



March 2023

# Guyana Utility Scale Solar Photovoltaic Program

## Project Summary – Onderneeming Essequibo

The Guyana Power and Light  
103 Carmichael Street,  
North Cummingsburg,  
Georgetown.



## PROJECT SUMMARY - Onderneeming

- *A detailed description of the proposed project, including:*
  - Physical location and its characteristics along with GPS coordinate/s; where applicable distances from the closest town, settlement, indigenous community, and nearby waterways such as creeks, rivers, closest town, etc; general/predominant land use (residential, tourism, agricultural, commercial, industrial, etc.) of the area; sensitive receptors (daycare facilities, schools, hospitals, etc.) likely to be affected by the proposed project; the relative abundance of natural resources in the area; and the non-disputed nature of the land.*

### **ONDERNEEMING - ESSEQUIBO**

This component will comprise two farms, specifically 5MWp at Onderneeming and 3MWp Charity, including a total of 6MW, 2hr (minimum) BESS split into 3.75MW at Onderneeming and 2.25MW at Charity for stability support on the grid. It is proposed that the Onderneeming solar PV farm will be interconnected to the South 13.8kV Load Feeder via a short 13.8kV Line (under 1km).

The area allocated for the proposed project, i.e., a portion of state land is in the rear of Plantation Onderneeming on the left bank of the Essequibo River in the County of Essequibo. Directly north of the proposed project site is characterised as ‘land’ whilst, the eastern border is a government reserve. Beyond this point lies the community of Onderneeming which is recognised as land registration area by the Guyana Lands and Surveys Commission with several allocated house lots. Access to the community and site are through the sand pit road that connects to the public road in the southwest direction. Southwest of the site is another reserve, which is followed by state plantations which are leased. The sandpit road also runs through this area. One resident was noted as occupying a small portion of land within the direct area of influence of the project site.

Within proximity to the site, directly southeast is a granite and zinc processing factory. In the northeast by north direction of the proposed area, within the community of Onderneeming, amenities include two churches, a boutique, a variety shop and one governmental agency, i.e., the

Onderneeming Village Office and the Suddie Primary School Annex.

There are no plans for further site expansion as there is an established road for access.



**Map Showing the Onderneeming Project area**

***ii. A description of all feasible and reasonable alternatives.***

This site was visited on April 13, 2021. GLSC indicated that the site is currently unoccupied and has no competing interest, as such, GPL can acquire it. An application for this site was submitted on April 30, 2021, and the lease was obtained in February 2022.

***iii. Description of any existing baseline information on the physical (landscape, soil, water, air, the use of natural resources), ecological (flora and fauna), and social***

*environment (economic and cultural aspects).*

Based on the ESA carried out the following existing baseline information was gathered:

**PHYSICAL ENVIRONMENT -**

**a) LANDSCAPE**

Onderneeming falls on the Coastal Plain, one of Guyana's five physiographic region. The Coastal Plain occupies 8.5 percent of the total land mass or an area of 18,033 km<sup>2</sup>. It is a narrow belt (ranging between 8 and 65km in width with a length of 440km) stretching from the Corentyne River in the east to Waini Point in the west and providing most of the agricultural production in the country.

East of the Essequibo River, the plain consists of recent and old sediments with recent deltaic and fluvio-marine clays and silts occurring on the coast with silty clays and sands inland. The recent plain occurs at elevations of 2m below to 3m above sea level with sandy old beach ridges forming higher ground. The older coastal plain lies at an altitude of about 3-9 m above sea level. The normal tidal range is about 3m with resultant flooding (particularly sea invasion) especially during the wet seasons from April to August and November to January and during high tides.

Many areas of the coastal plain are below sea level while other areas are manufactured and built-up to raise them above the surrounding land level. An elaborate system of sea defences, along with irrigation and drainage canals, is required to protect the area from flooding. West of the Essequibo River, the coastal plain narrows with extensive organic wetland 'pegasse' deposits inland. While these are most extensive in the west of the country primarily in Regions 1 and 2, they also occur scattered between the Essequibo, Demerara and Berbice Rivers. East of the Berbice River, the pegasse area is small and the coastal 'frontland' and 'riverain' clays relatively wide.

**b) SOIL**

The coastal plain is part of the flat, low-lying coastal lands that extend along the coast of South America from the Amazon to the Orinoco. The plain is composed of a wide variety of soils developed from a variety of parent materials such as marine and fluvio-marine deposits with back-

swamp organic soils. In general, the soils closer to the shore and along rivers are more fertile than the soils behind which can have extremely low fertility and toxicity in some instances. The soils have been mapped as:

- **1a-** Low humic gleys of high base status, marine phase "frontland clay" (Hydraquents with Sulfaquents, Fluvaquents)
- **2a-** Low humic gleys of high and medium base status, fluvio marine phase, riverain soils (Fluvaquents with Endoaquents, Medhemists)
- **3a-** Bog soils, peat and muck phases, deep pegasse (Medihemists with Sulfohemists, Medisaprists)
- **4a-** Low humic gleys of low base status, including groundwater laterites and planosols (Endoaquepts with Fluavaquents, Sulfaquepts)
- **5a-** Groundwater laterites (Humaquepts with Endoaquepts, Fluvaquents, Psammaquents)

***1a Low humic gleys of high base status, marine phase "frontland clay" (Hydraquents with Sulfaquents, Fluvaquents)***

This mapping unit occurs on the coastal plain of eastern Guyana from the Essequibo to the Corentyne river stretching some 32km inland in places. It contains fertile, poorly drained clay soils developed on unconsolidated sediments with associated sandy 'reefs' that are old beach ridges. Some saline soils and organic 'pegasse' soils also occur in patches. The soils need drainage prior to agricultural production but are fertile. The main limitations for agriculture are the need for drainage and occasional areas of salinity and acid sulphate and aluminium toxicity. In much of the coastal plain, these soils have a land use of rice and sugar with coconuts on the sandy reefs. In cases of no agricultural development, the vegetation is one of mangrove and swamp forest and marshy grassland.

***2a Low humic gleys of high and medium base status, fluvio-marine phase, riverain soils (Fluvaquents with Endoaquents, Medhemists)***

This mapping unit describes poorly drained, deep, silty loam to silty clay over clay textured soils that have developed over alluvial deposits. They occur between the Berbice and Corentyne rivers, along the Demerara River as far south as Linden and 100km up the Berbice River and at the Essequibo River mouth. The soils have moderate to high fertility

which decreases away from the coast. The need for drainage is the main limitation. The soils are extensively cultivated with rice and sugar as the main crops but with a natural vegetation like 1a where not cultivated.

***3a Bog soils, peat and muck phases, deep pegasse (Medihemists with Sulfohemists, Medisaprists)***

These organic bog soils known as ‘pegasse’ occur as coastal back-swamps and are most extensive in north-western Guyana, west of the Pomeroon River where they can extend 65km inland, although they also occur in patches behind the rest of the coastal plain. The soils are organic accumulations of peat and other organic matter occasionally interlayered with clay and can be as deep as 9m. They are very acid and have extremely low fertility. Drainage, fertility and acid sulphate toxicity are the main limitations to agriculture. The land cover is mainly natural vegetation of grassland and swamp forest with characteristic ite palms.

***4a Low humic gleys of low base status, including groundwater laterites and planosols (Endoaquepts with Fluvaquents, Sulfaquepts)***

This unit represents a complex of different soils in which Low Humic Gleys (Endoaquepts) are predominant. The unit occurs primarily in the backlands of the Mahaica-Berbice area, between the Berbice River and Canje Creek and in small patches between the Essequibo and Demerara rivers. The soils are very poorly drained clays often with a peat topsoil with better drained laterite ‘islands’ and planosols that show an abrupt silt pan. The soils have extremely low fertility and often exhibit acid sulphate and aluminium toxicity. Drainage, fertility and acid sulphate toxicity are the main limitations to agriculture. The land cover is mainly natural vegetation of scrub, waterlogged grassland/marsh and swamp forest.

