana AC)
6. Sistem Pengumpulan Dalaman (Kabel bawah tanah voltan sederhana (MV) di dalam tapak)
7. Penyambung Antara SPP (Sistem penyambungan elektrik)
8. Kemudahan Penyambungan Antara SPP (SPP IF) (Peralatan suis, perlindungan dan kawalan)
9. PMU (Unit Pengambilan Utama / Antara Muka Grid) (Pemeteran, perlindungan, pematuhan grid)
10. Talian Penghantaran (Ke PMU Kuala Ketil – di luar sempadan Projek)
11. Grid Nasional

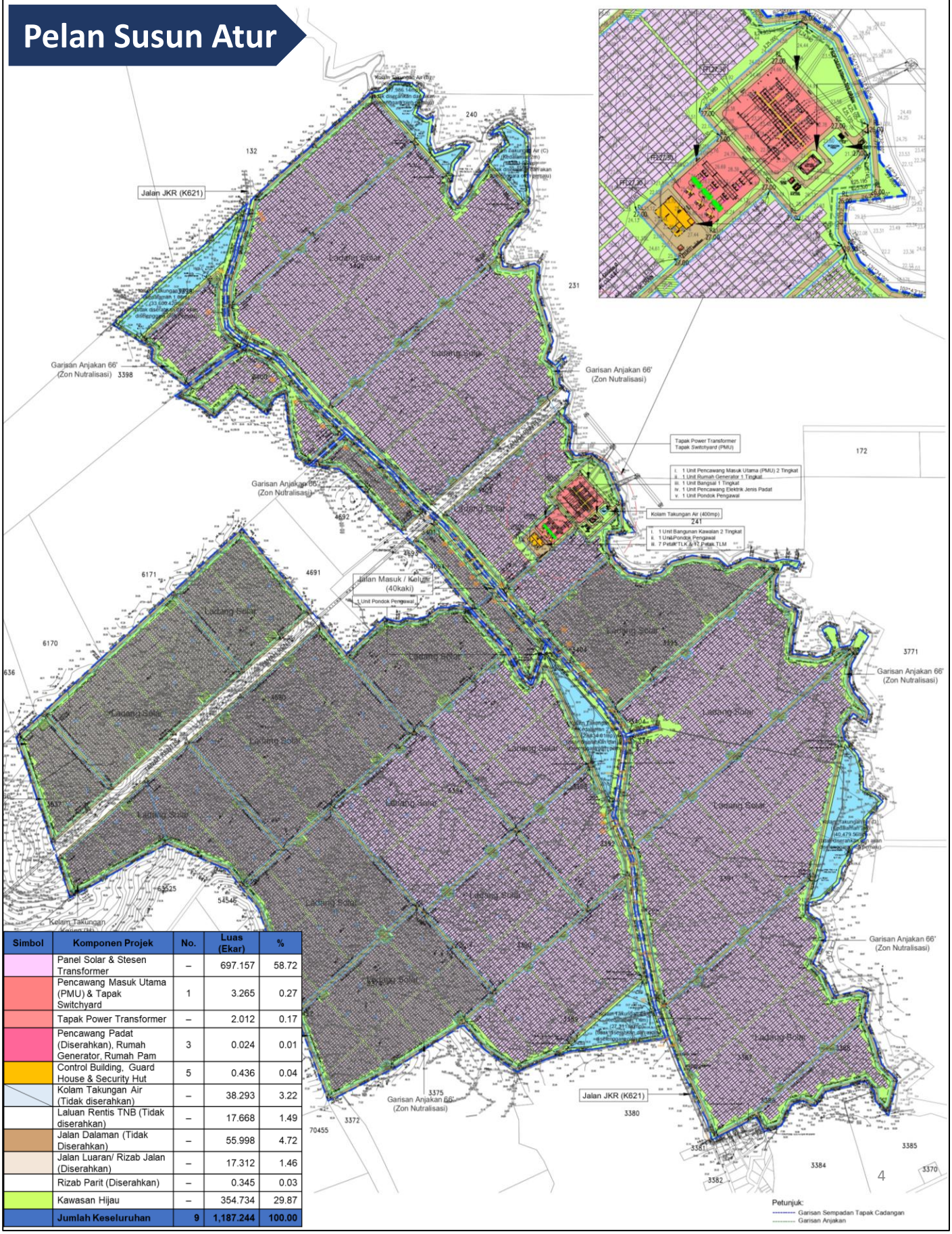
11. Grid Nasional

RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Pelan Susun Atur



Simbol	Komponen Projek	No.	Luas (Ekar)	%
	Panel Solar & Stesen Transformer	–	697.157	58.72
	Pencawang Masuk Utama (PMU) & Tapak Switchyard	1	3.265	0.27
	Tapak Power Transformer	–	2.012	0.17
	Pencawang Padat (Diserahkan), Rumah Generator, Rumah Pam	3	0.024	0.01
	Control Building, Guard House & Security Hut	5	0.436	0.04
	Kolam Takungan Air (Tidak diserahkan)	–	38.293	3.22
	Laluan Rentis TNB (Tidak diserahkan)	–	17.668	1.49
	Jalan Dalaman (Tidak Diserahkan)	–	55.998	4.72
	Jalan Luaran/ Rizab Jalan (Diserahkan)	–	17.312	1.46
	Rizab Parit (Diserahkan)	–	0.345	0.03
	Kawasan Hijau	–	354.734	29.87
	Jumlah Keseluruhan	**9**	**1,187.244**	**100.00**

RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

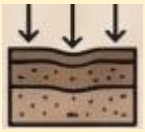
PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Persekitaran Sedia Ada



TOPOGRAFI

- Tanah pertanian sedia ada adalah ladang kelapa sawit
- Landskap yang diubahsuai



TANAH

- Terdiri dari butiran halus yang didominasi kelodak dan tanah liat



GEOLOGY

- Batuan sedimen berbutir halus dan metamorfik gred rendah, termasuk batu lumpur, batu sabak, filit



HIDROLOGI DAN SALIRAN

- Tapak Projek dalam lembangan Sg. Muda Basin
- Dua (2) Sungai terdekat dengan tapak Projek: Sg. Selambau & Sg. Jerong
- Surface runoff will flow into Sg. Selambau & Sg. Jerong which subsequently flow into Sg. Muda
- Dua (2) titik pengambilan air terlibat:
  - WIP Bukit Selambau (11.20 km hulu Projek)
  - WIP Kuala Ketil (11.40 km hilir Projek)



IKLIM DAN METEOROLOGI

Meteorologi Malaysia: Stesen Butterworth

- **Suhu**
  - Purata suhu tahunan : 28.0°
  - Suhu tertinggi: Mei 2024 (29.9°C)
  - Suhu terendah: Disember 2022 (26.4°C)
- **Kelembapan Relatif**
  - Purata tahunan : 82.2%
  - Maksimum: November 2022 (87.6%)
  - Minimum : June 2024 (64.4%)
- **Taburan dan Hari Hujan**
  - Hujan tertinggi Oktober 2016 (539.8 mm)
  - Hujan terendah pada February 2021 (2.6 mm)
- **Angin**
  - Frekuensi kejadian tertinggi (27.2%) arah timur.
  - Purata tahunan kelajuan : 1.8 m/s
  - Angin tenang : 4.2%



EKOLOGI

- The Project site is currently covered by secondary vegetation (shrubs, bushes and oil palm plantation)
- No species of high conservation for flora concern were recorded within the study area.
- Aquatic fauna within the study area exhibit low to moderate species diversity and are dominated by common, disturbance-tolerant taxa



GUNA TANAH

- Blok Perancangan 1 (BP) and BPK 1.15
- Tapak Projek bukan dalam Kawasan ESA
- Guna tanah sekitar 5-km radius :
  - Pertanian, institusi, perumahan, perdagangan, dan infrastruktur/utilitias.



