WHEATBELT SOLAR

376 MW (DC) SOLAR FARM

APPLICATION FOR DEVELOPMENT APPROVAL
SHIRE OF THREE SPRINGS
SUPPORTING REPORT

Proponent

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16 NOVEMBER 2023

EXECUTIVE SUMMARY

INTRODUCTION

Pilot Energy Limited (**the Proponent/Pilot Energy**) proposes to construct a 376 MW (DC) solar farm known as 'Wheatbelt Solar' (**Proposal**), within the Shire of Three Springs (**Shire**). Logie Legal has been engaged by Pilot Energy to assist with the approvals process for the Proposal and has prepared this report to accompany the application, under the *Shire of Three Spring Local Planning Scheme No. 2* (**LPS 2**), for approval to develop the solar farm. As the estimated construction value is above $5 million, the application for development is will be, as at the date of this document, determined by the Regional Joint Development Assessment Panel (**JDAP**), in accordance with the *Planning and Development (Development Assessment Panels) Regulations 2011*.

This report explains the Proposal, describes the existing site and environment and high level matters and potential impacts that may require management in association with the Proposal, including access, stormwater, bushfire, vegetation clearing and infrastructure servicing. It outlines the legislative and policy context governing the proposed development. The structure of the report reflects the requirements set out in the Shire's 'Planning Application Form' and the Department of Planning's 'Responsible Authority Report' template.

A similar proposal on the same site has been previously assessed in detail and approved by the Shire and Mid West Development Assessment Panel. Relevant technical studies which accompanied those decisions have appropriately identified all relevant planning issues. There is no discretion or departure being requested from any applicable State or local planning requirement.

The estimated capital investment value of the project is $440,000,000 and it will create approximately 30-60 construction and technical jobs, and up to 6 FTE ongoing operations and maintenance jobs. A number of these jobs will be sourced locally, and most will be accommodated in the town and Shire of Three Springs during construction.

The life of the solar farm asset is approximately 25 years, after which time the plant is able to continue production at 90% of original capacity. It could be de-commissioned by relatively simple processes and would leave the Land in a condition close to that prior to development.

The Proponent is confident, as demonstrated in this report, that the development would achieve acceptable amenity, health and environmental standards through its proposed siting, design, management and mitigation measures. Moreover, it is considered that the Proposal offers a net benefit to the community and a meaningful contribution to renewable energy production. It would contribute to achieving Western

Australian and Commonwealth emission reduction and renewable energy targets, is strongly aligned with the current State and local strategic framework, and would help meet the demand fro electricity within Western Australia. The Proposal promotes the objects of the *Planning and Development Act 2005* (**PD Act**), including that of ecologically sustainable development, and is consistent with the requirements and objectives of the *Shire of Three Spring Local Planning Scheme No. 2* (**LPS 2**).

THE PROPONENT

Pilot Energy is a junior oil and gas exploration and production company that is pursuing the diversification and transition to the development of carbon management projects, production of hydrogen and clean ammonia for export to emerging APAC Clean Energy markets and integrated renewable energy. Pilot intends to leverage its existing oil and gas operations and infrastructure to cornerstone these developments. Pilot Energy is proposing to develop Australia's first offshore Carbon Capture and Storage (**CCS**) Project through the conversion of the Cliff Head Oil field and associated infrastructure from oil production to CCS as part of the Mid West Clean Energy Project (**MWCEP**).

Pilot Energy holds a 21.25% interest in the Cliff Head Oil field and Cliff Head Infrastructure, and a 100% working interest in WA-481-P exploration permit, located offshore Western Australia.

The Proposal is a key component of Pilot Energy's plan to develop the MWCEP that is targeting, from 2027, the production and sale of 1.2 million tonnes per annum of clean ammonia into international and domestic markets. The MWCEP project is the first of its kind in Australia and plans to combine the region's CO_2 storage resources, existing infrastructure and world class renewable energy to produce and export ammonia. The MWCEP requires renewable energy generation supplied from a combination of wind assets and solar from the Proposal. Electricity from the proposal would be transported via a grid connection infrastructure delivered by the Proponent to the specifications defined by the TSO (Western Power). The Proposal will connect to the MWCEP ammonia production facility approximately 100km west with a private mid-voltage transmission network. The project may also supply energy to external customers. This will follow the current utility easements in place in a relatively direct line west to the coast. The pathway has been identified and it is anticipated there will be a relatively smooth process to finalise the easements. The transmission infrastructure is currently expected to include above and below ground cables.

Pilot Energy is in the process of securing partners and financing to support its business plans to become a leading energy developer and provider of clean energy projects in WA. The estimated capital investment value of the Proposal is $440,000,000.

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PROPOSAL OVERVIEW

The development site (**Land/Site**) is located on the corner of Wilson (Weir) Road and Simpson (Young) Road, in the Shire of Three Springs. It is approximately 330km North-East of Perth and 138km South-East of Geraldton. Figure 4 shows the location of the Land. The Land is currently used for mixed crop and livestock farm. Adjacent land surrounding the development site is predominately rural in nature, containing a number of farm and rural residential properties, as well as agricultural structures, local roads and access tracks. The region's population density is low.

A summary of the key project components is set out in Figure 1 below.

FIGURE 1 SUMMARY OF PROPOSAL COMPONENTS

Solar panel array: • approximately 626'688 solar PV panels on a single axis tracking system mounted on aluminium or steel piles with an installed capacity of up to 376 MW (DC) (**see Annexures H and I**); • covering approximately 530 ha out of 850 ha site.	Approximately 50 PCUs housing inverter, medium voltage transformer and switchgear on hard standings.
Direct current (DC) and alternate current (AC) cabling for electrical reticulation.	Substation transformer and substation transformers.
Operations and Maintenance (O&M) facility area, including two shipping containers for storage and administration.	Security fence and security cameras.
Business identification and safety signage (to be designed to the satisfaction of the Shire).	Local road upgrades to accommodate construction vehicles.
Internal all-weather access roads, track and carpark.	Landscaping.
Tourist area: boardwalk, toilets, interpretative signs.	Removal of some vegetation.

More detailed descriptions of these project components are provided in this report.

PROPOSAL BENEFITS

Numerous sources have identified that the Mid West region has access to abundant energy resources such as solar, wind and geothermal, which also have the potential to reduce carbon emissions. A summary of the benefits of the proposal are set out in Figure 2.

FIGURE 2 SUMMARY OF PROPOSAL BENEFITS

Creates 30-60 full-time equivalent (**FTE**) construction and technical jobs, and up to 6 FTE ongoing operational jobs, some sourced locally and many accommodated in the town of Three Springs.	Helps meet Western Australia's demand for electricity.
Brings custom to local businesses in the town and Shire during the development, construction and operational stages, including: • accommodation; • eateries; • grocery stores; • petrol stations; • tools and equipment; • vehicle service stations; and • transportation.	Contributes to achieving the Australian Government's emission reduction targets, renewable energy targets and *National Hydrogen Strategy* objectives.
Creates a potential tourist attraction in the Shire, with associated benefits, for researchers, environmentalists, and educational groups visiting the solar farm.	Supports the WA strategic framework, including *State Planning Strategy, Climate Policy, Energy Transformation Strategy, Reviewable Hydrogen Strategy, Diversify WA.*
Supports the objects of the *Planning and Development Act 2005* (**PD Act**), including that of ecologically sustainable development.	Supports the objectives of the *Shire of Three Spring Local Planning Scheme No. 2* (**LPS 2**).

POTENTIAL IMPACTS

Given the site's remoteness from the townsite and other sensitive uses, and the nature of a solar farm, there are no significant noise, visual or other amenity impacts. The greatest amenity impacts will be during the temporary construction phase of approximately 12-18 months (of which 5 months will be peak period), relating to noise, increased vehicular movement on local roads and visual impact on local passers-by along Simpson and Wilson Roads. As the majority of the site is already cleared, the Proposal does not require extensive clearing and decommissioning would return the site to its present condition.

Key issues considered in the Proponent's impact assessment stage have been bushfire planning and management, water supply, and road and traffic access and impacts. A summary of the potential impacts is set out in Figure 3.

FIGURE 3 SUMMARY OF PROPOSAL IMPACTS

Visual impact	Negligible; no unreasonable impacts. Not visible from townsite, recreational facilities, or Three Springs-Perenjori Road. Security fence and infrastructure intermittently visible from Simpson, Wilson and Hunt Roads by small number of local road users. View could be considered positive or negative. Visibility via Eastern lot boundary softened by retention of patch of trees on that boundary. Any visual impact consistent with existing amenity, which contains other similar infrastructure along Three Springs Road.
Glare	Negligible; no unreasonable impacts. . "the panel design includes an absorbent surface material, and not glass, which materially reduces glare. Design is upward facing, with an East-West rotation, so there would be no glare to Simpson Road, and minimal if any, glare impacts on passing motorists along Wilson Road.
Traffic	Negligable, no unreasonable impacts. Construction involves delivery of plant and materials over 5-10 months period, using articulated heavy vehicles (19 m semi-trailers) and oversize vehicles. An estimated 1200 truck movements (in and out) and 3000-5000 vehicle movements in total (on some sections). Charter buses and shuttle buses to transport workers. Traffic impacts are manageable due to existing capacity of Great Northern Highway.
Clearing of vegetation	No unreasonable impact. Majority of site is cleared and maintained to suit the existing agricultural activities; Proposal will not require extensive clearing or earthworks, and decommissioning would return the site to its present form and potential. Main tree patches retained. Proposal includes the clearing: • trees along North and South of existing main access road; • scattered York Gum and Wandoo trees in existing paddocks (poor-condition); • trees along access way and fence line (low ecological value) - these will be replaced with newly planted trees; • patch of York Gum/Salmon Gum in the East of the site; A clearing permit, if required, will be sought from DWER. Proposal will be referred to EPA but it is not expected that assessment will be required.
Bushfire	No unreasonable risk; adequately managed by maintaining (a) 20m Asset Protection Zone around development components; and (b) adequate water supply on site for fire-fighting purposes Compliant with *SPP 3.7- Planning in Bushfire Prone Areas* and the Guidelines.
Water	Negligible impact. Sourced from daily water usage allowance, externally supplied water for construction and workforce requirements, and installed tanks for fire-fighting purposes. Existing dams on site used as backup sources only. Development designed around, and to retain, existing water sources so that agricultural use can potentially co-exist with solar farm use. No impact on minor drainage line running from South-East Corner to Western boundary.No impact on minor drainage line running from South-East Corner to Western boundary.
Aboriginal heritage	No registered Aboriginal heritage sites identified.
Noise	Negligible; no unreasonable impacts during operation and maintenance. During construction phase for a duration of approximately 12-18 months. Nearest receiver approximately 1 km away, Predicted noise levels indicate compliance with *Noise Regulations* at all receivers.

The Proponent has considered these potential impacts and proposed appropriate measures to meet development requirements and mitigate adverse outcomes.

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ABBREVIATIONS

BAL	Bushfire Attack Level
DAP/JDAP	Development Assessment Panel/Joint Development Assessment Panel
DAP Regulations	*Planning and Development (Development Assessment Panel) Regulations 2011*
DPLH	Department of Planning Lands and Heritage
DWER	Department of Water and Environmental Regulation
EP Act	*Environmental Protection Act 1986 (WA)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 2000*
ha	hectares
km	kilometres
LPS 2	*Shire of Three Springs Local Planning Scheme No. 2*
m	metres
Noise Regulations	*Environmental Protection (Noise) Regulations 1997 (WA)*
PD Act	*Planning and Development Act 2005 (WA)*
Planning Regulations	*Planning and Development (Local Planning Schemes) Regulations 2015*
Shire	Shire of Three Springs

1. BACKGROUND

This document has been prepared in accordance with the Shire of Three Springs' LPS 2 and the Planning Regulations to support the application for planning consent for the Wheatbelt Solar large-scale solar farm (**Proposal**). The purpose of this document is to:

- describe the existing environment;
- detail the proposed development, including the key components, facilities and activities for construction, operation and decommissioning;
- identify the statutory and policy context governing the Proposal for planning and environmental assessment and approval;
- assess high level matters and potential planning and environmental impacts associated with the works and operation; and
- identify suitable management and mitigation measures to address potential impacts.

The structure and contents of this document support the requirements set out in the Shire's Planning Application Form and the Department of Planning, Lands and Heritage's Assessment Report Guidelines.

2. OUTLINE OF PROPOSAL

2.1 LAND AND LOCALITY

The Proposal is to be located on Lot 1366 on Diagram 5876, a rectangular lot with an area of 850ha, within the Shire of Three Springs. It is approximately 28 km East of Three Springs townsite, 35km West of Perenjori, 330km North-East of Perth and 138km South-East of Geraldton. The location is shown in Figure 4, and is at the corner of Wilson Road (Weir) and Simpson (Young) Road.

The Land is owned by Bestry Farms Pty Ltd, which has entered into an option agreement with the Proponent, that provides the Proponent with a call option over the entry into an agreed contract of sale to transfer the Land to the Proponent. Landowner consent is provided in the accompanying Form of Application for Planning Approval (**Annexure A**) and Development Assessment Panel Notice (**Annexure B**). The Land is subject to two easements, one to the State Energy Commission of WA (now Western Power) and one to Karara Power Pty Ltd, both associated with access to the overhead power lines traversing the Land. These consist of a high voltage power transmission line across the South-Eastern corner of the site (Southwest-Northeast alignment) and power distribution lines in the Southern and Eastern portions of the site. A Main Roads' reserve runs along a section of the Western boundary of the Land.

The Land is accessible from the Southern end of Wilson Road from a network of about 13km of unsealed roads (Broad Road, Hunt Road and Wilson Road) from the Perenjori - Three Springs sealed road. The unsealed roads are in good condition and currently trafficable by light vehicles.

The Land is currently used as a mixed crop and sheep farming and includes a homestead and farm workshop buildings located in the centre of site, accessed by a gravel track. Surrounding land is predominantly rural in nature, containing a number of farm and rural residential properties, as well as agricultural structures, local roads and access tracks. The population density is low. The nearest residences outside the land, as calculated from the proposed substation at the South-Eastern corner of the solar panel array, are approximately:

- North-West - 1.3km
- North-East - 1.28km
- South-West - 1.77km
- South-East - 1.67km

FIGURE 4 LOCALITY MAP

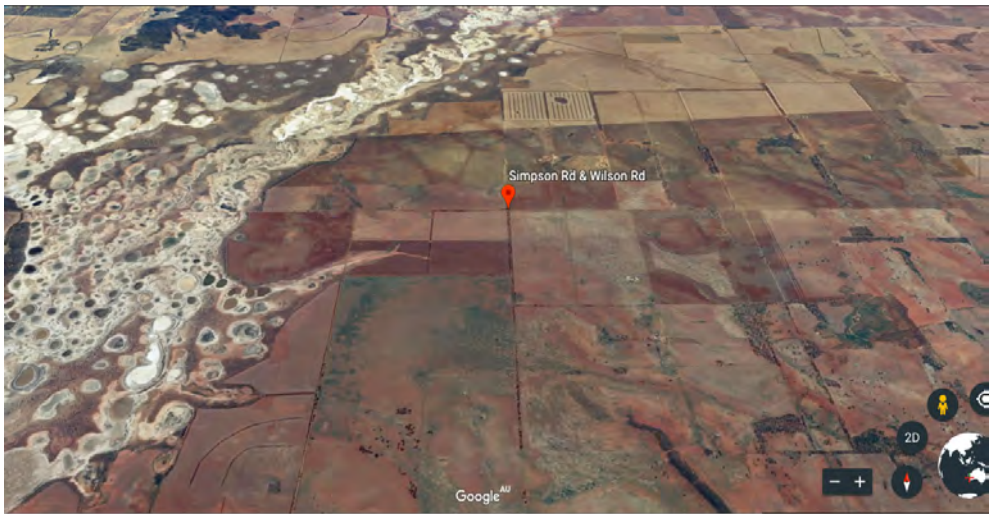


FIGURE 5 GEOTECHNICAL AND GEOLOGICAL CONSULTANTS GRAVEL PIT LOCATION PLAN

2.2 LAND FEATURES

The site is gently undulating with an overall fall from the South-East down to the North-West. The highest point on the site is around 288m AHD in the South-East corner. The lowest point on the site is around 255m AHD near the North-West corner. Geotechnical and Geological Consultants Pty Ltd prepared a Geotechnical Investigation Report in March 2022 (**GGC Report**) (**Annexure E**) which assessed the existing rock, soil and groundwater conditions of the site and access roads, suitability of the site for the Proposal and recommendations for implementation. They also assessed potential borrow material sources, finding two potential sources along Simpson Road.

The GGC Report recommended the following further investigations in order to develop and refine the geotechnical foundation design, and to support the design of other site infrastructure required for the Proposal:

- detailed geotechnical investigations in accordance with AS 1726-1993 “Geotechnical Site Investigations” as required to support detailed design development;
- investigations as required to provide information on existing subgrades for internal road design (within the site) and existing subgrade and pavement conditions for external access roads (leading to the site);
- pile driving trials and pile capacity testing on test piles to confirm the suitability of the pile driving equipment, pile types and assumed preliminary pile design parameters; and
- dynamic pile testing on production piles to verify achieved pile capacities for foundation piles during construction.

These investigations would be commissioned by the Proponent to confirm the detailed design.

Vegetation

The Land is largely cleared with four small remnant patches of degraded native vegetation, mostly on rocky ground, and scattered trees, as shown in Figure 6. Three of the areas of remnant vegetation contain York Gum (*Eucalyptus loxophleba*) and Wandoo (*Eucalyptus wandoo*) and occur in the Eastern side of the site. The trees are quite scattered and many are in poor condition which may have occurred due to fire. Some planting of York Gum seedlings has occurred in the central stand.

The patches of remnant vegetation are not fenced internally and are therefore open to stock grazing. As a result, the understorey is almost completely bare of native vegetation. Some Bluebush (*Maireana* spp.) occurs in these stands.

Several isolated stands of native York Gum and/or Wandoo trees occur around the property. Most of the trees in these stands are in poor condition. A few semi-mature Wandoo trees occur close to the drainage line in the South-West part of the site (Plate 6). While the trees are not all in good health they provide some habitat for native birds.

The access driveway to the farm house and sheds has been planted with Wandoo with the trees ranging in health from healthy to poor. York Gums have been planted on a fence line running Eastwards from the main access gate. The trees are in good health but are quite young, around 4-5m high. Several healthy River Red Gums (*Eucalyptus camaldulensis*), not native to the site, occur near the sheds and around the house.

No Declared Plants (weeds) for the Shire of Three Springs or Perenjori were found within the site. However, one Declared Plant for the Southern Western Australian shires - Common Heliotrope (*Heliotropium europaeum*) - was observed near the head of the small tributary to the drainage line close to the Southern boundary and the power line.

Protected Flora and Fauna

PGV Environmental advised upon survey that the site is highly unlikely to contain any Rare or Priority flora species (**Annexure D**). One Endangered and three Priority species could possibly occur on the granite ridges, however, given the highly degraded nature of the vegetation the likelihood that they occur is very low.

Fauna habitat on the site is restricted mainly to bird habitat, as vegetation is minimal and restricted to York Gum and Wandoo in remnant patches, tall shrublands on outcropping granite ridges and planted trees on the access way and on fence lines.

The site is within the breeding range of Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) which is listed as 'Threatened' under the EPBC Act. Carnaby's Black Cockatoo are known to breed in the hollows of Wandoo and York Gum trees. However, the PGV Environmental report concludes that the trees on the site are mostly too young to form hollows large enough for Carnaby's Black Cockatoos to breed in.

A small flock of Red-tailed Black Cockatoos (*Calyptorhynchus banksii samueli*) was observed in the remnant patch of woodland at the South-Eastern end containing the dam. The subspecies 'samueli' is not listed under State or Commonwealth environmental legislation.

Hydrology

There are a number of small farm dams for stock drinking water. However, no natural wetlands occur on the site.

A drainage line runs through the site entering at the South-East corner and running in a West-North-West direction towards the Western boundary. The drainage line is narrow, with banks of 0.5m - 5m wide. It becomes diffuse towards the centre of the site and fans out into a delta-shaped series of indistinct surface flows at the Western boundary. A tributary to the main drainage line enters the property from the mid-Southern boundary and flows towards the main line about 750m to the North, however the tributary peters out and does not physically connect to the main line by an incised channel.

The drainage lines were dry at the time of a March site inspection by PGV Environmental. The drainage lines do not appear to carry very much water when they flow.

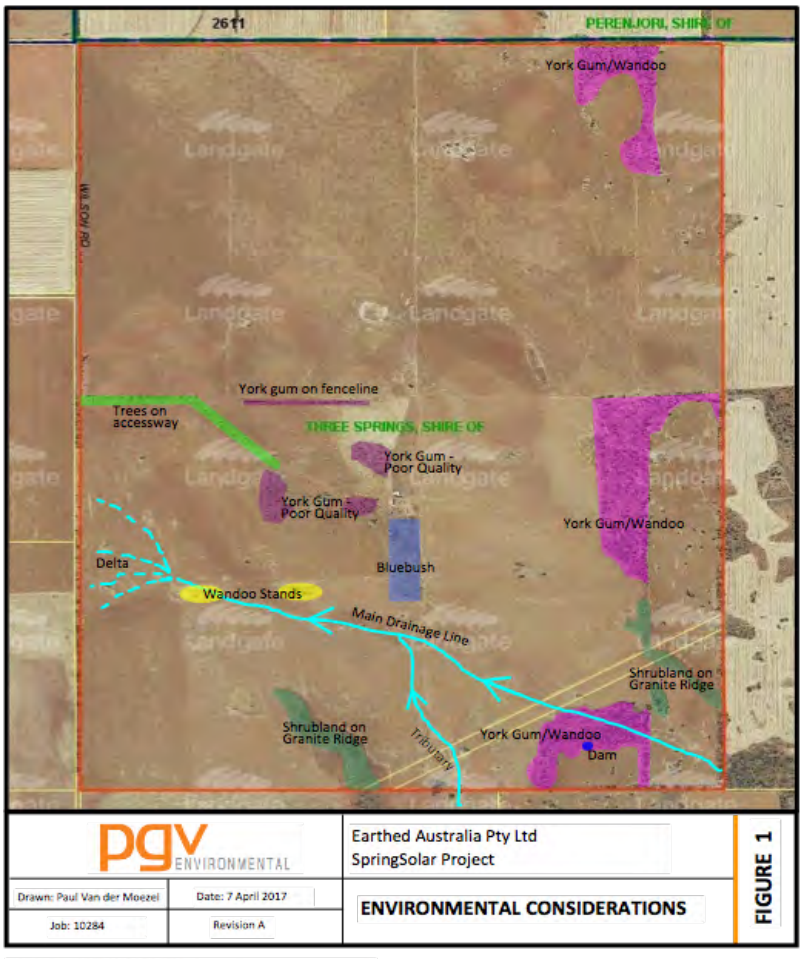
The site is within 2km of the massive chain of salt lakes that extend from further inland to the Yarra Yarra Lakes near Carnamah. No surface soil salinity is evident on the site.

2.3 EXISTING LAND USE

The site is currently, and has for many years, been used for cropping and cattle and sheep grazing.

The main entrance to the Land is from Wilson Road on the West, and the main access driveway runs West-East from that entrance to the existing homestead. The homestead, farm sheds and yards are centrally located on the site. These are proposed to be demolished and those areas covered by solar array.