***5a Groundwater laterites (Humaquepts with Endoaquepts, Fluvaquents, Psammaquents)***

This mapping unit occurs at the boundary of the coastal plain and the White Sand Plateau and is most extensive between the Berbice and Demerara rivers and south of the Torani Canal in Region 6. The soils are poor to moderately well drained, deep silty clays to clays of low fertility. Drainage is the main limitation in some areas, but the low fertility can be enhanced through appropriate land management. The land cover is largely forest with some

areas of savanna.

***c) WATER QUALITY***

Onderneeming is located in the Pomeroon – Supenaam Region. This region occupies 6,450 km<sup>2</sup> or 3 percent of the country. It is located on the west bank of the Essequibo River with the Atlantic Ocean to the north. About 75 percent of the interior of the region lies in the interior plains. From April to August and November to January, there is an abundance of freshwater from perennial rivers and streams like Pomeroon and Supenaam Rivers. Large to very large quantities of fresh water are available the remainder of the year. In the coastal lowlands, there is brackish to saline water which is available throughout the year from tidal influenced river and streams, coastal marshes, mangroves swamps and tidal lowlands. The populated areas include Suddie, Spring Garden on the Atlantic coast and Charity on the Pomeroon River.

Current wells are limited to the lowlands of the coast due to lack of roads, marsh lands and thick vegetation in the south. The coastal lowlands fill approximately 25 percent of the region including the populated areas where the coastal aquifer is situated. The A Sand aquifer is considered ideal for ground water exploration in this area and is located at depths between 150 – 215m. The remaining parts of the region lies within the interior plains where access to the aquifer is limited to lack of roads. In the southeast of the region, fresh water is available from an unconsolidated aquifer known as the White Sands Formation. Moderate to substantial amounts of fresh water are available however, due to inaccessibility, it remains unexplored. Few known wells exist within this aquifer.

***d) AIR QUALITY***

At the proposed site for the Onderneeming solar PV farm, PM<sub>2.5</sub> concentration ranged from 7.6 – 15.5 µg/m<sup>3</sup>, the latter recorded at sample point, OND-05, however, this level does not exceed the permissible limits outlined by the US National Ambient Air Quality Standards 24-hours average with the other seven values. Similarly, PM<sub>10</sub> values did not exceed the levels stipulated with the highest recording at OND-06 (32.8 µg/m<sup>3</sup>). Overall, the current baseline air quality within the area is good. Total volatile organic compounds were not detected at the site.

e) **NOISE LEVEL**

Currently, the proposed area for the Onderneeming Solar PV farm does not exceed the limits stipulated by the EPA Guyana with minor variation in the values recorded which were 31.2 dB (OND-04) to 44.1 dB (OND-06).

**ECOLOGICAL ENVIRONMENT –**

i. **FLORA**

The Pomeroon-Supenaam region comprises forested highland and low coastal plain, but also takes in a small portion of the hilly sand and clay region. The land has several uses including cultivated fields (rice, sugar cane, etc.). Huber, Gharbarran, & Funk, 1995 in collaboration with Aroaima Mining, University of Guyana, Fundación Instituto Botánico de Venezuela, Biological Diversity of the Guianas Programme, Smithsonian Institution classified forests within this region as follows:

A. Flooded coastal and lowland forests:

1. Low, evergreen, seasonally flooded swamp forest

Coastal 0-50m, macro thermic, ombrophilous, 18-24 m tall

*Pterocarpus, Macaranga, Virola* (major timber species)

2. Low, evergreen seasonally flooded marsh forest

coastal 0-50 m, macrothermic, ombrophilous, 10-15 (24)m tall

*Iryanthera – tabebuia* (on pegasse) *inga – Gustavia* (on alluvium)

3. Low/medium, evergreen, flood palm marsh forest

Coastal/lowland 0-100m, macrothermic, ombrophilous, 5-12 (30)m tall

*Symphonia – Tabebuia – Euterpe* on pegasse (NW District)

B. Non-flooded lowland forests:

1. Tall, evergreen, non-flooded forest (rain forest)

Lowland, 10-400m, macrothermic, ombrophilous, 20-40 (50)m tall

2. Non-flooded lowland forest on white sand:

Tall, evergreen, sclerophyllous forest (Wallaba forest)

Lowland 10-400m, macrothermic, ombrophilous, 25-35m tall

*Eperua - Eperua*

The areas proposed for the solar PV site in Region 2, that is, Onderneeming, is regarded as Dakama

Forest. Observation of the project sites showed that all project sites ranged from mildly to extremely disturbed since there was little to no canopy coverage. The main cause of the disturbance was agriculture. Onderneeming showed the least sign of disturbance. However, Onderneeming is the only site that requires vegetation removal, which is an estimated fourteen (14) acres. There are also remnants of agricultural crops such as banana, plantain, etc. In terms of aquatic plants, *Nymphcea ampla*, *Ceratopteris pteridoides*, were observed.

Species occurring at the proposed solar PV site for Onderneeming include:

<b>SPECIES NAME</b>	<b>COMMON NAME</b>
<i>Tapirira guianensis</i>	Duka
<i>Scleria secans</i>	Razor grass
<i>Curatella americana</i>	Sandpaper leaf
<i>Clusia spp.</i>	Autograph tree
<i>Plinia spp.</i>	
<i>Vismia spp.</i>	
<i>Spermacoce suaveolens</i>	
<i>Sporobolus jacquemontii</i>	Iron grass
<i>Socratea exorrhiza</i>	Walking palm
<i>Cyperus esculentus</i>	Yellow nut sedge
<i>Visima guianensis</i>	Bloodwood
<i>Eperua facata</i>	Soft walaba
<i>Clusia spp</i>	Kufa
<i>Colocasia spp</i>	Wild eddoes
<i>Echinochloa pyramidalis</i>	Antelope grass

**ii. FAUNA**

Overall, no ecologically significant or critical habitat was found at the proposed sites, so there is no risk of disturbance to any critical habitats. No endemic species were found inhabiting the proposed sites, a few species were CITES listed and most were LC Least concern.

## **SOCIAL ENVIRONMENT** -

### **a) ECONOMIC ASPECT**

Onderneeming is a village situated in the region: Pomeroon-Supenaam, located approximately 50km from Guyana's capital, Georgetown. The village is located along the Atlantic Coast and yields a population of approximately 1095 residents.