TRAFIK

- Jalan akses utama ke tapak Projek melalui K621.
- Isipadu Jam Puncak 2025:
  - KR403 (3143 pcu/hr),
  - KR409 (1185 pcu/hr),
  - KR408 (1387 pcu/hr),
  - KR601 (701 pcu/hr)

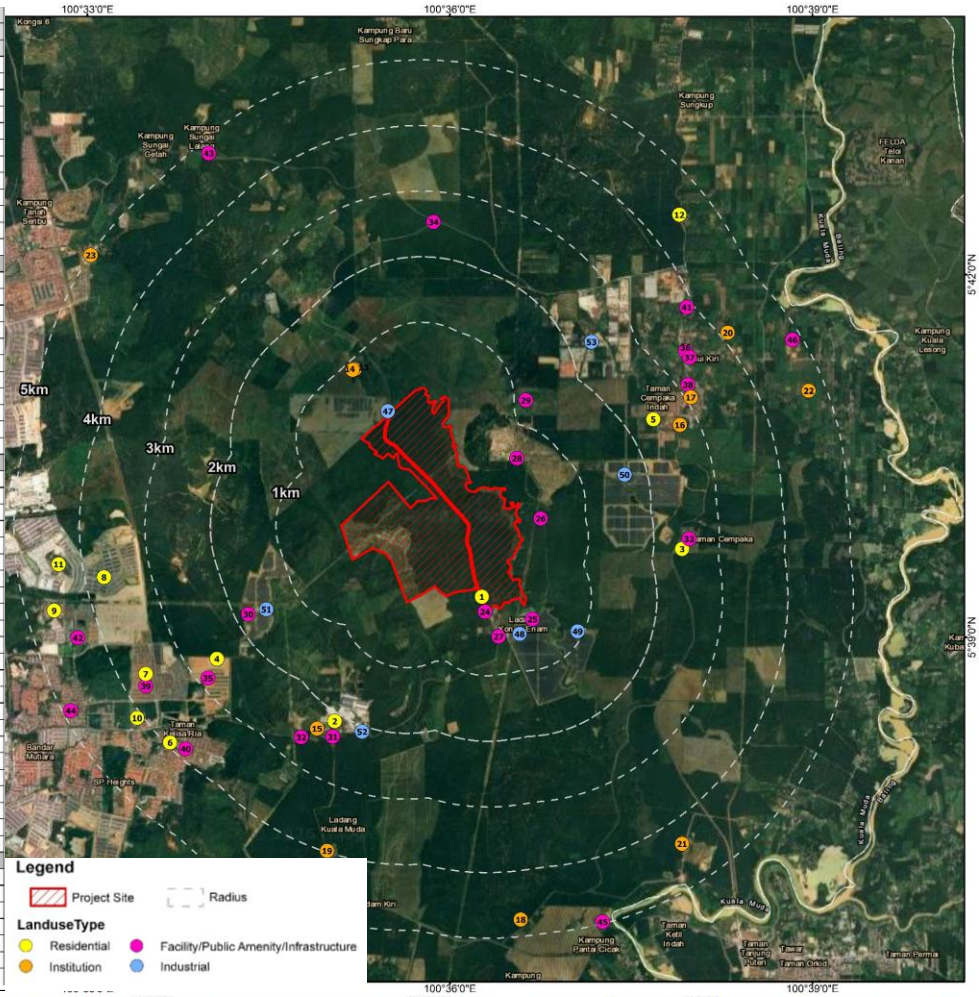
RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

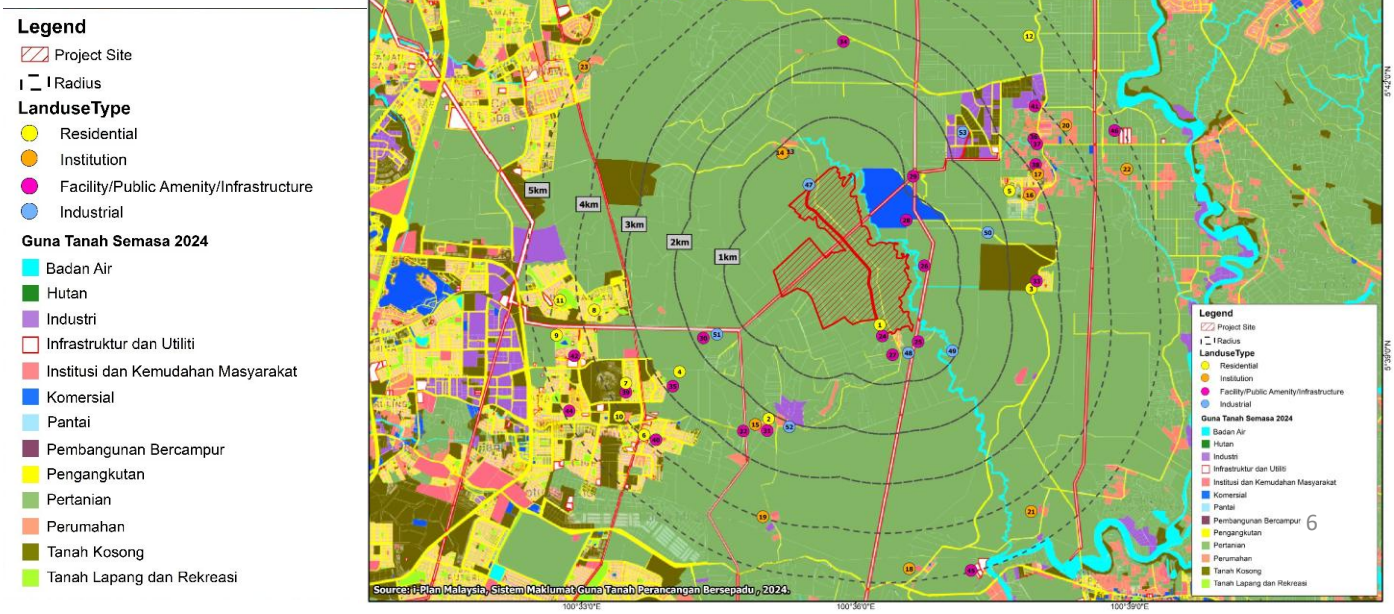
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Guna Tanah

Coordinate of Landuse			
No	Name	Longitude	Latitude
RESIDENTIAL			
1	Kg Patani Para	100° 36' 15.880" E	5° 39' 20.091" N
2	Kampung Sungai Division	100° 35' 2.800" E	5° 38' 18.370" N
3	Taman Cempaka Bukit Selambau	100° 37' 55.303" E	5° 39' 43.814" N
4	Taman Arowana	100° 34' 4.279" E	5° 38' 49.263" N
5	Taman Cempaka Indah	100° 37' 41.020" E	5° 40' 48.170" N
6	Taman Kelisa Ria	100° 33' 41.023" E	5° 38' 7.791" N
7	Spice Village	100° 33' 28.995" E	5° 38' 41.784" N
8	Senni, Bukit Banyan	100° 33' 8.266" E	5° 39' 29.828" N
9	Darul Aman Perdana	100° 32' 43.478" E	5° 39' 13.246" N
10	Kampung Rusa	100° 33' 24.672" E	5° 38' 19.926" N
11	Bukit Banyan Hill Park	100° 32' 45.715" E	5° 39' 36.196" N
12	Kampung 50 Relong	100° 37' 53.920" E	5° 42' 29.648" N
INSTITUTION			
13	SK Patani Para	100° 35' 12.718" E	5° 41' 12.926" N
14	SJK (T) Ldg Patani Para	100° 35' 11.650" E	5° 41' 12.676" N
15	SJK(T) Palanisamy Kumaran	100° 34' 54.042" E	5° 38' 14.674" N
16	SMK Bukit Selambau	100° 37' 54.230" E	5° 40' 45.360" N
17	SJK (C) Fuh Sun	100° 37' 59.640" E	5° 40' 59.070" N
18	SK Dataran Muda	100° 36' 35.173" E	5° 36' 39.950" N
19	SJK (T) Ladang Kuala Muda	100° 34' 58.994" E	5° 37' 14.080" N
20	Madrasah Nadwatul Furqan Was Sunan	100° 38' 17.955" E	5° 41' 31.148" N
21	SJK (T) Ladang Lubok Segintah	100° 37' 55.270" E	5° 37' 17.503" N
22	Maahad Tarbiah Al Faqeh	100° 38' 58.095" E	5° 41' 2.334" N
23	SJK (T) Sungai Getah	100° 33' 1.639" E	5° 42' 9.612" N
FACILITY/PUBLIC AMENITY/INFRASTRUCTURE			
24	Maha Mariamman Kovil 14	100° 36' 17.464" E	5° 39' 12.684" N
25	Cemetery Hindu	100° 36' 41.000" E	5° 39' 9.000" N
26	Muni Temple 22	100° 36' 45.080" E	5° 39' 58.890" N
27	Amman Kovil	100° 36' 24.180" E	5° 39' 0.370" N
28	Xing Fu Memorial Park (Cemetery)	100° 36' 33.254" E	5° 40' 28.805" N
29	Tangki Air SADA	100° 36' 37.713" E	5° 40' 57.615" N
30	PMU Kuala Muda Solar 132Kv	100° 34' 19.865" E	5° 39' 11.432" N
31	Arulmigu Karumariamman Temple	100° 35' 1.830" E	5° 38' 10.640" N
32	PMU Kuala Muda South	100° 34' 46.150" E	5° 38' 10.399" N
33	Surau Al Ikhlas Taman Cempaka	100° 37' 58.786" E	5° 39' 48.850" N
34	Murugan Muniandy Temple	100° 35' 51.890" E	5° 42' 26.080" N
35	Surau Taman Arowana	100° 33' 59.863" E	5° 38' 39.765" N
36	Klinik Kesihatan Bukit Selambau	100° 37' 56.923" E	5° 41' 22.044" N
37	Dewan Serbaguna Bukit Selambau	100° 37' 59.027" E	5° 41' 18.844" N
38	Masjid Al-Wajdi	100° 37' 58.205" E	5° 41' 5.320" N
39	Surau Taman Spice Village	100° 33' 29.024" E	5° 38' 35.816" N
40	Masjid Al- Maghfirah	100° 33' 48.808" E	5° 38' 4.644" N
41	Balai Polis Bukit Selambau	100° 37' 57.636" E	5° 41' 43.751" N
42	Surau Al Ansar Darulaman Perdana	100° 32' 55.246" E	5° 38' 59.732" N
43	Sri Mahamariamman Temple	100° 34' 0.305" E	5° 43' 0.180" N
44	Surau At- Taqwa	100° 32' 51.806" E	5° 38' 23.578" N
45	Loji Rawatan Air Kuala Ketil	100° 37' 15.798" E	5° 36' 38.813" N
46	Loji Rawatan Air Bukit Selambau	100° 38' 50.054" E	5° 41' 27.614" N
INDUSTRIAL			
47	Uzma Kuala Muda LSS	100° 35' 29.230" E	5° 40' 52.150" N
48	Solarpack Suria Sungai Petani (116MWp)	100° 36' 34.613" E	5° 39' 1.642" N
49	Leader Solar Energy II (Bkt. Selambau)	100° 37' 3.451" E	5° 39' 2.949" N
50	Solar Farm Bukit Selambau	100° 37' 26.800" E	5° 40' 20.680" N
51	BBP Solar Farm	100° 34' 28.861" E	5° 39' 13.855" N
52	Tiong Huat Rubber Factory Sdn Bhd	100° 35' 16.420" E	5° 38' 13.129" N
53	Kawasan Perusahaan Bukit Selambau	100° 37' 10.347" E	5° 41' 26.545" N



