Project title:

DEVELOPMENT OF 29.99MWAC LARGE SCALE SOLAR PHOTOVOLTAIC PLANT UNDER THE CORPORATE GREEN POWER PROGRAMME (CGPP) FOR NEFIN V POWER SDN. BHD. LOCATED IN TELUK INTAN, PERAK

Document title:

GENCO INTERCONNECTION FACILITIES ROUTING

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1. Interconnection Line SPPIC

A solar power plant is proposed to be developed on a plot of land in Teluk Intan, Perak with a capacity of 45MWp/29.99MWac. The proposed project site is located approximately 3.5 KM from PMU Teluk Intan East. To facilitate grid interconnection, a 132 kV transmission line is planned to be constructed, utilizing an underground installation method. The underground cable route, extending over 3.5 KM, will be implemented using the Horizontal Directional Drilling (HDD) technique to ensure minimal surface disruption and to enhance reliability and safety in the transmission of power from the project site to PMU Teluk Intan East.

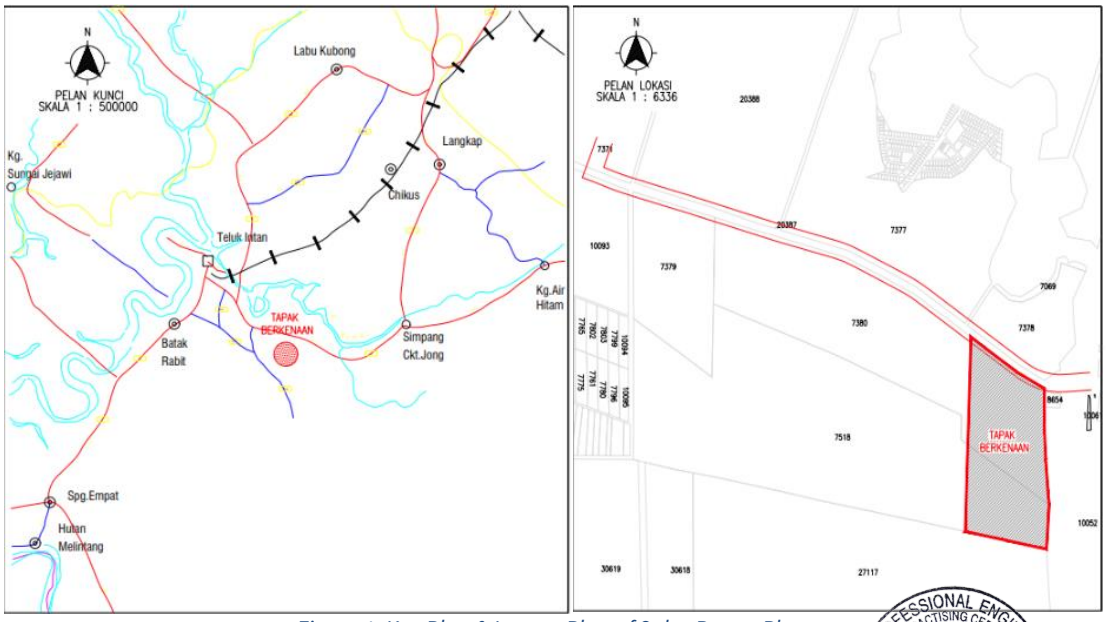

Figure 1: Key Plan & Layout Plan of Solar Power Plant

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2. SPP Interconnector

The SPP interconnector (SPPIC) shall connect to the SPPIF to the TNBIF via underground cable. The cable sizing shall be 3 x 1c x 400mmsq Aluminium XLPE and shall run underground for 3.5km between two termination points.

The cables shall be fed through 150mm corrugated High Density Poly-Ethylene (HDPE) double wall pipes. The method of installation is horizontal directional drill (HDD) as per requirements from local authorities. Besides the power cables, the SPPIC shall include two [2] 48-cores fibre optic cables that shall carry the data communication between RTU's located inside the control rooms of the TNBIF and SPPIF. Each Fibre optic cable shall be installed in pipes adjacent to the 132kV underground cables.