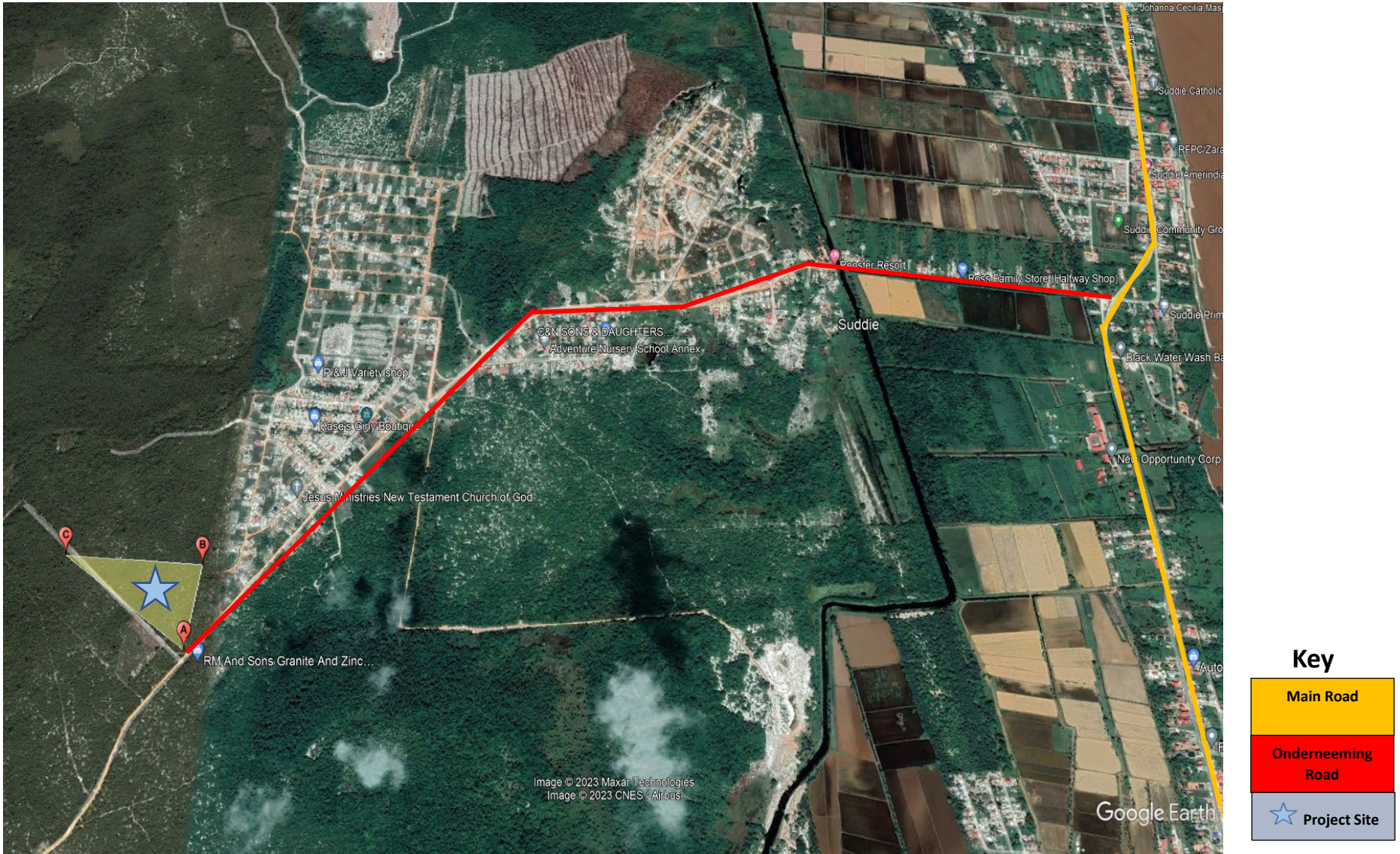
Residents held either a primary or secondary level of education (25.7% and 86.7% respectively). Assessment of employment status revealed 45.7% of respondents were unemployed. This consisted of 28.6% females, and 17.1% males. Conversely, 22.9% of residents were found to be employed, consisting of 17.1% of females, and 5.7% males and 2.9% of the population were retired.

The average monthly income of each household ranged from \$54,000 – \$174,000. A small percentage (2.9%) percent received an income which ranged from \$135,000 to \$174,000. This was followed by 8.6% who indicated an average income of \$95,000 to \$134,000, and 17.1% with an income below \$54,000. Meanwhile, the greatest percentage, being 71.4% indicated an income range from \$55,000 to \$95,000.

In the community, 42.9% of respondents indicated that lack of employment was the main social issue. Meanwhile, 25.7% indicated this to be crime, and 8.6% indicated poverty. The respondents had no indications of any problems with discrimination or any other social issues.

Concerning the level of social cohesion, 91.4% of the respondents indicated that the community had a good cohesion, whilst 8.6% indicated excellent levels of community cohesiveness., 88.6% stated that there were no opportunities for local employment, whilst 11.4% indicated that there were employment opportunities available. For the respondents who thought there were job opportunities, these were identified as police stations, supermarkets, hospitals and rice farm.

b) Layout of the project, presented on a map with a scale relevant to the size of the development with the following details:



c) A description of the design of the proposed which shall include:

a) Design\construction drawings, specification of any structures, volume of expected pollutants, etc.

The construction drawings are currently being developed and as soon as they are accepted and approved, they will be submitted to the agency.

b) The project size, e.g. capital investment, number of employees projected for each stage of the project, rates of production, transportation route etc;

The Capital investment for the entire GUY SOL project is 83.3 million united states dollars. The number of employees is yet to be determined. It is estimated that this project site will have an output of 5MWp.

c) Activities associated with all development stages from construction to closure:

a. operation and production processes and alternative design/s considered.

Response: Not applicable

b. a guide for all stages of the project from raw material to the finished product.

Response: Not applicable

c. technical description of the proposed project's process/activity accompanied by a Process Flow Diagram/s;

Response: Not applicable

d) **Use of Natural Resources: approximate quantities of raw materials required at each stage of the project and their possible sources;**

Response: Not applicable

e) **Source of utility services such as water supply and treatment options, energy/electricity and communication facilities;**

Water will be supplied from GWI, while transmission lines will be established from the nearest transmission lines to the site to facilitate the flow of the power produced from the solar farm back into the grid.

***f)* Waste production: types of waste, the monthly quantity/volume of waste managed (generated, stored, transported), the volume of effluent to be discharged along with a chemical analysis indicating the effluent's composition and methods of waste disposal/treatment. Potential locations for recovery/disposal sites shall be identified with justifications for the site selection;**

The only type of waste that will be produced will be domestic waste. This is be disposed of by a hired servicer provider.

***g)* The duration of the project for each phase; and**

Response: This will be provided when the information is available

***h)* Decommissioning plan (where applicable).**

Response: This will be provided when the information is available

***i)* Potential Impacts and their Significance**

j) *An assessment of the potential impacts of the proposed development and its significance in relation to:*

a. *the extent of the impact or the area of influence: the geographical area that may be affected by the proposed activity and the manner in which the various aspects of the environment: physical (landscape, soil, water, air, the use of natural resources), ecological (flora and fauna), and social (economic and cultural aspects) may be impacted;*

Site	Construction Phase	Operation	Decommissioning
	Dust generation		
Onderneeming			
	Dust generated during projects works is expected to be brief, frequent and localized. It will be attributable to site preparatory works mainly involving heavy machinery (clearing, levelling, excavation, grading).  This impact is considered minor as it is site specific and short term.  Effects are mitigable.	This is not expected during operation.	This is expected to be brief, frequent, and localized due to dismantling of the site and use of heavy machinery (clearing, levelling, excavation, grading).  This impact is considered minor.
	Reduction of carbon emissions (+)		

	<p>Due to the present forest cover within this proposed site, the preparation of this site will significantly impact the carbon sequestration that occurs within this area. However, the impact of this phase will be offset by the positive impact of the operation of the solar PV farm which will reduce dependence on fossil fuels. This impact is now reduced to low.</p>	<p>There is an expected long-term reduction of Greenhouse gas emissions. Given the current and projected loads at each site, the Essequibo component is expected to save a total of 9,390 tCO<sub>2</sub> annually. The generation of energy through the PV system provides a source of green power generation and significantly reduces dependence on fossil fuels. The impact is considered major.</p>	<p>This impact is not likely to occur in decommission.</p>
<p>Nitrogen and Carbon oxides emissions</p>			
	<p>This is expected to be brief and localized due to the operation of light and heavy vehicles, transportation trucks, generators, compressors and other construction equipment. This impact is considered minor.</p>	<p>The process of generating electricity from a solar power plant does not emit any harmful Greenhouse gases and/or waste products since substation only distributes power. The impact is considered insignificant.</p>	<p>This is expected to be brief and localized due to the operation of heavy machinery, transportation trucks, generators, compressors and other construction equipment. The impact is considered minor.</p>

<b>Site</b>	<b>Construction Phase</b>	<b>Operation</b>	<b>Decommissioning</b>
	Noise level		
	The presence of and operation of light and heavy vehicles, transportation trucks, generators, compressors and other construction equipment. Heavy machines will generate noise; however, this impact is considered low as it is expected to be brief, frequent and localized.	This phase will produce localized low levels of noise due to operation of electrical components of the PV plant, maintenance activities, and vehicular traffic. The impact is considered minor.	Brief, frequent and localized elevated noise levels due to dismantling of facilities, increased vehicular traffic, and movement of equipment. This impact is considered minor.