Guna Tanah Sediada di Tapak Projek



Persekitan Sedia Ada

SOSIO-EKONOMI

- Hampir separuh daripada responden (46.8%) menyatakan sokongan penuh terhadap Projek, dengan mengiktiraf kepentingannya dalam memenuhi permintaan elektrik masa depan serta menyokong keperluan tenaga negara.
- 7.9% responden menunjukkan sokongan bersyarat, tertakluk kepada Proponent Projek memastikan kualiti alam sekitar dikekalkan dan kehidupan harian komuniti berhampiran tidak terjejas.
- 24.4% responden menyatakan mereka tidak menyokong Projek, terutamanya disebabkan kebimbangan terhadap kehadiran kumulatif pembangunan ladang solar yang berhampiran dengan kawasan kediaman mereka.
- 20.9% responden mengambil pendirian neutral, tidak menunjukkan sokongan mahupun penentangan secara jelas terhadap Projek.

PEMANTAUAN GARIS DASAR

KUALITI AIR SUNGAI

- Pemantauan di 12 Lokasi hulu dan hilir sungai
- Sampel dibandingkan dengan *National Water Quality Standard* (NWQS)
- Kualiti air keseluruhan :
  - Kelas II dan Kelas IV

KUALITI UDARA

- Garis dasar di empat (4) Lokasi;
  - A1 - Kg. Patani Para;
  - A2 - Xing Fu Memorial Park Quarters;
  - A3 - UZMA Kuala Muda Sdn Bhd,
  - A4 - Rumah Ladang in Kebun Barath
- Semua stesen mematuhi *Malaysian Ambient Air Quality Standards (MAAQS 2020)*

TAHAP GETARAN

- Garis dasar di empat (4) Lokasi;
  - V1 - Kg. Patani Para;
  - V2 - Xing Fu Memorial Park Quarters;
  - V3 - UZMA Kuala Muda Sdn Bhd,
  - V4 - Rumah Ladang in Kebun Barath
- Tahap getaran di semua stesen di bawah limit garis panduan DOE.

NOISE LEVEL

- Garis dasar di empat (4) Lokasi:
  - N1 - Kg. Patani Para;
  - N2 - Xing Fu Memorial Park Quarters;
  - N3 - UZMA Kuala Muda Sdn Bhd,
  - N4 - Rumah Ladang in Kebun Barath
- Tahap bunyi yang direkodkan pada waktu siang dan malam Adalah mematuhi *Guidelines for Environmental Noise Limits and Control* (DOE, 2019).

RINGKASAN EKSEKUTIF

PENILAIAN IMPAK ALAM SEKITAR (JADUAL PERTAMA)

PEMBANGUNAN LOJI JANAKUASA SOLAR FOTOVOLTAIK BERSKALA BESAR (LSSPV) 650 MWp/500 MWac DI ATAS LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Impak dan Langkah Mitigasi

Kelestarian Fizikal & Hidrologi



Kawalan Hakisan & Air Larian
Menggunakan langkah kawalan LD-P2M2 dan perangkap enapan untuk mencegah hakisan tanah serta banjir kilat.





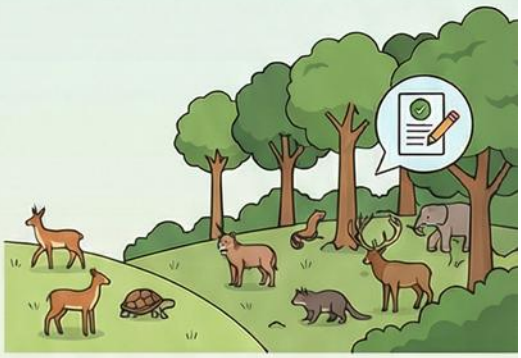
Kualiti Udara & Bunyi
Larangan pembakaran terbuka dan kawalan habuk bagi memastikan kualiti udara serta tahap kebisingan terkawal

Kelestanian Fizikal & Hidrologi



Pengurusan Sisa Biomassa:
Pokok kelapa sawit yang ditebang akan diricih, dikompos, dan ditanam di dalam kawasan tapak projek.

Ekologi & Kesejahteraan Komuniti



Perlindungan Flora & Fauna
Pembersihan tapak secara berperingkat dan melaporkan sebarang penampakan hidupan liar kepada pihak PERHILITAN



Peluang Ekonomi Tempatan:
Memberi keutamaan kepada penduduk tempatan bagi pengisian peluang perniagaan dan pekerjaan yang wujud.



Ekologi Akuatik
Penggunaan perangkap kelodak dan kolam enapan (BMPs).



Kesejahteraan Sosial
Unit Pengurusan Komuniti dan keutamaan pengambilan pekerja tempatan.



Fauna
Pemasangan papan tanda amaran jalan raya untuk mengelakkan 'roadkill'.



Keselamatan Trafik & Kesihatan:
Pelan logistik dan saringan kesihatan pekerja dilaksanakan bagi mengurangkan gangguan kepada aliran trafik awam.

Program Pemantauan Alam Sekitar yang Dicadangkan



Pemantauan Pematuhan (CM)

- Memastikan syarat kelulusan EIA dipatuhi oleh Penggerak Projek
- Dijalankan oleh makmal bertauliah

AUDIT PEMATUHAN ALAM SEKITAR

- Audit oleh juru audit berdaftar
- Kelayakan CESSWI atau CISEC
- Amalan Pengurusan Baik (BMPs) diterapkan dalam pelaksanaan Projek



Pemantauan Kesan (IM)

- Memastikan kesan berpotensi adalah betul.
- Memastikan Langkah mitigasi dilaksanakn

PEMANTAUAN GARIS DASAR

- Petunjuk umum mengenai keadaan asas alam sekitar pada masa laporan disediakan

PROGRAM PEMANTAUAN ALAM SEKITAR

- Menyediakan pangkalan data impak alam sekitar
- Penunjuk awal terhadap impak alam sekitar



Pemantau Prestasi (PM)

- Memastikan keberkesan system kawalan pencemaran
- EO menjalankan PM di tapak

PEMANTAUAN KAWAL SELIA SENDIRI

- Memastikan keberkesanan langkah-langkah mitigasi serta pematuhan terhadap peraturan alam sekitar.