FIGURE 6 EXISTING LAND USES AND ENVIRONMENTAL FEATURES



Aerial sourced from Landgate

FIGURE 7 EXISTING LAND USE FEATURES (NORTH)

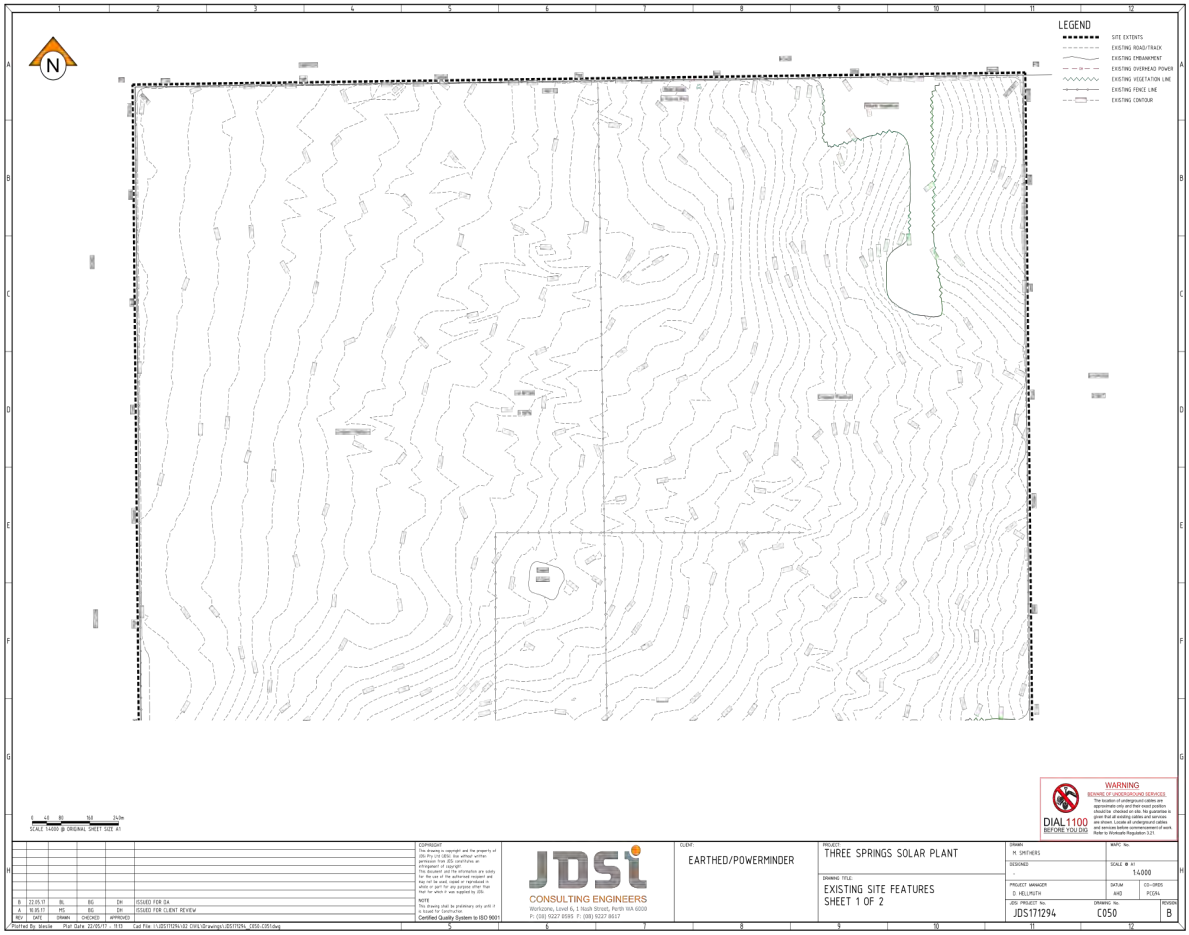
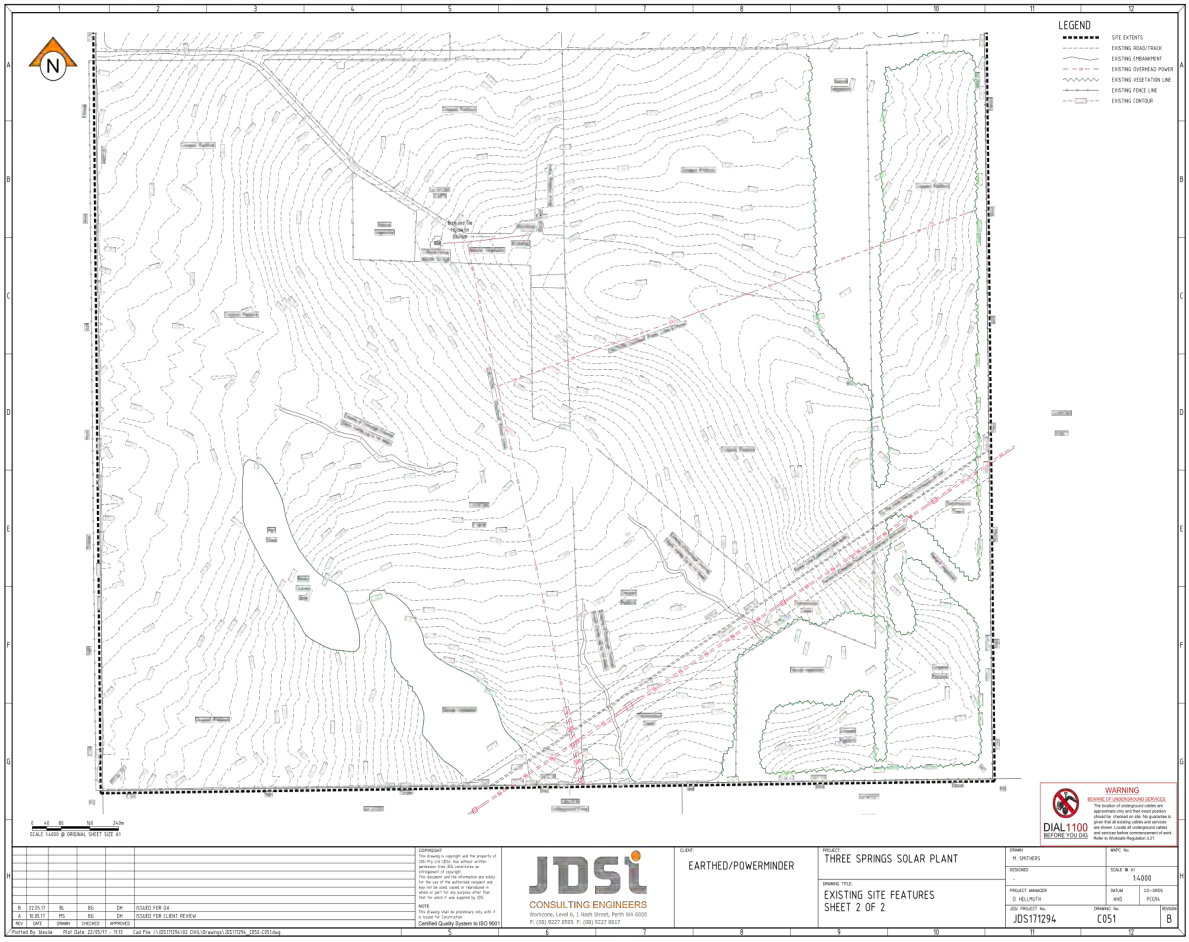


FIGURE 8 EXISTING LAND USE FEATURES (SOUTH)



2.4 PROPOSED DEVELOPMENT

Pilot Energy proposes to construct and operate a solar plant and associated electrical infrastructure with a maximum generating capacity of up to 376 MW, to be known as ‘Wheatbelt Solar’. The key components of the development are summarised in the table in Figure 9. The proposed layout of the development is shown in Figure 10 with individual component layouts in Figures 11 - 13. Component specifications are subject to detailed design and product selection.

FIGURE 9 KEY PROPOSAL COMPONENTS

Component	Description	Construction Activity
Development Summary	The construction and operation of a 376 MW (DC) photovoltaic array, new substation transformer, underground electrical connections, inverters and overhead transmission line (to connect with the existing 350 kV transmission line (or alternatively a purpose built transmission line, not part of this application). The Proposal also includes access roads, carparks, fencing, security cameras, local road upgrades, and a visitor's area. The photovoltaic panel array will cover approximately 530ha of the 850ha site.	As stated.
PV Panels	Approximately 626,688 PV modules arranged in a fixed tilt from horizontal of 25 degree North azimuth. Modules measure 1200mm x 600mm x 6.8mm. Support structures for the PV panels will stand 2-3 m high with steel posts as foundations.	Excavate and install posts (pile driven). Attach support structures to posts, Mount panels on support structure (crane mounted).
Substation	Approximate area of 250m x 100m x 4m. Proposed design consists of 2 x 160MVA from AAB, consisting of a busbar, circuit breakers, current transformers, transformers. Located at the South-East corner of the solar panel array.	Proponent to construct.
Electrical connections, inverters and collection circuits	Electrical cabling connecting the PV modules to the central inverters and transformers. Copper and aluminium interconnection cabling for the collection circuits. An underground transmission line over approximately 300m connecting the solar panels to the new substation at the South-Eastern corner of the panel array, then a 132kw overhead transmission line South connecting to the existing high-voltage connection point.	Install/connect electrical wiring. Trenching, cable laying and backfill. Footings installed for inverters and transformers, mount inverters and transformers on footings. Connect inverters.

Component	Description	Construction Activity
Access tracks and parking	Site Access - a new 6m-wide gravel (or equivalent material) access road entering the site from Wilson Road on the West, would service construction, operational and visitor traffic to the site. To be located a little South of the existing main access road. Solar Panel Roads - internal 6m-wide gravel road encircling the solar panel array, for heavy and light vehicle access; natural turning circle. Compacted earth roads within the solar array, around each block of panels. East-West roads will be for light vehicles only; would not require heavy vehicle turning movements. Substation Road - running from just West of the existing homestead diagonally South-East to the substation. Carparks and letdown areas - Gravel (or equivalent) parking provided for the Tourist Area with signage directing vehicles where to park. This will accommodate light and heavy vehicles. Tracks - light vehicle access tracks required for operations will be on undisturbed ground remaining between panel installations. Local Road Upgrades - upgrades to Simpson Rd, Hunt Rd and/or Broad Rd, as needed. A sealed car park consisting of approximately 50 spaces located in the North-Western corner of the site.	Civil works for construction of access roads, carport and upgrade to local roads.
Fencing and landscaping	Fencing is to be approximately 2 - 3m high, located around the permitted of the solar panel array, and around the substation. Vegetation planted for future screening, to the Shire's satisfaction.	Excavate, form footings (concrete) and construct fence.
Operation and Maintenance Buildings	Two shipping containers would be installed, just inside the entry to the solar array area. These would be utilised for: power plant controller, security camera equipment, electrical board, office furniture, computer and internet connection, kitchen; and toilet.	Transport, delivery and installation of shipping containers.
Tourist area	Picnic and interpretive area, boardwalk and viewing platform, toilet facilities and a carpark.	Various.
Earthworks	Generally limited to road and carpark formation, stormwater cut-off drains, retention basin and building locations including tourist area, storage area and substation site. Some smoothing of occasional steep undulations in areas of the solar panel array area may be needed.	Various.
Stormwater Drainage	Stormwater drainage strategy will be to direct overland flows prior to roadways and away from buildings via cut-off drains. Soakwells systems and / or swales will be utilised for building roof runoff as required.	The cut-off drains will be constructed adjacent to the roads which will direct overland flow into the retention basin at the lowest part of the site. Culverts will be utilised to convey stormwater under roadways where required.

Component	Description	Construction Activity
Decomissioning	The depreciable life of the asset is 25 years, after which time the solar plant would continue to operate with small incremental reductions in capacity for a further 20 years or more, or alternatively replaced by state-of-the-art solar panels.	When eventually decommissioned, the above-ground infrastructure would be removed, with negligible land use impact.
Construction phase	Estimated 12-18 months.	
Jobs	30-60 FTE construction jobs and up to 6 FTE operations and maintenance positions.	
CIV	440,000,000 A$	

FIGURE 10 SITE LAYOUT

2.4.1 SOLAR PANEL ARRAY

Photovoltaic infrastructure on the site will comprise groups of panels located 2-3m above ground with a 10m - 40m setback from the Northern site boundary and 114m setback from the Western boundary. The PV infrastructure will be mounted on a tracking system comprising galvanised steel H-Section piles, of either 120mm x 120mm or 140mm x 140mm, embedded to approximately 4m below ground using a pile driver.

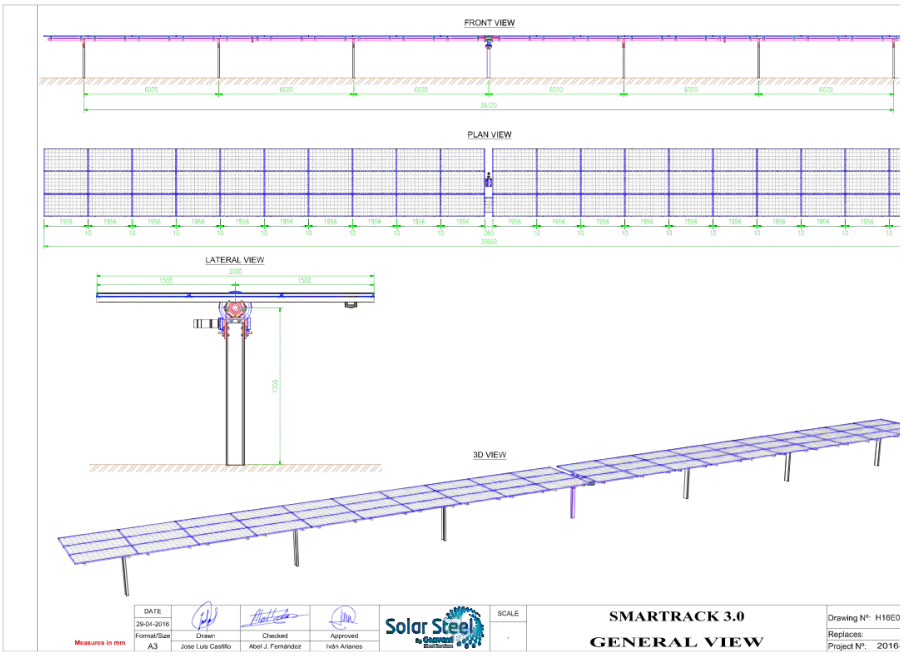
Support structures would be joined to the steel posts and the modules would be fixed to the support structures. The PV modules will face upwards, tilting in an East-West rotation. They can be tilted to 90% if required (for example in a hail storm).

Individual PV modules would be connected in a series. Cables underneath the PV modules would connect to each other to create a string of 32 panels. The different strings would then be connected together in parallel to inverters. The inverters would convert DC output from the PV modules into AC output. The onsite transformer within the solar array would increase the low voltage of the AC output from the inverters to 33kva, and then the power would be transmitted to the proposed onsite substation via a new underground 33kV line of approximately 300m length.

The exact final infrastructure layout is yet to be finalised however, will be contained solely within the Site which includes the access road as well as areas required for stockpiling and materials laydown during construction.

FIGURE 11 EXAMPLES PHOTON ENERGY SOLAR PV PANELS

FIGURE 12 EXAMPLE GROUND-MOUNTING ARRANGEMENT



2.4.2 GRID CONNECTION AND SUBSTATION

The Proponent would build a grid connection to allow the generated electricity to flow onto the grid. The Proponent intends to deliver this infrastructure itself to the specifications defined by the TSO (Western Power). The project will connect to the MWCEP ammonia production facility located approximately 100km west of the project with a private midvoltage network. This will follow the current utility easements in place in a relatively direct line west to the coast. The pathway has been identified and it is anticipated there will be a relatively smooth process to finalise the easements. The transmission infrastructure is currently expected to include above and below ground cables.

The substation is to be located approximately in the centre of the site. This Land was selected in part due to its proximity to existing power lines, in order to most easily and efficiently facilitate the substation process. Relevant approvals will be obtained from Western Power for the substation design and connection or, alternatively, private power supply infrastructure will be constructed. Development of the substation forms part of the development application, however, the electricity connection and supply aspects are outside of the scope of the current application.

FIGURE 13 EXAMPLE SUBSTATION

2.4.3 TRANSMISSION

Western Australia's physical electricity system, the South West Interconnected System (**SWIS**), incorporates over 7,800km of transmission lines and supplies around 18 terawatt hours each year.

The increase in demand for energy in the Mid West is anticipated to be substantial. In addition to energy intensive resource projects such as magnetite processing, new demand is expected to be driven by the development of the 'Mid West Hydrogen Hub' . The State government committed $5.5 million to new planning works and studies for the hub in October 2022. This builds on the $7.5 million commitment for an access road into the Oakajee Strategic Industrial Area and approval by the Industrial Lands Panel for allocation of land in the SIA to six companies for the development of hydrogen-related projects.

To alleviate systems constraints, the State government completed, in 2016, Stage 1 of its Mid West Energy Project, providing a new 330kv transmission line from Three Springs to Neerabup, with the section between Eneabba and Karara mine site already having been constructed by Karara Mining Ltd and operated by Western Power under an agreement. Stage 2, which is proposed to deliver an improved transmission network from Three Springs to Geraldton, is subject to further funding. The Proposal is not reliant on pending stages of the MidWest Clean Energy Project, as it will connect to the existing high voltage transmission line (part of the Eneabba-Karara line) or construct its own transmission line.

As stated in the previous section, while the connection and transmission options are outside the scope of this application, the cable infrastructure, which is unlikely to change notwithstanding which connection options is pursued, does form part of the Proposal.

Two existing power lines pass directly above or nearby the Land;

- 330kv high voltage power line, running from Three Springs Terminal to Karara Mine, transversing the South-Eastern corner of the Land;
- 132kv power line runs from a different, smaller Three Springs 132kva terminal to Karara Mine, merging with the 330kv high voltage power line just North-East of the two terminals, and about 15km from the Land.

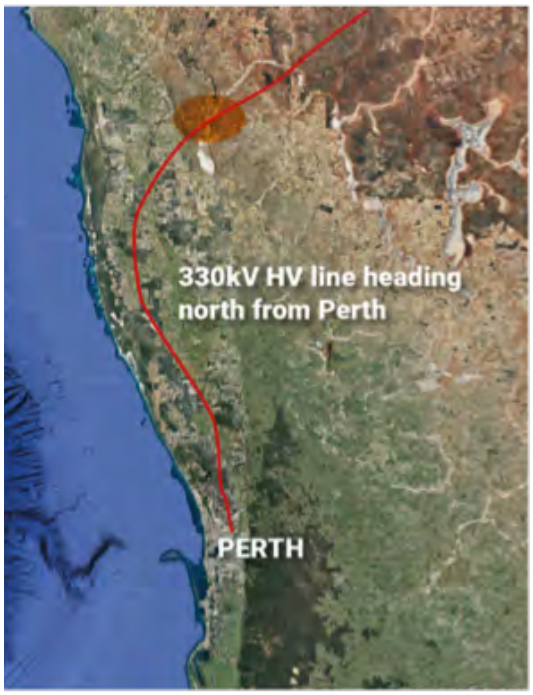
The proposed solar farm would most likely connect to the SWIS via the existing power lines. Cabling will be required to connect the solar panels to the existing power line. These comprise:

- a low-voltage underground transmission line from the solar panel array to the new substation; and
- a 132kV overhead transmission line from the new substation South to the existing high voltage power line.

The new transmission lines would utilise the standard low-voltage procedure. All underground cabling would be installed in trenches with a sand bed placed under the cabling contained in a nylon jacket for termite protection. Once the cables are installed, the cables would be covered by a layer of sand and the trench backfilled with existing fill. Cables would be mechanically protected in accordance with *AS 3000:2016 Electrical Installations.*

A cleared footprint of 100mx100m under the high voltage line in the South-East of the Land may be required if circuit breakers are required. This has been provided for in the enclosed plans.

FIGURE 14 SOUTH-WEST INTERCONNECTED SYSTEM (SECTION)



2.4.4 TOURIST AREA

A Tourist/Interpretation Area would be created, not far inside the main entry. A boardwalk would be constructed running parallel to, and set back from, the East-West solar panel perimeter fence for about 50m in length. In addition to the boardwalk, the area would contain a picnic area, children's nature playground, toilets and carpark. A preliminary architectural design being considered by the Proponent is shown in Figure 16 as an example.

FIGURE 15 TOURIST AREA LAYOUT

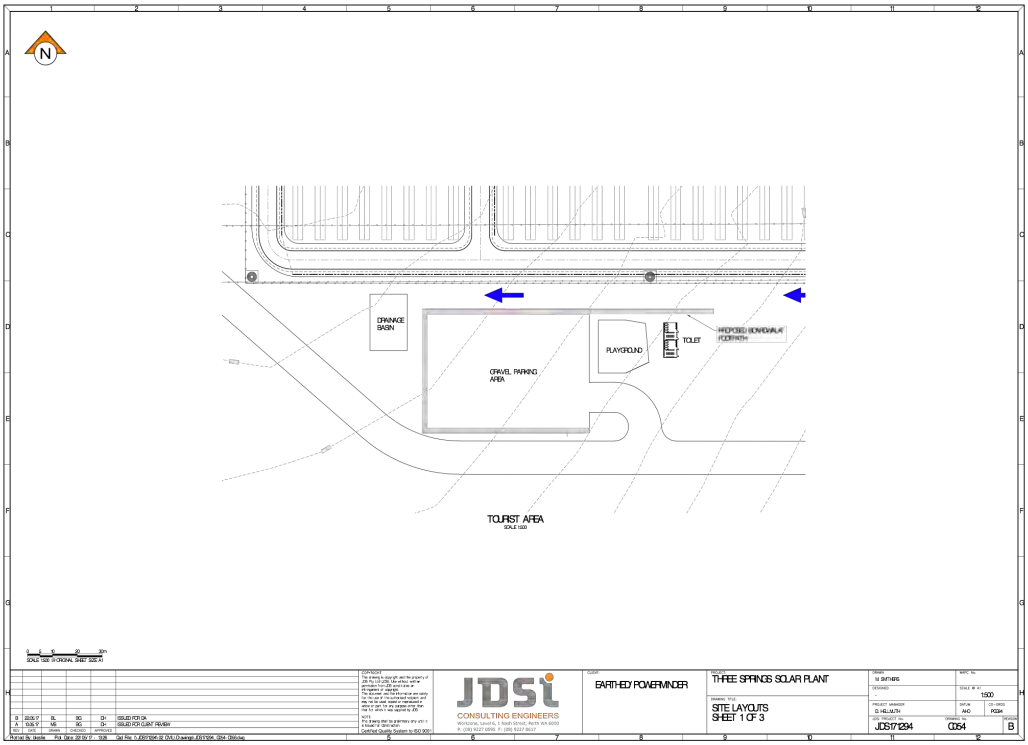
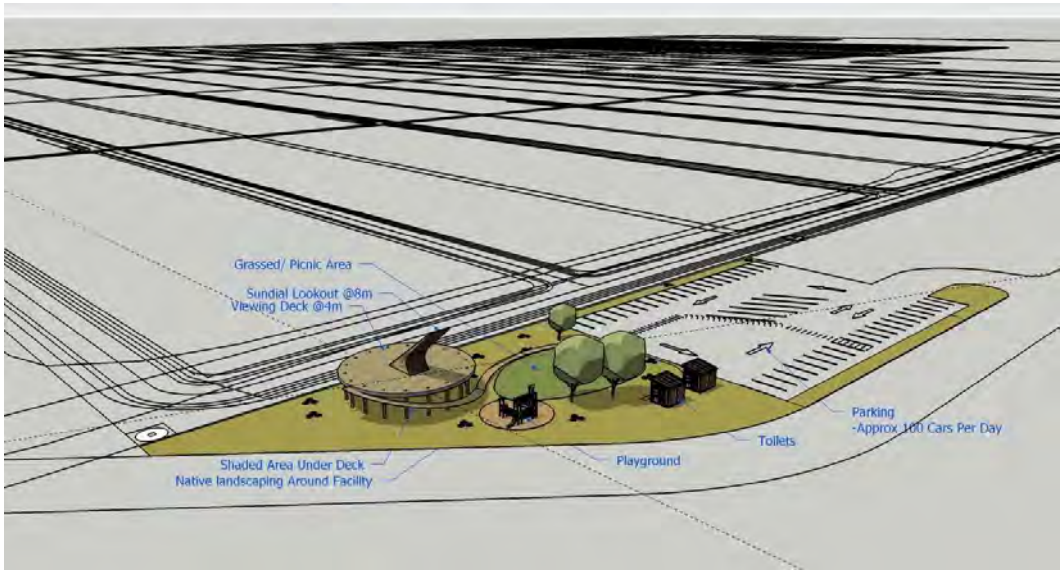


FIGURE 16 EXAMPLE TOURIST AREA, ARCHITECTURAL DESIGN



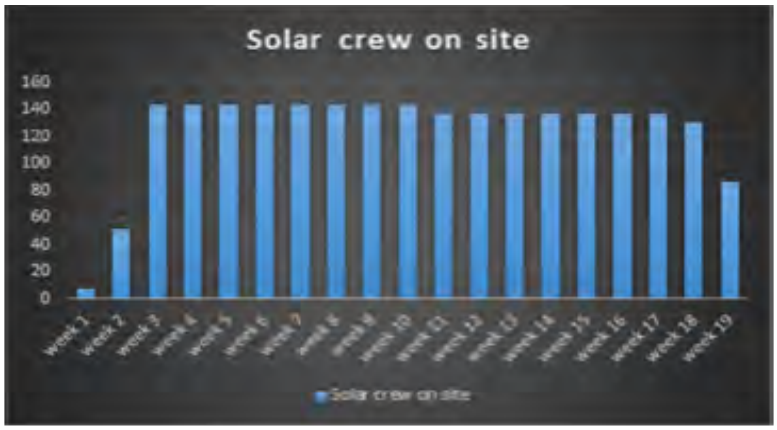
In addition to the onsite Tourist Area, and in response to consultation with Shire councillors in relation to a previous similar proposal, the Proponent proposes to install an interpretive sign in town, informing locals and tourists about the solar farm and operations. The location and design of the sign will be finalised in consultation with the Shire. A good example of tourist signage, interpretative and website information is that hosted by the Alice Springs Desert Knowledge Solar Centre: http://dkasolarcentre.com.au/locations/alice-springs. Some examples of the types of interpretative signs being considered by the Proponent follow in Figure 17.