<b>Site</b>	<b>Construction Phase</b>	<b>Operation</b>	<b>Decommissioning</b>
	Loss of topsoil		
Onderneeming	Loss of topsoil		
	Long-term and localized loss of topsoil during site clearing and preparation activities is expected at this site, however, this site was previously disturbed, however due	This impact is not likely to occur during operation.	Removal of facilities and supporting structures will disturb topsoil once more. This is considered low as it is temporary and localised.

	to exposure to other anthropogenic activities which may have disturbed the topsoil previously within the proposed area, this impact is reduced to medium. It is estimated that 14 acres of land will be cleared for works.		
		Soil compaction	
	Long-term and localized soil compaction may cause soil erosion and surface water runoff and riverbed silting. Effects can be minimized with adequate mitigation measures. The impact is considered minor.	This impact is not likely to occur during operation.	This impact is not likely to occur during decommission.
		Soil contamination	
	Brief and localized soil contamination due to oil spills or other hazardous substances. Effects can be avoided with adequate mitigation measures. The impact is considered minor.	With adequate mitigation measures in place, this impact will not be likely during operation. This is considered insignificant.	Brief and localized soil contamination due to oil spills during dismantling activities is expected. Effects can be avoided with adequate mitigation measures. This impact is considered minor.

		Soil erosion	
	Erosion/disturbance of the soil is expected during construction from activities including land clearance and assembling of foundation structures for mounting of solar modules. Potential impacts associated with transmission line infrastructure is minimal since the site has established lines. The scale is localized at activity areas. This impact is considered minor and temporary.	Erosion of the soil may occur during this phase due to vehicle movement which will only happen during the occasional maintenance activities. Furthermore, water that falls on solar PV panels run down the panel to the dripline to the soil which may potentially cause localised erosion. This impact has the potential to be moderate however, with adequate mitigation measures like ground cover and proper drainage to manage runoff this is likely to be reduced to negligible/low risk.	During this phase, this impact is likely from the removal of infrastructure like mounting structures, however, if land cover is maintained throughout operation and soil is put back after removal, the potential for this impact is significantly reduced. This impact is expected to be low due to its occurrence at specific localised areas and existing erosion control measures from operation.

Site	Construction Phase	Operation	Decommissioning
	Land use		
Onderneeming	The site is 30 acres of state-owned land. The current land use of the land can be considered as commercial/industrial. The	The site will be used for energy generation for the lifetime of the facility. There is no significant change in the land use of the site. The	The farm will be dismantled, and the facilities removed. The future site use shall be in line with the land use of the area

	<p>installation of the PV systems will not significantly impact the economic activities of the communities and the surrounding area. The impact is considered minor.</p> <p>Current land use of the right of way (ROW) which are also road reserves commonly used for installation of infrastructure networks such as the one recommended for the Project. The new transmission lines for interconnection of PV Farm to the grid and substations will be done within the existing right of ROW. Therefore, there is no expected modification of the current land use of the proposed transmission lines. It is proposed that the Onderneeming Solar Farm be interconnected to the south 13.8kV</p>	<p>installation of the PV systems will not significantly impact the economic activities of the area. The impact is considered insignificant.</p>	<p>or be restored to its initial stage. The impact is considered minor.</p>
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	<p>load feeder via a short (under 1km) 13.8kV line along an existing road. The impact is considered insignificant.</p>		
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Site	Construction Phase	Operation	Decommissioning
	Visual landscape		
Onderneeming	The presence of solar PV farms in proximity to vegetative cover may moderately impact the natural aesthetics within this project site.	This impact is expected to last throughout the project lifetime. This impact is regarded as medium as it is long-term and within a vegetated area.	The decommissioning of the system will reverse the visual impacts at the proposed site. The impact is considered minor.

Site	Construction Phase	Operation	Decommissioning
	Solid waste generation		
Onderneeming	Waste generation will be significant during the construction phase. Volumes of green waste is expected to be generated at this site due to the vegetative cover. Construction and domestic waste generation is expected	Domestic waste generation may be expected during operation from permanent maintenance staff. Although the generation will be long-term and localized, the volume generated can be considered low.	Solid waste generated is expected to increase in the decommissioning stage. Solid waste generated is expected to be localized, temporary and significant volume of domestic, scrap metal,

	<p>to be temporary and localized but significant in volume. As an indirect impact, it likely that temporal food supply businesses will increase nearby the project site. These businesses will also be a source of increased generation of solid waste that must be considered. Poor solid waste management on site may lead to improper disposal, burning, and pollution of water resources.</p> <p>The effects can be minimized with adequate mitigation measures. The impact is considered moderate.</p>	<p>The effects can be minimized with adequate mitigation measures. The impact is considered minor.</p>	<p>construction waste, and hazardous waste.</p> <p>The effects can be minimized with adequate mitigation measures. The impact is considered moderate.</p>
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Site	Construction Phase	Operation	Decommissioning
	Surface water pollution		
Onderneeming	Construction activities may result in pollution of nearby surface water due to runoff (increased turbidity, organic	During operation, wastewater will be generated from security/maintenance staff offices and cleaning of the PV	Surface water pollution: Activities may result in pollution of public irrigation canal due to runoff (increased turbidity,

	<p>load). This is expected to be temporary and controlled with adequate drainage and wastewater management at the site.</p> <p>Potential spills of oil could cause contamination of the nearby surface water through run-off. This aspect is temporary and avoidable.</p> <p>Wastewater generation from construction staff living quarters may also cause increased organic load to nearby water bodies, if not adequately managed.</p> <p>The impact is considered moderate.</p>	<p>cells. The effect is expected to be long term and can be mitigated with adequate collection and management practices.</p> <p>The removal of soil cover might generate minor impacts due to erosions during operation also.</p> <p>Potential spills of oil and any other hazardous substances could cause contamination of the nearby public irrigation canals. This aspect is very localized, temporary and easily avoidable.</p> <p>The impact is considered minor.</p>	<p>organic load). This is expected to be temporary and controlled with adequate drainage at the site.</p> <p>Potential spills of oil could cause contamination of the nearby public irrigation canals. This aspect is very localized, temporary and easily avoidable.</p> <p>The impact is considered moderate.</p>
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<b>Site</b>	<b>Construction Phase</b>	<b>Operation</b>	<b>Decommissioning</b>
	Groundwater contamination		
Onderneeming	Groundwater resources may be impacted during the construction stage from oil spills and leaks or due to	Improper solid and wastewater have the potential to negatively impact	Groundwater resources may be impacted during the decommissioning stage from oil spills and leaks or due to

	<p>improper storage and handling. Improper solid and wastewater management can also impact the groundwater resources. The effects are considered temporary and moderate. Adequate measures can avoid potential effects.</p> <p>The impact is considered minor.</p>	<p>ground water resources. Adequate measures can avoid potential effects.</p> <p>The impact is considered insignificant.</p>	<p>improper storage and handling. Improper solid and wastewater management can also impact the groundwater resources. The effects are considered short term and minor. Adequate measures can avoid potential effects.</p> <p>The impact is considered insignificant.</p>
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Site	Construction Phase	Operation	Decommissioning
	Creation/loss of natural habitat		
Onderneeming	<p>This project site is marked as disturbed, however, there is vegetative cover since the land allocated for the PV plant is within a forested area. There are also high levels of faunal biodiversity within the wider area, however, no indication or presence of threatened or protected flora or fauna species at the proposed site for construction was recorded.</p>	<p>The increase in ground shade and humidity may promote growth of vegetation which can open opportunities for agrivoltaic farming (Corbley, 2022).</p> <p>This impact is positive and long-term.</p> <p>The reflection of solar panels may affect birds as the main wildlife in the surroundings, and transmission lines</p>	<p>The impact of this stage may be determined by the activities designated during operational aspects of the farm.</p>