PEMANTAU	KEKERAPAN
Fasa Pembinaan	
Pemantauan Prestasi	
• Mengikut pelan LD-P2M2	• Laporan Pemantau Prestasi - mingguan
• Sistem Pengurusan Sisa	• Setiap bulan
Pemantauan Pematuhan	
• Kolam Sedimen	• Setiap bulan • Selepas hujan
Pemantauan Kesan	
• Kualiti air (12 lokasi) • Kualiti udara, bunyi dan getaran (4 lokasi)	• Kualiti Air dan Udara: Setiap bulan • Getaran dan bunyi: Setiap tiga (3) bulan
Fasa Operasi	
Pemantauan Pematuhan	
• Pelepasan dari kolam tadahan	• Quarterly

Pelan Tindakan Kecemasan

Pasukan Tindakan Kecemasan

Satu pasukan individu berkelayakan dengan peranan dan tanggungjawab khusus untuk dilaksanakan semasa kecemasan. Pasukan ini bertanggungjawab melaksanakan prosedur berikut:



TINDAKAN KECEMASAN KEBAKARAN

Menyalaras pergerakan pekerja dan komunikasi



TINDAKAN TUMPAHAN

Kaedah mitigasi dan proses pelaporan



TINDAKAN KECEMASAN PERUBATAN

Prosedur untuk diikuti dan proses hubungan dengan perkhidmatan perubatan.

Kesimpulan

GARIS PANDUAN EIA

- Garis Panduan EIA di Malaysia (EGIM), 2016
- Garis Panduan EIA Pembangunan di Kawasan Cerun dan Bukit, 2017

IMPAK PERINGKAT PEMBINAAN

Sederhana
Kualiti air, kualiti udara, tahap bunyi dan getaran, Hakisan, Biomass (Sisa)

Rendah
Sisa Pepejal, Sisa Terjadual, Ekologi, Sosio-ekonomi, Trafik

IMPAK PERINGKAT OPERASI

- Kesan tidak signifikan
- Kebimbangan utama : Kualiti air dan Sisa Terjadual

Semua potensi impak boleh dikurangkan dengan ketara dengan pelaksanaan semua Langkah mitigasi yang dicadangkan.

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT (1ST SCHEDULE)

DEVELOPMENT OF A 650 MWp/500 MWac LARGE SCALE SOLAR PHOTOVOLTAIC (LSSPV) POWER PLANT ON LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 OF MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

PROJECT PROPONENT

TNB KUALA MUDA SOLAR SDN BHD

Address : TNB Platinum Tower, Level 16, 3 Jalan Bukit Pantai, 59100 Bangsar, Kuala Lumpur.
Telephone : 03 21082355
Contact Person : Mr. Gopalkrishnan a/l Sekharan
Email : sekharan@tnb.com.my

EIA CONSULTANT

TNB Labs Sdn. Bhd.
No. 1, Lorong Ayer Itam,
43000 Kajang, Selangor
Ts. Ahmad Nazri Bin Saidin
(EIA Team Leader)
016-6650 549
nazri.saidin@tnb.com.my

In collaboration with:

ES Eco Smart Sdn. Bhd.
Level 5, No. 9, Menara ES, Persiaran Industri, Bandar Sri Damansara,
52200 Kuala Lumpur
Wazfarina Abdul Wahid (Consultant)
03-6273 6013
waw@esecosmart.com

Overview

LEGAL REQUIREMENT



First Schedule: Activity 13
Development or land clearing activities involving areas of less than 50 per cent of land where the slope gradient is equal to or greater than 25 degrees (≥25°) but less than 35 degrees (<35°).

PROJECT OVERVIEW



To develop a large-scale solar photovoltaic (LSSPV) farm with an installed capacity of 650 MWp (DC) and an export capacity of 500 MWac to the national grid.

ZONING



AGRICULTURE
(with Permitted Activity Electrical Supply)
Rancangan Tempatan Daerah (RTD) Kuala Muda 2035

LOCATION



Located within Mukim Sungai Petani in Daerah Kuala Muda, Kedah Darul Aman.
Covering Lot 3373, 3374, 3386 - 3395, 3399 - 3404, 3637- 3639, and 4690
Total area: 1,187.244 acre (480.46 ha)

Statement of Need

GOVERNMENT POLICIES AND PLANS

The Project is in line with:

- National Energy Transition Roadmap (NETR) 2023
- *Twelfth Malaysia Plan (RMK-12) 2021-2025*
- *Malaysia Renewable Energy Roadmap (MyRER)*
- *National Energy Policy (DTN) 2022-2040*
- *Large-Scale Solar (LSS) Programme*
- *Rancangan Struktur Negeri Kedah 2035*
- *Garis Panduan Pembangunan Ladang Solar Negeri Kedah 2018*
- *RTD Kuala Muda, Kedah 2035 (Penggantian)*

ECONOMIC BENEFITS

- The Project represents a strategic and timely investment in Malaysia's renewable energy infrastructure.
- The Project aims to increase investments in the region which will lead to job creation, stimulate local economies, and contribute to the overall economic growth of Kedah State.

SOCIAL BENEFITS

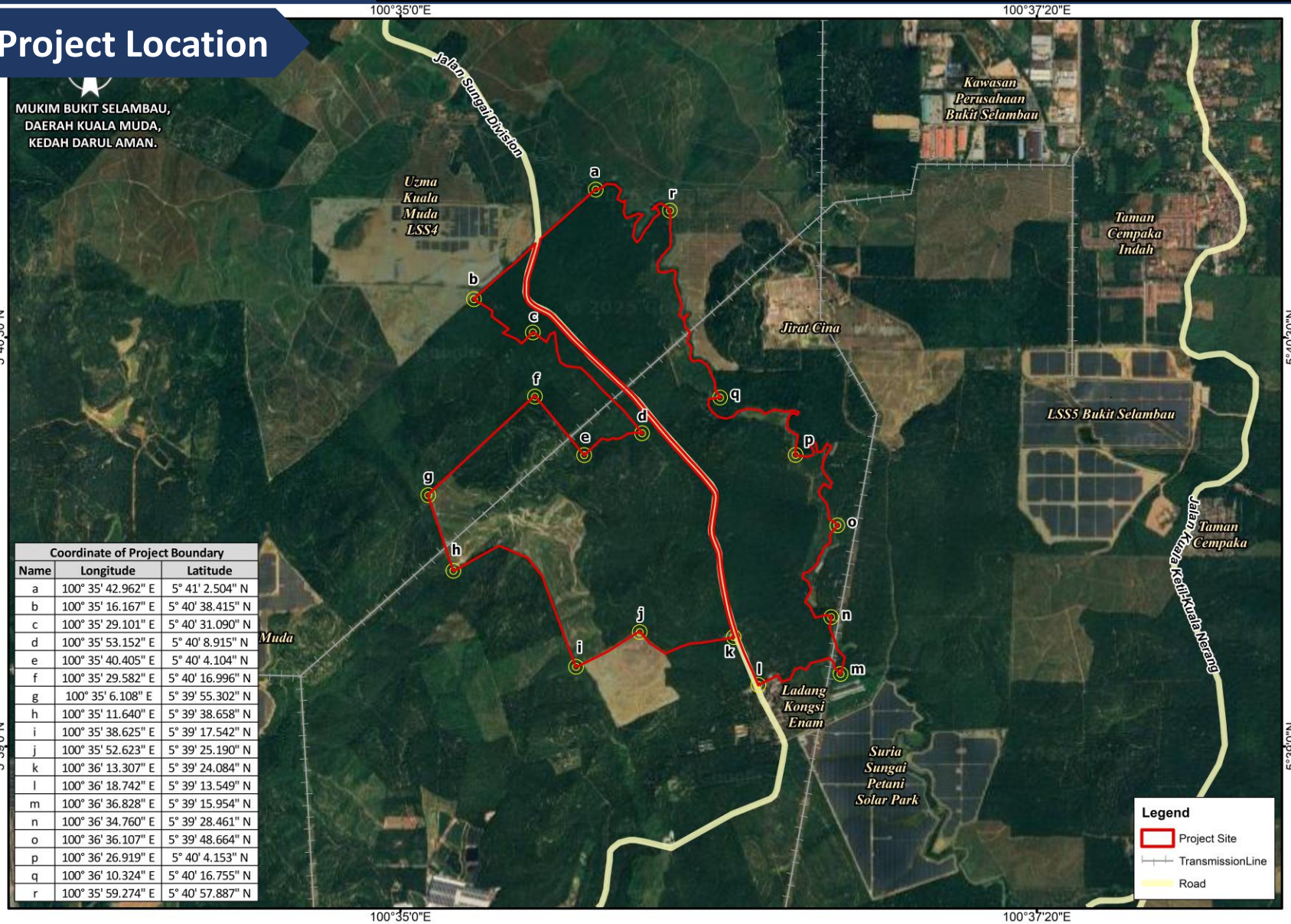
- Malaysia's electricity demand has exhibited a sustained upward trend, driven by population growth, urbanisation, industrial expansion, and rising standards of living.
- Projections by the Energy Commission Malaysia indicate that national electricity demand is expected to grow at an average annual rate of approximately 3 to 4% through 2035, reflecting continued economic and social development (Energy Commission Malaysia, 2020).