FIGURE 17 EXAMPLES TOURIST SIGNAGE

2.4.5 WORKFORCE ACCOMMODATION

The construction phase would generate a requirement for accommodation of 30-60 personnel, varying with workforce requirements across 12-18 months, with the majority of those being during a 5-month peak period. The largest workforce component would be the solar crew, during the first 5 months of the construction phase. In addition to the solar crew, there will be a smaller civil crew for the substation, which will overlap with the solar crew for 2-3 weeks, as well as a cook, a medic and security.

FIGURE 18 SOLAR CREW WORKFORCE (ACCOMMODATED IN TOWN)



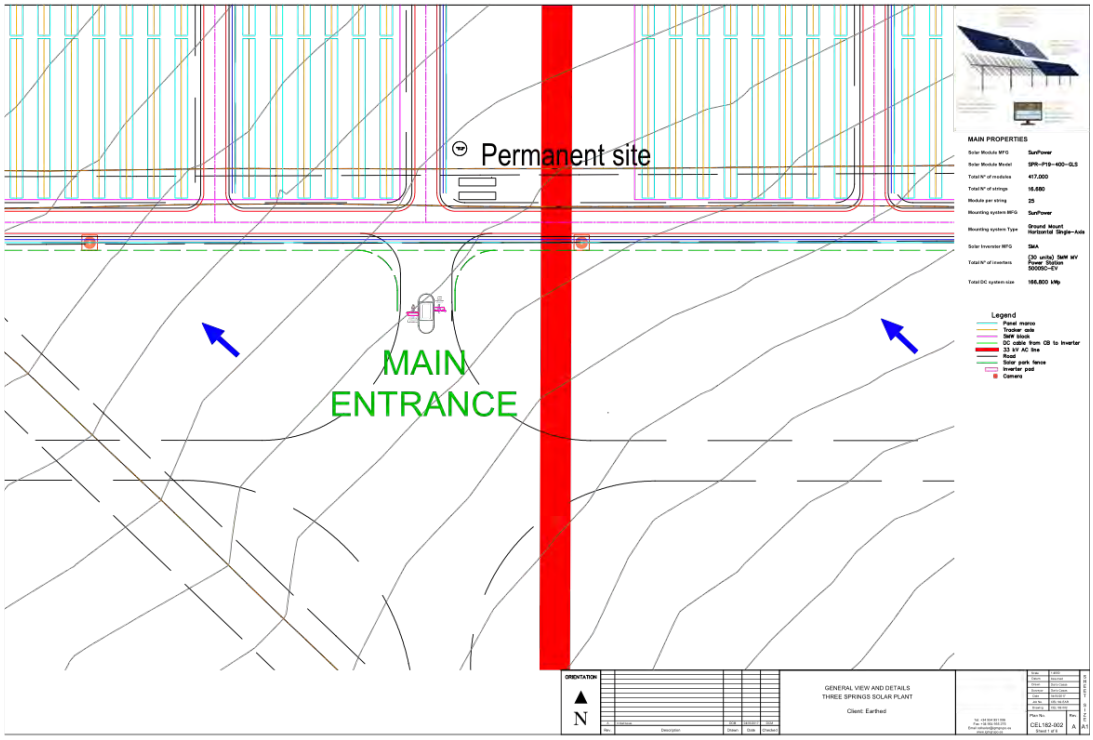
Accommodation would be sourced from (a) local rooms, chiefly the Commercial Hotel, which has a capacity of 80 rooms and/or (b) construction of temporary or permanent accommodation within the townsite, in consultation with the Shire. No onsite workers' accommodation is proposed.

2.4.6 SHIPPING CONTAINERS

Two permanent shipping containers are proposed to be installed inside the solar panel array area, just inside the entry to the solar panel array. These would be used to house:

- power plant controller;
- security camera equipment;
- electrical board;
- office furniture;
- computer and internet connection;
- kitchen; and
- toilet.

FIGURE 19 SHIPPING CONTAINER ROOMS



2.4.7 ROADS AND ACCESS

The roads and parking will be constructed from locally sourced gravel or equivalent material and compaction of the existing ground. Sealing of the road may be considered in specific locations to minimise the generation of dust which may impact the solar panels.

Main Access Road and Substation Road

The main site access road would utilise the existing main entrance of Wilson Road, and run South-East for about 50m before heading directly East until an intersection level with the existing homestead. This road would run a little South of, and parallel to, the existing driveway between the site entrance and homestead. The trees along the existing driveway would need to be cleared for the solar panel array.

From the central intersection, the road would provide access (continuing East) to the substation and the Eastern solar PV array, (heading North) around the perimeter of the Northern PV array, and (heading South) through and around the Southern PV array. This strategy minimises the road required, follows the natural drainage path, and separates three solar blocks.

Solar Panel Road(s)

A gravel road would encircle each solar panel array, for heavy and light vehicle access and provide a natural turning circle. Within the solar array, compacted earth roads around each block of panels would provide light vehicle access for maintenance; these would not require heavy vehicle turning movements.

Parking

Parking would be provided for the Tourist Area with signage directing vehicles where to park. This carpark would accommodate light vehicles and tourist buses. Prior to COD, during construction, this could also be used for overflow parking of other vehicles as needed.

External Road Upgrades

The Proposal is likely to require upgrades surrounding roads to accommodate delivery of components from port. Upgrades would be needed to sections of Broad Road, Hunt Road, and a small section of Weir (Wilson) Road. In addition, where this route intersects with the Perenjori-Three Springs Road and Bateman Road, those intersections will need upgrading. These upgrades would be undertaken by the Proponent, in consultation with the Shire.

FIGURE 20 ROADS AND FENCE LAYOUT

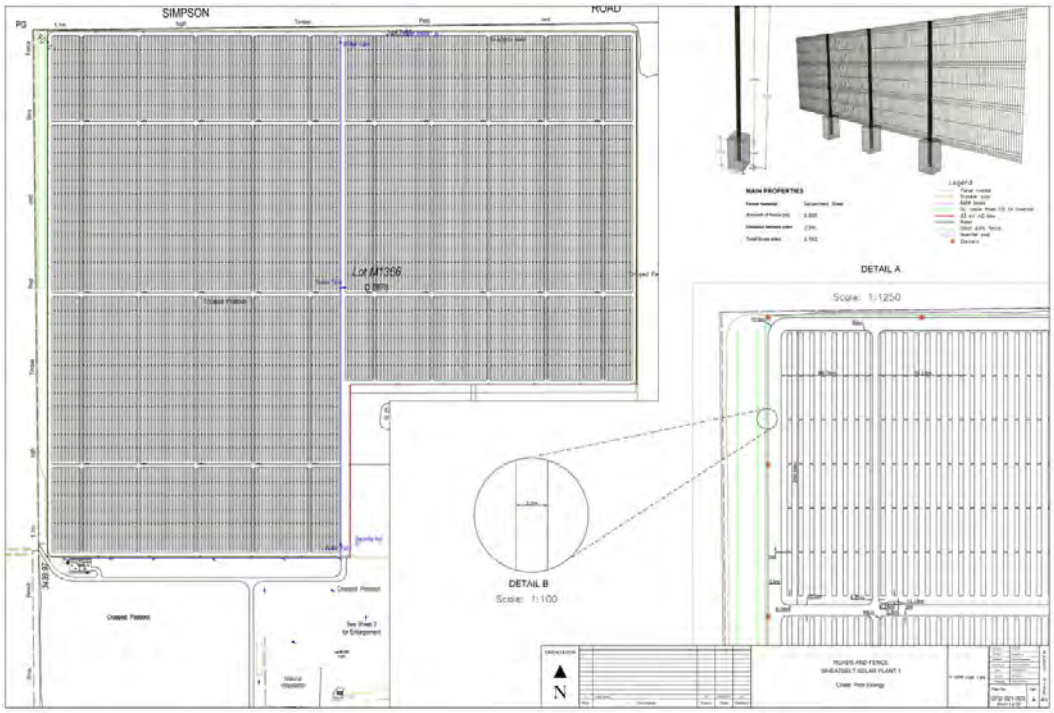


FIGURE 21 TRUCK PATH

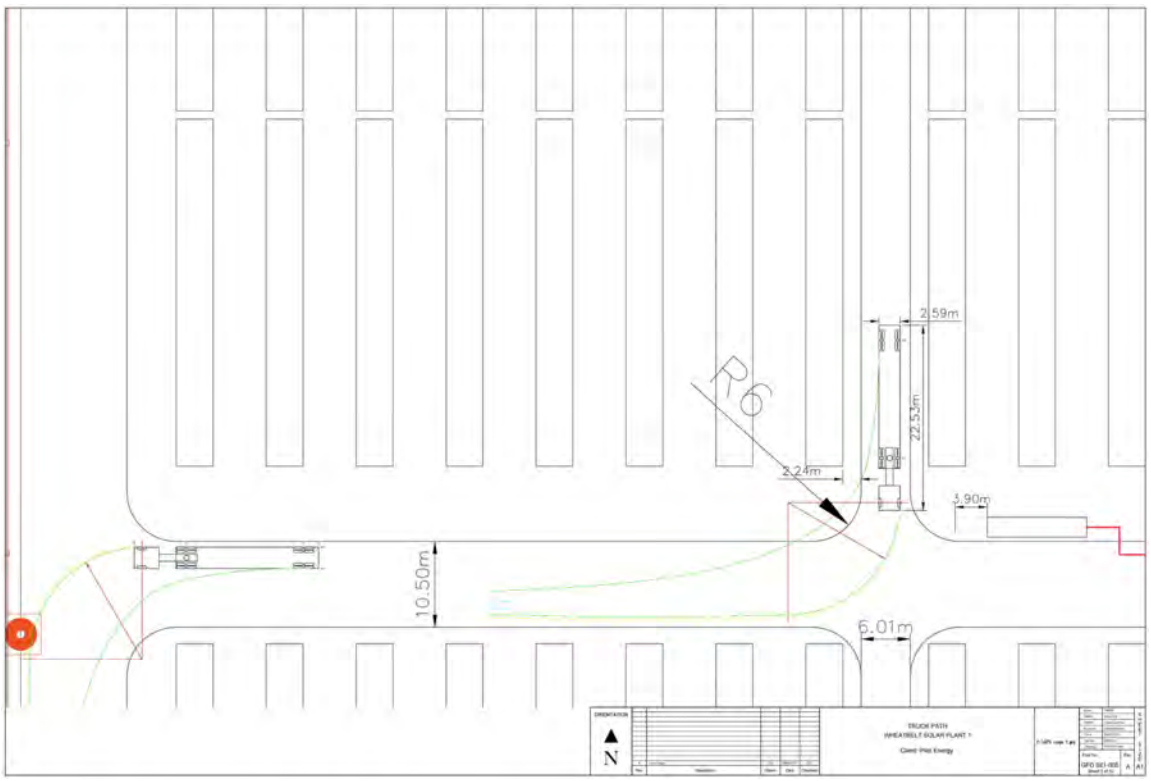


FIGURE 22 ROADS CIVIL DESIGN

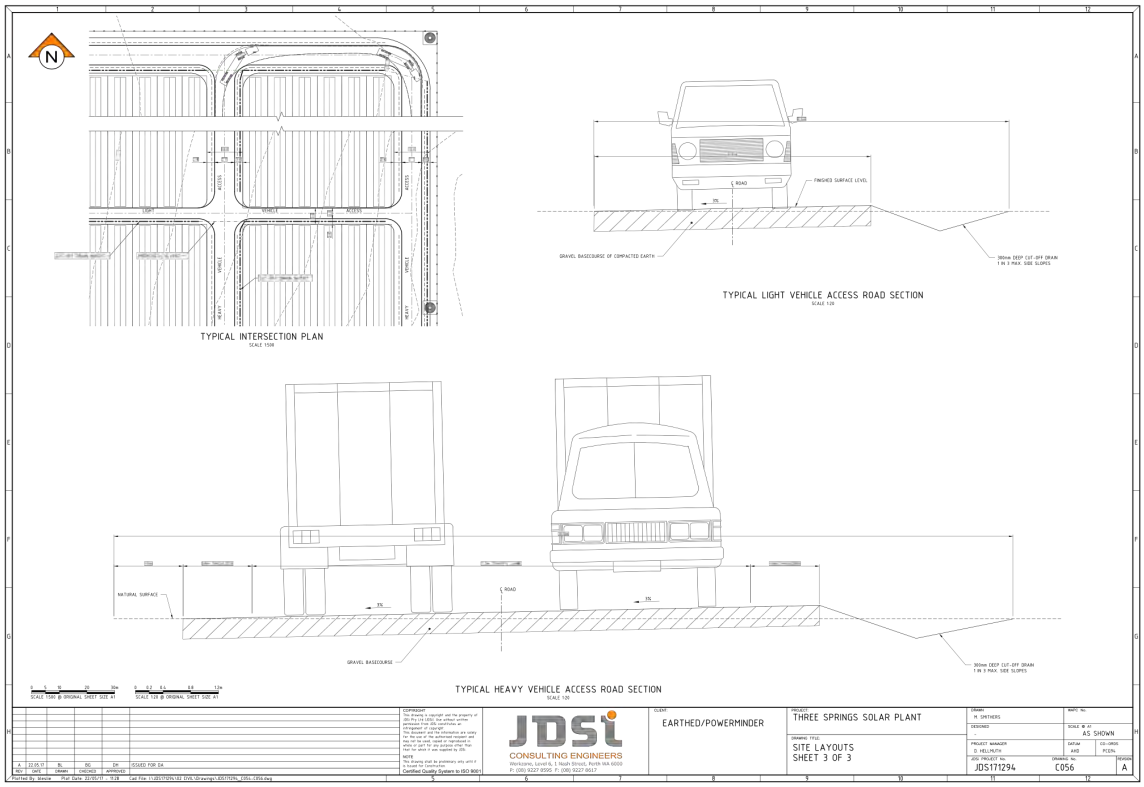


FIGURE 23 LOCAL ROAD UPGRADE PLAN

FIGURE 24 VIEW FROM MAIN GATE

Inside Main Gate Looking South (note Main Roads Easement inside property):

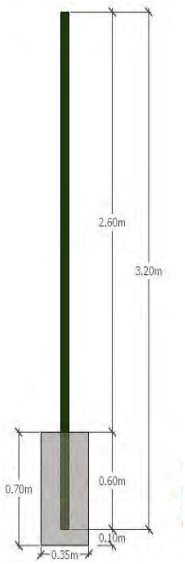
Inside Main Gate Looking North (note the Southern end of the section of trees inside property):

2.4.8 FENCES AND SECURITY

As valuable equipment and operations will be brought onto and remain on site, together with potential construction hazards, security measures will be utilised to ensure safety and security on the site.

A single continuous 2-3m-high wire mesh fence is proposed around the permitter of the solar panel array and substation. Drones and cameras will be utilised, and there will be security presence on-site 24 hours/ day, during both construction and operations. Signage will be placed on the fencing alerting people to the presence of electrical infrastructure and potential dangers.

FIGURE 25 EXAMPLE SECURITY FENCING



2.4.9 EARTHWORKS

The site is relatively flat with slopes generally less than 3%. The earthworks will generally be limited to road and carpark formation, stormwater cut-off drains, retention basin and building locations including tourist area, storage area and substation site. Significant earthworks are not expected to be required for the solar panel array, as undulations in the land are not problematic for those structures. There may be some minor smoothing of occasional steep undulations within the solar array. The intent of the earthworks will be to minimise the impact to the existing topography and vegetation whilst also achieving a cut to fill balance within the site.

2.4.10 WASTEWATER AND STORMWATER

Wastewater generated by the proposal includes worker amenities required during construction only and stormwater runoff.

Ancillary worker facilities including toilets and kitchen area would be provided during construction. Wastewater would be stored onsite in aboveground tanks that would be periodically emptied and disposed of at an appropriately licensed facility.

The stormwater drainage strategy will be to direct overland flows prior to roadways and away from buildings via cut-off drains. The cut-off drains will be constructed adjacent to the roads which will direct overland flow into the retention basin downstream of development areas and the lowest part of the site. Culverts will be utilised to convey stormwater under roadways where required. Soakwells systems and/or swales will be utilised for building roof runoff as required.

Water from the existing developed area and immediately West of that area flows towards the main entrance. The existing central road acts as a water run-off course. This course will be retained and refined, with water

channelled towards the proposed Tourist Area where a natural drainage area will support local vegetation combined and wildflowers.

The drainage line further South is understood at times to reach a 2.5m depth. This would be maintained and channelled towards the entrance in support of planted wildflowers or trees immediately South of the entrance and entrance road.

2.4.11 WATER SUPPLY

The Proposal is estimated to require the following water supplies:

Construction Phase

- construction (mainly dust suppression) - variable daily requirement of 2,000 - 10,000L.

Operation and maintenance

- solar panel cleaning - 50,000L per clean, 2-3 times per year; allow 150,000L per year;
- tourist area toilets - 400,000L per year;
- general maintenance - additional maximum 100,000L per year.

Fire-fighting

- ongoing high pressure supply available for bushfire response, of 2bar, 3,000L/20minutes;

It is proposed to fulfil the above requirements from a combination of the following solutions:

- existing daily supply of 2.3L/minute, which provides allowance of 1.2 millionL per year;
- external supply and delivery of water for construction requirements;
- installed tanks with combined capacity of 250,000L, as dedicated fire-fighting supply, with hydrant and pressure of 2bar (3000L/minute), to be kept supplied by external water supply and stored daily allowance.

The Proponent has identified a number of options for external water supply. These include:

- a standpipe 15 km from the Land on Morowa Road, halfway between Perenjori and Morawa. The Proponent intends to seek permission from the Shire of Morawa to utilise and to purchase water for construction purposes;
- a privately owned water source of 50 million litres, located 50km from property, which the Proponent has confirmed would be available for purchase; and

- supply delivered from Perth.

Water resources and supply are discussed further below under Part 5.

2.4.12 POWER SUPPLY

There is an existing 10kva, single-phase transformer on the Land. The Proponent intends to apply to Western Power to upgrade to a 150kva transformer with three phase power on site. If this option is not feasible, generators could potentially be rented or purchased in order to supply power during the construction phase.

Once the construction phase is complete and the project is operational, the solar farm will utilise either mains power or power from its own operation for any maintenance requirements.

3. DEVELOPMENT BENEFITS & JUSTIFICATION

While justification of the Proposal is not required in Western Australia for a development application or approval, it is noted that there are considerable commercial, strategic and climate-related benefits associated with the project. The proposed development is strongly supported by Federal, State and local strategic and policy frameworks, (outlined in the next section) and would provide the following benefits:

- produce renewable energy that does not produce greenhouse gases;
- provide a significant contribution to Western Australia's move towards green energy and target of net zero by 2050;
- develop the solar power industry and supply chain in Australia;
- develop Australian intellectual property and know-how in solar power;
- assist with Australia's commitments under national and international agreements;
- generate local economic benefits by generating jobs (approximately 30-60 temporary FTE jobs during the construction period and up to 6 FTE permanent maintenance jobs during operation), encouraging regional development and maximising the use of local contractors and equipment hire; and utilising some general supplies; and
- source construction materials and supplies locally through liaison with local industry representatives.

The Wheatbelt Solar farm would contribute to meeting the energy requirements and strategic objectives of government, as well as having benefits for the local industry, community and environment.

4. STRATEGIC AND REGULATORY FRAMEWORK

This section addresses the framework of policy, strategy and legislation applicable to the Proposal.

The Australian and Western Australian governments have both developed emission reduction targets and strategies to meet those targets, fulfil Australia's international commitments, and provide reliable energy to the public. The Commonwealth regulatory framework includes the safeguard mechanism, the mandatory renewable energy target, renewable energy certificates and the *National Hydrogen Strategy*. The Western Australian government has set an aspirational target of zero emissions by 2050 and a number of organisations, such as Infrastructure WA, are calling for that to be strengthened to a firm commitment. A raft of strategic documents now support the accelerated development of renewable energy, clean hydrogen and carbon capture utilisation and storage (**CCUS**).

Relevant State and local policy and legal documents are set out below.

4.1 STATE PLANNING STRATEGY 2050

This strategy provides a set of state planning principles, strategic goals and objectives. A key 'Energy Objective' is to:

> *Enable secure, reliable, competitive and clean energy that meets the State's growing demand.*

Part 2 of the strategy contains a vision statement for the Mid West Region as follows:

> *In the next three decades the Mid West region will continue to diversify its economic base in the areas in agriculture, minerals development, downstream processing of commodities and tourism. Geraldton will continue development as the largest regional centre north of Perth, offering a wide range of facilities and attractions.*

The Proposal corresponds with these objectives for clean energy production and diversification of the Mid West economy.

4.2 WESTERN AUSTRALIAN CLIMATE POLICY 2020

The Climate Policy was introduced to manage the State's aspiration of 'net zero by 2050'. The policy provides for new proposals undergoing environmental impact assessment to set interim and long-term emission reduction targets consistent with the State's net zero aspiration,. The proposed solar farm does not create emissions or require emission reductions. It does, however, contribute to the following outcomes specified in the Climate Policy:

- new jobs in clean industries in Western Australia;
- greater adoption of low-carbon technologies in the resource and primary industry sectors;

- global decarbonisation through export of renewable energy and reduced supply chain emissions; and
- enhanced economic diversification and resilience.

The policy incorporates, and is supported by, a number of other related strategies, including: *Renewable Hydrogen Strategy 2019, Future Battery Industry Strategy 2019, Greenhouse Gas Emissions Policy for Major Projects 2019, Distributed Energy Resources Roadmap 2020, Clean Energy Future Fund 2020, Renewable Energy Investment 2020 ($44.5m in the renewable energy infrastructure in the North-West), Energy Transformation Strategy 2019-2021, Carbon Farming for Pastoralists 2019, Carbon for Conservation 2020, Investment in Renewable Hydrogen 2020 ($22m), and Electric vehicle Strategy 2019.*

The Proposal supports key objectives and actions of this package of strategies that was developed in 2019-2020.

4.3 LEADING WESTERN AUSTRALIA'S BRIGHTER ENERGY FUTURE: ENERGY TRANSFORMATION STRATEGY STATE 2: 2021-2025

The *Energy Transformation Strategy Stage 2* focuses, amongst other things, on integrating new technology into the power system, supported by the following statements in the strategy:

> *Supporting local renewable energy suppliers to assist the mining sector's transition to lower-emissions energy, and planning for the SWIS to transition to a more 'modular' grid over the long term, including SPS [stand along power systems] and microgrids.*
>
> *Work with local manufactures and mining industry to increase uptake in locally-supplied renewable energy.*
>
> *Identify new technology and supply arrangements, evaluate accelerating AMI roll out.*
>
> *Remove barriers to access and investment.*

4.4 RENEWABLE HYDROGEN STRATEGY 2021

The Renewable Hydrogen Strategy forecasts that the value of Australia's potential low-emission hydrogen exports could reach $2.2 billion by 2030 and $5.7 billion by 2040. The Oakajee Strategic Industrial Area is being developed with infrastructure to support its potential as a world-class multi-product renewable hydrogen precinct.

A key attribute of Western Australia, in addition to its natural renewable energy resources, is the availability of land (such as the proposed Site) and existing infrastructure:

> *With an area of 2.5 million km2 (one third of the Australian continent), low intensity land use combined with low population density, Western Australia is well placed to develop large-scale renewable energy generation.*

> *Western Australia has world-class industrial and export infrastructure that can accommodate the development of the hydrogen industry.*

The strategy states that:

> *The Western Australian Government will ensure all relevant State Government agencies support the renewable hydrogen vision to assist proponents in seeking approvals and permits.*

These commitments support approval of the Proposal.

4.5 FUTURE STATE: ACCELERATING DIVERSIFY WA 2023

This strategy builds on the *Diversify WA 2020* strategy, updating the State government's priority sectors for development in the post-Covid economy. The Proposal, with its positioning within Pilot Energy's MWCEP, falls clearly within the targeted sectors of:

- renewable hydrogen - produce and scale; and
- carbon capture utilisation and storage technology - develop and commercialise.

It also supports the cross-sector enablers for acceleration by providing (amongst others):

- key infrastructure and project ready-land; and
- skilled and productive workforce.

4.6 WAPC POSITION STATEMENT: RENEWABLE ENERGY FACILITIES 2021

The position statement outlines the WAPC requirements to support the consistent consideration and provision of renewable energy within Western Australia. The key objectives of this position statement are:

- guide the establishment of renewable energy facilities to support the State *Energy Transformation Strategy*;
- outline key planning and environmental considerations for the location, siting and design of renewable energy facilities;
- promote the consistent consideration and assessment of renewable energy facilities;
- facilitate appropriate development of renewable energy facilities, while minimising any impact on the environmental, natural landscape and urban areas;
- encourage informed public engagement early in the renewable energy planning processes.

The proposal fulfils, and aligns with, these objectives.