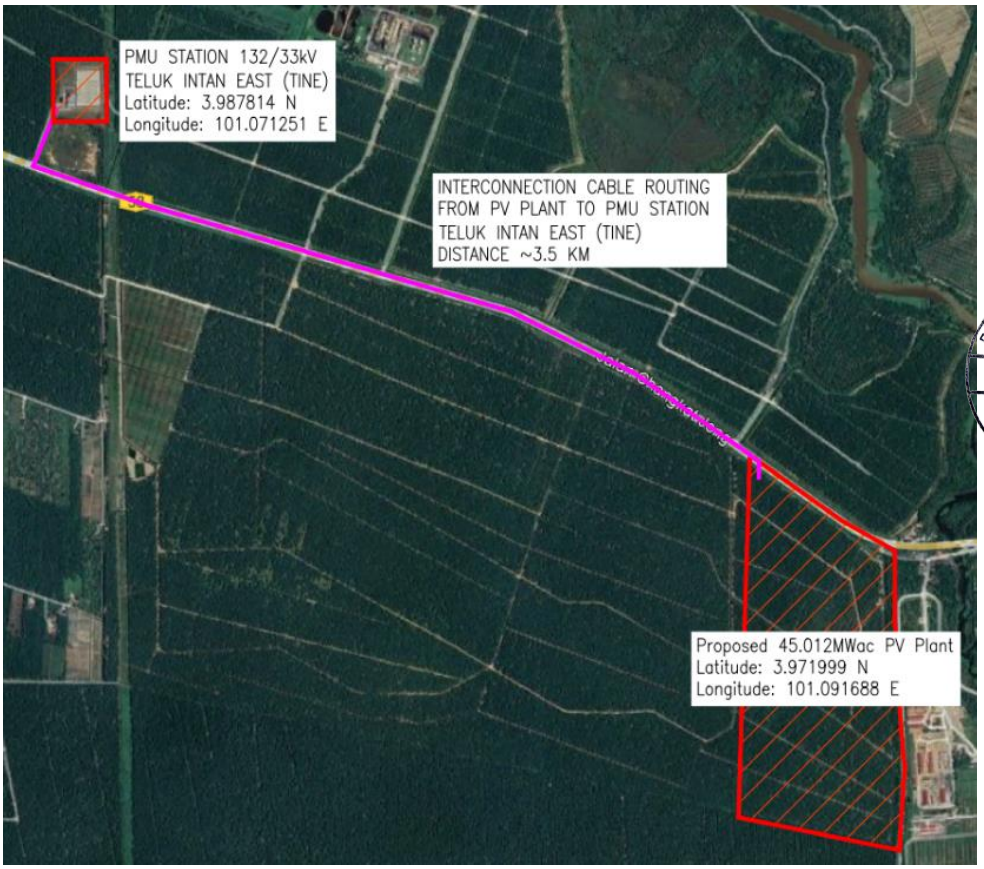
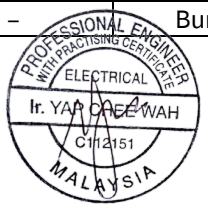


Figure 2: Proposed Cable Routing from Solar Power Plant to PMU Teluk Intan East

2.1. 132kV Cable

The cable size shall be used is 400mmsq cable with the following specification:

Description	Unit	Value
Reference Standard	–	IEC 60840, IEC 60228
Rated Voltage (Uo/Um)	kV	76/132 (145)
Conductor	–	Aluminium, Class 2 compacted stranded, water-blocking tape/yarn
Cross-Sectional Area	mm^2	400
No. of Strands	Nos	≥ 53
Approx. Conductor Diameter	mm	23.34
Conductor Resistance (20°C)	Ω/km	0.0780
Short Circuit Rating	kA	1s: 37.79 2s: 31.25 3s: 21.82
Insulation	–	XLPE Compound, average thickness 20.0 mm, approx. diameter 69.6 mm
Conductor Screen	–	Semi-conductive bonded, min. thickness 0.8 mm
Insulation Screen	–	Semi-conductive bonded, min. thickness 0.8 mm
Metallic Screen	–	Annealed copper wires (57 × 2.23 mm), short circuit rating 22.13 kA (3s)
Equalizing Tape	–	Annealed copper tape (1 × 0.1 mm), open helix, dia. 79.6 mm
Radial Water Barrier	–	Semi-conductive swellable tape (1 × 0.5 mm), dia. 81.7 mm
Longitudinal Water Barrier	–	Laminated Al (PE/Al/PE), 1 × 0.03 mm, dia. 82.3 mm
Outer Sheath	–	PE Compound ST7, thickness 4.0 mm (min.), black, graphite coated, dia. 90 mm
Drum Type	–	Steel drum
Ampacity (buried, flat)	A	683 (air @ 30°C) 472 (ground @ 20°C, F) 474 (ground @ 20°C, D)
Induced Voltage Drop	mV/A/m	0.1066
Additional Notes	–	Burial depth 0.8 m, soil resistivity 1.5 K·m/W, duct size 150 mm