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Project Location



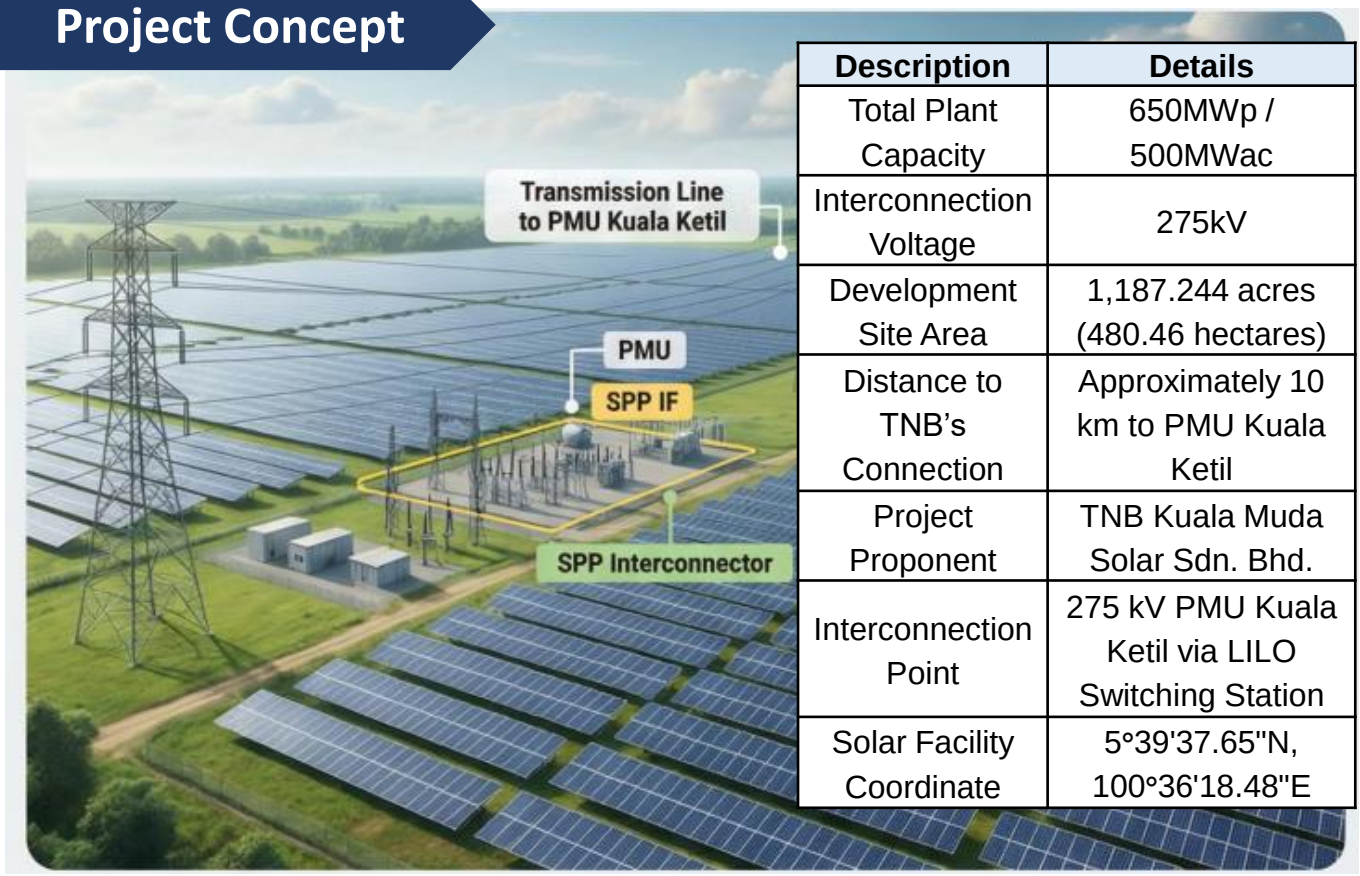
Coordinate of Project Boundary		
Name	Longitude	Latitude
a	100° 35' 42.962" E	5° 41' 2.504" N
b	100° 35' 16.167" E	5° 40' 38.415" N
c	100° 35' 29.101" E	5° 40' 31.090" N
d	100° 35' 53.152" E	5° 40' 8.915" N
e	100° 35' 40.405" E	5° 40' 4.104" N
f	100° 35' 29.582" E	5° 40' 16.996" N
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p	100° 36' 26.919" E	5° 40' 4.153" N
q	100° 36' 10.324" E	5° 40' 16.755" N
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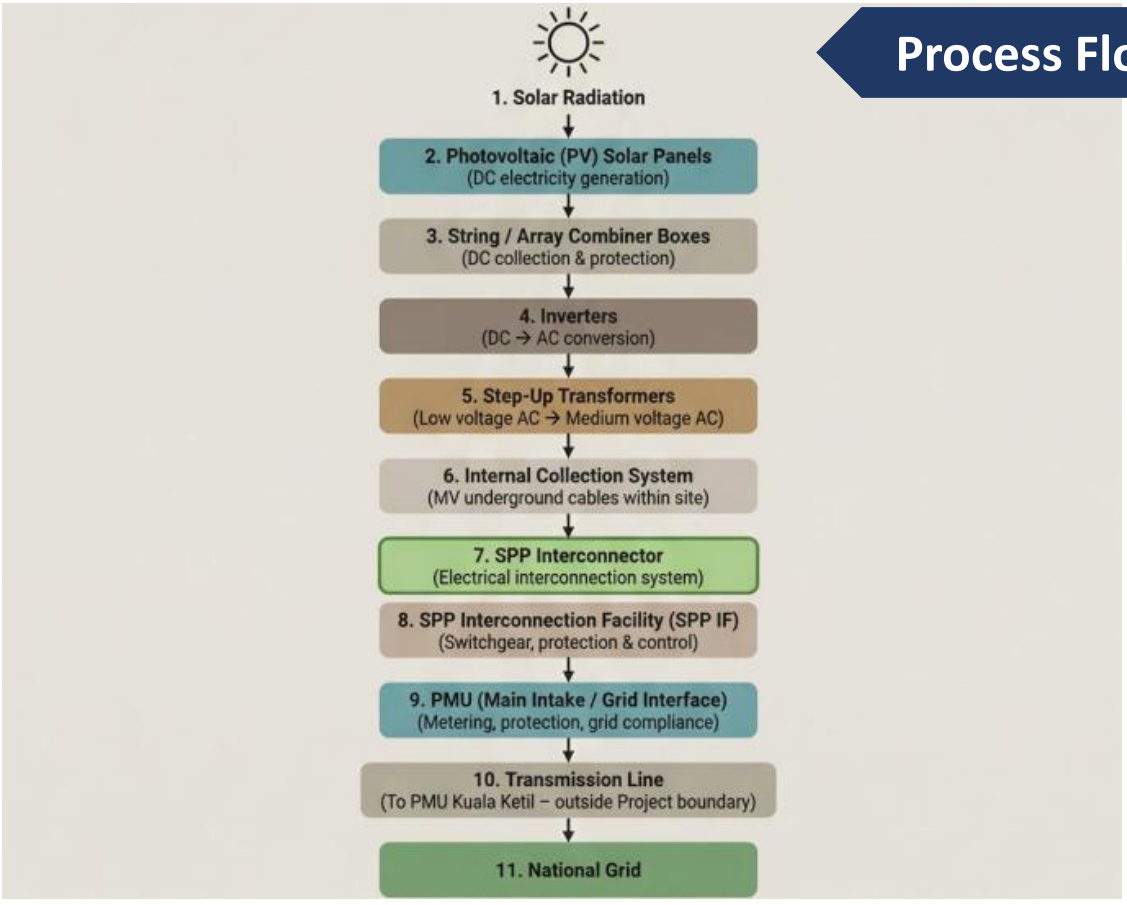
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Project Concept