4.7 MID WEST REGIONAL PLANNING AND INFRASTRUCTURE FRAMEWORK 2015

This Framework identified the primary challenge for the North Midlands as being 'to retain and grow its population share, whilst both servicing and benefiting from the economic growth that is expected to be generated from nearby iron ore projects'. Whilst now eight years old, the Framework still reflects relevant economic and employment challenges and opportunities:

> *Increasing power transmission capability for the Mid West region including support for energy production and supply.*
>
> *The increase in demand for energy in the Mid West is anticipated to be substantial. This is expected to be driven largely by proposed resource projects, particularly those involving energy intensive magnetite processing.*
>
> *The further development of energy technologies and innovative solutions to natural resource management also present additional opportunities.*
>
> *The Mid West region has access to abundant energy resources such as solar, wind and geothermal, which also have the benefit of potentially reducing carbon emissions.*

4.8 SHIRE OF THREE SPRINGS STRATEGIC COMMUNITY PLAN 2018-2028

The Strategic Community Plan identifies tourism, energy and light industry as drivers for the Three Springs economy over the relevant decade. The Proposal is aligned with this plan.

4.9 SHIRE OF THREE SPRINGS CORPORATE BUSINESS PLAN 2020-2024

The Corporate Business Plan provides the following relevant strategies and actions, supporting approval of the Proposal:

- promote existing and new industry opportunities to increase employment;
- enable suitable land availability for commercial/industrial development;
- support sustainable farming and other industry development;
- support the provision of power, water and gas services in to the region;
- leverage opportunities in regards to substation;
- investigate and develop the long-term use of the Three Springs Mining Camp;
- develop natural resource projects; and
- provide and maintain good quality tourism infrastructure and facilities.

4.10 GOVERNING LEGISLATION

The following legislation governs the planning and environmental assessment of the Proposal:

- *Planning and Development Act 2005* (**PD Act**);
- *Planning and Development (Development Assessment Panels) Regulations 2011* (**DAP Regulations**);
- *Planning and Development (Local Planning Schemes) Regulations 2015* (**Planning Regulations**);
- *State Planning Policy 3.7 - Planning in Bushfire Prone Areas;*
- *Shire of Three Springs Local Planning Scheme No.2* (**LPS 2**);
- *Environmental Protection Act 1986* (**EP Act**);
- *Environmental Protection (Clearing of Native Vegetation) Regulations 2012*; (**Clearing Regulations**)
- *Biodiversity Conservation Act 2016;*
- *Aboriginal Cultural Heritage Act 2021* (**ACH Act**); and
- *Environmental Protection and Biodiversity Conservation Act 1999 (Cth)* (**EPBC Act**).

Requirements of, and compliance with, the above legislation are considered in relevant parts throughout this application.

4.11 PERMISSIBILITY AND APPROVALS PATHWAY

The application for development approval, although lodged with, advertised and assessed by the Shire, will be finally determined by the Regional Joint Development Assessment Panel (**JDAP**), as the capital value of the proposal is greater than $5 million.

LPS 2 provides a zoning table, which sets out the permissible uses within each zone identified on the scheme map. The use definitions are contained (partly) in LPS 2 and (partly) in the Model Scheme Text, in the Planning Regulations.

The development site is located within the ‘Rural Zone’. The objective of the zone is:

> *To provide for the sustainable use of land for the agricultural industry and other uses complimentary (sic) to sustainable agricultural practices, which are compatible with the capability of the land and retain the rural character and amenity of the locality.*

With the gazettal of LPS 2 on 27 January 2017, a new use classification of 'Renewable Energy Facility' was introduced into the Zoning Table, and defined as follows:

> ***renewable energy facility*** *means premises used to generate energy from a renewable energy source and includes any building or other structure used in, or in connection with, the generation of energy by a renewable resource. It does not include solar panels or a wind turbine located on a lot with a single house where the energy produced only supplies that house or private rural use or anemometers.*

The Proposal falls within the above definition and use classification. Notably, the components of the development, such as the substation, and shipping containers, fall within 'any building or other structure used in, or in connection with, the generation of energy by a renewable resource'.

This use is identified as an 'A' use in the 'Rural Zone', which means that it is not permitted unless the JDAP (in this case) has exercised its discretion by granting development approval after notice has been given in accordance with clause 64 of the Deemed Provisions of the Planning Regulations. A minimum advertising period of 14 days is required by those provisions.

The Proposal includes a Tourist Area comprising of an interpretive display, a 50m boardwalk with viewing platform, a picnic area, toilet block and carpark. No tourist accommodation is proposed. LPS 2 defines 'tourist development' as follows:

> ***tourist development*** *means a building, or a group of buildings forming a complex, other than a bed and breakfast, a caravan park or holiday accommodation, used to provide —*
>
> *(a) short-term accommodation for guests; and*
>
> *(b) onsite facilities for the use of guests; and*
>
> *(c) facilities for the management of the development;*

Clause 32, Table 7 of LPS 2 also permits incidental tourist uses within the 'Rural Zone', as follows:

> *Within the Rural or Rural Smallholdings zones, the local government may allow a range of accommodation and other tourist related uses subject to the zoning table, provided these are incidental to the rural use of the land and impacts associated with the tourist use are contained on-site.*

The proposed Tourist Area would fall within the incidental tourism-related uses referred to in Table 7.

All components of the development are therefore permissible within the existing zoning, and consistent with the objective of the zone.

4.12 DEVELOPMENT STANDARDS

The Proposal has been considered and designed in light of the 'Additional Site and Development Requirements' set out in Table 7, Schedule 1 and Schedule 2 of LPS 2, as well as requirements and preferences contained in other legislation and policies described above. These are summarised in Figure 26 below.

While not considered necessary in this case. the Shire or JDAP may, under clause 34 of LPS 2, approve an application that does not comply with of LPS 2, either with or without conditions. However, such an application can only be approved if they have advertised the Proposal and had regard to any expressed views and, if the Shire or JDAP are satisfied that approval would:

- be appropriate having regard to the assessment considerations in clause 67 of the Deemed Provisions; and
- not have a significant adverse effect on the occupiers or users of the development, the inhabitants of the locality or the likely future development of the locality.

FIGURE 26 DEVELOPMENT COMPLIANCE TABLE

Item	Requirement	Item	Requirement
Setbacks	Front - 20m (Simpson Road) Side - 10m (Wilson Road) Rear - 20m (Adjoining lots)	Setback from the lot boundary/ road reserve to the development/ buildings are: **Front (Simpson Rd)** • Western portion of the frontage as follows: - 21- 40m to solar panels, from narrowest to widest setback; -3.43m to solar panel fence; - 5m from solar panel fence to solar panel road. **Side (Wilson Rd))** : - 114m to solar panels; - 2-3m to solar panel road. **Side (Eastern adjoining lot)** • Northern section ~ 500 m to solar panel array. **Rear (Southern adjoining lots)** • 65m to nearest solar panel array.	Complies with all setback requirements from road reserves/lot boundaries to building frontages. It is noted that the positioning of the solar panel array, with accompanying perimeter road, has been selected to avoid and minimise impact on remnant vegetation and drainage.

Item	Requirement	Item	Requirement
Open Space/ Landscaping	N/A in 'Rural Zone' (Schedule 2)		Complies.
Use of Setback Land	May only use for: a) gardens/landscaping; b) access driveways; and c) vehicle parking to the satisfaction of the Shire		
Additional Dwellings on Farms	Maximum 3 dwellings (inc. ancillary dwellings).	One existing dwellings which will be demolished. No new permanent dwellings are proposed.	Complies.
Watercourses and Wetlands	Not permitted to: a) erect any habitable building within 30m of the nearest definable bank of any watercourse; or b) install effluent disposal system on any land within 100m of the nearest definable bank of any watercourse.	No new permanent habitable buildings are proposed.	Complies.
Flood Risk	Devt in on land prone to flooding/inundation must be referred to DWER prior to determination. Devt in or adjacent to flood prone areas must demonstrate adequate flood protection from 100-year ARI flood event is in place, including having a finished floor level a minimum of 0.5m above the level of inundation for a 100-year ARI event as provided by the DWER.	The Land is not prone to flooding or inundation.	Complies. Should not require referral to DWER on this issue.

Item	Requirement	Item	Requirement
Development on Land Abutting Unconstructed Roads	Where development is on Land abutting an unconstructed, or not having access to a constructed road, Shire/JDAP may either: (a) refuse the application until the road has been constructed or access by means of a constructed road provided; or (b) grant the application approval subject to a condition requiring the applicant to pay a sum of money towards payment of the cost or estimated cost of the road or part thereof; (c) or require other legal arrangements to be made for permanent access, to the satisfaction of the Shire.	Existing access to constructed road at North (Simpson Road). Proposed new access to constructed road at west (Wilson Road). The Southern boundary is directly adjacent neighbouring lots (lots 1329 and1527) and the western boundary is directly adjacent Lot 1369 with no constructed roads along these boundaries.	Complies. The Land has existing permanent access to the Simpson Road. The Proposal will create a second permanent access to Wilson Road. The Southern and Eastern boundaries abut adjoining lots, and there is no apparent need to construct additional roads between those lots.
Domestic Water Supply	Where a reticulated water supply is not available, the Shire will require the provision of a potable water supply for domestic use of such quality as specified in the Australian Drinking Water Quality Guidelines (2004) and the provision of a separate water supply for land management and fire fighting purposes of combined minimum capacity as determined by the Shire.	The site is connected to reticulated water supply. Two existing dams on site, with water available much of the year. Additional water supplies are proposed, as outlined in the Application.	Complies.
Effluent Disposal	Any onsite effluent disposal system to be referred to Department of Health for advice. Separate approval from Department of Health if required.	Existing effluent disposal on site, associated with existing rural dwelling. No new onsite effluent disposal system proposed. Temporary effluent associated with construction personnel will transported off site by civil contractor.	Complies. No apparent need to refer application to, or seek approval from, Department of Health

Item	Requirement	Item	Requirement
Remnant Vegetation, Environmentally Significant Flora and Fauna	Devt. on land containing significant flora, fauna and / or remnant vegetation shall be referred to the DBCA and/or DWER for advice. Proponent will be required to identify, assess, and put in place measures to protect significant remnant vegetation, flora and/or fauna prior to determination.	Majority of the Land is cleared, with no overstory remaning. Environmental survey & assessment has been conducted. Land contains no environmentally significant flora or fauna. Land contains some remnant vegetation. Mitigation measure adopted include: -Site design to avoid and minimise clearing of stands of remnant vegetation.	Complies. Does not appear to be a need for referral to DBCA or DWER. Proponent intends to refer the Proposal itself to the EPA. It is expected that the EPA will decide that formal assessment is not required.
Outdoor Storage	All outdoor areas used for the storage of motor vehicle bodies, timber, steel products or any other materials in connection with a commercial or industrial use, shall be screened from view from any public place by such means as determined by, and to the satisfaction of, the Shire.	Existing farm sheds are located in the centre of the Land, will be removed in any event. New perimeter fence, with vegetation planting for future screening, will partly screen the solar farm structures from public view.	Complies (to the extent that this requirement applies at all. ie, unclear whether this applies to farm sheds and renewable energy facility outbuildings). Should the Shire or JDAP consider that this standard is not complied with, the Proponent is willing to provide additional screening.
Carparking **Notes - Schedule 1, LPS 2**	Determined by the local government. In addition to car parking spaces, the local government may require tourist bus and coach parking. Shire shall determine number of car parking spaces to be provided having regard to: • the nature of the proposed development; • number of employees and visitors likely to be on the site; • need to keep roads and streets free of obstructions and the amenity of Land in the area.	As outlined in the Application. Tourist bus and coach parking are accommodated in the carpark proposed.	Complies. Further details may be addressed by condition of approval if necessary.

5. POTENTIAL IMPACTS

5.1 ENVIRONMENTAL IMPACTS

Consideration has been given to configuring the solar farm to retain as much of the existing vegetation as possible. The Proponent will continue to give priority to avoiding or minimising vegetation clearing and impact during construction and operation.

The location of the array, sub-station and building will impact mostly cleared areas and degraded woodland or shrubland vegetation on the site., Installation of the solar arrays would require removal of:

- one stand of York Gums/Salmon Gums in the Eastern part of of the site would need to be removed to allow for the solar array in that section. and
- trees along the North and South of the existing main access road from the entry gate to the homestead
- scattered York Gum and Wandoo trees in poor condition in paddocks as well as the planted trees along the access way and fence line. These trees are considered to have low ecological value.

The clearing of semi-mature Wandoo trees will be minimised. Future tree-planting is proposed for the site but are part of this application.

None of the trees likely to be cleared have any habitat values for conservation significant fauna species, largely due to the sizes, ages and condition of the remaining trees.

The Declared Plant, Common Heliotrope, will need to be controlled. If the species remains on the site, the Proponent proposes to eradicate its presence prior to construction or alternatively to identify in detail the weed affected area and avoid or manage all traffic through the area.

The location of the substation and the solar array will not impact on the minor drainage line that runs from the South-East corner of the site to the western boundary.

The Proponent considers that the Proposal is not likely to have a significant impact on the environment, and the potential lesser impacts can be managed as discussed.

It is expected that formal environmental impact assessment and referral will not be required. Nevertheless, it is intended to submit the Proposal to the Environmental Protection Authority for advice and confirmation. As the proposed use is not a ‘prescribed premises’ under the *Environmental Protection Regulations 1987*, it is unlikely that a works approval will be required for the construction phase. If a vegetation clearing permit under Part V of the EP Act is required in relation to the trees that require clearing, the Proponent will apply

for one. Referral to the Commonwealth Minister for Environment under the EPBC Act is not required as no matters of national environmental significance have been identified in the environmental survey.

5.2 NOISE IMPACT

Little or no audible noise impact will occur from operations, while some temporary noise associated with heavy vehicle movements and construction activities will occur during the construction phase.

Noise Generated During Construction

The construction of the solar plant will occur over a period of approximately 12-18 months, with the main sources of noise occurring from the use of site machinery and construction vehicle movements.

As the nearest sensitive receiver (rural residence) is approximately 1.3km away, preliminary consideration of predicted noise levels indicate that compliance will be achieved at all receivers (with ground and atmospheric absorption effects accounted for).

Noise mitigation measures are proposed by the Applicant to further reduce any potential noise impacts. These include undertaking community consultation to determine the least sensitive time periods for noisy works to occur within, the preparation of a Construction Noise Management Plan (**CNMP**) including provisions for noise monitoring, reducing traffic noise (such as minimising the use of engine brakes and engine idling), and the positioning of noisy equipment within the site to provide the greatest acoustic shielding to sensitive receivers.

Noise Generated During Operation

During operation, the sources of noise associated with the proposal are attributed to the electrical substation, maintenance activities and transmission line.

With regards to the substation, the predicted noise level at the closest receiver is predicted to be well below the existing background level, and the recommended day-time acceptable amenity noise criteria, Noise from the substation is considered by the Proponent to be inaudible.

With regards to the maintenance activities, any noise will be intermittent, and only occur during the day.

With regards to the transmission line, the aeolian noise would occur as wind passes over the transmission line poles and wires, however it is considered to be infrequent, and given the distance to the nearest non-involved receiver, aeolian noise impacts is considered to be negligible. Corona noise (hissing/crackling sound more commonly heard in wet/high humidity conditions) which consists of low frequency and broadband noise, has also been given consideration with compliance apparent at all receivers.

The noise levels generated by the proposal would not have unreasonable impacts on the amenity of the surrounding receivers nor propose a constraint to approval of the development.

5.3 VISUAL IMPACT

The development will not be visible from Three Springs or any fringe townsite areas, local tourist and recreational facilities or the Three Springs - Perenjori Road. From Simpson Road and Wilson Road and Hunt Road, the security fence and solar farm would be visible from the very small number of local users of those roads. From the Eastern lot boundary, any visual impact of the substation on the adjoining owner would be softened by the remaining patch of trees along the Eastern boundary.

Given the remoteness of the site from any townsite or urban fringe, the flat terrain, and the relative low level of the infrastructure, it is not considered that visual impact will be a significant issue. Further, the visual landscape already contains other similar infrastructure along the Three Springs - Perenjori Road.

Sunlight and glare were also considered. The panels are designed to absorb sunlight and convert it into electricity. So minimising the light reflected is a key design goal with reflection expected to be minimal and comparable to glass facades. As the panels would be upward facing, with an East-West rotation, there would be no glare to Simpson Road, and minimal if any, glare impacts on passing motorists along Wilson Road.

The transmission line will be travelling underground, hence no visual impact is associated with that. Views of the infrastructure by passing motorists from Wilson Road will only be intermittent, and given the nearest residence is more than 1km away, visual impacts are considered low by the Proponent. The light colour and narrow width of the poles is also expected to help in minimising any visual impacts.

5.4 TRAFFIC AND TRANSPORT

Road Network

Roads in the Mid West region currently carry a large number of freight vehicles, with these outnumbering cars in some instances. The *Mid West Regional Planning and Infrastructure Framework 2015* recognises that that ‘in the short-term, the volume of freight vehicles on the road is likely to increase as there will be a need to carry out extensive construction work on mine sites and other infrastructure projects’.

The main access route within the Shire of Three Springs is the Midlands Road which is a State-controlled road and serves as the main route between the Great Northern Highway and Brand Highway linking Bindoon, Moora, Carnamah, Three Springs and Mingenew. Significant local roads include the Eneabba-Three Springs Road which provides access from Three Springs townsite to the Brand Highway to the west, and the Morawa-Three Springs Road which provides access from the Three Springs townsite East to the Great Northern Highway.

The main road through the Three Springs townsite and the main commercial street is the Midlands Road which also attracts high volumes of heavy vehicle traffic as a result of mining and agricultural activities. The Midlands Road is designated suitable for road trains with a maximum length of 27.5m. This standard also applies to Glyde Street and the Perenjori-Three Springs Road, which means that heavy vehicle traffic is able to pass through an established residential area on its way North. There is only one road within the Shire of Three Springs that is designated suitable for road trains with a maximum length of 36.5m, being the Eneabba-Three Springs Road.

Three Springs-Perenjori Road

Roads 2040 (WALGA, Amended 2021) outlines the development strategy for the Three Springs-Perenjori Road, which is a RAV Network 5 road (conditional).

The first seven kilometres is the principal access road to the talc mine located North-East of Three Springs. This is a long life mineral resource development and a contributor to the value of mineral production from the Mid West Region and to the local economy in general. A number of mine workers use this route as a commuter link from Perenjori to the mine site.

The mine haulage requirements generate a significant number of RAV combination trips on this road, particularly since 2003 when the decision to utilise road, rather than rail as the transport medium to cart the product to Geraldton and other ports was introduced. In addition, the road carries seasonally high grain and fertiliser traffic, general freight and tourist traffic.

The road is the primary Eastern link from Three Springs providing access to the town and the surrounding areas. There is an increasing use of this road by heavy traffic delivering, or moving grain, to and from East/ West CBH receival points.

The Three Springs Shire has upgraded the section of Perenjori Road from SLK 0.00 to 9.10 to a Type 5 standard, to facilitate better access to the talc mine.

The section from the talc mine East to the Perenjori Shire boundary (16 km) has been widened to a width suitable for a mix of medium/ long vehicles and passenger vehicles to adequately ensure the safety of the road user. This is relevant to the Proposal, as it will support traffic to and from the site.

The Local Planning Strategy includes a map identifying the heavy vehicle road networks within the Shire.

Proposed Traffic Access and Impact

Construction of the solar plant would involve the delivery of plant and materials over a 5-10 month period. This would involve the use of articulated heavy vehicles (19m semi-trailers) to transport 2 shipping containers, and oversize/overmass vehicles to deliver components such as the substation transformer. It is estimated that 1200 truck movements (in and out) and 3000-5000 vehicle movements in total (on some sections) will need to be accommodated.

Access to the site is via the Great Northern Highway, with the development components coming most likely from Fremantle (or possibly Geraldton). The Great Northern Highway has regularly been used for intensive construction periods for mining operations in the region, and it is considered that it is well capable of handling the required movements during the Proposal's construction phase. The Proponent would use a charter bus service from Perth to the site and smaller shuttle buses to transport workers locally. This is designed to limit vehicle movements and to limit the project impact of the project on existing roads. The Proponent's assessment concludes that the impact of the additional construction traffic will be manageable due to the existing capacity of the road network.

The Proponent has identified that sections of the Perenjori-Three Springs Road, Hunt Road and Broad Road, and possibly Simpson Road, would need to be upgraded to accommodate heavy vehicle usage during construction of the Proposal.

A new access road is proposed to enter the site from Wilson Road on the West, just South of the existing main entrance.

The Proponent will liaise with Shire officers and Main Roads as needed, to ensure that all new grading and road construction is completed to the satisfaction of the Shire.

5.5 SOCIO-ECONOMIC

There will be a number of positive socio-economic outcomes. The Proposal supports State and local strategic objectives of encouraging regional development. More specifically, an estimated 30-60 FTE jobs would be generated across the 12-18 months of construction and commissioning, with up to 6 FTE associated with the ongoing operations. The peak period would be approximately 5 months of that time. Some of these jobs would be sourced locally and regionally, with some sourced out of Perth. The Proponent intends to use some local contractors, services and materials supply during construction. The Proponent ongoing infrastructure and support for local tourism in relation to the solar farm, with both an onsite and townsite tourism presence. This will be developed in consultation with the Shire and relevant community organisations.

In terms of worker accommodation, rental accommodation in Three Springs and surrounds would be utilised.

5.6 ABORIGINAL HERITAGE

The Land is within the combined Yamatji Native Title Determination area, incorporating the former claims of the Amangu People, and the Widi Mob, both of whom maintain traditional interests and practices in the broader area. An Indigenous Land Use Agreement was reached with the State government for the Yamatji

determination area in October 2020. Bundi Yamatji Aboriginal Corporation (BYAC) is the Prescribed Body Corporate for the Yamatji Nation.

Numerous sites of Aboriginal significance are listed within the region. An Aboriginal Heritage Impact and Risk Assessment in respect of the site and the Proposal has been conducted by Terra Rosa (**Annexure G**), who found that:

- there are no registered Aboriginal sites in the project area;
- the works are defined as having significant disturbance to land which has been significantly altered through both pastoral activities and infrastructure projects; and
- as per the Due Diligence Guidelines, they have a 'medium risk' of impacting unknown sites in the project area.

There are two registered sites of Aboriginal heritage significance located within the Shire. These include the Yarra Yarra Lakes and Bimara. Both these sites are natural sites which have significant mythological value. The Yarra Yarra Lakes site area is extensive and encompasses the Three Springs townsite.

The Proponent recognises the importance of Aboriginal heritage, and is interested in supporting the understanding and recognition of Aboriginal sites within the Shire. The Proponent proposes to consult with the traditional owners to determine whether any unregistered sites of significance are present on the development land, and comply with the any applicable requirements of the *Aboriginal Cultural Heritage Act 2021*.

5.7 LAND USE IMPACTS

The proposed site is currently utilised for the purposes of agriculture, mainly sheep grazing. Following construction, the site of the solar plant will no longer be used for grazing, however grazing and cropping would be possible in conjunction with the solar farm.

The Proponent acknowledges that there would be a small reduction in land available for agriculture, however considers this reduction to be negligible and therefore unlikely to significantly impact on the agricultural production capacity of the Three Springs Shire area.

Risks to surrounding agriculture lands through the spreading of weed species and introduction of pest animals would be managed through the development of a weed management plan.

The solar plant asset has a life of 25 years, after which it can continue to operate at 90% for additional years. There is no plan to decommission it, and no reason to plan the decommissioning, as the plant can continue to operate or be upgraded. However, when it is decommissioned, it will enable the entire site to be

returned to grazing, if required. In this respect, all above-ground infrastructure will be removed, with the site left in as good or better condition, in terms of vegetation cover after decommissioning. This would ensure that land will not be lost to agricultural activities permanently, and should be suitable for agricultural use in the future, if required.

5.8 BUSHFIRE

Because the development involves the construction and operation of an electricity-generating facility which includes a series of photovoltaic cells, substation transformer, and connection to the existing transmission line, this has been assessed as being a 'high risk development' for the purposes of bushfire risk assessment and planning and a risk exists that the infrastructure components of the development may exacerbate or cause fire if not managed appropriately.

In this respect, site maintenance activities, welding/soldering activities and the operation of powered motor vehicles or plant fitted with power hydraulics on land containing combustible material, are all activities that can cause or increase the risk of bush fire.

However, given the site is largely cleared of overstorey vegetation, any risk of bushfire through the above activities would be minimised through the development of a Bush Fire Management Plan. This would include management measures for all activities with a risk of fire ignition, onsite fuel loads, the storage and maintenance of firefighting equipment and operational and post-fire clean up procedures.

The substation transformer would also contain oil that could cause or exacerbate fire. The facility, however, would be bunded with a capacity exceeding the volume of the oil, to contain the oil in the event of a major leak or fire.

A 'Bushfire Attack Level' assessment and 'Bushfire Management Plan' have been prepared by Bushfire Prone for the Proposal in compliance with SPP 3.7 and the related Guidelines (**Annexure F**). That assessment found that the Proposal 'achieves an appropriate balance between bushfire risk management measures; biodiversity conservation values; environmental protection and biodiversity management; and landscape amenity, with consideration of climate change'.