	<p>The impact can be localized and long term, but low in intensity and considered moderate. The total area estimated to be cleared is 14 acres.</p>	<p>may affect bird mortality. The effects will be long term and localized.</p> <p>Solar PV farms can impact bird communities through habitat loss and the risk of avian collision mortality.</p> <p>An extrapolated mortality study based on a bird density of 38 to 50 species per ha (15 to 20 species per acre) may occur 4.5 bird fatalities per MW per year (Visser, Elke et. al 2019). A PV plant with 50 acres area or 10 MW is expected to impact 45 bird fatalities per 10 MW per year in a modest projection.</p> <p>Future data is needed to have a better accuracy in bird density and to understand the risk of PV solar energy developments on birds.</p> <p>The impact can be considered moderate.</p>	
	Noise levels		

	<p>Noise generated by construction and machinery is more likely to impact wildlife in the surrounding areas of the site. Due to the faunal biodiversity in the surrounding environs, this impact is considered moderate.</p>	<p>The decreased but prevailing noise due to the operations may deter activity during these hours. This impact is considered low as it is localised and short-term.</p>	<p>Noise generated by construction workers and machinery is most likely to add to existing noises in this phase. These noises are not likely to impact wildlife as there may have been migration from this area after a prolonged presence. Any potential impacts will be temporary and localised. This impact is considered minor.</p>
	<p>Aesthetics</p>		
	<p>The increased traffic and machines during construction may affect faunal biodiversity within areas of influence causing migration to undisturbed areas of the forest. This impact is considered temporary and moderate.</p>	<p>The presence of the solar farm within a vegetated area may be distinguishable when compared to its surroundings but considering its delineated boundaries (with fencing), it is therefore confined and limited to a specific area. Furthermore, adequate mitigation measures can reduce this impact to negligible. This impact can be regarded as long term, direct and minor.</p>	<p>The impact of this stage may be determined by the activities designated during operational aspects of the farm.</p>

Site	Construction Phase	Operation	Decommissioning
Demography			
Onderneeming			
	<p>During the construction phase, an increase in population is expected in the area. While residents are expected to take part in some construction activities, there may be an influx of workers with specific skills. The effects are considered temporary, and localized. In general, this will bring a positive socio-economic impact to the area. However, demographics are not expected to be significantly impacted during this stage.</p> <p>The impact can be considered as minor.</p>	<p>Operation of the PV systems requires little staff. Additionally, maintenance and operational activities are expected to be carried out by GPL staff residing the areas of influence. The effects will be long term, localized but insignificant as it is not expected to change the demography of these areas. The impact is considered minor.</p>	<p>Decommissioning activities will need to ensure the quality of the GPL service is not affected negatively. In such case, the removal of the system is more likely to have an impact in the socio-economic activities of the area and its demography. To this assessment, it is assumed that GPL service after decommissioning will be maintained, therefore, decommissioning of the system is not considered to have a significant impact.</p>
Socioeconomics			

	<p>Increased activities due to construction will temporarily increase the economic activities within proximity to the construction sites to accommodate the current needs of the workers.</p> <p>This impact is considered positive and minor.</p>	<p>An expected indirect impact of the operation of the PV systems is the increase of population in the area. The increase of energy production with the current reliable service from GPL, will naturally promote an expansion of socio-economic activities in the area thus also impacting the demography. This effect is considered high spread, long term and significant for the community.</p> <p>The impact is considered major.</p>	<p>An influx of construction workers will increase economic activities within the area temporarily.</p> <p>This impact is considered positive and minor.</p>
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Site	Construction Phase	Operation	Decommissioning
	Employment		
Onderneeming			
	<p>During the construction phase, employment opportunities will be generated for skilled and unskilled labour. There will also be a demand for local goods and services which will have an impact on the earning</p>	<p>The operation of the PV systems will be managed by GPL staff, however permanent roles like security services and scheduled upkeep. Therefore, a direct impact on employment generation is</p>	<p>During this phase, there may be temporary employment opportunities during the dismantling of the plant. However, this is expected to be in a much lesser</p>

	<p>capacity of local businesses. These impacts while positive are expected to be only temporary and localized. The impact is considered minor.</p>	<p>expected during this phase. This impact is considered minor.</p>	<p>extent than in the construction phase. The impact is considered minor.</p>
	<p>Socioeconomic activities</p>		
	<p>This impact is insignificant at this phase.</p>	<p>An indirect impact of the operation of the PV systems is the increase of employment in the district. The expected improvement on the reliability of the GPL service, will naturally promote an expansion of socioeconomic activities in the area thus impacting employment opportunities. This impact is considered major. Additionally, the Programme intends to finance training and apprenticeships in solar PV installation and energy management projects which will be designed for diversity and inclusion, targeting women and persons with disabilities, adding to specific job skills and thereby employment within the sector.</p>	<p>This impact is negligible at this phase considering the Government of Guyana's long-term plans for low-cost energy generation.</p>

		This effect is considered high spread, long term and significant for the community.	
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Site	Construction	Operation	Decommission
	Displacement		
Onderneeming	GLSC indicated that the site is currently unoccupied and has no competing interest and as such can be acquired by GPL. A resident currently utilizing the outer perimeter of the project site for a chicken pen (20x40 feet/6.09m x 12.19m) was identified.	This impact is not likely to occur during this phase.	This impact is not likely to occur during this phase.

Site	Construction Phase	Operation	Decommissioning
	Livelihood		
Onderneeming	The livelihood of a resident utilizing a small area of the outer perimeter of the project site for poultry farming is likely to be affected modestly during this phase. Since the resident has freely consented to leaving prior to commencement of any works, in	The construction and operation of the PV system will increase energy security and access in the area and will support the development of a greener economy. It is highly likely the project economic activities will expand and diversify economies with employment	It is assumed that GPL service after decommissioning will be maintained, therefore, decommissioning of the system is not considered to have a significant impact.

	<p>addition to adequate reimbursement, this impact has been reduced to negligible.</p>	<p>opportunities and improving the quality of life in the community. The effects will spread at the community level and can be considered long term. There is also an anticipated positive effect on income generation opportunities for women.</p> <p>Furthermore, this sustainable form of electricity will contribute to funding for system upgrades, including digitization, improving overall system reliability and the resilience of GPL's Transmission and Distribution network. Renewed access to revenues originally dedicated to fuel and subsidies would also aid in the repayment of debts. This will allow GPL to provide increased value to its customers through more reliable and affordable electricity service in Guyana. This impact is considered major.</p>	
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Site	Construction Phase	Operation	Decommissioning
	Social/cultural		
Onderneeming	While there may be a temporary increase of construction workers in the area, the local customs, cultures, and social relations are not expected to be significantly impacted. There are no cultural sites or near to the project site. This impact is considered minor.	This phase of the PV systems will be managed by local GPL staff. There are no expected impacts on local customs, culture, and social relations directly related to the operation of the PV systems. This impact is considered insignificant.	There are no expected impacts on local customs, culture, and social relations directly related to the decommissioning of the PV systems. This impact is considered insignificant.

