## **Marton Solar Project**

## **Work Phases and Job Creation**



Maximising Asset Values Creating Climate To Live In A Better World

For



### Document Management system

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### **1. Executive Summary**

The proposed Marton Solar Project will employ the following labour hours during phase 1 and Phase 2 of this Project.

### Phase 1: Engineering, procurement, and construction

System design and engineering	1920 labour hours
Construction project personnel	20660 labour hours
Installation	246400 labour hours
Testing, commissioning and technical	1080 labour hours

### Phase 2: Operation, maintenance, and asset management

The proposed Marton Solar Project will create the following jobs for the life of the project (35 years) throughout phase 2.

<b>Operations &amp; maintenance and asset management</b>	10128 labour hours per year for 35
	years

## 2. Introduction

GreenEnco Limited ("The Consultants") has been appointed by Harmony Energy (NZ) Limited ("The Client") to:

- (i) undertake an assessment of the number of jobs that will be created by the development of the proposed Marton Solar Project ("Project"); and
- (ii) detail the labour hours that will be employed during the engineering, procurement and construction work phase of the Project and the operations, maintenance and asset management work phase of the Project.

The Consultants is a Technical Advisor with over 7 GW global experience advising clients in connection with utility scale solar photovoltaic (PV) and battery storage projects in 15 countries in 4 continents. The Consultants team has over 50 years of cumulative operational excellence across the full solar project life cycle. GreenEnco's custom-made Technical Advisory solutions are strengthened with integrated engineering services and operational asset optimisation solutions.

The Consultants is providing The Client with design optimisation services in connection with the Project and has a detailed knowledge of the work that will be involved during the construction and operational phases.

### 2.1. The Project

The Consultants has been informed by The Client that following an initial investigation into a few sites in Marton, The Client has identified a suitable site for solar development within a close proximity to the Marton sub-station, its topography and its size. The Project site is located the East of Pukepapa Road and to the south of Makirikriri Road, Marton 4789, New Zealand as shown below.



Energy from solar farms is yet to be a part of New Zealand's energy mix; however, they offer many advantages over other forms of energy generation. It is also expected that the solar farm construction is expected to grow in very near future and help to create socio-economic development locally and nationally. Solar farms provide a natural and inexhaustible source of energy that is clean and low impact, their benefits include:

- Emissions-free electricity generation
- Noise-free electricity generation
- Very low technology risk
- Low maintenance requirements
- Lower environmental impact than wind, hydro and geothermal
- Less weather dependent than wind and hydro (solar works on cloudy days)
- Restoration of farmland
- Enhancement of biodiversity
- Low impact on public amenity
- Diversification of New Zealand's energy mix
- Contributing to New Zealand's 100% renewable energy targets

### 3. Scope of Works

## 3.1. Engineering, Procurement and Construction Phase

### **Engineering & Design**

- Plant conceptual design
- Resource assessment
- Civil design
- Instrumental engineering
- Supervision systems
- Electrical and mechanical design
- Environmental engineering
- Social assessments
- Capital estimating
- Supplier technical offer Evaluation
- Permits and licensing
- Technical data archive
- Site Studies and Surveys, System Studies, and Calculations
- Geotechnical Study and investigation
- Pull-out Test
- Detailed Topography
- Final Design (Issued for Construction Designs IFC)
- Bill-of-materials (BOM) development
- AC works/grid code compliance
- QA/QC for construction design
- Field review when installed

#### **Project and Contract Management**

- Project budgeting, planning, cost control and progress tracking
- EPC tendering and contracting
- Contract award and kick-off
- Contract and order management
- Expediting and logistics follow up
- Quality control
- Grid connection agreements
- Claims prevention and response
- Risk management
- Health & safety
- Field review when installed
- Support during Construction

#### **Construction and Handover - Civil Works**

- Vegetation Suppression (Site Cleaning)
- Land Levelling
- Land Levelling Disposal
- Internal Access
- Access Maintenance
- Fence
- Low Voltage Trenches
- High Voltage Trenches
- Drainage System
- Mounting structure Pile Driving (or pre-drilling), subject to soil investigation report
- Civil Foundation for Inverter Station
- External Access

- Modules cleaning at end of construction
- 0&M Building
- Other Civil Works Items

### **Electromechanical Works**

- Mounting System Installation
- PV Module Installation
- Inverter Installation
- String box Installation
- DC Cables Installation (PV Modules to String box)
- DC Cables Installation (String box to Inverter)
- MV Cables Installation
- Security System Installation (per fence meters)
- Grounding System Installation
- Meteorological Stations
- Monitoring Supervisory Control and Data Acquisition (SCADA) System
- Other Electric/mechanical Items