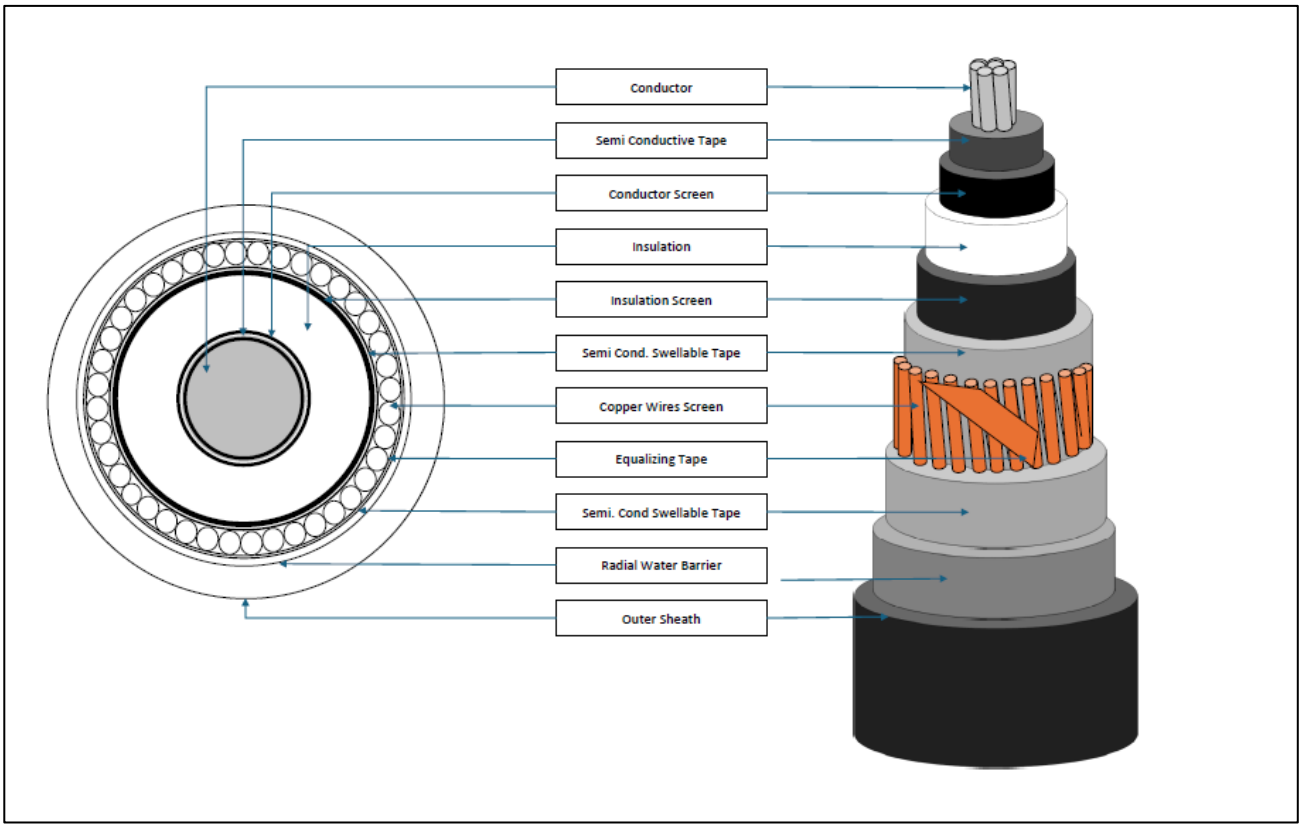


Figure 3: Physical Cable Specifications

Cable bending radius:

Condition	Rule of thumb	Min. bend radius	Min. bend diameter
During installation/pulling	20 × OD	1.80 m	3.60 m
After installation (set in place)	15 × OD	1.35 m	2.70 m
(Conservative/site constraints)	25 × OD	2.25 m	4.50 m

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2.2. Method of Construction

The 132 kV, 400 mm² XLPE cable shall be installed with strict adherence to the manufacturer's recommended bending radius. During installation and pulling, a minimum bending radius of 1.80 m (20 × OD) shall be maintained, while after installation the cable shall not be bent below 1.35 m (15 × OD). For site constraints, a conservative bending radius of 2.25 m (25 × OD) may be applied.

To accommodate these requirements, the cable will be routed underneath the pavement road and aligned to ensure a smooth transition to the cable sealing end termination point without exceeding the permissible bending radius. Table below outlines the proposed method of the under-pavement cable routing.