Key findings and recommendations from the assessment were:

- the proposed development is located within a designated bushfire prone area;
- by implementing the positioning and vegetation management measures identified in this Plan the proposed development can meet the acceptable solution of being subject to BAL-29 or below and result in the bushfire risk being able to be managed. It does not require the use of BAL-40 or BAL-FZ construction standards;
- the Proposal is of a nature and size as to be is classified as a high risk land use;

- the potential risk of a bushfire starting from the operating PV panels is low and with the development to be manned 24 hours a day during operation. The risk of a bushfire starting and spreading from the site is minimised by the managed low threat areas surrounding the infrastructure including the PV panels;

- the risk of a bushfire impacting on the development will be restricted if the appropriate APZ and low threat vegetation is maintained during operation of the site. The BAL rating of BAL-12.5 can be achieved by surrounding all proposed infrastructure with the implementation of a 20m APZ incorporating the access roads and low fuel zones;

Location of Buildings and Applicable BAL

- the proposed location of the solar array and other proposed infrastructure will result in it being subject to BAL-12.5. As such it is located appropriately but the required separation distances from the classified vegetation will need to be maintained.

- the development of internal roads, infrastructure and surrounding areas will allow for applicable APZ's to be developed and maintained to protect the development from the impact of a bushfire. As the majority of the site is comprised of cropped pasture and degraded open woodlands the establishment of the separation distances to reduce the radiant heat impact on the infrastructure can be achieved as demonstrated by the BAL contour map and the mitigation measures outlined in the following sections of this Plan including vegetation management, access ways and emergency water supply.

Vehicular Access

- Simpson Road and Hunt Road provide safe access and egress to two different destinations. As public roads, they are available to all residents and the public at all times and under all weather conditions;

- access to Simpson Road and Hunt Road is via Wilson Road at a distance of approximately 450 metres from the proposed development and it is considered that this route has an associated low bushfire risk as the roads pass through cropped and over grazed paddocks. Minor tree lined road verges will not impact greatly on the bushfire behaviour and any grass fires that may be in the area will allow people to travel along the roads relatively safely if required;

- the development is proposing to update several public roads to allow the increased traffic movement from Three Springs, see Figure 23 for possible road upgrades to assist access and egress to the site. It should be noted that the figure indicates the road may be sealed but may be left as an all-weather gravel road like the majority of the regional roads in the area;

- all internal roads are currently gravel roads suitable for 3.4 fire appliances with width and turn around possible in multiple areas. The proposed development allows for semi-trailer vehicles to access the site and will allow the vehicles to pass on the majority of the internal roads with turn around areas at the main infrastructure areas;

- all internal roads are currently gravel roads suitable for 3.4 fire appliances with width and turn around possible in multiple areas. The proposed development allows for semi-trailer vehicles to access the site and will allow the vehicles to pass on the majority of the internal roads with turn around areas at the main infrastructure areas;

Firefighting Water Supply

- reticulated water supply does exist for the proposed development site but is only for domestic water supply, there are no reticulated hydrants in the area, the closest hydrant is in the townsite of Three Springs ~28km West;

- it is proposed to install 100,000L combined capacity of emergency water tanks (probably in the form of 2x 50,000L) within the development site. These water tanks will be fitted with the appropriate Camlok fittings (75mm & 50mm adaptor) as approved by the Department of Fire and Emergency Services and the local government with appropriate hardstand access for 3.4 fire appliances;

- the main bushfire risk to the site is grass fires travelling through the paddocks that may impact on the infrastructure with emergency services providing asset protection of the development to restrict flame contact on the infrastructure. With the implementation of the appropriate APZ's only limited water will be required to protect the infrastructure;

Building Construction Standards

The existing homestead and buildings would be removed and are therefore not the subject the bushfire construction requirements.

At future planning stages an overall risk management plan will be developed for the construction and operation stages of the development. This overall risk management plan will address bushfire risk and implement mitigation and response procedures for bushfire-related incidents.

The development will be designed, constructed and operated to minimise and manage fire risks in consultation with the local Rural Fire Service.

The Proponent considers that, subject to the mitigation measures and recommended conditions being implemented, the development will not propose an unacceptable level of risk and impact to bushfire.

5.9 AIR QUALITY / DUST MANAGEMENT

During construction of the development, dust generation may occur as a result of excavation, earthworks and the movement of traffic along any unsealed roads. However, any impacts to surrounding receivers is considered to be minimal given the distance to the closest non associated receiver is approximately 1000m.

Protocols will be developed to minimise emissions from vehicle and construction equipment and for the suppression of dust such as via the use of water carts.

The development is constructed and operated in a manner that minimises dust generation from the site, including wind-blown and traffic generated dust. The solar farm would not emit any emissions during operation.

5.10 WATER SUPPLY

Water Sources and Management

The Mid West water supply is drawn from groundwater sources with Water Corporation operating water schemes at regional centres, including one at Three Springs (Department of Local Government and Regional Development, 2006). Broadly, water use is assessed under the *Rights in Water and Irrigation Act 1914.*

The Shire is generally located within the Arrowsmith groundwater area which extends from Geraldton South to Green Head and East to Coorow. In 2010 the (then) Department of Water released the Arrowsmith Groundwater Allocation Plan, to manage the allocation of groundwater resources across the region. The Allocation Plan stated that, out of a potential 184.9 gigalitres of groundwater to be allocated, and in addition to the current volume of 53.9 gigalitres for general supply and 14.6 gigalitres for public water supply, the Department of Water had reserved an additional 18.5 gigalitres for public water supply to meet demand until 2040. Therefore it is considered that there are sufficient water resources available to cater for an increase in demand.

The Water Corporation draws 240,000 kilolitres per annum from the Dookanooka Water Reserve for public water supply purposes. At the time the Drinking Water Source Protection Plan was prepared in 2007 (it has not been updated since), approximately 69% of the licence amount was being abstracted. As development in Three Springs has not significantly changed since the time, it is assumed that the current allocation is sufficient in the short to medium term.

Water for the townsite of Three Springs, surrounding farms and the nearby talc mine is supplied from two Water Corporation bores, located within the Dookanooka Water Reserve.

A Recycled Water Supply Scheme for the townsite of Three Springs was approved by the Department of Water in November 2011 with the recycled water to be utilised for the irrigation of recreational facilities.

This scheme is consistent with the principles of water sensitive urban design (WSUD), which include waste water re-use and achieving the highest value use of fit-for-purpose water.

Proposal - Water Supply

The Land is connected to the Water Corporation main pipeline. Being centrally located in the North Midlands region, Three Springs hosts Water Authority and Western Power depots.

The Land is supplied by a Water Corporation mains pipeline along Simpson/Young Road on the North of the property. There is a water metre in the centre of the Northern lot boundary. Two existing onsite tanks, of 50000L and 25000L, support farm operations.

The Proposal would require water supply for construction, ongoing operation, and ongoing bushfire management. During construction water supply, mainly for dust suppression, would be a variable daily requirement of between 2,000L-10,000L, fluctuating across a 10 to 12-month period. Potable water for the temporary workforce would be approximately 30,000L per day or 150L/person/day. This would be transported to site and stored in two new tanks of 50,000L each.

Once operational, the solar plant requires little water and the daily supply limit would be sufficient for ongoing maintenance. Supply would largely be for use in the amenities building for up to 6 FTE permanent staff. Water for bushfire management would comprise an ongoing requirement for high pressure water supply.

It is proposed to fulfil the above supply requirements from a combination of the following solutions:

- installation of a standpipe or hydrant at the property boundary for utilisation during construction; this will also be available on an ongoing basis for bushfire response. The standpipe would be made available for Shire/DFES/Water Corporation use in perpetuity; and
- new water storage tanks with a combined capacity of 250,000L, to be supplied by water delivered to site, as well storing unused daily allowance;
- existing on-site dams as additional backup supply.

It is considered that the development will not pose an unacceptable level of impact on the local water supply. Sufficient water will be kept on site to supply construction, operational and bushfire protection requirements.

5.11 SEWAGE

The townsite of Three Springs is connected to reticulated sewerage. The rural hinterland has no reticulated sewerage service and effluent waste must be disposed of through on-site systems.

On-site effluent disposal systems associated with the existing homestead will be removed, Sewage associated with the construction workforce present during working hours would be dealt with by the turnkey campsite provider, who is obliged to meet any standards specified by the Department of Health and the Department of Water and Environmental Regulation.

5.12 ELECTRICITY/GAS

The site is connected to mains power and this will be utilised for the shipping containers and any temporary requirements during construction.

Ongoing operation of the solar farm requires very little power supply; requirements are easily supplied from the operation itself.

No reticulated gas is supplied within the Three Springs townsite. The Proponent will rely upon delivered bottled gas if it is needed.

It is considered that the Proposal will not place undue pressure on the local electricity or gas supplies.

5.13 TELECOMMUNICATIONS

The Shire is serviced by a number of telecommunications providers in the form of land lines and mobile phone towers. The mobile network does not cover the whole of the Shire, primarily due to the large size, distance from densely populated areas and low population along particular transport routes.

There is some mobile coverage at the site.

5.14 ELECTRIC AND MAGNETIC FIELDS

Electromagnetic fields (**EMFs**) consist of electric and magnetic fields and are produced whenever electricity is used. EMFs also occur naturally in the environment, e.g., from a buildup of electric charge in thunderstorms and Earth's magnetic field (WHO 2012).

Electric fields are produced by voltage whereas magnetic fields are produced by current. When electricity flows, EMFs exist close to the wires that carry electricity and close to electrical devices and appliances while operational (WHO 2007). Electric and magnetic field strengths reduce rapidly with distance from the source, and while electric fields are insulated by air and insulation material, magnetic fields are not.

Fields of different frequencies interact with the body in different ways. EMF field sources to which people may be exposed are predominately in three frequency ranges. The Extremely Low Frequency (ELF) range of 0-300 Hz incorporates the 50 and 60 Hz frequencies of the electric power supply and of electric and magnetic fields generated by transmission lines and other electrical devices and infrastructure (Repacholi 2003).

Over decades of EMF research, no major public health risks have emerged but uncertainties remain (WHO undated). While it is accepted that short term exposure to very high levels of electromagnetic fields can be harmful to health, the International EMF Project, established by the World Health Organisation, has thus far concluded that there are no substantive health consequences from exposure to ELF electric fields at the low levels generally encountered by the public (WHO 2007), such as those that would be produced by electricity generation at the WRSF.

Exposure to ELF magnetic fields is mostly considered to be harmless, however a policy of prudent avoidance has been taken as a result of any doubt. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA 2015) advises that 'the scientific evidence does not establish that exposure to ELF EMF found near power lines is a hazard to human health'.

The International Commission on Non-Ionizing Radiation Protection (**ICNPR**) published Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300GHz) in 1998. The guidelines were updated in 2010. The objective of the paper was to establish guidelines for limiting EMF exposure that will provide protection against known adverse health effects. To prevent health relevant interactions with Low Frequency fields, ICNIRP recommends limiting exposure to these fields so that the threshold at which the interactions between the body and the external electric and magnetic field causes adverse effects inside the body is never reached. The exposure limits, called basic restrictions, are related to the threshold showing adverse effects, with an additional reduction factor to consider scientific uncertainties pertaining to the determination of the threshold. They are expressed in terms of the induced internal electric field strength in V/m. The exposure limits outside the body, called reference levels, are derived from the basic restrictions using worst case exposure assumptions, in such a way that remaining below the reference levels (in the air) implies that the basic restrictions will also be met (in the body) (ICNIRP 2016).

Research into electric and magnetic fields undertaken at utility scale photovoltaic installations in California by Chang and Jennings (1994), indicated that magnetic fields were significantly less for solar arrays than for household applications. Chang and Jennings (1994) found magnetic fields from solar arrays were not distinguishable from background levels at the site boundary, suggesting the health risk of EMFs from solar arrays is minimal.

Potential impacts

Potential for EMF impacts occurs only during the operational phase of the solar farm when electrical infrastructure is capable of generating EMFs. Due to the type and configuration of the solar farm infrastructure proposed, the electromagnetic fields would vary in different locations onsite, as discussed below.

Underground 33 kV cable

The Proposal would require the installation of an underground 33 kV cable to link the solar farm output to the collections circuits.

Cables used in the 33 kV onsite reticulation cabling would contain three core conductors in trefoil (three lobed) arrangements to reduce the effects of magnetic fields from adjacent conductors.

Results of an electromagnetic field assessment undertaken for a cable, considered to be indicative of what would be used at the solar farm, indicate the electric and magnetic fields produced by the cable are much lower than the ICNIRP reference levels. The magnetic field on the surface of the ground directly above the cable is expected to be approximately 4.7µT, which is significantly less than the ICNIRP 200µT exposure limit for the general public. The magnetic field strength is inversely proportional to the distance from the conductor squared and as such the magnetic field is expected to decay to zero with increased distance from the conductor (UGL 2016). The electric field produced is contained in the cable between the core and the metallic screen and does not affect the surrounding environment.

Based on these results, the electromagnetic interference as a result of the 33 kV underground cable are considered to be negligible and well within the ICNIRP reference levels.

Solar panels and inverters

Each solar panel will have a 52.3V in open circuit and 9.12A of rated current. Each string of 25 panels have a voltage to 1307.5V in open circuit with 9.12A current. As the trackers are grouped together in parallel there would be 500 panels on the same DC bus which would represent 1307.5V and 182.4A in standard condition and 193.4A in short circuit.

Installation of DC wiring between panels and the PCBs would be required. This underground cabling would conduct about 6.85A at between 30 and 50 V. Electromagnetic interference as a result of the underground cable are considered to be negligible.

The inverters fall into the Extremely Low Frequency (ELF) range of 0-300 Hz. Within this range, the EMFs are not considered to be a hazard to human health. In addition, the PCBs would be located within the fenced solar farm site with no public access and would operate only during the day time reducing the total time that EMFs are generated by the infrastructure.

Substation

The new substation and connection of the solar farm to the substation would increase the electromagnetic effect somewhat over background levels. However, the fenced exclusion area around the substation components is sufficient to reduce the EMF to negligible levels.

Receptors – public safety

The closest residence is located over 1 km from the solar farm site. The areas proposed for installation of the solar farm infrastructure would have no public access other than the proposed tourist area. Access to the area outside of the tourist area would be restricted to appropriately trained and qualified maintenance staff.

Tourists or visitors accessing the sites would have no reason to spend extended periods near the infrastructure.

Receptors – electrical devices

The PCB's to be used for the Proposal would be similar to other typical electrical and household devices. Additionally, they are designed to reduce all possible interference emissions via the circuit's technical avoidance of high frequency currents, the deployment of filters and the use of grounded metal housings.

Summary of impacts

Acute impacts are not anticipated as a consequence of the low exposure rates in combination with the low likelihood that people or stock would be within range of high exposure levels for extended periods.

Onsite, underground cabling with conductors in a trefoil (three lobed) arrangement would be used where practicable which would assist in shielding EMFs. The EMF exposure to receptors including the public, property owners and workers are well below the 200μT levels considered prudent for public health.

Overall research has not shown to date that long-term low-level low frequency exposure has detrimental effects on health. Applying the precautionary principle to design and site this infrastructure, exposure to EMFs and potential for adverse health impacts can be avoided or reduced. Adverse health impacts from EMFs are therefore unlikely as a result of the proposal.

Environmental safeguards

All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia.

The Proponent is confident that the levels of MF (even for the worst case scenario being directly under/ beside the source of MF) are significantly lower than the ARPANSA levels, and so impact on human health would not occur.

5.15 FLOODING

Consideration has been given to the potential impact flooding could have on the proposed solar plant and associated infrastructure.

As there are few watercourses within the Shire of Three Springs, the risk of flooding over the majority of the Shire is minimal (within the 0-20% range). There are isolated pockets of inundation risk, however these are not in the vicinity of the development site. The development site is not within any identified risk areas.

According to the Environmental Assessment by PGV, none of the soil types on the site have any flood risk according to the DAFWA mapping (DAFWA, 2017).

It is noted that the modules will be mounted 2-3 metres above the ground (and above the height of the 1:100 year ARI flood event) on posts that are pile-driven to the ground.

The Proponent considers that the development will not be subjected to an unacceptable level of impact due to any flood event.

6. CONSULTATION

6.1 ADVERTISING REQUIREMENTS

As a discretionary use in the 'Rural Zone', in accordance with LPS 2 and the Planning Regulations, the Application and Proposal details are required to be advertised for a minimum of 14 days. During that time, representatives of the Proponent will be available to answer questions and consider submissions from interested parties.

6.2 SHIRE AND PUBLIC AUTHORITIES

Representatives of the Proponent and Logie Legal visited the Shire on 17 March 2023 to meet with, and present the Proposal to the Mid West Development Commission, Shire Councillors and staff. Feedback was positive and a number of opportunities were identified in relation to the Proposal, which were noted for future discussions.

It is expected that the Shire may refer the Application to the following government authorities and regulatory agencies during the referral period of the planning assessment:

- Water Corporation;
- Department of Fire and Emergency Services; and
- Western Power.

The environmental survey and assessment have identified no significant environmental impacts associated with the Proposal so referral to the Environmental Protection Authority is not required.

6.3 COMMUNITY

Representatives of the Proponent have visited Three Springs a number of times in relation to a similar but separate proposal on the same site and met with Shire councillors and officers. They talked to approximately 15 community members in relation to that former proposal, including the current landowners of the Land, owners of the hotel, the hardware store and local earthmoving company. The same representatives conducted a community information event at the Three Springs hotel. with members of the public. The feedback from all groups was very supportive of that proposal.

Property Owners

The proposed development is to be located on private land that is being purchased from Bestry Farms Pty Ltd by the Proponent. An option agreement provides the Proponent with a call option over the entry into an agreed contract of sale to transfer the Land to the Proponent. There has been ongoing conferral with the current landowners in relation to the existing site features and proposed land use.

Other stakeholders

A number of community members and groups have been identified with the potential to have an interest in the proposal based on:

- proximity to the Site;
- potential for views/visual impact of the Proposal;
- tourism benefits associated with the Proposal;
- local employment and business opportunities associated with the Proposal.

Key community stakeholders are identified as including:

- rural residents within a 2km radius of the site;
- Three Springs and Perenjori Community;
- Three Springs Land Conservation;
- Three Springs Wildflower Country Visitors' Centre.

7. CONCLUSION

The Wheatbelt Solar Farm represents a positive project for the local community and the State, strongly aligning with all strategic documents, with negligible and manageable amenity impacts. Pilot Energy seeks support for the Proposal from the Shire and the JDAP, with a view to progressing the project and commencing construction in 2025 or 2026.

ANNEXURE A - SHIRE OF THREE SPRINGS APPLICATION FOR PLANNING CONSENT

DocuSign Envelope ID: 0325033B-72EC-4CDD-B898-467EFD4D8236

FORM OF APPLICATION FOR PLANNING APPROVAL

(PLEASE COMPLETE ALL BOXES)

OWNER DETAILS:

Name(s): Bestry Farms Pty Ltd (ACN 074 406 214)

Postal Address: Post Office Box 57, Perenjori WA Postcode: 6620

Contact Person:

Phone: Email:

Signature: Date:

Signature: Date:

NOTE: The signatures of ALL the owner(s) is required to process this application.

APPLICANT DETAILS: (if different from owner)

Name: Logie Legal on behalf of Pilot Energy Limited (ABN 86 115 229 984)

Postal Address: 172 Onslow Road, Shenton Park, WA Postcode: 6008

Contact Person: Merinda Logie

Phone: DocuSigned by: 0403 496 956 Email: merindalogie@logielegal.com

Signature: DFF98410F07143E... Date: 10/27/2023

PROPERTY DETAILS:

Lot/Location No: M1366 House/Street No: 163

Street Name: Wilson Road Locality/Suburb: Womarden

Diagram/Plan No: 5876 Volume No: 44 Folio No: 29A

DocuSign Envelope ID: 0325033B-72EC-4CDD-B898-467EFD4D8236

EXISTING DEVELOPMENT/LAND USE:

Nature of any Existing Development/Land Use: Mixed crop and livestock farm.

PROPOSED DEVELOPMENT/LAND USE:

Description of Proposed Development/Land Use: Renewable Energy Facility - 376 MW Solar Farm.

Approximate Cost: $AUD 440,000,000.00

Estimated Time of Completion: 12 - 18 months

REQUIRED INFORMATION & FEES:

Please refer over for the information required to be submitted with this application and the schedule of fees. This application will not be processed without all required information including payment of the appropriate fee.

OFFICE USE ONLY:

Date Received: _____ Application No: _____

Accepting Officer's Initials: _____ File Number: _____

Required Fee: $_____ Date Paid: _____

DocuSign Envelope ID: 0325033B-72EC-4CDD-B898-467EFD4D8236

The provision of sufficient information accompanying an application for planning approval will ensure that the application will:

- Be considered entirely on its merits but with regard to the public interest; and
- Dealt with in an expeditious and efficient manner.

More specifically, it will enable Council (and its authorised officers) as the responsible decision-making authority to:

- Have a reasonable understanding of the general nature and processes of the development proposed;
- Gauge the likely impact and effect of the development proposed on the local neighbourhood in which it is proposed and the community overall; and
- Determine whether the development controls can be met and the objectives of both the zone in which the development proposed is to take place and the Scheme overall can be achieved.

Unless Council waives and particular requirement every application of planning consent shall comprise:-

(a) A cover letter outlining the general nature of the proposed development and intended date of commencement (of the use) from the time consent is granted and, where relevant:-

   i. A description of processes involved, with particular reference to the likely emission of any noise, vibration, smell, light, electrical interference, fuses, smoke, dust, oil and other waste products, vehicular traffic generation, and whether safety or health hazard to nearby residents and/or occupiers of land and buildings;
   ii. The number of persons proposed to be employed in the undertaking of the development;
   iii. The date and hours of operation of the development;
   iv. The nature and extent of any machinery proposed to be used in the operation of the development (including likely noise levels to be generated);
   v. The number of vehicles to be used in connection with the undertaking and operation of the development.

(b) Three (3) copies of a plan or plans at an appropriate scale (not less than 1:100) showing:-

   i. The location of the site including street names, lot numbers, north point and the dimensions of the site;
   ii. The existing and proposed ground levels over the whole of the land the subject of the application and the location, height and type of all existing structures, and structures and vegetation proposed to be removed;
   iii. The existing and proposed use of the site, including proposed hours of operation, and buildings and structures to be erected on the site;
   iv. The existing and proposed means of access for pedestrians and vehicles to and from the site;
   v. The location, number, dimensions and layout of all car parking spaces intended to be provided.
   vi. The location and dimensions of any area proposed to be provided for the loading and unloading of vehicles carrying goods or commodities to and from the site and the means of access to and from those areas.
   vii. The location, dimensions and design of any open storage or trade display area and particulars of the manner in which it is proposed to develop the same; and
   viii. The nature and extent of any open space and landscaping proposed for the site.

(c) Plans, elevations and sections of any building proposed to be erected or altered and of any building it is intended to retain;

(d) Any specialist studies that Local Government may require the applicant to undertake in support of the application such as traffic, heritage, environmental, engineering or urban design studies; and

(e) Any other plan or information that the Local Government may require to enable the application to be determined.

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SHIRE OF THREE SPRINGS - PLANNING SERVICES FEES

ITEM	DESCRIPTION OF PLANNING SERVICE	FEE
1	Determining a development application (other than for an extractive industry) where the development has not commenced or been carried out and the estimated cost of the development is: a) Not more than $50,000 b) More than $50,000 but not more than $500,000 c) More than $500,000 but not more than $2.5 million d) More than $2.5 million but not more than $5 million e) More than $5 million but not than $21.5 million f) More than $21.5 million	 $147 0.32% of the estimated cost of development $1,700 + 0.257% for every $1 in excess of $500,000 $7,161 + 0.206% for every $1 in excess of $2.5m $12,633 + 0.123% for every $1 in excess of $5m $34,196
2	Determining a development application (other than for an extractive industry) where the development has commenced or been carried out	The fee in item 1 plus, by way of penalty, twice that fee
3	Determining a development application for an extractive industry where the development has not commenced or been carried out	$739
4	Determining a development application for an extractive industry where the development has commenced or been carried out	The fee in item 3 plus, by way of penalty, twice that fee
5	Assessing amended plans (this applies where a determination has already been given by the Shire or where amended plans are submitted and not requested by the Shire)	66% of the original application fee with a minimum of $73
6	Single House – Residential Design Codes performance criteria or Town Planning Scheme variation assessment	$73 per performance criteria / Town Planning Scheme variation assessed with a minimum of $147 and a maximum of $730
7	Demolition where Planning Approval required	$147
8	Determining an initial application for approval of a home based business (including cottage industry) where the home based business has not commenced	$222
9	Determining an initial application for approval of a home based business (including cottage industry) where the home based business has commenced	The fee in item 8 plus, by way of penalty, twice that fee
10	Determining an application for the renewal of an approval for a home based business (including cottage industry) or other Planning Approval	$73
11	Determining an application for change of use or for alteration or extension or change of a non-conforming use which item 1 does not apply and where the change of use has not commenced	$295
12	Determining an application for change of use or for alteration or extension or change of a non-conforming use which item 1 does not apply and where the change of use has commenced	The fee in item 11 plus, by way of penalty, twice that fee
13	Extension of current Planning Approval	$131 (GST inclusive)
14	Relocation of building envelope	$147
15	Providing a subdivision clearance for: a) Not more than 5 lots b) More than 5 lots but not more than 195 lots c) More than 195 lots	 $73 per lot $73 per lot for the first 5 lots and $35 per lot thereafter $7,393
16	* Minor Scheme Amendment (i.e. an amendment that involves only textural changes or rectifies a zoning anomaly)	$4,023 (GST inclusive) (50% refundable if not advertised)
17	* Major Scheme Amendment (i.e. an amendment that involves a zoning change)	$7,377 (GST inclusive) (50% refundable if not advertised)
18	* Minor Structure Plans, Outline Development Plans, Subdivision Guide Plans or similar Modifications to Plans once approval given	$3,348 (GST inclusive) (50% refundable if not advertised) $1,077 (GST inclusive)
19	* Major Structure Plans, Outline Development Plans Subdivision Guide Plans or similar Modifications to Plans once approval given	$6,043 (GST inclusive) (50% refundable if not advertised) $2,147 (GST inclusive)
20	* Detailed Area Plan, Design Guidelines or similar	$932 (GST inclusive)
21	Issue of zoning certificate	$73
22	Issue of Section 40 certificate	$76 (GST inclusive)
23	Issue of written planning advice	$73
24	* Road / R.O.W / P.A.W. request for closure	$657 (GST inclusive)
25	Advertising a) On site signage b) Newspaper advertising	 $323 per sign (GST inclusive) $323 per advertisement (GST inclusive)
26	CD digital copy of planning document	$26 (GST inclusive)
27	Pre-strata inspection	$329 (GST inclusive)

NOTE: All fees are exempt from GST unless otherwise indicated.