### **Project Management**

- Site Mobilisation and provision of site offices, warehouse welfare and CONTRACTOR's preliminaries
- Project Management including site supervision, security, HSSE, interfaces, documentation, and signage
- Contractor Insurances
- Special Tools

### Supervision

- execution monitoring
- Site construction monitoring
- Material Receipt and quality Check

- Warehouse management
- Grid interconnection management
- Health and safety monitoring

### Handover

- Plant commissioning
- Testing and Commissioning
- Handover to O&M team

### **3.2. Operations, Maintenance and Asset Management Phase**

Operational and Maintenance (O&M) is a common good practice for smooth operation of the system. The O&M scopes contains a list of preventatives, predictive and corrective maintenance works.

A data driven technical analysis of the plant performance comes under asset management scope. Asset Management is an essential scope of utility scale solar PV projects ensuring the system performance to its optimum level and help the O&M contractor to be more proactive in their job scopes.

The jobs that need to be done during this phase will last for the life of the Project, which is planned to be 35 – 40 years years.

During this phase sheep farming will be integrated into the solar farm which will create 2 additional long-term jobs.

## 4. Jobs To Be Created and Job Durations

The Consultants consider that the total duration for engineering, procurement and construction will be in the range of 15 – 18 months. The jobs required to deliver the Scope of Works are listed in the table below.

System Design and Engineering				
Job Title	Weeks	Hrs/Week	Labour Hours	
Civil 1	7	40	280	
Civil 2	2.6	40	104	
Structural 1	2.8	40	112	
Electrical 1	9	40	360	
Electrical 2	7	40	280	
Electrical 3	5.6	40	224	
Draftsman	14	40	560	

Construction Project Personnel				
Job Title	Weeks	Hrs/Week	Labour Hours	
Project Director	2.8	40	112	
Project Controls	12	40	480	
Office Administrator	10	40	400	
Process Support	10	40	400	
Project Manager	39	40	1560	
Construction Manager 1	46.8	40	1872	
Construction Manager 2	46.8	40	1872	
General Superintendent	46.8	40	1872	
Project Engineer	46.8	40	1872	
Civil/Structural Superintendent	22.75	40	910	

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Mechanical Superintendent	22.75	40	910
Electrical Superintendent 1	39	40	1560
Electrical Superintendent 2	39	40	1560
Commissioning Manager 1	6	40	240
Commissioning Manager 2	6	40	240
Quality Engineer - Structural/Civil	25	40	1000
Quality Engineer - Electrical	20	40	800
Quality Manager	12	40	480
Safety Manager	15	40	600
Quality Inspector	7	40	280
Safety Inspector	5	40	200
Logistics Manager	20	40	800
Purchasing Coordinator	16	40	640

Installation				
Job Title	Number of people	Weeks	Hrs/ Week	Labour Hours
Mechanical installation team	100	14	40	56000
Civil installation team	70	35	40	98000
Electrical installation team	60	38.5	40	92400

Testing & commissioning and Technical Advisor					
Job Title	Weeks	Hrs/Week	Labour Hours		
Testing and commissioning engineer 1	6	40	240		
Testing and commissioning engineer 2	6	40	240		
Testing and commissioning engineer 3	6	40	240		

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Testing and commissioning engineer 4	6	40	240	
Technical Advisor	3	40	120	

### The personnel listed below are required for the life of the Project (35 years).

Operation & Maintenance and Asset Management						
Job Title	Weeks	Hrs/Week	Labour Hours			
Full Time – calculated on yearly basis						
Operation & Maintenance Technician 1	31.2	40	1248			
Operation & Maintenance Technician 2	31.2	40	1248			
Data monitoring	52	40	2080			
Asset Manager -Commercial	52	40	2080			
Asset Manager -Technical	52	40	2080			
Part Time – calculated on yearly basis						
HV Engineer (Part time)	31.2	10	312			
Module cleaning 1 (Part time)	9	30	270			
Module cleaning 1 (Part time)	9	30	270			
Grass cutting 1 (Part time)	3.5	30	105			
Grass cutting 1 (Part time)	3.5	30	105			
Testing Engineer (Part time)	7	30	210			
Technical Audit (Part time)	1	30	30			
Thermal inspection surveyor	3	30	90			