Site	Construction Phase	Operation	Decommissioning
	Infrastructure		
Onderneeming	There is no expected disruption of energy or other services during construction activities. Any Unexpected events would have a brief and widespread effect. However, effects can be minimized with adequate planning. Upgrading of the access road to the proposed site may create traffic	During the operation of the PV system, the energy service is expected to be reliable. Modular PV systems are resilient to disruptive events. If a module is damaged, the system remains operational. This will benefit the customers and will minimize power outage in the area. Water supply service is expected to be impacted	For this assessment, it is assumed that GPL service after decommissioning will be maintained, therefore, decommissioning of the system is not considered to have a significant impact.

	<p>disturbances. The use of any current trail should be considered and relevant stakeholders contacted to ensure no significant disruption of activities to local users. The impact is considered moderate.</p>	<p>positively, since power disruptions to the distribution system will also be minimized.</p> <p>Effects will be long term and at the community level.</p> <p>The impact is considered direct, significant and major.</p>	
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<b>Site</b>	<b>Construction Phase</b>	<b>Operation</b>	<b>Decommissioning</b>
	<b>Health and safety</b>		
Onderneeming	<p>During construction, there will be health and safety hazards on site and in surrounding area due to increase vehicular traffic, heavy machinery operation, excavation, and other construction activities. The effects will be localized and temporary. However, the effects can be minimized by strict adherence of the approved safety procedures mandatory under the Laws of Guyana.</p>	<p>During operations, workers will be exposed to occupational hazards especially during maintenance. The probability of occurrence can be minimized by strict adherence to occupational safety procedures.</p> <p>The impact is considered indirect and minor.</p>	<p>Increased exposure to hazards is expected in the decommissioning activities. Strict adherence to health and safety procedures will minimize these effects.</p> <p>The impact is considered direct and moderate.</p>

	<p>Influx of construction workers may lead to increase in the prevalence of sexually transmitted diseases among the local population, as well as sexual violence. Considering that labour is expected to be filled locally, this concern can be regarded as low. However, health and awareness campaigns as well as a code of conduct indicating clear repercussions can minimize any potential effects.</p> <p>The impact is considered moderate.</p>		
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Site	Construction Phase	Operation	Decommissioning
	Supply Chain Risk		
Onderneeming	The solar PV supply chain is vulnerable to impacts like natural disasters, wars, pandemics, technical incapacities, individual company decisions, etc. which can impact project costs and	This impact is not likely to occur during this phase.	This impact is not likely to occur during this phase.

	<p>management. This impact is considered medium as it is unpredictable and direct, however, it can only be expected during this phase.</p> <p>This impact can be reduced by greater understanding of price mechanisms and competition by the PEU to inform decisions about capital costs before hiring a Contractor.</p>		
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- b. the trans frontier nature of the impacts i.e. does it cross country borders or boundaries;***

Response: Not applicable

- c. the magnitude and complexity of the impacts;***

Response: Not applicable

- d. the probability of the impacts;***

Response: Not applicable

- e. the duration, frequency and reversibility of the impacts; and***

Response: Not applicable

- f. Cumulative impacts with other projects: additional surveys and assessment may be required to determine whether existing projects in combination with the proposed project will have a significant cumulative effect on the receiving environment.***

Response: Not applicable

**k) Description of proposed environmental management and mitigation measures for all environmental, ecological and social impacts.**

<i>Environmental and Social Management Plan – Construction of the Onderneeming Solar PV Farm</i>						
	<b>Issue/ Impact</b>	<b>Mitigation Measures</b>	<b>Monitoring Indicators</b>	<b>Responsibility for Implementation</b>	<b>Responsibility for Monitoring</b>	<b>Estimated Cost (US\$)</b>
Air Quality	Dust generation	<ul style="list-style-type: none"> <li>▪ Cover stockpiles to minimize dust generation.</li> <li>▪ Suppress dust from construction, stockpiles and increased vehicular traffic by sprinkling water.</li> <li>▪ Consider wind direction when stockpiling construction materials. Orientation will avoid downwind residences or sensitive locations.</li> <li>▪ Implement vehicle speed control through signage</li> </ul>	<ul style="list-style-type: none"> <li>▪ PM monitoring</li> <li>▪ Dust generation observation</li> <li>▪ Complaints register</li> </ul>	All contractors on site	Site Supervisor	5,000

		and speed bumps, whenever necessary.				
NO <sub>x</sub> and CO <sub>x</sub> emissions	<ul style="list-style-type: none"> <li>▪ Maintain vehicles and on-site construction equipment regularly.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Equipment maintenance records according to schedule</li> <li>▪ Vehicle fitness certificates</li> </ul>	All contractors on site	Site Supervisor	10,000	
Noise	<ul style="list-style-type: none"> <li>▪ Use padding/noise isolators for construction equipment and machinery.</li> <li>▪ Carry out fixed noise sources or activities away from site boundaries, particularly boundaries close to sensitive environments.</li> <li>▪ Maintain construction vehicles and machinery adequately.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Monitoring of dB</li> <li>▪ Complaints register</li> <li>▪ Equipment maintenance records according to schedule</li> <li>▪ Workers' compliance to H&amp;S procedures</li> <li>▪ Consultation records</li> <li>▪ Environmental Annual Reports</li> </ul>	All contractors on site	Site Supervisor	5,000	

		<ul style="list-style-type: none"> <li>▪ Use ear plugs or earmuffs for specific activities by workers, visitors and any individuals working in proximity to the works.</li> <li>▪ Consult stakeholders (immediate surroundings of site) to plan activities accordingly.</li> </ul>				
Soil	Topsoil loss	<ul style="list-style-type: none"> <li>▪ Limit the removal of vegetation to the site footprint.</li> <li>▪ Whenever possible, removed topsoil should be conserved and used for remediation of affected areas with special consideration of any sites with vegetative cover.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP Compliance records</li> <li>▪ Environmental Annual Report</li> </ul>	All contractors on site	Site Supervisor	15,000

Soil compaction and erosion	<ul style="list-style-type: none"> <li>▪ Develop suitable drainage in consideration of the physical characteristics of the site.</li> <li>▪ Plant grass or use of rocks under the solar panels is also recommended to reduce erosion at the drip line.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP Compliance records</li> <li>▪ Environmental Annual Report</li> </ul>	All contractors on site	Site Supervisor	
Soil contamination	<ul style="list-style-type: none"> <li>▪ Adequately dispose of waste materials.</li> <li>▪ Provide bunded areas or secondary containment for storage of oil/fuel and/or any other hazardous materials or substances like batteries with 110% capacity of the stored material.</li> <li>▪ Provide spill kits at strategic locations.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Complaints register</li> <li>▪ ESMP Compliance records</li> <li>▪ Environmental Annual Report</li> </ul>	All contractors on site.	Site Supervisor	

		<ul style="list-style-type: none"> <li>▪ Service construction vehicles and machinery regularly.</li> <li>▪ Ensure that any vehicle maintenance is handled on impervious surfaces to avoid soil contamination.</li> <li>▪ Treat or dispose contaminated soil with a commercial oil-absorbing product, if possible.</li> </ul>				
Land Use (ROW)		<ul style="list-style-type: none"> <li>▪ Current land use of the right-of-way (ROW) is considered road reserved commonly used for infrastructural works like installation of networks of the solar PV farm.</li> <li>▪ The proposed transmission lines for</li> </ul>	<ul style="list-style-type: none"> <li>▪ Complaints register</li> <li>▪ ESMP Compliance records</li> </ul>	All contractors on site.	Site Supervisor	

		<p>interconnection of PV Farm to the grid and substations will be done within the existing ROW.</p> <ul style="list-style-type: none"> <li>▪ It is proposed that the Onderneeming Solar Farm be interconnected to the South 13.8kV Load Feeder via a short 13.8kV Line (under 1km).</li> <li>▪ Therefore, there is no expected modification of the land use of the proposed transmission lines at no site. The impact is considered insignificant.</li> </ul>				
	Landscape and visual impact	<ul style="list-style-type: none"> <li>▪ The site proposed for the proposed solar PV farm in Onderneeming is</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP Compliance records</li> </ul>	All contractors on site	Site Supervisor	5,000