* Fee is inclusive of all associated advertising charges.

ANNEXURE B - DEVELOPMENT ASSESSMENT PANEL NOTICE OF DEVELOPMENT APPLICATION

DocuSign Envelope ID: 0325033B-72EC-4CDD-B898-467EFD4D8236

Government of **Western Australia**
Development Assessment Panels

DAP FORM 1

Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005
Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 7, 10 and 21

Application Details

To	*Name of local government and/or Western Australian Planning Commission* Shire of Three Springs and Western Australian Planning Commission	
Planning Scheme(s)	*Name of planning scheme(s) that applies to the prescribed land* Shire of Three Springs Local Planning Scheme No.2	
Land	*Lot number, street name, town/suburb* Lot M1366, 163 Wilson Road, Womarden	
Certificate of Title (provide copy)	*Volume Number* 44	*Folio* 29A
	Location Number	*Plan / Diagram Number* Diagram 5876
Details of development application made to responsible authority	*Summary of Proposal* Solar plant and associated electrical infrastructure	
Development Use	*Residential / Commercial / Industrial / Rural / Mixed Use / Other* Renewable Energy Facility - 376 MW Solar Farm	
Estimated cost of development (GST Exc)	$ 440,000,000.00	

Part A – Acknowledgement by Applicant and Landowner

Mandatory Application	☒ I give notice that I understand that this is a mandatory Development Assessment Panel application *(regulation 5)*
Optional Application	☐ I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel *(regulation 6)*
Delegated Application	☐ I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination *(regulation 9)*

Applicant Details (to be completed and signed by applicant)

- By completing this notice, I declare that all the information provided in this application is true and correct.
- I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name	Merinda Logie on behalf of Pilot Energy Limited (ABN 86 115 229 984)	
Company	Logie Legal	
Address	*Street Number/PO Box number, street name, suburb, state, postcode* 172 Onslow Road, Shenton Park, WA, 6008	
Contact Details	*Email* **DocuSigned by:** merindalogie@logielegal.com	*Phone* 0403 496 956
Signature	Mlogie DFF98410F07143E...	*Date* 10/27/2023

Landowner Details (to be completed and signed if landowner is different from applicant)

- By completing this notice, consent is provided to submitting this application.
- If there are more than two landowners, please provide all relevant information on a separate page.
- Signatures must be provided by all registered proprietors or by an authorised agent as shown on the Certificate of Title.
- Alternatively, a letter of consent, which is signed by all registered proprietors or by the authorised agent, can be provided.
- Companies, apart from sole directors, are required to provide signatories for two directors, a director and the company seal or a director and a company secretary.

Company (if applicable)	Bestry Farms Pty Ltd (ACN 074 406 214)	
Contact Details	*Email*	*Phone*
Address	*Street Number/PO Box number, street name, suburb, state, postcode* Post Office Box 57, Perenjori WA 6620	
Name/s		
Title/s	*Landowner/Sole Director/Director (2 signatures required)* Landowner	*Additional Landowner/ Director/Secretary (if applicable)*
Signature/s		
Date		

Part B – Local government acceptance for assessment

Responsible Authority	☐ Local Government (LG) ☐ * Western Australian Planning Commission (WAPC) ☐ * Dual – Local Government and Western Australian Planning Commission ☐ Building Management and Works (Department of Finance) – *Public Primary School Applications*	
* WAPC/DUAL reporting details	*If WAPC or DUAL is selected, please provide details of relevant provision (or within covering letter)*	
Fees for applications *(DAP Regulations - Schedule 1)*	$ Amount that has been paid by the applicant $ Amount to be paid by local government *(delegated applications only - regulation 22)*	
Statutory Timeframe *(regulation 12)*	☐ 60 days (advertising not required) ☐ 90 days (advertising required or other scheme provision)	
LG Reference Number		
Name of planning officer *(Report Writer)*		
Position/Title		
Contact Details	*Email*	*Phone*
Planning Officer's Signature		*Date accepted for assessment*

Please refer to the Guidance Note: Lodging a DAP Application for further information.

ANNEXURE C - CERTIFICATE OF TITLE

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
44	**29A**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT M 1366 ON DIAGRAM 5876

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

BESTRY FARMS PTY LTD OF POST OFFICE BOX 57, PERENJORI

(T H758729) REGISTERED 25/5/2001

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 5616/1949.
2. E137454 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA. SEE SKETCH ON VOL 44 FOL 29A. REGISTERED 29/6/1989.
3. M992046 MORTGAGE TO RURAL BANK LTD REGISTERED 7/5/2015.
4. N435666 EASEMENT TO KARARA POWER PTY LTD FOR ELECTRICITY TRANSMISSION PURPOSES - SEE DEPOSITED PLAN 401822 REGISTERED 15/9/2016.
5. P542405 CAVEAT BY PILOT ENERGY LIMITED LODGED 8/5/2023.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	44-29A (M 1366/D5876)
PREVIOUS TITLE:	1117-492
PROPERTY STREET ADDRESS:	163 WILSON RD, WOMARDEN.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF THREE SPRINGS

LANDGATE COPY OF ORIGINAL NOT TO SCALE 27/10/2023 02:08 PM Request number: 65783320

Landgate
www.landgate.wa.gov.au

ANNEXURE D - ENVIRONMENTAL SURVEY ASSESSMENT

WHEATBELT SOLAR PLANT 1

ENVIRONMENTAL ASSESSMENT

Prepared for:	Pilot Energy Limited
Date:	22 July 2022
Version:	3
Report No.	2021-576

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Tables

Table 1: Conservation Significant Species and their Potential to Occur on the Site

Plates

Plate 1: Main Drainage Line eastern end

Plate 2: Tributary to main drainage line

Plate 3: Farm dam used by stock in the south-east

Plate 4: Central stand of York Gum and Salmon Gum

Plate 5: Tall shrubland on the granite ridge

Plate 6: Stand of Salmon Gum next to the drainage line

Plate 7: Common Heliotrope (photo from FloraBase)

Figures

Figure 1: Environmental Features

Figure 2: Soil Mapping

Appendices

Appendix 1: Proposed Site Layout

1 INTRODUCTION

1.1 Background

Pilot Energy Limited is proposing to construct a solar plant on a farm located at Lot 1366 Weir Road, Three Springs. The location was chosen partly due to the presence of a High Voltage 330kV power line that runs through the southern end of the property. The power line is part of the dedicated 180km powerline from Eneabba to the Karara mine site approximately 100km to the north-east of the property.

The solar project consists of the following:

- A solar panel array covering an area of around 270ha featuring:
  - Total DC Power : 376 MW
  - Panels: Risen RSM120-8-600BMDG
  - Number of modules 626,668
  - Inverters: Sungrow 6.8 MW
- A sub-station transformer; and
- A parking area (Appendix 1).

The facility may include a visitor information centre at some stage following completion.

Lot 1366 Weir Road is located in the Shire of Three Springs, approximately 20km north-east of the Three Springs townsite and 34km west of Perenjori. The size of the property is approximately 840ha (Figure 1).

1.2 Purpose and Scope

PGV Environmental was commissioned to undertake an environmental assessment of the proposed development. The assessment includes the following scope of works:

- Review aerial photography to identify any environmental features such as remnant vegetation, trees on fence lines, wetlands, hydrological features;
- Desktop evaluation of the soil types on the property;
- A site inspection to ground-truth the information gathered from the aerial photography review;
- Assessment of any potential listed species under State and Federal environmental legislation;
- Inspection of the site for the presence of any noxious weeds; and
- Assess the likelihood of any potential hazardous materials being stored on site.

The assessment does not include the environmental benefits of the solar farm to the local or wider community.

2 EXISTING ENVIRONMENT

2.1 Land Use

The site has been used for cropping and cattle and sheep grazing for many years. As a result, most of the site has been cleared for agriculture, with some patches of vegetation remaining particularly on rocky ground. The homestead, farm sheds and yards are centrally located on the site.

Herbicide and potentially pesticide chemicals will be stored in the shed area. Diesel fuel will also be stored in an underground tank near the sheds. There is potential for the chemicals and diesel to have soaked into the soil over time, however this is likely to be limited to small areas.

2.2 Topography

The site is gently undulating with an overall fall from the south-east down to the north-west. The highest point on the site is around 288m AHD in the south-east corner. The lowest point on the site is around 255m AHD near the north-west corner.

Two low and narrow ridges occur on the site, one in the south-east corner and a more prominent one straddling the southern boundary.

2.3 Geology and Soils

The Department of Agriculture and Food Western Australia (DAFWA) maps five different soils types on the site (Figure 2) as follows:

- **Rockdale 1 Subsystem**

  This soil type is mapped over the two small ridges on the site and is described as “undulating terrain with outcrops of gneiss; red, yellow and calcareous loamy earths with shallow sands and rocky soils”.

- **Rockdale 2 Subsystem**

  This soil type is the dominant system on the site and is mapped over most of the southeastern two-thirds of the site. The soils are described as “gently undulating rises with broad ridge crests and shallow open depressions; red, yellow and calcareous loamy earths with yellow deep sand”.

- **Morawa 2 Subsystem**

  This soil type is mapped on the south-west portion of the site and is described as “gently undulating low rises; shallow sands and loams over granite and red-brown hardpan”.

- **Morawa 3 Subsystem**

  The Morawa 3 soil type occurs in the north-west quarter of the site and is described as “almost level plain with distinctive gilgai microrelief; red-brown clays and loams with red-brown hardpans”.

- **Morawa 4 Subsystem**

  This soil type occurs in a small area on the north-eastern boundary of the site. The soils are “rises of low relief with gently inclined gradients; brown loamy duplexes and red shallow loams over hardpans” (DAFWA, 2017).

The Morawa 3 subsystem has a 100% risk of waterlogging while the Morawa 4 subsystem has a 5% risk. All other soil types have 0% risk of waterlogging. None of the soil types have any Flood risk according to the DAFWA mapping (DAFWA, 2017).

2.4 Hydrology

The site contains a number of small farm dams for stock drinking water. However, no natural wetlands occur on the site.

A minor drainage line runs through the site entering at the south-east corner and running in a west-north-west direction towards the western boundary. The drainage line is narrow at no more than 5m wide and is incised at the eastern half with up to 0.5m banks. The drainage line becomes diffuse towards the centre of the site and fans out into a delta-shaped series of indistinct surface flows at the western boundary.

Plate 1: Main Drainage Line eastern end

A tributary to the main drainage line enters the property from the mid-southern boundary and flows towards the main line about 750m to the north, however the tributary peters out and does not physically connect to the main line by an incised channel.

Plate 2: Tributary to main drainage line

The drainage lines were dry at the time of the site inspection on 31 March 2017. The drainage lines do not appear to carry very much water when they flow.

One of the stock dams is located among native trees in the south-east part of the site and is associated with the main drainage line and is possibly fed by surface flows. The dam was a focal point for cattle during the site inspection (Plate 3), indicating the water is likely to be non-saline.

Plate 3: Farm dam used by stock in the south-east

The site is within 2km of the massive chain of salt lakes that extend from further inland to the Yarra Yarra Lakes near Carnamah. No surface soil salinity is evident on the site.

2.5 Vegetation

Most of the native vegetation has been cleared from the site to enable cropping and grazing activities to occur.

Four patches of remnant vegetation occur as shown in Figure 2. Three of the areas of remnant vegetation contain York Gum (*Eucalyptus loxophleba*) and Salmon Gum (*Eucalyptus salmonophloia*) and occur in the eastern side of the site. The trees are quite scattered and many are in poor condition which may have occurred due to fire. Some planting of York Gum seedlings has occurred in the central stand.

The patches of remnant vegetation are not fenced internally and are therefore open to stock grazing. As a result, the understorey is almost completely bare of native vegetation. Some Bluebush (*Maireana* spp.) occurs in these stands. Plate 4 is a typical example of the remnant York Gum and Salmon Gum woodlands.

Plate 4: Central stand of York Gum and Salmon Gum.

The vegetation on the low granite ridge that straddles the southern boundary of the site is a tall shrubland with main species being *Acacia acuminata* (Jam), *Acacia tetragonophylla, Allocasuarina* sp. and *Dodonaea inaequifolia* (Plate 5). Native understorey is mostly absent apart from abundant Pincushions (*Borya sphaerocephala*) among the granite boulders. The condition of the native vegetation on the ridge is Degraded with Oats the most noticeable weed.

A smaller granite ridge near the south-east corner of the property contains some *Acacia acuminata* as well as tall shrubs of *Hakea recurva* and *Melaleuca* spp. with *Borya sphaerocephala* common among the small granite boulders.

Several isolated stands of native York Gum and/or Salmon Gums occur around the property. Most of the trees in these stands are in poor condition. A few semi-mature Salmon Gums occur close to the drainage line in the south-west part of the site (Plate 6). While the trees are not all in good health they provide some habitat for native birds.

The access driveway to the farm house and sheds has been planted with Salmon Gum with the trees ranging in health from healthy to poor. York Gums have been planted on a fence line running eastwards from the main access gate. The trees are in good health but are quite young, around 4-5m high.

Several healthy River Red Gums (*Eucalyptus camaldulensis*), not native to the site, occur near the sheds and around the house.

Plate 5: Tall shrubland on the granite ridge

Plate 6: Stand of Salmon Gum next to the drainage line

2.6 Flora

Table 1 lists the conservation significant species that have been recorded within 10km of the site according to NatureMap (DPaW database) and the EPBC Act Protected Matters Search Tool.

The Table also identifies the habitat preference for each species and the likelihood of occurring on the site. Some species from the database search have been omitted due to database errors and obvious geographic misplacement.

Table 1: Conservation Significant Species and their Potential to Occur on the Site

Species	Conservation Status	Habitat Preference	Likelihood of Occurrence on the site
Acacia aprica	Endangered	Red or gravelly sand, sandy loam. Plains, rocky hills	Unlikely
Acacia cochlocarpa subsp. cochlocarpa	Endangered	Clayey, sandy, gravel	Unlikely
Chorizema humile	Endangered	Sandy clay or loam. Plains	Unlikely
Dasymalla axillaris	Critically Endangered	Unknown	Unknown
Eremophila nivea	Endangered	Sandy clay, clay loam. Undulating plains, road verges	Unlikely
Eremophila pinnatifida	Endangered	Loam	Unlikely
Eremophila viscida	Endangered	Granitic soils, sandy loam. Stony gullies, sandplains	Possible
Gastrolobium hamulosum	Endangered	Sandy, gravelly soils or clay. Flats, slopes, ridges	Unlikely
Grevillea murex	Endangered	Sand, clay loam	Unlikely
Grevillea pythara	Critically Endangered	Sand or sandy loam with gravel	Unlikely
Gyrostemon reticulatus	Endangered (presumed extinct)	Dense shrubland in brown/yellow loamy sand on sloping topography	Highly unlikely
Hemiandra gardneri	Critically Endangered	Sand, clayey sand. Sandplains	Unlikely
Roycea pycnophylloides	Endangered	Sandy soils, clay. Saline flats	Highly unlikely
Tecticornia bulbosa	Vulnerable	Saline sandy clay or red/brown loam	Highly unlikely
Verticordia spicata subsp. squamosa	Endangered	Sand, clayey sand. Sandplains, flats, road verges	Unlikely
Wurmbea tubulosa	Endangered	Clay, loam, river banks, seasonally-wet places	Highly unlikely
Acacia nodiflora	Priority 3	Rocky loam or clay. Rocky ranges, granite hills	Possible
Acacia pterocaulon	Priority 1	Rocky clay loam, sandy clay. Rocky hillslopes	Possible
Calytrix ecalycata subsp. ecalycata	Priority 3	Sand, sandy gravel, clay loam, granite, sandstone. Uplands, valley flats, ridges, hills	Possible

Species	Conservation Status	Habitat Preference	Likelihood of Occurrence on the site
Podotheca pritzelii	Priority 3	Sand ridges in salt flats	Highly unlikely
Tecticornia fimbriata	Priority 3	Margins of salt and gypsum lakes	No
Verticordia comosa	Priority 1	Yellow or grey sand	No

One Endangered and three Priority species could possibly occur on the granite ridges, however given the highly degraded nature of the vegetation the likelihood that they occur is very low.

2.7 Weeds

Several species of weeds listed as Declared Plants under the *Agriculture and Related Resources Protection Act 1976* have been recorded in the Shires of Three Springs and Perenjori including:

- Doublegee (*Rumex hypogaeus*)
- Paterson's Curse (*Echium plantagineum*)
- Saffron Thistle (*Carthamus lanatus*)
- Two-leaf Cape Tulip (*Moraea miniata*)

No evidence of these plants was observed during the site inspection. Two-leaf Cape Tulip would not have been able to be identified during the March survey.

A stand of Common Heliotrope (*Heliotropium europaeum*) was observed near the head of the small tributary to the drainage line close to the southern boundary and the power line. Common Heliotrope (Plate 7) is a small annual herb that flowers from December to March. The species is listed as a P1 and P3 species for southern Western Australian Shires but is not listed as a Declared Plant for the Shires of Three Springs or Perenjori.

Plate 7: Common Heliotrope (photo from FloraBase)

2.8 Fauna

The vegetation on the site is minimal and restricted to York Gum and Salmon Gum in remnant patches, tall shrublands on outcropping granite ridges and planted trees on the access way and on fence lines. As a result, the fauna habitat on the site is restricted mainly to bird habitat.

The site is within the breeding range of Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) which is listed as Threatened under both the State *Wildlife Conservation Act 1950* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 2000*. Carnaby's Black Cockatoo are known to breed in the hollows of Salmon Gum and York Gum trees. The trees on the site are mostly too young to form hollows large enough for Carnaby's Black Cockatoos to breed in.

A small flock of Red-tailed Black Cockatoos (*Calyptorhynchus banksii samueli*) was observed in the remnant patch of woodland at the south-eastern end containing the dam. The subspecies 'samueli' is not listed under State or Commonwealth environmental legislation.

3 ENVIRONMENTAL ASSESSMENT

3.1 Proposed Solar Project Layout

The solar project is likely to consist of the following:

- A 376 MW solar panel array with;
  - 626,688 panels
  - Panels: Risen RSM120-8-600BMDG
  - Inverters: Sungrow 6.8 MW
- A sub-station transformer located close to the solar array;
- Parking area on the western boundary; and
- Security hut in the central area where the existing driveway is (Appendix 1).

The solar array is proposed to be located on approximately 80% of the site and has been designed to avoid, as much as possible, areas with environmental features and will be fenced for security reasons.

A 132KV high voltage line is proposed to connect the substation to the existing 330kV power line to the south. The environmental features of the site that this report considers are relevant to the potential impact of the project are shown in Figure 1.

3.2 Land Use

The current use of the Lot as a farm for cropping and grazing will not have any negative impact on the proposed use of the site for the solar project. Some small areas of soil contamination may exist around the farm sheds due to chemical leakage or fuel spills and should be investigated if the sheds are to be removed for the solar project.

3.3 Flora and Vegetation

The site is highly unlikely to contain any Rare or Priority flora species. Four small patches of remnant vegetation occur on the site and predominantly consists of York Gum and Salmon Gum woodlands with a degraded understorey as well as some shrublands on granite outcrops, also in degraded condition.

The solar array will require the clearing of scattered York Gum and Salmon Gums in poor condition in paddocks as well as the planted trees along the access way and fence line. These trees are considered to have low ecological value. The solar array will impact about a quarter of a stand of York Gum/Salmon Gum vegetation in the central part of the eastern boundary of the site. The impact is not deemed to be significant due to the small area of impact, poor quality trees and completely degraded nature of the understorey.

3.4 Weeds

No Declared Plants relevant to the Shire of Three Springs were observed on the site. One Declared Plant from the south-west of Western Australia, Common Heliotrope (*Heliotropium europaeum*), was observed close to the mid-southern boundary. Common Heliotrope is known to grow following summer rains as occurred in the area in 2017 (145mm in Three Springs by the end of February). The

species can cause toxicity in stock. Construction of the solar project should avoid spreading this species on the site.

3.5 Fauna

The woodlands on the site have some value as bird habitat, however no fauna of conservation significance is likely to use the trees on a consistent basis. No trees were observed with hollows large enough for Carnaby's Black Cockatoo to breed in.

The location of the array will impact on a small number of planted trees along the accessway and fence line and in the York Gum/Salmon Gum vegetation in the central part of the eastern boundary of the site. These could be replaced with future planting of York Gum and Salmon Gum in undeveloped parts of the site.

3.6 Hydrology

A part of the solar panel array is proposed to be located over a part of the minor drainage line that runs from the south-east corner of the site to the western boundary. Appropriate stormwater management controls will be required if there is proposed to be any ground disturbance in the natural drainage line.

4 CONCLUSION

The Environmental Assessment concludes the following:

- Some minor chemical and fuel spill may occur in the soil around the sheds and may need to be investigated if the sheds are to be removed for the solar project;
- Four stands of remnant vegetation occur on the eastern and southern parts of the site and consist predominantly of York Gum and Salmon Gum over pasture. Some tall shrublands occur on granite outcrops. The areas of remnant vegetation do not have any native understorey but retain some ecological value. The proposed solar project layout retains three of the areas in full and impacts on a very small part of the York Gum/Salmon Gum vegetation in the central part of the eastern boundary of the site;
- Isolated native trees occur in paddocks, around the house and sheds and planted trees occur along the access way and some fence lines. The trees have limited ecological values. Some trees along the access way and the west-east fence line that extends from the current farm access gate will be removed for the solar array. Planting of York Gum and Salmon Gums in areas outside of the solar farm should replace the trees that need to be cleared.
- Clearing the planted trees along the access way and fence line will not need a clearing permit. Clearing any remnant native trees in the paddocks will not require a Clearing Permit, as advice from DWER Native Vegetation Branch is that the solar panels bolted to the ground are considered a 'structure' and therefore clearing less than 5ha per year is exempt from a clearing permit provided the vegetation is not riparian, which it isn't;
- The Declared Plant, Common Heliotrope, occurs near the mid-southern boundary and should be controlled by the current landowner. If the species remains on the site during construction of the solar project, the weed affected area should be identified and all traffic through the area be avoided;
- None of the trees likely to be cleared have any habitat values for conservation significant fauna species; and
- The solar array is proposed to be located over the western part of the minor drainage line. Appropriate stormwater management controls will be required if there is proposed to be any ground disturbance in the natural drainage line.