Description	Details
Total Plant Capacity	650MWp / 500MWac
Interconnection Voltage	275kV
Development Site Area	1,187.244 acres (480.46 hectares)
Distance to TNB's Connection	Approximately 10 km to PMU Kuala Ketil
Project Proponent	TNB Kuala Muda Solar Sdn. Bhd.
Interconnection Point	275 kV PMU Kuala Ketil via LILO Switching Station
Solar Facility Coordinate	5°39'37.65"N, 100°36'18.48"E

Process Flowchart

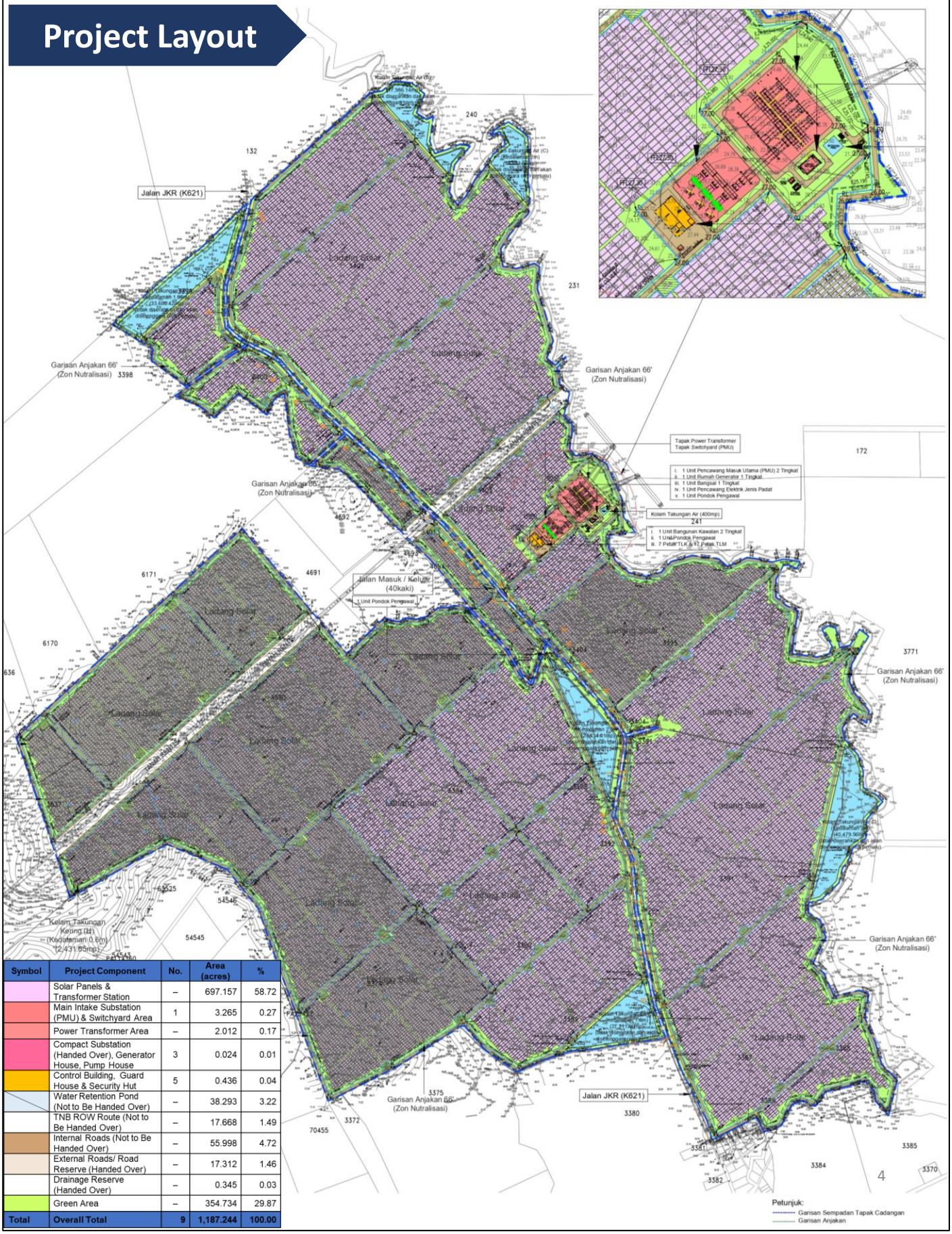


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Project Layout



Symbol	Project Component	No.	Area (acres)	%
	Solar Panels & Transformer Station	–	697.157	58.72
	Main Intake Substation (PMU) & Switchyard Area	1	3.265	0.27
	Power Transformer Area	–	2.012	0.17
	Compact Substation (Handed Over), Generator House, Pump House	3	0.024	0.01
	Control Building, Guard House & Security Hut	5	0.436	0.04
	Water Retention Pond (Not to Be Handed Over)	–	38.293	3.22
	TNB ROW Route (Not to Be Handed Over)	–	17.668	1.49
	Internal Roads (Not to Be Handed Over)	–	55.998	4.72
	External Roads/ Road Reserve (Handed Over)	–	17.312	1.46
	Drainage Reserve (Handed Over)	–	0.345	0.03
	Green Area	–	354.734	29.87
Total	**Overall Total**	**9**	**1,187.244**	**100.00**

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT (1ST SCHEDULE)

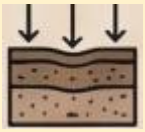
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Existing Environment



TOPOGRAPHY

- Existing agricultural land consisting of oil palm plantations
- Modified landscape with limited remaining natural landforms



SOIL

- Subsoil across the site comprises of fine-grained soils dominated by silt and clay



GEOLOGY

- Fine-grained sedimentary and low-grade metamorphic rocks, including mudstone, argillaceous facies, slate, phyllite, and pelitic hornfels, with subordinate occurrences of sandstone and metasandstone



HYDROLOGY AND DRAINAGE

- Project Site within Sg. Muda Basin
- Two (2) rivers identified within the Project Site: Sg. Selambau & Sg. Jerong
- Surface runoff will flow into Sg. Selambau & Sg. Jerong which subsequently flow into Sg. Muda
- Two (2) Water Intake Points (WIP) involve:
  - Bukit Selambau WIP (11.20 km upstream of Project Site)
  - Kuala Ketil WIP (11.40 km downstream of Project Site)



CLIMATE & METEOROLOGY

Meteorological Malaysia: Butterworth Station

- **Temperature**
  - Annual mean temperature is 28.0°
  - Highest temperature was in May 2024 (29.9°C)
  - Lowest temperature was in December 2022 (26.4°C)
- **Relative Humidity**
  - Annual mean relative humidity is 82.2%
  - Highest was in November 2022 (87.6%)
  - Lowest was in June 2024 (64.4%)
- **Rainfall and Rain Days**
  - Highest rainfall and rain days in October 2016 and year of 2022 respectively (539.8 mm and 201 days)
  - Lowest rainfall and rain days in February 2021 and year 2019 (2.6 mm and 158 days)
- **Wind**
  - Highest frequency of occurrence (27.2%) from East direction
  - Annual mean speed is 1.8 m/s
  - Calm wind 4.2% of the year



ECOLOGY

- The Project site is currently covered by secondary vegetation (shrubs, bushes and oil palm plantation)
- No species of high conservation for flora concern were recorded within the study area.
- Aquatic fauna within the study area exhibit low to moderate species diversity and are dominated by common, disturbance-tolerant taxa



LANDUSE

- The Project site is located within *Blok Perancangan 1 (BP)* and BPK 1.15
- The Project site is not within ESA area
- The surrounding land use within a 5-km radius is surrounded by predominantly agriculture as well as institutional/facilities areas, along with industrial, residential, commercial and infrastructure/utilities areas



TRAFFIC

- The main access road to the Project site is via K621.
- Peak Hour Volume (PHV) for year 2025:
  - KR403 (3143 pcu/hr),
  - KR409 (1185 pcu/hr),
  - KR408 (1387 pcu/hr),
  - KR601 (701 pcu/hr)