		<p>vegetated, see <b>Table 3-6</b> for overview. This impact is considerate moderate.</p> <ul style="list-style-type: none"> <li>▪ Consult with aeronautical authorities with regards positioning and direction of solar panels to avoid conflicts with flying airplanes.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Consultation meeting records</li> </ul>			
	Solid waste generation	<ul style="list-style-type: none"> <li>▪ Dispose of waste in the authorized landfill as regulated by the local authority.</li> <li>▪ Plan and coordinate with the local NDC/RDC to manage the increased volume expected to be generated from the site.</li> <li>▪ Provide the site with adequate number of bins</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP Compliance records</li> <li>▪ Consultation records with solid waste management authorities.</li> <li>▪ Complaints records</li> <li>▪ Valid contract with solid waste</li> </ul>	All contractors on site	Site Supervisor	50,000

		<p>for the disposal of domestic waste.</p> <ul style="list-style-type: none"> <li>▪ Burning of waste on-site is strictly prohibited.</li> <li>▪ Ensure adequate arrangements are made for the frequent collection of domestic, construction and hazardous materials.</li> <li>▪ Provide bins to facilitate waste from food supply entrepreneurs within the proximity to the site.</li> <li>▪ Clean and maintain site and immediate surroundings.</li> </ul>	<p>collection contractor.</p> <ul style="list-style-type: none"> <li>▪ Existence of at least one container bin outside the project site where food services providers are located (if necessary).</li> </ul>			
	Hazardous waste	<ul style="list-style-type: none"> <li>▪ This phase is expected to produce much hazardous waste due to ongoing construction process which requires regular</li> </ul>	<ul style="list-style-type: none"> <li>▪ Compliance with hazardous waste management plan and Environmental Permit</li> </ul>	All contractors on site	Site Supervisor	5,000

		<p>maintenance and servicing of machines and vehicles.</p> <ul style="list-style-type: none"> <li>▪ A hazardous waste management plan must be developed by the contractor for spent oil, oily rags, grease, filters, etc. that will be used on site.</li> <li>▪ Hazardous all hazardous materials on site and dispose according to stipulations outlined Environmental Protection (Hazardous Waste Management) Regulations 2000 and Environmental Permit.</li> <li>▪ Any oil from machines serviced should be collected and stored in a</li> </ul>	<ul style="list-style-type: none"> <li>▪ Environmental Annual Report where quantities generated are recorded and intended method of disposal</li> </ul>			
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		<p>bunded area or secondary containment for storage of any hazardous materials or substances like batteries with 110% capacity of the stored material.</p> <ul style="list-style-type: none"> <li>▪ Machines and parts should not be serviced or cleaned near to or in any standing water body.</li> <li>▪ See section</li> </ul>				
	Surface water pollution	<ul style="list-style-type: none"> <li>▪ Design drainage for the site to minimize run-off and in consideration of any nearby water bodies.</li> <li>▪ Monitor and maintain drainage system regularly.</li> <li>▪ Provide adequate temporary sanitary facilities for workers on-</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP compliance records</li> <li>▪ Existence of temporary sanitary facilities</li> <li>▪ Valid contract with waste collection contractor</li> </ul>	All contractors on site	Site Supervisor	30,000

		<p>site while permanent facilities are constructed.</p> <ul style="list-style-type: none"> <li>▪ Ensure frequent collection of waste generated by sanitary facilities by an EPA approved contractor.</li> <li>▪ Provide bunded areas or secondary containment for storage of oil/fuel with 115% capacity of the stored material.</li> </ul>				
	Groundwater pollution	<ul style="list-style-type: none"> <li>▪ Clean oil spills, fuel spill and other site contaminants rapidly and immediately.</li> <li>▪ Frequent collection of waste generated by sanitary facilities will be done by an EPA approved contractor.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ESMP compliance records</li> <li>▪ Existence of temporary sanitary facilities</li> <li>▪ Valid contract with waste collection contractor</li> </ul>	All contractors on site	Site Supervisor	

		<ul style="list-style-type: none"> <li>Provide bunded areas or secondary containment for storage of oil/fuel with 115% capacity of the stored material.</li> </ul>				
	Loss of natural habitat	<ul style="list-style-type: none"> <li>At the site proposed for the Onderneeming solar PV farm, the natural habitat was disturbed but species diversity is high in relation to the other sites.</li> <li>Monitor and maintain noise levels as recommended by the EPA Noise Regulations to minimize potential effects to fauna in the surrounding areas i.e., Construction</li> <li>90dB daytime limits (06:00 – 18:00h)</li> </ul>	<ul style="list-style-type: none"> <li>dB monitoring</li> </ul>	All contractors on site	Site Supervisor	500

		<ul style="list-style-type: none"> <li>75dB night-time limits (18:00 – 06:00h)</li> <li>Ensure the Fauna Rescue Plan is consulted if any animal is encountered.</li> </ul>				
Demography and Employment	<ul style="list-style-type: none"> <li>Maximise the local labour market.</li> <li>Ensure the recruitment process is transparent.</li> </ul>	<ul style="list-style-type: none"> <li>Employment records</li> <li>Number of local labours employed at the site</li> </ul>	All contractors on site	Site Supervisor	1,000	
Socio-cultural	<ul style="list-style-type: none"> <li>Regularly consult with the community through meaningful stakeholder consultation.</li> </ul>	<ul style="list-style-type: none"> <li>Monthly community consultation records</li> </ul>	All contractors on site	Site Supervisor	5,000	
Infrastructure	<ul style="list-style-type: none"> <li>Ensure timely and adequate public announcements with regards to any service interruption because of the project, including road closures if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>Service interruption records</li> <li>Duration of service interruption</li> </ul>	All contractors on site	Site Supervisor	5,000	

	<p>Health and Safety</p>	<ul style="list-style-type: none"> <li>▪ A health and safety plan should be implemented by the contractor on site.</li> <li>▪ Workers' awareness sessions on health and safety issues should be carried regularly.</li> <li>▪ Provide awareness campaigns to the population and training to workers on the mitigation of any potential community health and safety impacts.</li> <li>▪ All personnel on site must be provided with PPE.</li> <li>▪ Site emergency response plans should be developed including a fire safety plan.</li> </ul>	<p>H&amp;S Plan compliance records</p> <ul style="list-style-type: none"> <li>▪ H&amp;S awareness sessions attendance records</li> <li>▪ Site emergency response and Fire Safety plans developed and implemented.</li> <li>▪ ESMP compliance records.</li> <li>▪ Visible traffic and speed signage.</li> </ul>	<p>All contractors on site</p>	<p>Site Supervisor</p>	<p>20,000</p>
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		<ul style="list-style-type: none"> <li>▪ Provide adequate fire-fighting equipment on site.</li> <li>▪ Ensure clear, visible signage throughout the site and surrounding areas always.</li> <li>▪ Traffic control and speed limits must be observed.</li> <li>▪ Limit work hours to daytime limits (06:00-18:00h), unless otherwise agreed with relevant stakeholders.</li> <li>▪ If work needs to be completed during the evening, night-time limits are (18:00 -6:00h).</li> <li>▪ Occupational hazards should be marked on site and staff trained on hazard recognition.</li> </ul>				
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		<ul style="list-style-type: none"> <li>▪ Cleanliness of the site must be always maintained.</li> </ul>				
	Health: HIV/AIDS	<ul style="list-style-type: none"> <li>▪ Use code of ethics, conduct, and good practices based on existing GPL standards and guidelines.</li> <li>▪ Training on awareness, and education on safe practises in the workplace during the period of construction must be done.</li> <li>▪ Equip staff with appropriate equipment and materials to protect colleagues from the risk of exposure to STIs.</li> <li>▪ Disseminate information on safe practises including occupational</li> </ul>	<ul style="list-style-type: none"> <li>▪ Compliance with the code of ethics</li> <li>▪ Behaviours which facilitate unintentional injuries and violence,</li> <li>▪ Tobacco use,</li> <li>▪ Alcohol and drug use,</li> <li>▪ Sexual behaviours related to pregnancy and sexually transmitted diseases,</li> <li>▪ Unhealthy dietary behaviours, and</li> </ul>	Health and Safety Officer. Program should be adapted to comply with local laws.	Health and safety officer	3,500

		health and first aid training.	<ul style="list-style-type: none"> <li>▪ Physical inactivity and being overweight.</li> </ul>			
	Supply chain	<ul style="list-style-type: none"> <li>• Ensure that there is greater understanding of price mechanisms and competition by the PEU to inform decisions about capital costs before hiring a Contractor.</li> <li>▪ Research suppliers and products for adequate quotations.</li> </ul>	<ul style="list-style-type: none"> <li>▪ International price comparisons</li> <li>▪ Reputation of suppliers and products</li> </ul>	PEU-GPL	GPL	0