5 REFERENCES

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Department of the Environment (DoE) (2012). *Matters of National Environmental Significance. Significant Impact Guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999* Commonwealth of Australia

Department of Sustainability, Environment, Water, Population and Communities (2012). *EPBC Act referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) Calyptorhynchus latirostris Baudin's cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso*. Commonwealth of Australia

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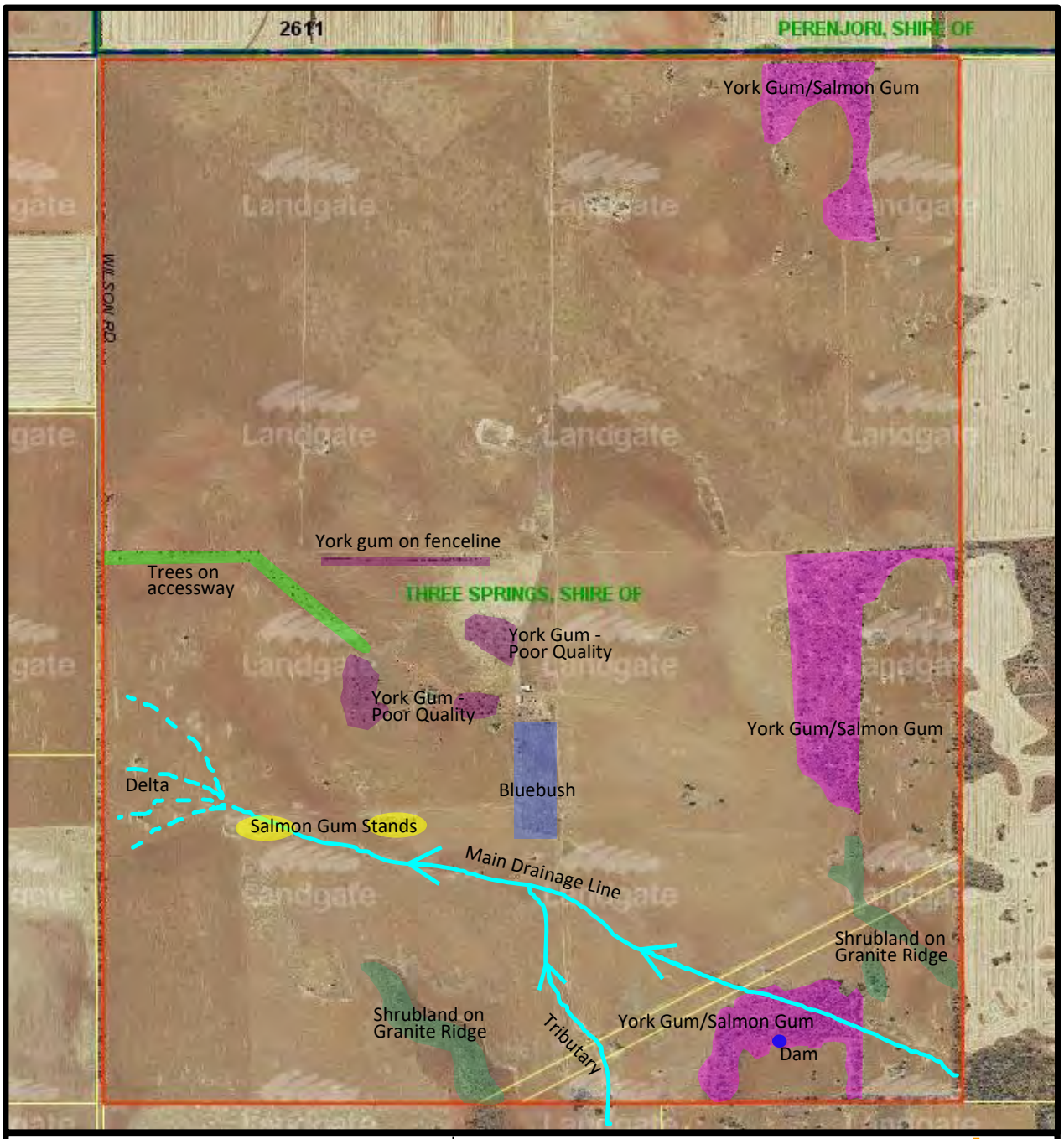
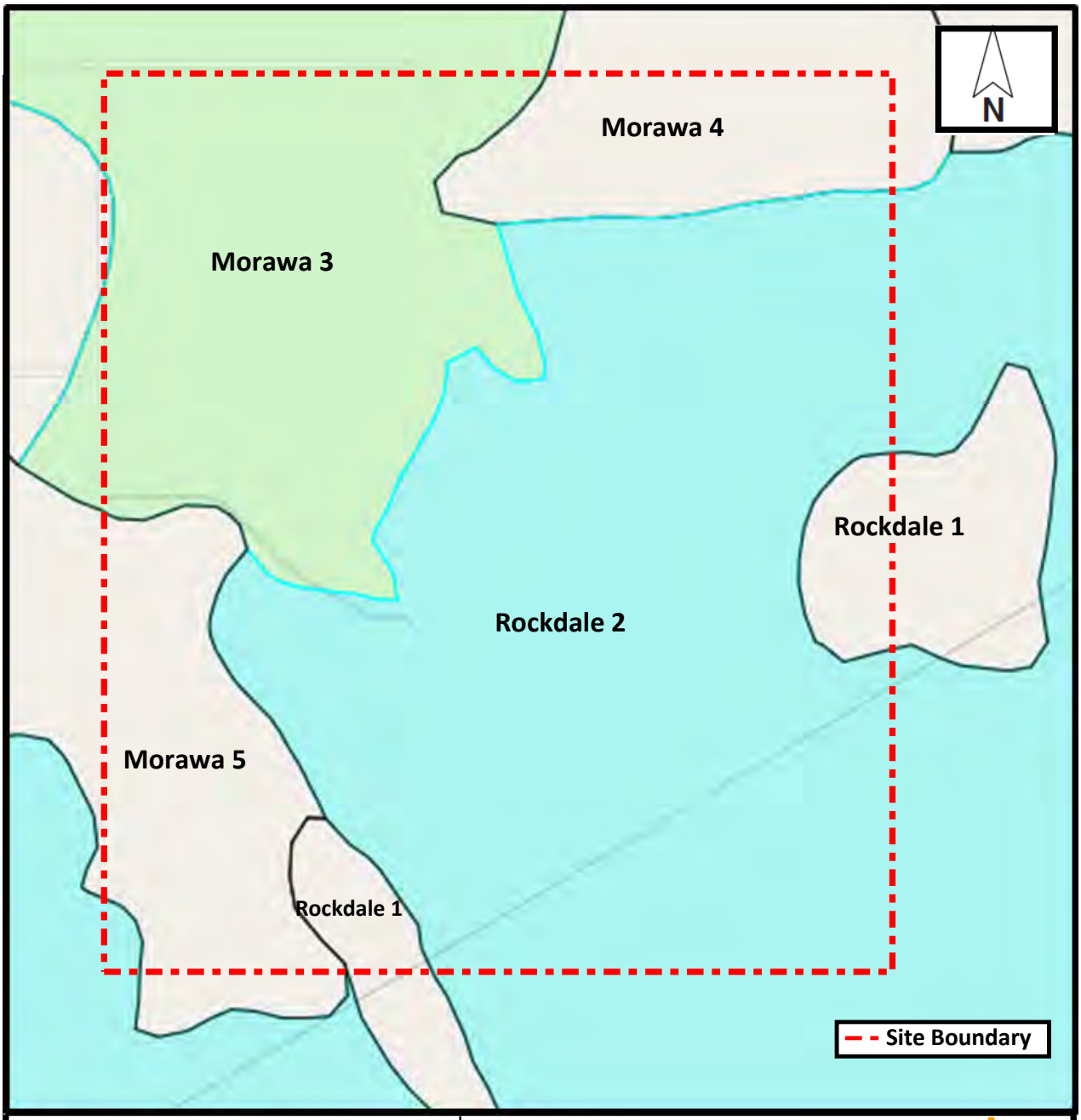
FIGURES



pgv ENVIRONMENTAL		Earthed Australia Pty Ltd SpringSolar Project	FIGURE 1
Drawn: Paul Van der Moezel	Date: 7 April 2017	**ENVIRONMENTAL CONSIDERATIONS**	
Job: 10284	Revision A		

Aerial sourced from Landgate

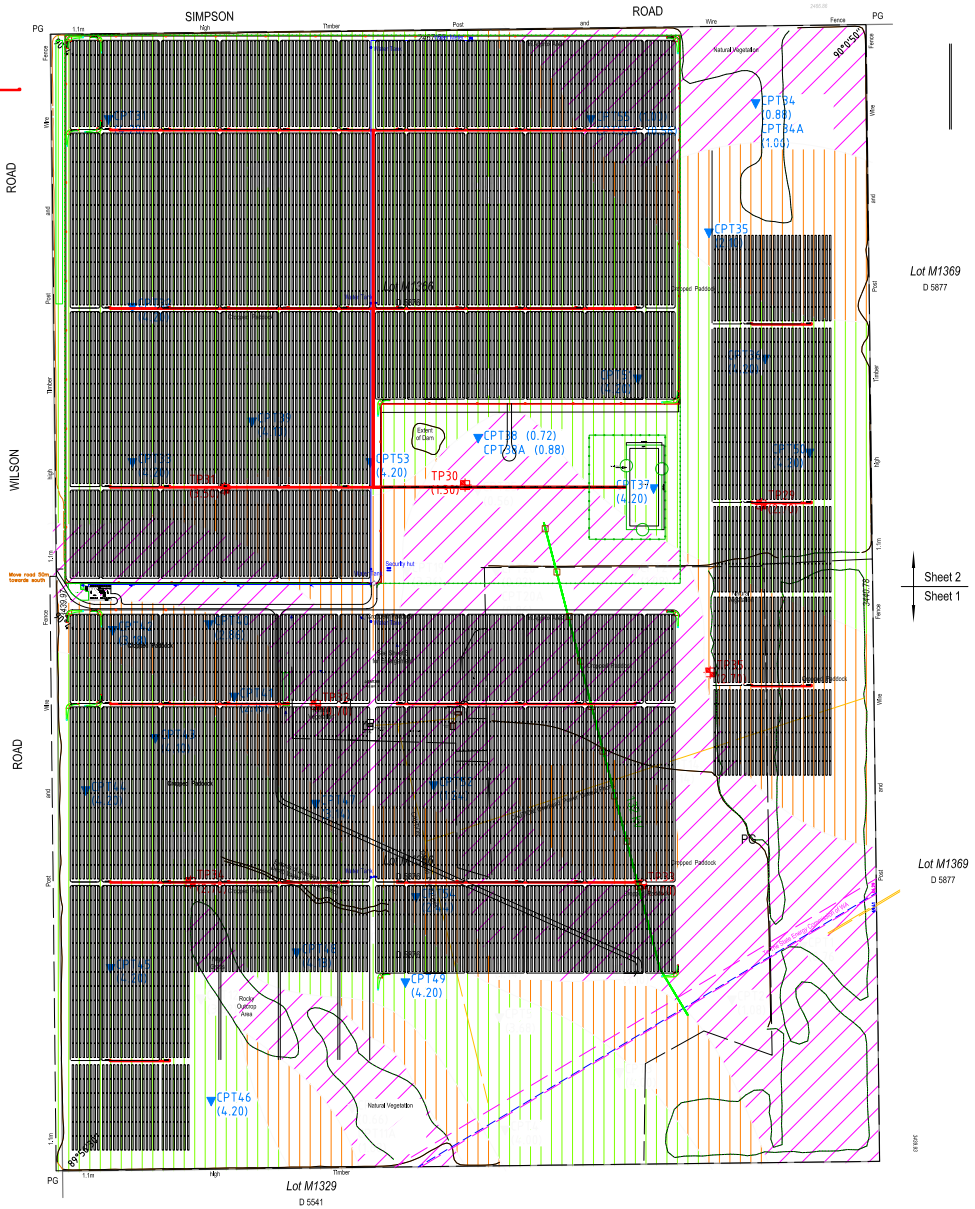


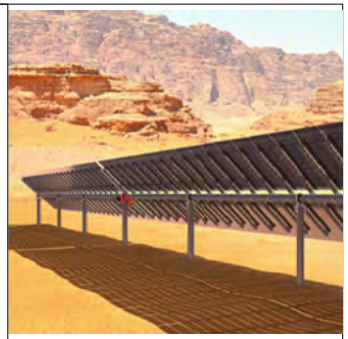
pgv ENVIRONMENTAL		Earthed Australia Pty Ltd SpringSolar Project	FIGURE 2
Drawn: Paul Van der Moezel	Date: 7 April 2017	**SOIL MAPPING**	
Job: 10284	Revision A		

Mapping sourced from DAFWA

APPENDIX 1

Proposed Site Layout





MAIN PROPERTIES

Solar Module MFG	Rizen
Solar Module Model	RSM120-8-600BMDG
Total N° of modules	626,688
Total N° of strings	19,584
Module per string	32
Mounting system MFG	Soltec
Mounting system Type	SF7 Bifacial Ground Mount Horizontal Single-Axis
Solar Inverster MFG	SunGrow
Total N° of Inverters	(56 units) 6.8MW MV Power Station 6800HV-MV
Total DC system size	376,012.8 kWp

Legend

- Panel marco
- Tracker axis
- 5MW block
- DC cable from CB to Inverter
- 33 kV AC line
- Road
- Solar park fence
- Inverter pad
- Camera

ORIENTATION

N

Rev.	Description	Drawn	Date	Checked
A	Initial Issue.	CG	21/04/2022	CG

GENERAL VIEW
WHEATBELT SOLAR PLANT 1

Client: Pilot Energy

GREEN FUEL DEVELOPMENTS

Scale	1:4000
Datum	Assumed
Drawn	Cónie Geldme
Surveyor	Cónie Geldme
Date	09/06/2021
Job No.	GFD 021
Drawing	GFD-021-001
Plan No.	GFD 021-001
Sheet 1 of 50	
Rev.	A
SHEET SIZE	A1

ANNEXURE E - GEOTECHNICAL PRELIMINARY REPORT

Geotechnical and Geological Consultants

Geotechnical Investigation Report

Proposed Solar Farm Development
Womarden, (near Three Springs) WA

GGC211891

March 2022

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Proposed Solar Farm Development
Wilson Road, Womarden (near Three Springs)
Geotechnical Investigation Report

Our ref: GGC211891-R03-Rev0

Prepared for:

Pilot Energy Limited
c/- Green Fuel Development
377A Railway Road
Shenton Park WA 6008

Prepared by:

Geotechnical and Geological Consultants Pty Ltd
433 Vincent Street West
Leederville WA 6007

17 March 2022

Document authorisation

For and on behalf of Geotechnical and Geological Consultants Pty Ltd

Ian Rogers

Senior Engineering Geologist

Quality information

Revision history

Revision	Description	Date	Author	Reviewer	Signatory
Rev0	Issued to Client	17 March 2022	IHR	RM	IHR

Distribution

Report Status	No. of copies	Format	Distributed to	Date
Rev0	1	PDF	Green Fuel Development Pty Ltd	17 March 2022
Rev0	1	PDF	Geotechnical and Geological Consultants Pty Ltd Report Library	17 March 2022

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"Your Geotechnical Report"

FIGURES

Figure 1: Site Investigation Plan

Figure 2: Gravel Pit Location Plan

Figure 3: Interpreted CPT Plan

APPENDICES

APPENDIX A: CPT Results

APPENDIX B: Infiltration Test Results

APPENDIX C: Test Pit Logs and Photographs

APPENDIX D: Geophysical Investigation Results

APPENDIX E: Existing Road Inspection Photographs

APPENDIX F: Existing Road Inspection Photographs

APPENDIX G: Previous Laboratory Test Certificate

1 Introduction

This report presents the results of a geotechnical investigation carried out by Geotechnical and Geological Consultants Pty Ltd (GGC) for Green Fuel Development Pty Ltd (GFD) for a proposed solar farm project, located off Wilson Road, Womarden, WA 6519 (the site).

We understand that the proposed solar farm will be located on approximately 500 hectares of the site. The total site area is about 850 hectares and the site is currently in use as a mixed crop and livestock farm.

This work was commissioned by Greg Stace of GFD via a confirmation email dated 19 August 2021.

GGC have previously completed two geotechnical investigations for the project including an investigation for access road upgrade in 2017 (Report reference GGC211891-R02-Rev0 dated 21 April 2021) and the ground conditions carried out in 2019 (Report reference GGC211891-R01-Rev1 dated 21 April 2021).

2 Site description

The site is a rectangular shaped parcel of land that covers a total area of about 850 hectares and is located at the southern end of Wilson Road, Womarden (near Three Springs), Western Australia.

The site currently in use as a crop and livestock farm, and includes a brick and tile homestead on stumps and farm workshop buildings located in the centre of the site and accessed by a gravel track. The majority of the land on the site was observed to be cropped paddock, with some areas observed to be undeveloped and comprising rock outcrop and natural vegetation.

An overhead transmission line traverses across the south-eastern corner of the site, along a southwest/ northeast alignment. There are also overhead LV power distribution lines traversing the southern and eastern portions of the site.

The topographic and feature survey by Denada Surveys Pty Ltd (Denada) indicates that the existing site levels range between about 280 m AHD in the southeast to about 252 m AHD on the western boundary. There is a notable ridge of higher ground, that can be delineated approximately by the 270 m AHD topographic contour on the Denada survey plans, that includes the majority of the south eastern corner of the site and a ‘central ridge’ around the existing farmstead buildings. The ground surface in the areas of higher ground was often observed to include lithic rock fragments, boulders and rock strength materials.

Surface cracking and potential Gilgai micro topographic features were observed across the site in low lying areas underlain by clay.

The site is accessible from the southern end of Wilson Road, via a network of about 13 km of unsealed gravel roads (Broad Road, Hunt Road and Wilson Road), from the Perenjori – Three Springs Road (sealed road). At the time of the fieldwork, the unsealed roads leading to the site were dry, in good condition and were readily trafficable by light vehicle.

3 Proposed development

It is understood the proposed development will include the construction of a solar farm covering about 500 hectares.

GFD has advised that the foundations for the solar panel units are expected to comprise driven steel H-Section piles, typically embedded to a depth of about 4 m below finished ground level.

No information on proposed road access, internal roads and site infrastructure or bulk earthworks requirements has been provided to GGC and we have assumed that no significant fill earthworks will be undertaken at the site (other than localised re-grading that may be required to maintain a constant site surface level).

4 Project objectives

The objectives of the geotechnical study were to:

- Assess soil, rock and groundwater conditions within areas of the site not previously investigated and within the solar farm footprint;
- Assess the permeability rate/s at selected locations within the site for the purposes of stormwater disposal design;
- Provide an updated assessment of areas requiring piled foundations and areas requiring shallow footings;
- Provide an assessment of excavation conditions within the critical trench alignments and substation footprint;
- Provide an assessment of the soil electrical resistivity ground conditions beneath the substation footprint;
- Provide advice for sourcing naturally occurring pavement materials (base and subbase) in the vicinity of the solar farm site;
- Provide engineering parameters and specifications for naturally occurring base and subbase materials for use in pavement design in accordance with Engineering Road Note 9, '*Procedure for the Design of Flexible Pavements*', MRWA, January 2010 (if required); and
- Provide recommendations for further geotechnical investigations required to provide information for development of detailed foundation designs.

5 Available information

The following information has been provided by GFD for use in compiling this report:

- Sketch plan showing three potential substation locations dated 1 March 2022;
- Drawing GFD-021-001 Sheet 1 of 50 Revision A dated 5 March 2021;
- Denada Survey Pty Ltd Contour Plans 20773cf-001a Sheets 1 to 3 Revision A date 3 April 2017; and
- Example Report "*Solar Steel by Gonvarri Steel Services - Driven Test Loads for One Motor Per Row Solar Voltaic Tracker to be Installed in Vavuniya, Sri Lanka*" Rev.0 dated 25 November 2016.

6 Fieldwork

6.1 Overview

Fieldwork was carried between 8 and 10 March 2022, inclusive, under the full time supervision of a Senior Engineering Geologist and Geotechnical Engineer from GGC.

Test locations were typically selected to target areas of the site not previously investigated, areas within the solar farm footprint, and areas of critical infrastructure (including trenches and proposed substation locations).

It should be noted that some test locations were moved following discussions with the land owner, to minimise disturbance of the active farming area.

The test locations were measured during the fieldwork by hand-held GPS relative to Geocentric Datum of Australia (GDA). All depth measurements included in this report are referenced in metres below the existing ground level. Surface elevations were not recorded by GGC and elevations at each test location were estimated in the office using existing surface contours provided by GFD.

The positions of the test locations are shown on ***Figure 1*** and the numbering of the test locations is a continuation from the previous GGC investigations.

The locations of potential sources of borrow material were identified during previous GGC investigations and shown on ***Figure 2.***

6.2 Fieldwork Summary

The fieldwork undertaken for this investigation included the following:

- Advancing of 28 Electrical Friction Cone Penetration Test (CPT) probes (CPT31 to CPT55) to depths of between 0.5 m and 4.2 m below exisitng ground level;
- Four infiltration tests (IT01 to IT04) within the hand auger boreholes at depths of up to 1.0 m below existing ground level;
- Excavation of seven test pits using a 30 tonne excavator (TP29 to TP35), to depths of between 0.7 m and 3.5 m below exisitng ground level;
- Measurement of soil electrical resistivity using a Wenner Array Vertical Electical Sounding (VES) method at three locations with electrode spacing of 1 m, 2 m, 4 m, 8 m, 16 m, 24 m, and 32 m, along two orthogonal traverses; and
- Visual inspection of two potential sources of borrow material (Gravel Pit 3 and Gravel Pit 4) along Simpsons Road.

6.3 CPT Probes

The CPT testing was carried out within areas of the site not previously investigated, within the solar farm footprint, and to refine ground model presented in the previous GGC report dated 21 April 2021 (Reference GGC211891-R01-Rev1).

A total of 28 CPT probes (CPT31 to CPT55) were carried out, including repeated tests at three locations, to depths of between 0.5 m to 4.2 m using a specialist CPT Rig operated by Probedrill Pty Ltd.

A summary table of the CPT testing carried out for this investigation and the previous investigation (CPT1 to CPT30) is presented in ***Appendix A*** together with the CPT results and explanation sheet explaining the soil interpretation methods.

6.4 Infiltration testing

A total of four infiltration tests were completed in hand augured boreholes (IT01 to IT04) to depths of between 0.6 m to 1.0 m. The infiltration tests were completed using the *"Inverse Auger Hole Method"* described by Cocks (2007). The results of the infiltration testing are summarised in ***Table 1*** and calculation sheets included in ***Appendix B***.

Table 1 – Summary of falling head infiltration tests

Test Reference and Location	Ground conditions	Depth to base of test (m)#	Minimum Unsaturated Permeability, k (m/day)*
IT01	Silty SAND over CLAY	0.6	0.1
IT02	Clayey SAND over CLAY	0.7	0.2
IT03	Silty SAND over CLAY	0.7	0.2
IT04	CLAY	1.0	0.1

Notes: # All depths are relative to existing ground surface.

* Minimum estimated unsaturated permeability rates are based on the "inverse auger hole method"

6.5 Test pits

The test pits were excavated at locations as close as practical to the proposed trenching alignments across the site.

A total of seven test pits (TP29 to TP35) were excavated to depths between 0.7 m to 4.0 m below existing ground surface using a 30-tonne excavator. On completion, each test pit was backfilled with spoil.

A summary of the test pits excavated is presented in ***Table 2***. The test pit logs showing the major strata intersected and the depths at which samples were recovered are presented, together with explanatory notes, in ***Appendix C***.

Table 2 – Summary of test pits

Test Pit No.	Easting	Northing	Termination Depth (m bgl)	Termination Details
TP29	397,194	6,745,141	2.7	Target depth
TP30	396,310	6,745,193	2.7	Target depth
TP31	395,577	6,745,175	3.5	Target depth
TP32	395,869	6,744,526	0.7	Refusal Ferricrete
TP33	396,851	6,743,996	1.0	Refusal Weathered Gneiss
TP34	395,497	6,744,000	2.7	Target depth
TP35	397,056	6,744,632	1.3	Refusal Ferricrete

6.6 Soil resistivity testing

The soil resistivity testing was carried out at the locations of potential substation across the site using Wenner Array VES.

Three locations were tested (WA01-A to WA03-A) with two orthogonal VES traverses acquired at each test location to measure variations in the subsurface electrical properties.

The VES data was processed by GBG Maps Pty Ltd (GBG) and the geophysical investigation report is included as ***Appendix D***. A summary of the VES results are presented in ***Table 3***, ***Table 4*** and ***Table 5***.

Table 3 – Resistivity layer model at WA01-A

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	0.30	0.30	1332	0.35	0.35	481
2	11.82	11.52	114.1	0.63	0.28	28.6
3	∞	∞	3100	2.13	1.50	680
4				3.11	0.98	22.3
5				∞	∞	190

Table 4 – Resistivity layer model at WA02-A

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	1.46	1.46	64.4	0.64	0.64	87.6
2	2.56	1.10	12.6	1.47	0.83	9.77
3	2.89	0.33	17.6	∞	∞	435
4	∞	∞	364			

Table 5 – Resistivity layer model at WA03-A

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	0.65	0.65	4.15	1.23	1.23	2.97
2	2.56	1.90	2.26	2.91	1.68	0.76
3	5.22	2.66	1.63	3.26	0.35	2.50
4	∞	∞	30.4	∞	∞	30.1

6.7 Existing road inspections

The existing roads used to access the site from the sealed Perenjori-Three Spring Road include Broad Road, Hunt Road, and Wilson Road.

The existing roads are formed from gravel and transverse the generally level to very gently sloping ground. The roads are bounded on both sides by open pasture and occasional small salt lakes. Mature trees (eucalypts) and sparse scrub line the road verges.

The road surfaces are unsealed and covered with compacted, imported lateritic gravel fill (gravel sheeting). The road verges comprise a surface cover of in-situ topsoil, lateritic gravel fill, or exposures of the underlying subgrade material. There are no formed table drains present along the roads and they are generally road is generally 'at-grade".