Activity	Method	Responsibility	Remarks
Preparation	Review drawings, confirm utility-free route, check cable drums, arrange tools & equipment.	Site Engineer / Supervisor	Ensure compliance with approved IFC drawings.
Excavation & Trench Prep	Excavate trench to required depth/width, provide sand bedding, install ducts under pavement.	Civil Contractor	Duct entry/exit must allow required bending radius.
Cable Laying / Pulling	Position drum on jacks, pull with rollers/winch, maintain bending radius ≥ 1.80 m during pulling.	Cable Laying Crew	Pulling tension must not exceed manufacturer's limit.
Bending Radius & Alignment	Check bends at duct exit and sealing end, maintain ≥ 1.35 m after installation, ≥ 2.25 m if constrained.	Supervisor / QA Inspector	Use rollers and protective covers to avoid sheath damage.
Termination (Sealing End)	Prepare cable end, install termination kit, bond metallic screens to earth.	Termination Specialist	Follow manufacturer's termination manual and IEC 60840.
Backfilling & Reinstatement	Backfill with fine sand, install protective tiles/tapes, compact layers, reinstate pavement.	Civil Contractor	Ensure 150 mm sand cover above cable before tiles.
Testing & Commissioning	Perform IR, sheath integrity, HV withstand, and PD tests; energize after approval.	Testing Engineer	Testing as per IEC 60840 and project specifications.

3. Site Picture

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4. Routing Plan

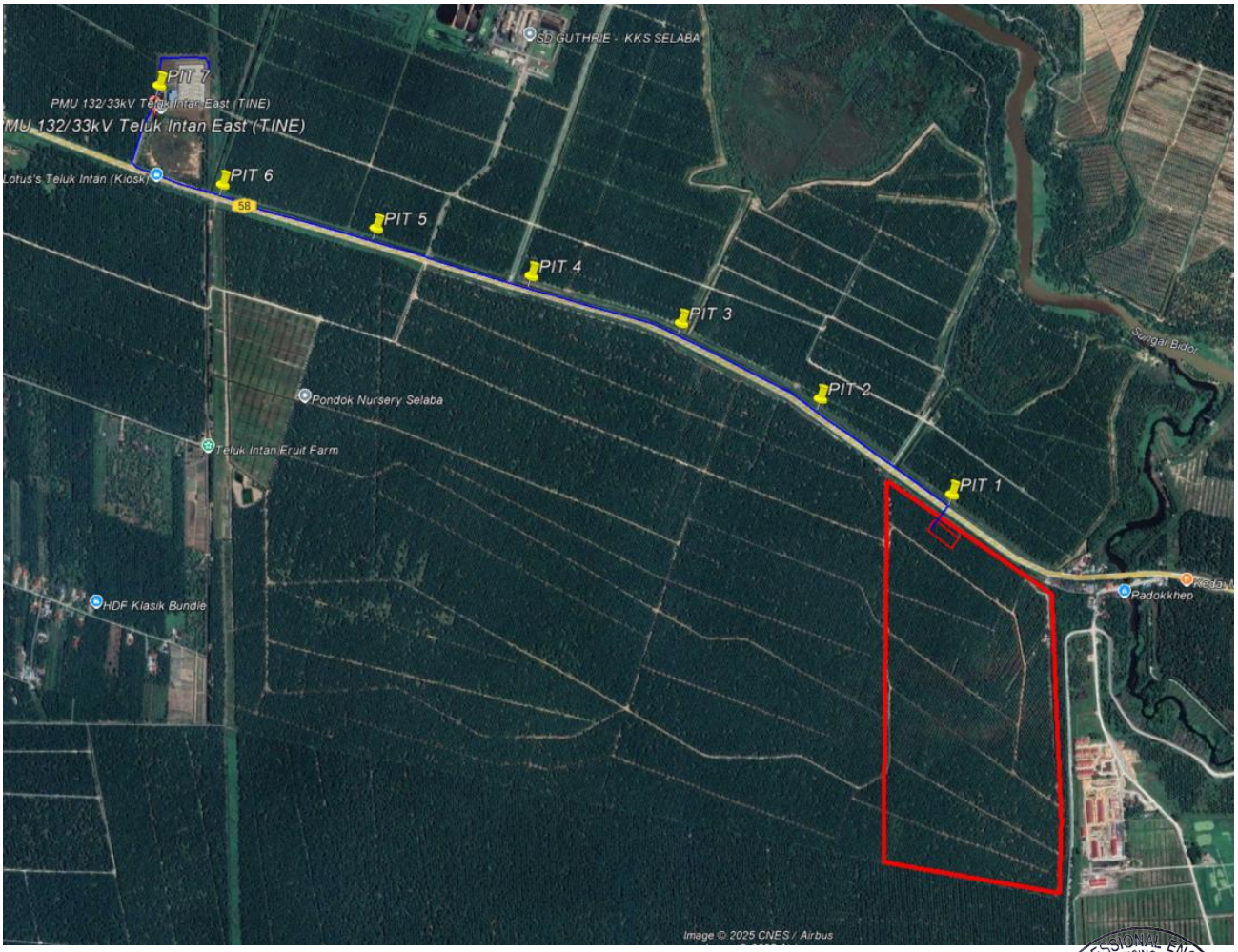

Figure 4: Proposed Routing Plan with Proposed HDD Pit Locations

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