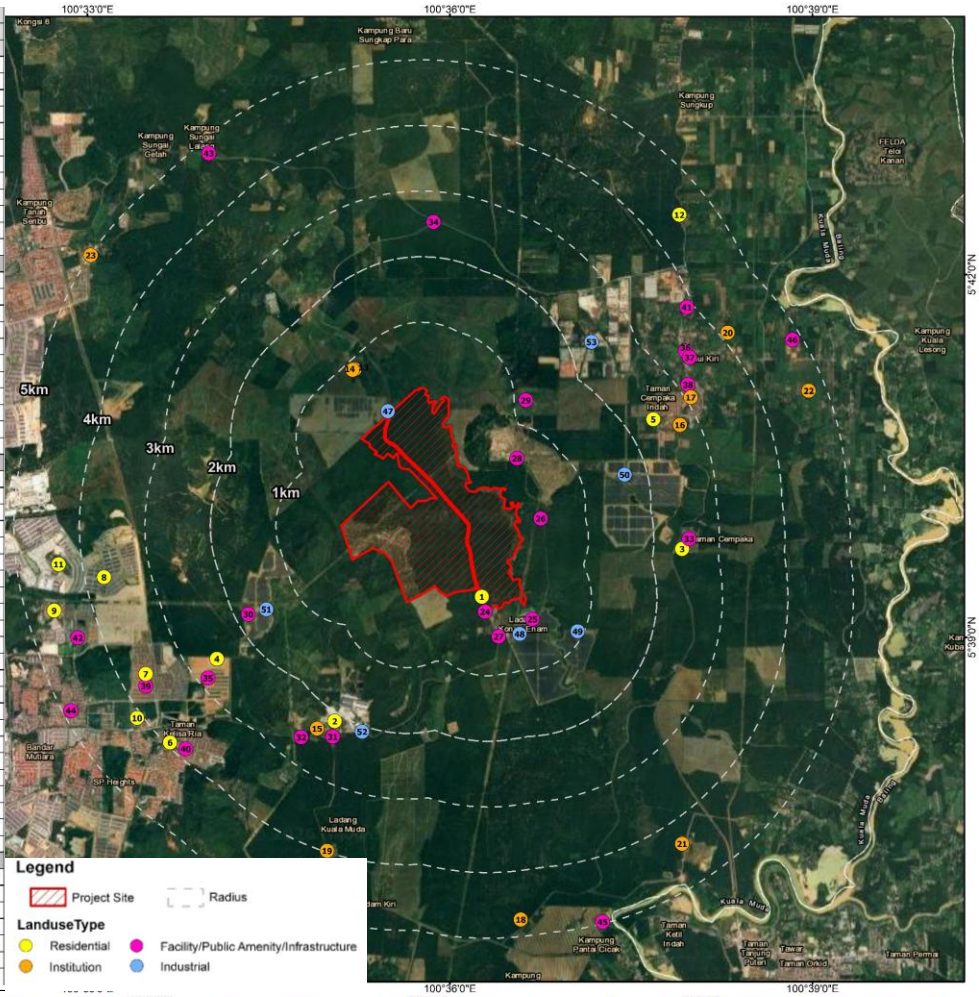
EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT (1ST SCHEDULE)

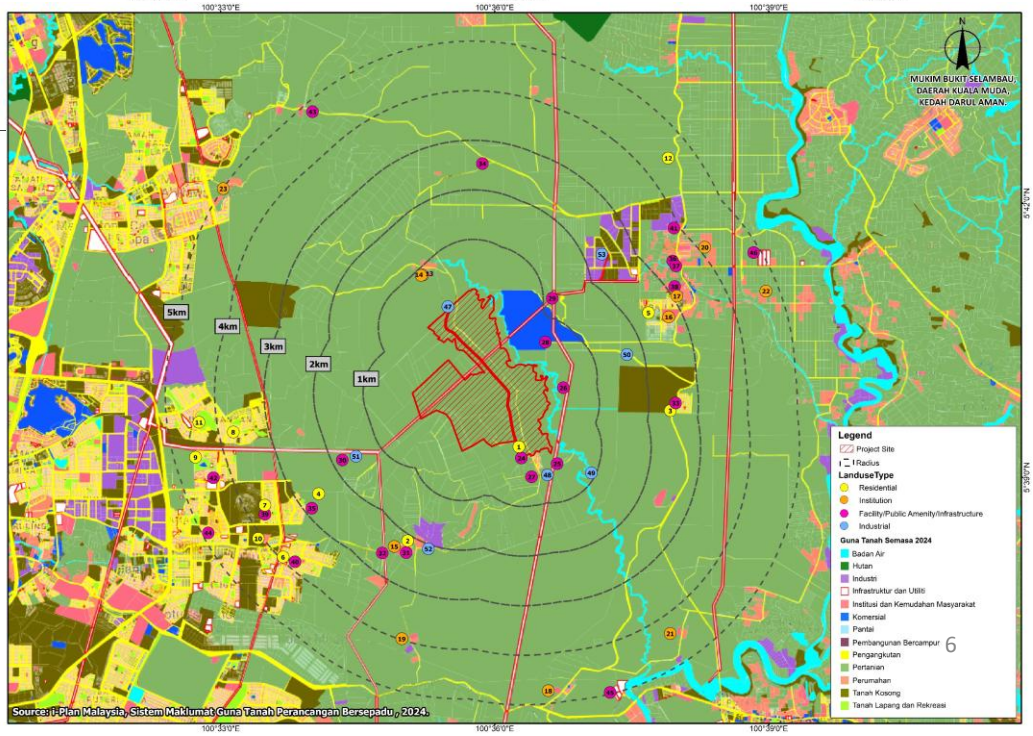
DEVELOPMENT OF A 650 MWp/500 MWac LARGE SCALE SOLAR PHOTOVOLTAIC (LSSPV) POWER PLANT ON LOT 3373 – 3374, 3386 – 3395, 3399 – 3404, 3637 – 3639, 4690 OF MUKIM SUNGAI PETANI, DAERAH KUALA MUDA, KEDAH DARUL AMAN

Landuse

Coordinate of Landuse			
No	Name	Longitude	Latitude
	RESIDENTIAL		
1	Kg Patani Para	100° 36' 15.880" E	5° 39' 20.091" N
2	Kampung Sungai Division	100° 35' 2.800" E	5° 38' 18.370" N
3	Taman Cempaka Bukit Selambau	100° 37' 55.303" E	5° 39' 43.814" N
4	Taman Arowana	100° 34' 4.279" E	5° 38' 49.263" N
5	Taman Cempaka Indah	100° 37' 41.020" E	5° 40' 48.170" N
6	Taman Kelisa Ria	100° 33' 41.023" E	5° 38' 7.791" N
7	Spice Village	100° 33' 28.995" E	5° 38' 41.784" N
8	Senni, Bukit Banyan	100° 33' 8.266" E	5° 39' 29.828" N
9	Darul Aman Perdana	100° 32' 43.478" E	5° 39' 13.246" N
10	Kampung Rusa	100° 33' 24.672" E	5° 38' 19.926" N
11	Bukit Banyan Hill Park	100° 32' 45.715" E	5° 39' 36.196" N
12	Kampung 50 Relong	100° 37' 53.920" E	5° 42' 29.648" N
	INSTITUTION		
13	SK Patani Para	100° 35' 12.718" E	5° 41' 12.926" N
14	SJK (T) Ldg Patani Para	100° 35' 11.650" E	5° 41' 12.676" N
15	SJK(T) Palanisamy Kumaran	100° 34' 54.042" E	5° 38' 14.674" N
16	SMK Bukit Selambau	100° 37' 54.230" E	5° 40' 45.360" N
17	SJK (C) Fuh Sun	100° 37' 59.640" E	5° 40' 59.070" N
18	SK Dataran Muda	100° 36' 35.173" E	5° 36' 39.950" N
19	SJK (T) Ladang Kuala Muda	100° 34' 58.994" E	5° 37' 14.080" N
20	Madrasah Nadwatul Furqan Was Sunan	100° 38' 17.955" E	5° 41' 31.148" N
21	SJK (T) Ladang Lubok Segintah	100° 37' 55.270" E	5° 37' 17.503" N
22	Maahad Tarbiah Al Faqeh	100° 38' 58.095" E	5° 41' 2.334" N
23	SJK (T) Sungai Getah	100° 33' 1.639" E	5° 42' 9.612" N
	FACILITY/PUBLIC AMENITY/INFRASTRUCTURE		
24	Maha Mariamman Kovil 14	100° 36' 17.464" E	5° 39' 12.684" N
25	Cemetery Hindu	100° 36' 41.000" E	5° 39' 9.000" N
26	Muni Temple 22	100° 36' 45.080" E	5° 39' 58.890" N
27	Amman Kovil	100° 36' 24.180" E	5° 39' 0.370" N
28	Xing Fu Memorial Park (Cemetery)	100° 36' 33.254" E	5° 40' 28.805" N
29	Tangki Air SADA	100° 36' 37.713" E	5° 40' 57.615" N
30	PMU Kuala Muda Solar 132Kv	100° 34' 19.865" E	5° 39' 11.432" N
31	Arulmigu Karumariamman Temple	100° 35' 1.830" E	5° 38' 10.640" N
32	PMU Kuala Muda South	100° 34' 46.150" E	5° 38' 10.399" N
33	Surau Al Ikhlas Taman Cempaka	100° 37' 58.786" E	5° 39' 48.850" N
34	Murugan Muniandy Temple	100° 35' 51.890" E	5° 42' 26.080" N
35	Surau Taman Arowana	100° 33' 59.863" E	5° 38' 39.765" N
36	Kilinik Kesihatan Bukit Selambau	100° 37' 56.923" E	5° 41' 22.044" N
37	Dewan Serbaguna Bukit Selambau	100° 37' 59.027" E	5° 41' 18.844" N
38	Masjid Al-Wajdi	100° 37' 58.205" E	5° 41' 5.320" N
39	Surau Taman Spice Village	100° 33' 29.024" E	5° 38' 35.816" N
40	Masjid Al- Maghfirah	100° 33' 48.808" E	5° 38' 4.644" N
41	Balai Polis Bukit Selambau	100° 37' 57.636" E	5° 41' 43.751" N
42	Surau Al Ansar Darulaman Perdana	100° 32' 55.246" E	5° 38' 59.732" N
43	Sri Mahamariamman Temple	100° 34' 0.305" E	5° 43' 0.180" N
44	Surau At- Taqwa	100° 32' 51.806" E	5° 38' 23.578" N
45	Loji Rawatan Air Kuala Ketil	100° 37' 15.798" E	5° 36' 38.813" N
46	Loji Rawatan Air Bukit Selambau	100° 38' 50.054" E	5° 41' 27.614" N
	INDUSTRIAL		
47	Uzma Kuala Muda LSS	100° 35' 29.230" E	5° 40' 52.150" N
48	Solarpack Suria Sungai Petani (116MWp)	100° 36' 34.613" E	5° 39' 1.642" N
49	Leader Solar Energy II (Bkt. Selambau)	100° 37' 3.451" E	5° 39' 2.949" N
50	Solar Farm Bukit Selambau	100° 37' 26.800" E	5° 40' 20.680" N
51	BBP Solar Farm	100° 34' 28.861" E	5° 39' 13.855" N
52	Tiong Huat Rubber Factory Sdn Bhd	100° 35' 16.420" E	5° 38' 13.129" N
53	Kawasan Perusahaan Bukit Selambau	100° 37' 10.347" E	5° 41' 26.545" N