- l) A summary of minutes of any public consultations/ meetings held by the Project proponent with key stakeholders expressing their views and opinions.*

### **SUMMARY OF MINUTES**

The consultation meeting related to the above-mentioned project was conducted with the community members, as it was seen that they are the most crucial part of the implementation of the project; whilst taking into consideration the social and environmental impacts of such a project, as well as issues surrounding land ownership. All other relevant stakeholders were invited, and the meeting was held on Tuesday, 21 June 2022 in the Primary School Annex in Onderneeming. The meeting was called to order at 10:00 am with 48 signed attendees.

### **MATTERS ARISING FROM THE MEETING:**

**Commencement of Training:** The training would be run before the construction of the solar panel so that persons can get hands-on experience. In terms of the employment of the trainees, it would depend on the contractor because care must be taken in mandating contractors to employ persons since losses can be incurred. A resident expressed that maybe the contractor cannot be mandated but individuals can be recommended to the contractor. Contractors can also add to the community by looking at other services offered by the community such as catering. Mr. Dillawar indicated that he could contact the NDC to gather a list of services and skill sets within the community. Another resident expressed that it is a good initiative because there are men and women with skills in the community.

**Disappointment for the cancellation of a project:** One resident commented that the project is a good steppingstone as it would assist with electricity expenses over time. He also expressed that Lima Sands project was disappointing due to the cancellation of a project because of the critically endangered yellow head parrot that lived in the area for the project. Mr. Dillawar expressed that it doesn't bar the development of Lima Sands but it just bars GPL from establishing a scale solar PV project because of the rules. Mr. Dillawar indicated that there is a new site in Charity so the area would be developed soon.

**Operation of project:** Mr. Dillawar indicated that the solar panels would require regular maintenance such as cleaning and washing the panels. In terms of day-to-day staff, it would include

operators and security. Mr. Dillawar also highlight that they would like to engage school children to visit the solar panels and see the operation. Engineers would have to be local, in Anna Regina, there are officers who can perform such perform duties. There would be one dedicated project engineer in each area to direct and monitor operations.

**Notice of commencement of construction:** Mr. Dillawar indicated that GPL is mandated to update the residents before work starts, especially in the newspapers. The tender process would be launched at the end of July once environmental assessments are completed. He also indicated that the contractor must make a visit to the community before construction so the community can expect another visit, at this meeting they will provide their contact person and their plan of the work.

**Plan of action:** All projects will start at the same but in three lots. Ideally, clearing of the location should be done before, however, the value of the project was above 1 million US dollars therefore, a tender process needed to be initiated. This is to ensure transparency. Clearing and filling would be the first steps for the location.

**Starting of Construction:** Construction would start in the new year, ground mounted. It's a simple foundation, different foundation methods would be employed.

**Relocation:** A resident requested a meeting with the Project Coordinator after the meeting concluded. She noted that she is currently utilizing the reserved government land on the perimeter of the proposed solar PV farm site for a small chicken pen (20x40 feet) (6.09m x 12.19m). An agreement was immediately reached since the resident indicated that she would vacate the area as soon as possible with the assistance of GPL. This matter is to be dealt with using the grievance mechanism.

**ANY OTHER BUSINESS:** A resident expressed their gratitude and happiness for the presence of the Solar PV Project team. She indicated that is great that Onderneeming has another developmental project which can assist residents who are in training and school to experience fewer blackouts.

**CLOSING REMARKS:** Mr. Dillawar expressed that he is impressed with the turnout and is glad that villagers are taking the time to be interested in their community to understand what is going on. He thanked the residents for coming out and encouraged them to contact the number allocated for grievances to express any concerns about the project.

Mr. Espinosa also expressed gratitude for the community's response during the execution of the project. He related that for the environmental aspect, there is secondary forest so there should be no concern.

*m) A description of any assumptions, uncertainties and gaps in knowledge.*

NA

*n) A non-technical summary of the project (a summary of what the project is about in layman's language that clearly describes your project).*

Funds from the Guyana-Norway Partnership will be utilized to execute a National Solar PV Project aligned with its plans to increase renewable energy penetration and grid stability in the power system. The project will be administered through the Inter-American Development Bank (IDB), with GPL as the Executing Agency. The execution of the projects that are a part of this program will support Guyana's transition to renewable energy and the diversification of the energy matrix via the use of cleaner and renewable energy sources in the electricity generation mix. Eight projects are currently proposed under Component 1: three sites (Prospect, Hampshire and Trafalgar) are vacant agricultural fields owned by the Government, to avoid land conflicts; two sites are former mining sites, those are Dacoura and Retrieve) in Linden; two sites are located on vegetated areas (Block 37 and Onderneeming) being the only feasible technical option for the respective areas, and one site in Charity.

The project will consist of 33MWp solar PV in three different grids as follows:

- ✓ 15MWp of Solar PV with a minimum of 22MWh (11MW, 2h) of battery storage for the Linden Isolated System.
- ✓ 8MWp of Solar PV with a minimum of 12MWh (6MW, 2h) of battery storage for the Essequibo Coast Isolated System.
- ✓ 10MWp of Solar PV for the Demerara-Berbice Interconnected System, specifically in Berbice.

## **Benefits**

The development of a National Utility Scale Solar PV Program will generate benefits including:

▪ **Economic**

- a) Diversification of the local economies within each proposed project area and overall, nationally due to a more reliable, stable form of electricity
- b) Increase resilience to the volatility of the global fuel market:
  - ✓ The diversification of the energy generation matrix of these grids will result in operational and maintenance cost savings for GPL.
  - ✓ Significant reduction in Government subsidies which can be used for:
  - ✓ System upgrades, including digitisation, improving overall system reliability and the resilience of GPL's and LECI's Transmission and Distribution networks.

Thereby, allowing GPL and LECI to provide increased value to their customers through more reliable and affordable electricity services in Guyana.

▪ **Social and Gender**

- a) Improved efficiency in the health, education, water, and public safety sectors
- b) Employment during construction and operation
- c) Local training and institutional capacity

▪ **Environment**

- a) Contribution to the mitigation of global climate change by reduced emissions of Greenhouse Gases.
- b) The reduction and avoidance of CO<sub>2</sub> emissions in electricity generation via the diversification of the energy supply matrix with the introduction of renewable energy-based sources of energy specifically,
  - Linden is purposed to conserve 17,259 tCO<sub>2</sub> (valued = US\$1.04M).
  - Essequibo will conserve 9,390 tCO<sub>2</sub> (valued = US\$1.04M).
  - Berbice will save 10,671 tCO<sub>2</sub> (valued = US\$0.64M).
- c) Reduction in the consumption of and dependence on fossil fuel for electricity generation.