Construction Methodology

This document outlines the construction methodology for the Ongaonga solar farm.

1. Pre Construction Activities

The following activities are generally required to be completed prior to commencement of the construction works:

- Obtaining of all required approvals including resource consent and/or building consent
- Geotechnical testing
- Topography survey
- Pile testing
- Detailed engineering studies, design and drawings

Once these pre-construction activities are complete to the satisfaction of Helios and our investors, Helios will exercise the Option to Lease, and officially enter the lease arrangement, at which point the 35 year term of Lease will commence.

2. Construction Activities

Construction will occur over a period of approximately 12 months generally following the sequence described below. Due to the size of the site construction may be staged across the site.

- Site preparation including removal of existing farm infrastructure and marking out the site. The property is relatively flat and therefore no major earthworks are required to prepare the site for the installation of the solar arrays.
- Erecting the security fence (deer fencing with an approx height of 2m consisting of timber posts and mesh wire)
- Installing CCTV cameras
- Creating the internal access tracks and laydown area
- Driving steel piles into the ground
- Installing mounting frames and solar panels
- Trenching and cable laying for direct current (DC) cables
- Preparing areas for the inverters, switchgear, transformer, substation and battery storage area
- Installation of the housing/ cabinets for the above infrastructure
- Trenching and cable laying for medium voltage alternating current (AC) cables
- Connect all cables and energise the facility

The planting plan will be implemented as part of the construction activities during the planting seasons.

2.1 Earthworks

Given the large component of installation methodology for the solar farm, only a small portion of the construction phase activities will involve earthworks.

Earthworks will be completed in stages to minimise the amount of soil exposed at any one time. All access tracks will be finished in an all-weather metalled surface. A total of approximately 30,072 m^3 of earthworks will be undertaken across an approximate 5.26 ha area. This will be a mix of cut and fill Works required for cable trenching, foundations for components and access track establishment. All material is to be reused on-site Approximately 12,641 m^3 of thermal sand will be imported to the site for trenching purposes.

The estimated total area and volume of earthworks per project component is broken down as follows:

Component	Area of Earthworks
Units	*m2*
DC Cable trenching	7,800
AC Cable Trenching	4,127
HV Cable Trench	0
Inverters	452
Roading	32,764
Substation	6,300
BESS Area	1,200
Total:	**52,644**

Table 1: Estimated earthworks volumes for the Ongaonga Solar Farm

In the event that, during earthworks, an archaeological find is made or koiwi uncovered, work shall stop immediately, the appropriate iwi authority shall be advised and an appropriate course of action shall be determined in accordance with the Heritage New Zealand Pouhere Taonga Act 2014 and the appropriate iwi protocols.

2.1.1 Piling and Trenching

The supports for the solar panels will be installed using driven ground pile methodology, no concrete foundations are required. The piles will be driven into the ground at regular intervals at a depth providing optimal strength, with an expected typical depth of between 2.5- 3.0m. The piles will be galvanized steel with a matte finish.

Trenches will then be excavated for the cabling which connect the solar arrays to the inverters. The DC cable trenches will be approximately 600mm wide and 0.8m deep. The AC cable trenches may be wider at approximately 800mm wide and 1.2m deep. The trenches will be completed in sections and backfilled with thermal sand to minimise the area of earthworks exposed at any one time.

2.1.2 Foundations

The site is flat therefore very minimal earthworks will be required to establish foundations for the inverters, substation and battery storage area. The battery storage area will be finished in gravel and each battery will sit on concrete plinths. Prefabricated inverter and battery units will be installed by crane lift onto the foundations.

2.1.3. Erosion and Sediment Control

The following methods are proposed to manage sediment and erosion control through construction:

- Any exposed earth will be backfilled as soon as practicable
- The trenching will be completed in stages to minimise the area of exposed earth at any one time
- All excavated soils will be kept on site and re-used or backfilled, if any material is unable to be re-used on site it will be transported to an appropriate facility
- Sediment run-off will be managed within the site by the contractor
- The flat topography of the site and relatively free draining nature of the soils mean construction phase stormwater can be managed appropriately onsite by the contractor

2.1.4 Dust Control

Earthworks will be completed in stages to minimise the amount of soil exposed at any one time. All access tracks will be finished in an all-weather metalled surface.

The contractor will deploy appropriate measures to manage any dust within the boundaries of the site. Appropriate measures may include deploying water carts (or alternative dust suppression mechanism).

2.2 Racking and Panel Installation

The solar panels are installed in lines of panels called an ‘array’. Solar panels and associated racking will be transported to site in shipping containers and assembled onsite. There are no earthworks required to install the solar panels.

2.3 Vehicle Crossing and Roading Upgrades

An Integrated Transportation Assessment (ITA) has been undertaken by Gray Matter Ltd. A copy of this report is included in Appendix 8. The ITA outlines the proposed vehicle crossing and roading upgrades, internal accessways, parking, and loading requirements of the activities.

As identified above, the existing site contains a number of existing vehicle crossings and farm gates which provide access to the surrounding roading network, with immediate access to Taylor Road.

It is proposed to utilise existing vehicle crossing access points and upgrade these as necessary to provide access to the solar farm for construction and operational purposes.

Figure 1 below illustrates the location of the access points which will service the solar farm. All access will be from Taylor Road only. Further information is provided in the Transport Assessment prepared by Gray Matter.

Figure1: Vehicle Crossings for the Solar Farm, Source: Gray Matter Transport Assessment dated 24 October 2023

2.4 Internal Accessways and Laydown Area

The primary internal accessways will be 4m wide (both carriageway and access width) and constructed to an all-weather, metalled surface with necessary stormwater control. The primary accessways will provide vehicle access to the inverters located centrally across the site.

All parking and loading areas will be constructed to an all-weather, metalled surface with necessary stormwater control.

A main laydown area will be constructed in the north-eastern corner of the site by the proposed substation. Dust will be controlled via water carts as required.

2.5 Connection to the Waipawa Substation

The solar farm will be connected to the Waipawa substation via a new 110kV overhead transmission line. The construction of new electrical lines and poles are considered a Permitted Activity under Rule 10.4.1(a) of the Operative District Plan and Rule NU-R3 of the Proposed District Plan (Appeals Version).

Helios will work closely with Central Hawkes Bay District Council and other relevant authorities to obtain the required approvals to install the 110kV transmission line. The design of the transmission line will meet the relevant pole design standards which mitigate the risks to road users, through a safety in design methodology.

3. Commissioning Activities

The process of commissioning is the final stage in establishing a solar farm and involves a series of tests to ensure all components including solar panels, inverters, transformers, switchgear and associated systems are installed and functioning correctly. It also involves grid connection testing to ensure the power generated by the solar farm can be safely and effectively integrated into the electricity grid. While there are a number of electrical contractors required on site during this time, there are no prolonged or heavy construction related activities during the commissioning stage.