Existing land use of the Project site



Existing Environment

SOCIO-ECONOMIC

- Nearly half of the respondents (46.8%) expressed full support for the Project, recognizing its importance in meeting future electricity demand and supporting national energy needs.
- 7.9% of respondents indicated conditional support, subject to the Project Proponent ensuring that environmental quality is maintained and that the daily lives of nearby communities are not adversely affected.
- 24.4% of respondents stated that they did not support the Project, primarily due to concerns over the cumulative presence of solar farm developments in close proximity to their residential areas.
- 20.9% of respondents adopted a neutral stance, indicating neither explicit support nor opposition towards the Project

ENVIRONMENTAL BASELINE MONITORING

RIVER WATER QUALITY

- Monitoring at twelve (12) locations situated at the upstream and downstream as well as within and outside of the Project site boundary
- All samples compared against the limits stipulated under Class III in the National Water Quality Standard (NWQS)
- The overall water quality for all monitoring locations ranges from Class II to Class IV

AIR QUALITY

- Baseline at four (4) locations:
  - A1 - Kg. Patani Para;
  - A2 - Xing Fu Memorial Park Quarters;
  - A3 - UZMA Kuala Muda Sdn Bhd,
  - A4 - Rumah Ladang in Kebun Barath
- All measured parameters compared and complied with Malaysian Ambient Air Quality Standards (MAAQS 2020)

VIBRATION LEVEL

- Baseline at four (4) locations:
  - V1 - Kg. Patani Para;
  - V2 - Xing Fu Memorial Park Quarters;
  - V3 - UZMA Kuala Muda Sdn Bhd,
  - V4 - Rumah Ladang in Kebun Barath
- Vibration: Ground vibration measurements at all monitoring locations were within DOE guideline limits, indicating no existing vibration-related concerns.

NOISE LEVEL

- Baseline at four (4) locations:
  - N1 - Kg. Patani Para;
  - N2 - Xing Fu Memorial Park Quarters;
  - N3 - UZMA Kuala Muda Sdn Bhd,
  - N4 - Rumah Ladang in Kebun Barath
- Noise Level: Daytime and nighttime noise levels recorded within and around the Project site complied with the Guidelines for Environmental Noise Limits and Control (DOE, 2019).

Impact and Mitigation Measure

Physical & Hydrological Sustainability



Erosion & Runoff Control
Implementing LD-P2M2 control measures and sediment traps to prevent soil erosion and flash floods





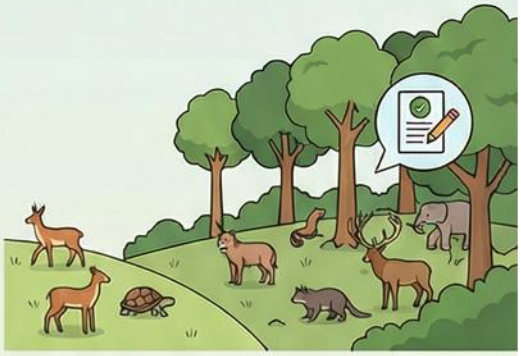
Air Quality and Noise
Prohibition of open burning and dust control to ensure air quality and regulated noise levels.

Physical & Hydrological Sustainability



Biomass waste management
Felled oil palm trees are shredded, composted & buried within Project area.

Ecology & Community Well-Being



Flora & Fauna Protection
Phased site clearing and reporting any wildlife sightings to PERHILITAN



Local Economic Opportunities
Giving priority to local residents for business and employment opportunities.



Aquatic Ecology
Sediment basin/ Silt Trap and BMPs



Social well being
Community management unit and prioritization of local worker recruitment



Terrestrial Fauna
Installation of road warning signs to prevent roadkill



Ensuring Traffic & Safety/ Health
Logistic plan and worker health screening

Proposed Environmental Monitoring Program



COMPLIANCE MONITORING (CM)

- Ensures EIA conditions of approval are complied with by the Project Proponent
- Carried out by Accredited Laboratory

ENVIRONMENTAL COMPLIANCE AUDIT

- Environmental Audit by a registered environmental auditor
- Possess Certified Erosion, Sediment and Storm Water Inspector (CESSWI) or Malaysian Certified Inspector of Sediment and Erosion Control (MY-CISEC) Qualifications
- Best Management Practices (BMPs) will be adopted



IMPACT MONITORING (IM)

- Ensures potential impacts stated in EIA preparation stage are correct
- Ensures mitigation method are properly implemented

BASELINE MONITORING

- General indication of the baseline environmental conditions at the time of reporting

ENVIRONMENTAL MONITORING PROGRAM

- Provides environmental impacts database
- Early indicator of environmental impacts



PERFORMANCE MONITORING (PM)

- Ensures effectiveness of pollution control systems and mitigation measures
- EO to carry out PM on site

SELF-REGULATORY MONITORING

- Ensures effectiveness of mitigating measures and compliance towards environmental regulations

MONITORING	FREQUENCY
Construction Phase	
Performance Monitoring	
• As per LD-P2M2 plan	• Weekly reporting in Performance Monitoring Report (PMR)
• Waste management system	• Monthly
Compliance Monitoring	
• Sediment Basin discharge outlet	• Monthly • After rainfall
Impact Monitoring	
• Water quality (12 stations) • Ambient air quality, Noise and Vibration (4 stations)	• Water and Ambient air quality : Monthly • Noise and Vibration: Quarterly
Operational Phase	
Compliance monitoring	
• Discharge detention pond outlet	• Quarterly

Emergency Response Plan

EMERGENCY RESPONSE TEAM

A team of qualified individuals with specific roles and responsibilities to carry out during an emergency. Responsible for executing the following procedures:



FIRE EMERGENCY RESPONSE

Coordinating workers movement and communication with fire department



SPILLAGE PROCEDURES

Mitigation methods and reporting process



MEDICAL EMERGENCY RESPONSE

Procedure to follow and contact process with medical services

Conclusion

EIA GUIDELINES

- EIA Guidelines in Malaysia (EGIM), 2016
- EIA Guidelines Development in Slope and Hill Areas, 2017.

CONSTRUCTION STAGE IMPACTS

Moderate
Water Quality, Air Quality, Noise and Vibration Levels, Soil Erosion, Biomass (waste)

Minor
Solid Waste, Scheduled Waste, Ecology, Socio-economy, traffic

OPERATIONAL STAGE IMPACTS

- Impacts are not significant
- Main concerns: Water Quality and Solid Waste

All potential impacts can be reduced significantly with implementation of **ALL** recommended mitigation measures