Photographs of the existing roads are presented in ***Appendix E***.

6.8 Borrow material inspections

The locations of the potential borrow material sources inspected during this investigation were identified during previous GGC investigations. Two potential locations of sources along Simpson Road were inspected (Gravel Pit 3 and Gravel Pit 4).

The inspections involved a walkover of each site by GGC and the recording of surficial ground conditions. Photographs of the inspections are present in ***Appendix F***.

Gravel Pit 3

Gravel Pit 3 is located on Simpson Road about 25 km west of the site and comprises a triangular shaped portion of land with a number of existing potential borrow pits within densely vegetated bushland.

A number of the borrow pits appear to be exhausted and at the time of inspection it was unclear whether any of the borrow pits were currently active.

Material sampling was not carried out at this location due to the unknown status of the borrow.

The existing borrow pit that was inspected comprised gravelly stockpiles, outcropping rock in the base, and discrete areas of lateritic gravel.

It is likely that lateritic gravelly fill has been won from borrow pits within this area.

Gravel Pit 4

Gravel Pit 4 is located on Simpson Road about 10 km west of the site and comprises a triangular shaped portion of land that is densely vegetated with one potential existing borrow pit in the south east corner.

A number of lateritic gravelly stockpiles were observed adjacent to outcropping weathered rock, however it was unclear whether stockpiles had been won from this area or imported.

The potential existing borrow pit did not appear active at the time of inspection.

Material sampling was not carried out at this location due to the unknown origin of the materials present.

7 Laboratory testing

Laboratory testing was not carried out as part of this investigation.

8 Site conditions

8.1 Published information

The Perenjori 1:250,000 scale geology map indicates that the site is located over three main geological units. These units are described as:

- ***Alluvial and Colluvial deposits (C_{zc})*** **–** transported clay, sand and lithic fragments, may be indurated;
- ***Lithic Fragments (C_{zf})*** **–** sand and clay, may include colluvium; and
- ***Leucocratic equigranular ortho-and para-gneiss (A_{nl})*** **–** fine to medium grained; minor supracrustal remnants common; uniform to banded, folded fabric; some flaser texture.

The site is not covered by published groundwater contour information.

8.2 Subsurface conditions

The subsurface conditions encountered during the investigation fieldwork were generally consistent with the published geology and previous GGC reports.

The typical subsurface conditions are summarised in ***Table 6***.

Table 6 – Typical subsurface conditions

Layer/Unit	Depth to Top of Layer (m)	Depth to Bottom of Layer (m)	Thickness of Layer (m)	Typical Description/ Remarks
Silty SAND minor Clayey SAND	0.0	~0.5	~0.5	Fine to coarse grained, subangular to subrounded; red brown to brown; non plastic to low plasticity; trace to with some fine to coarse grained, angular to subrounded gravel; loose to medium dense; with some roots and root fibres; of possibly Alluvial and disturbed by farming origin. Overlying CLAY/Silty CLAY or Sandy GRAVEL/Gravelly SAND.
CLAY/Silty CLAY	~0.5	Beneath depth of investigation	~3.5	Medium to high plasticity; red brown to orange brown; trace fine to coarse sand; trace fine to coarse lithic and calcrete gravel; very stiff to hard becoming very stiff at depth; of possibly Alluvial and Residual Soil origin. Frequently mottled off white between 0.5 m to 1.8 m with some fine to coarse, angular to subangular, very low to low strength Calcrete gravel sized nodules. Described as Sandy GRAVEL in TP31.
Sandy GRAVEL/Gravelly SAND	0.0 to +4.2	0.3 to beneath depth of investigation	0.3 to 0.6	Fine to coarse grained, subangular to rounded lithic, pisolithic and Calcrete gravel; sand fine to coarse grained, subangular to subrounded; red brown, orange brown mottled off white, pale brown and grey; trace to with some low plasticity fines; weakly to moderately cemented; of Colluvial, Alluvial, and Duricrust origin. Overlying FERRICRETE/WEATHERED GNEISS
FERRICRETE/ WEATHERED GNEISS*	0.3 to +4.2	Beneath depth of investigation	-	Recovered as Mixtures of Sand, Gravel and Cobbles; variably cemented/ weathered, very low to medium strength; mottled/ stained red brown, purple, pale brown, grey. Strength increases with depth to refusal becoming high strength. Difficulty to distinguish between Ferricrete/ Gneiss; Ferricrete overlying and overprinting upper boundary of Gneiss.

It should be noted that the depth to rock (Ferricrete/Weathered Gneiss) varies considerably across the site. Further information is presented in ***Section 9.2*** and on ***Figure 03*** detailing the depths to refusal of the CPTs which is likely to correlated with the Sandy GRAVEL/Gravelly SAND layer and/or Ferricrete/ Weathered Gneiss.

The term 'Weathered Gneiss' a simplified term used to describe the rock of likely Gneissic origin (refer to the published information for more detail).

Groundwater was not observed during the fieldwork. Drainage channels (dry) and drainage features were observed in low lying area in the southwest and southeast of the site. At these locations, there was some evidence of shrinkage cracking and localised soil erosion.

9 Geotechnical assessment

9.1 Assessment of permeability rates

The infiltration testing carried out across the site indicated a low rate of permeability of between 0.1 to 0.2 m/day within the soils at the locations tested.

Given the size of the site and current number of test locations a design permeability rate of 0.1 m / day in considered suitable.

Further testing is recommended following detailed design of the storm water disposal/site drainage system to confirm permeability rates at specific locations.

9.2 Assessment of CPT obstructions and pile driving conditions

It is understood that driven H-piles are the preferred method of founding the solar panel units.

A total of 63 CPT's were advanced during the two geotechnical investigations at the site, including repeated probes at eight locations.

Based on the current information and information from the previous investigation, we have interpreted the CPT results and presented an updated assessment of areas where early pile refusal within 4 m of the existing ground surface is likely. This assessment is presented on ***Figure 3***.

The boundaries shown on ***Figure 3*** are indicative and based on investigations using CPT's.

Based on this assessment and the currently available information, the subsurface conditions in two areas of the site, in the southwest and north, appear to be favourable for pile installation. It is likely that obstructions will be encountered at shallow depth (< 4 m) elsewhere on the site and that these obstructions pose a risk of early pile refusal.

It must be noted that this assessment is qualitative in nature, and the success of driving piles is dependent on a number of factor other than the ground conditions. Other factors that will affect pile driving include:

- Method of installation and equipment (including type of piling hammer and hammer characteristics).
- Pile type, pile stiffness and dimensions.
- Experience of piling crew using the pile types and equipment and in the local ground conditions; and
- Pre-treatment and drilling of the ground in advance of pile driving.

It is possible that pre-drilling, alternative methods of piling and alternative foundation types may reduce the risk of premature pile refusal and these should be considered as part of detailed design and site trials. It is important to note that the capacity of piles is influenced greatly by the method of installation and any ground disturbance during installation. It is recommended that a quantitative pile driving assessment be completed as part of detailed design using GRL-WEAP or a similar program.

It is recommended that test piles be advanced at the site as part of future investigations during the detailed design process to confirm pile driving and to verify the site-specific pile design parameters used for detailed design. It is recommended that a percentage of production piles (typically between about 2 and 5% of production piles) be subjected to dynamic pile testing and CAPWAP analysis (or similar wave equation analysis), in accordance with Appendix B of AS 2159-2009 "*Piling - Design and Installation*".

The type and amount of pile testing completed on production piles will affect the geotechnical reduction factor used to determining working pile loads in accordance with AS 2159-2009.

9.3 Pile design parameters

Piles must be designed in accordance with the requirements of AS 2159-2009 "*Piling – Design and Installation*".

We have assessed the available CPT data and recommended the preliminary geotechnical pile design parameters in ***Table 7*** for concept design development.

We have assumed that the H-section piles will penetrate at a distance of at least 3 pile diameters into each strata to fully mobilise the average skin friction and end bearing values stated. If embedment depths of less than 3 diameters are achieved, the values in ***Table 7*** should be reduced in consultation with an experienced geotechnical engineer.

Table 7 - Recommended preliminary pile design parameters

Major Soil Type	Ultimate Base Resistance[#1] Fb (kPa)	Ultimate Average Shaft Friction in Compression[#2] Fm,s (kPa)	Ultimate Average Shaft Friction in Tension [#3] Fm,st (kPa)
Silty SAND (Medium Dense)	Not recommended[*1]	20	15
CLAY/ Silty Clay – Very Stiff	500[*3]	30	24
Rock	TBC – further geotechnical investigation required	N/A[*2]	N/A[*2]

Notes:
[#1] Base resistance values estimated using Nq values recommended by Berezantsev et al (1961).
[#2] Shaft Friction values estimated using method recommended by Poulos (1980).
[#3] Ultimate average shaft friction in tension estimated as 0.8x compression value in accordance with the recommendations in AS 2159-2009 (subject to on-site pile testing to confirm design value).
[*1] Silty SAND unit not recommended as a bearing stratum for H-piles.
[*2] H-piles are unlikely to penetrate to a suitable embedment for shaft friction to be mobilised in rock.
[*3] for H-Piles embedded at shallow depths (i.e. 4 m or less), it is recommended that the base resistance contribution in stiff clays be based on the cross sectional areas of the steel pile section only and not the gross-base area of the pile.

9.4 Preliminary pile embedment lengths for compression and tension

Based on the information provided, we have assumed that H-section piles with dimensions of either 120 mm (h) x 120 mm (b) or 140 mm (h) x 140 mm (b) will to be used to found the solar panels for this project.

The example report provided by GFD indicates that typical working loads of about 10 kN (compression) and 5 kN (tension) are expected on each pile. Based on a preliminary (conservative) geotechnical reduction factor (ϕ_g) of 0.45 (based on lower bound values and the risk rating system in AS 2159-2009) ultimate pile loads of about 23 kN (compression) and 11 kN (tension) have been estimated as likely to be required.

It is important to note that Clay soils have been observed at site, and in some areas evidence of shrinkage cracking was observed during the fieldwork. On this basis, and assuming a depth of soil suction change of 3 m for the Three Springs area (in accordance with AS 2870-2011), we recommended that all foundation piles required to act as tension piles be advanced beyond a depth of 3 m below existing ground level. Any tension resistance contribution above 3 m depth should be ignored in reactive clays soils, as the soil/ pile interface contact may not be continuous. This minimum depth of embedment may be revised following more detailed geotechnical investigations and assessment of soil suction depths.

Estimated minimum pile lengths for the assumed H-section piles have been summarised in ***Table 8***.

Table 8 - Preliminary minimum driven pile lengths for compression and tension

H –Section Dimensions	Base Area (pile CSA only- not plugged) (m^2)	Shaft Contact Area (fully plugged) (m^2/m)	Min. Embedment for Compression (m bgl)*1	Min Embedment for Tension*2 (m bgl)
120 x 120	0.0034 (wt = 7 mm)	0.48	2.5	4
140 x 140	0.0043 (wt= 7 mm)	0.56	2	4

Notes: *1 – minimum embedment for compression includes 0.5 m allowance for ground disturbance as per AS 2159-2009.
*2 – minimum embedment for tension includes 3 m embedment allowance for shrink –swell effects (refer to text above) where piles refuse early, alternative methods of pile installation or alternative foundation types may be required.

9.5 Pile preparation and alternative foundation options

Where the H-section piles cannot be advanced to a suitable depth to mobilise tensile (uplift) resistance to satisfy the design requirements, ground treatment in advance of piling and alternative foundation options may be considered for the solar panel units. Options for ground treatment and alternative foundations that could be considered for this project include:

- Shallow excavation and removal of shallow obstructions (where obstructions are within the top 1 m or 2 m);
- Pre-drilling using a suitably sized percussive drill head to advance a pilot hole to the required depth (note: pilot drill hole diameter must be less than the outside dimensions (h and b dimensions) of the H-section piles and final size should be confirmed in consultation with an experienced geotechnical engineer);
- Ground anchors designed to provide the required tensile (uplift) capacity;
- Alternative pile types, such as bored and cast-in-situ piles; and
- Alternative foundation types, such as mass footings.

9.6 Assessment of exposure classification for steel and concrete piles

The durability design of piles for this project must be completed in accordance with Section 6 of AS 2159-2009 "*Piling - Design and Installation*".

The assessment of exposure classification for the site has been completed using the analytical results from the laboratory testing from the previous GGC investigation, included as ***Appendix G***, and the exposure classification limits presented in Table 6.4.2(c) and Table 6.5.2 (c) of AS2159-2009.

Based on the results from the CPT profiles, we consider that the assessment of exposure classifications for this site should be judged using "*Soil conditions B – low permeability soils (e.g., silts and clays) or all soils above the groundwater*".

The results of the assessment for concrete piles in soil indicate that the test results are within the "*non-aggressive*" and "*mild*" exposure classifications as noted in Table 6.4.2(c) of the Standard. If concrete piles are designed for use at the site, then the minimum concrete cover and concrete strength recommendations included in Table 6.4.3 of the Standard must be adopted.

The results of the assessment for steel piles in soil indicate that the test results are all within the "*non-aggressive*" exposure classification as noted in Table 6.5.2 (c) of the Standard. Based on this exposure classification, Table 6.5.3 of the Standard recommends a uniform corrosion allowance of

<0.01 mm/year for exposed steel piles in soil without corrosion protection and without a protection system.

9.7 Assessment of excavation conditions

The excavation conditions at the site were investigated based on the proposed locations of likely trench alignments.

The excavation characteristics have been assessed based on the test pit data and our experience in similar conditions, and are expected to be as follows:

- The Silty SAND, CLAY/Silty CLAY, and Sandy GRAVEL/Gravelly SANDs are assessed as having an Excavation Method of "*Dig*";
- The Ferricrete / Weathered Gneiss is assessed as having a likely Excavation Method of "*Dig to Rip*" for the upper 0.5 m to 1.0 m.

The Excavation Method descriptors are in general accordance with Pettifer and Fookes (1994).

The Earthworks Contractor should make their own assessment of the excavatability of the in-situ materials, in particular the Ferricrete and Weathered Gneiss.

9.8 Advice on sourcing naturally occurring pavement materials

Based on the inspections carried out at Gravel Pit 3 and Gravel Pit 4 there is the potential for these areas to produce suitable lateritic gravelly material for use in road construction at the site.

It is likely that the area around Gravel Pit 3 has previously been utilised as a source of lateritic gravelly fill for use in the maintenance of existing gravel roads in the Shire of Three Springs.

It was unclear whether Gravel Pit 4 has been utilised as a source of fill.

Information should be sort from the Shire of Three Springs to confirm the status of Gravel Pit 3 and Gravel Pit 4 and further investigation and testing are recommended if utilisation of the material from these locations are permissible.

Additional information regarding engineering parameters and specifications for naturally occurring base and subbase materials for use in pavement design is provided in the GGC report dated 21 April 2021 (Reference GGC211981-R02-Rev1).

9.9 Recommended future geotechnical investigations and testing

Based on the results of the geotechnical investigation completed at the site, the subsurface conditions encountered are considered reasonably complex for pile driving. In order to develop and refine the geotechnical foundation design, and to support the design of other site infrastructure required for this development, the following geotechnical investigation and testing are recommended:

- Detailed geotechnical investigations in accordance with AS 1726-1993 "*Geotechnical Site Investigations*" as required to support detailed design development;
- Investigations as required to provide information on existing subgrades for internal road design (within the site) and existing subgrade and pavement conditions for external access roads (leading to the site);
- Pile driving trials and pile capacity testing on test piles to confirm the suitability of the pile driving equipment, pile types and assumed preliminary pile design parameters; and
- Dynamic pile testing on production piles to verify achieved pile capacities for foundation piles during construction.

10 Important information about your GGC geotechnical report

The reader's attention is drawn to the important information about this report which follows the main text.

11 References

The following published information sources have been reviewed by GGC in compiling this report:

- Standards Australia (2009) "*Piling – Design and Installation*" Australian Standard AS 2159 – 2009
- Standards Australia (2011) "*Residential Slabs and Footings*" Australian Standard AS 2870 – 2011
- Standards Australia "*Geotechnical Site Investigations*" Australian Standard AS 1726-1993.
- Berezantsev (1961) "*Load bearing capacity and deformation of piled foundations*", proceedings of the 5th International Conference on Soil Mechanics, Paris, 1961.
- Poulos and Davis (1980) "*Pile Foundation Analysis and Design*"
- Perenjori (1983), Sheet SH 50-6 (1:250,000 scale) Geological Series, Geological Survey of Western Australia.

IMPORTANT INFORMATION SHEETS

1 Introduction

The information contained in this document is to inform GGC's clients of the reasonable expectations of a geotechnical report and options to mitigate geotechnical risks and consequences. This information is provided to help clients understand where GGC's responsibility as a geotechnical engineer, acting reasonably, begin and end. In doing so, it also highlights the responsibility of our client and third parties.

Please contact the GGC Project Director should you not understand the report and the limitations of the information provided.

2 Collection and Interpretation of Data

Geotechnical investigations identify subsurface conditions only at the point of investigation. The material encountered during the investigation is recorded on logs and based on a visual assessment and (if undertaken) supported by laboratory test results. In the case of an Electric Friction Cone Penetrometer Test (CPT), the data recorded is a tip pressure and sleeve friction on a rod; from which ground conditions are inferred.

Actual conditions may differ from those encountered during the investigations and / or inferred a distance from the investigation stations. In addition, the actual interface between materials or units may be gradual or more abrupt than inferred from the results of the investigation.

A Chartered Geotechnical Engineer and / or Engineering Geologist should be retained through the various stages of the project to identify variances, conduct additional tests if required, and provide recommendations to address geotechnical / geological issues identified on site. The Chartered Geotechnical Engineer / Engineering Geologist should also review the actual conditions encountered to confirm that they are consistent with those inferred in this report.

3 Change in Subsurface Conditions

The geotechnical recommendations and parameters provided in this report are based on the ground conditions encountered at the time of the geotechnical investigation. Changes in the ground conditions can occur over time and include, but are not limited to, the following:

- Filling or excavation works (or other anthropologic events);
- Flooding;
- Groundwater fluctuations;
- Earthquakes or other such events;
- Works on neighbouring sites impacting on the subject site; and,
- Migration of pollutants from neighbouring properties.

GGC should be consulted if there is any protracted delay in the issue of this report and the use of the recommendations provided.

It is important to note that where ground conditions have changed, additional geotechnical investigations and testing may be required to assess the impacts of the changed ground conditions.

4 Specificity of Report

This geotechnical report has been prepared for a specific project and design; therefore, it has been written to address specific geotechnical issues. In doing so, the following has been taken into account:

- The project objectives as described in the report;
- The client's budget and programme constraints;
- The specific site mentioned in the report; and,
- The nature and extent of the development at the site.

This report should not be used for any other purpose other than what has been specifically described and should not be relied upon if:

- The report was not written for you;
- The report was not written for your specific site;
- The report does not address your specific development;
- There is a significant delay between undertaking the report and developing the site; or,
- Significant changes to the site have occurred.

Where the information and recommendations contained within this report are being used by others, GGC should be engaged during the design process to engage with the other members of the design team and review works being produced by the other design team members to confirm that it is consistent with the geotechnical report.

5 Environmental Issues

Unless specifically addressed in this report, environmental and contamination considerations are not included. The investigation methods required for environmental investigation often differ to those used for geotechnical investigations and the information contained within this report may not be appropriate for use by environmental engineering consultants and scientists.

This report was not prepared to address environmental issues and the client is responsible to ensure environmental considerations have been taken into account for the project. GGC can provide information on environmental engineering consultants, should this be required.

6 Construction

The method of ground investigation used for geotechnical investigations limits GGC's ability to know every detail about the ground conditions on site. GGC use reasonable engineering judgement to form an assessment of the subsurface conditions at the site based on information obtained at specific locations.

Ground conditions may be encountered during construction that were not anticipated during the geotechnical investigation. Should this be the case, GGC should be engaged to provide construction support as a means of mitigating the consequence of encountering unexpected ground conditions.

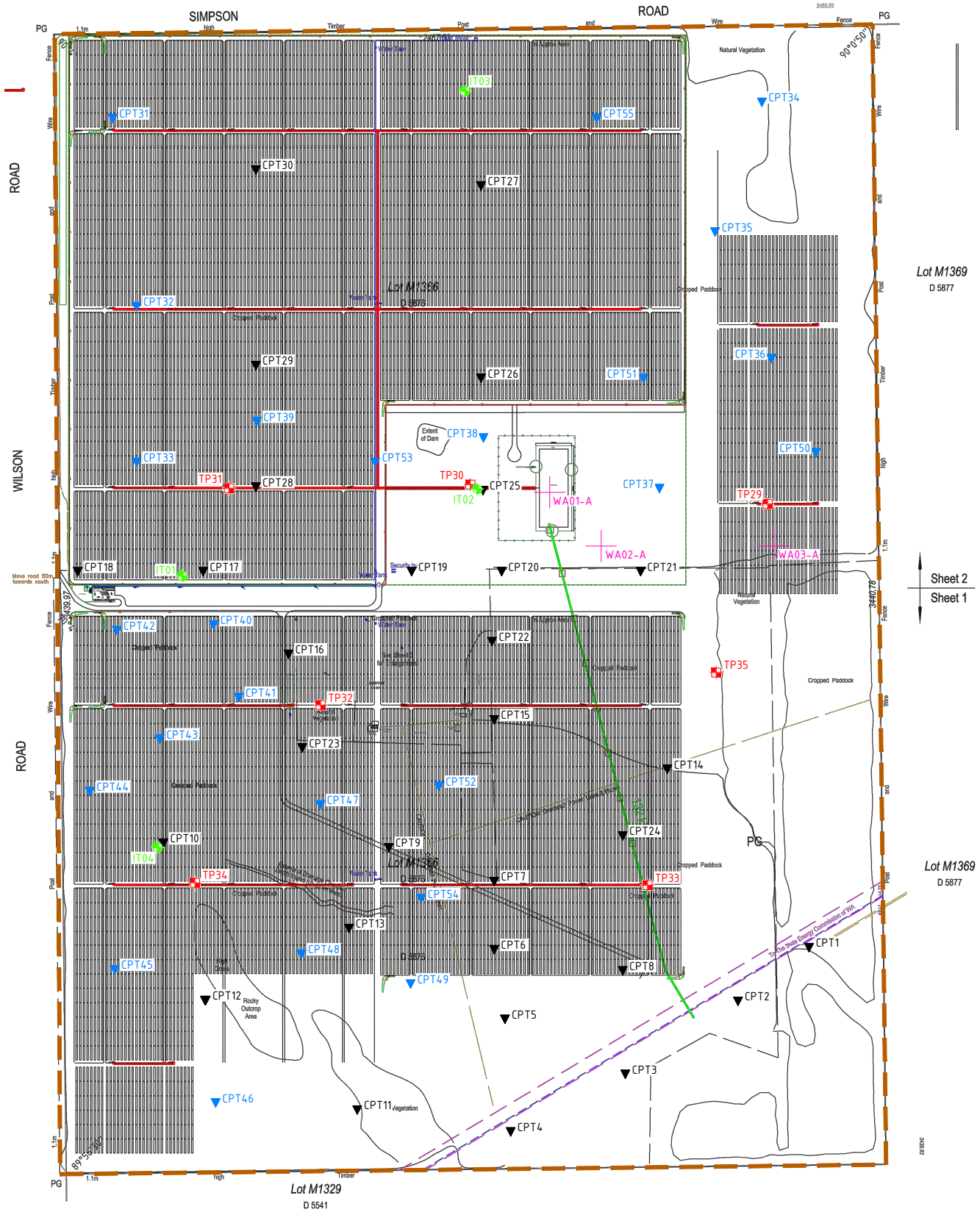
7 Responsibility of Others

GGC has prepared this report for the use by our client. GGC does not accept any responsibility from any third party, other than our client, who uses the information contained in this report. GGC takes no responsibility for any damages suffered by any third party as a consequence of any decisions or action that have been made based on this report.

Further information regarding the responsibility of clients and other third parties should also be obtained from the following:

- "Guidelines for the Provision of Geotechnical Information in Construction", published by the Institution of Engineers Australia;
- Australian Standard AS 2870 – 2011, Residential Slabs and Footings;
- Australian Standard, AS 5100 – 2004, Bridge Design Set; and,
- Any other Standard or Code of Practice applicable to the development.

FIGURES



LEGEND

- CPT LOCATION (GGC 2022)
- CPT LOCATION (GGC 2021)
- TEST PIT LOCATION
- INFILTRATION TEST LOCATION
- RESISTIVITY TEST LOCATION
- PROPOSED TRENCH LOCATION

TITLE: Site Investigation Plan Proposed Solar Farm Development Womarden (near Three Springs), WA	DRAWN: C. STEWART	DATE: 15-03-2022	
	CHECKED: I. ROGERS	DATE: 16-03-2022	
	PROJECT No: GGC211891-R02-Rev0		A3
	SCALE: N.T.S.	FIGURE No: 01	

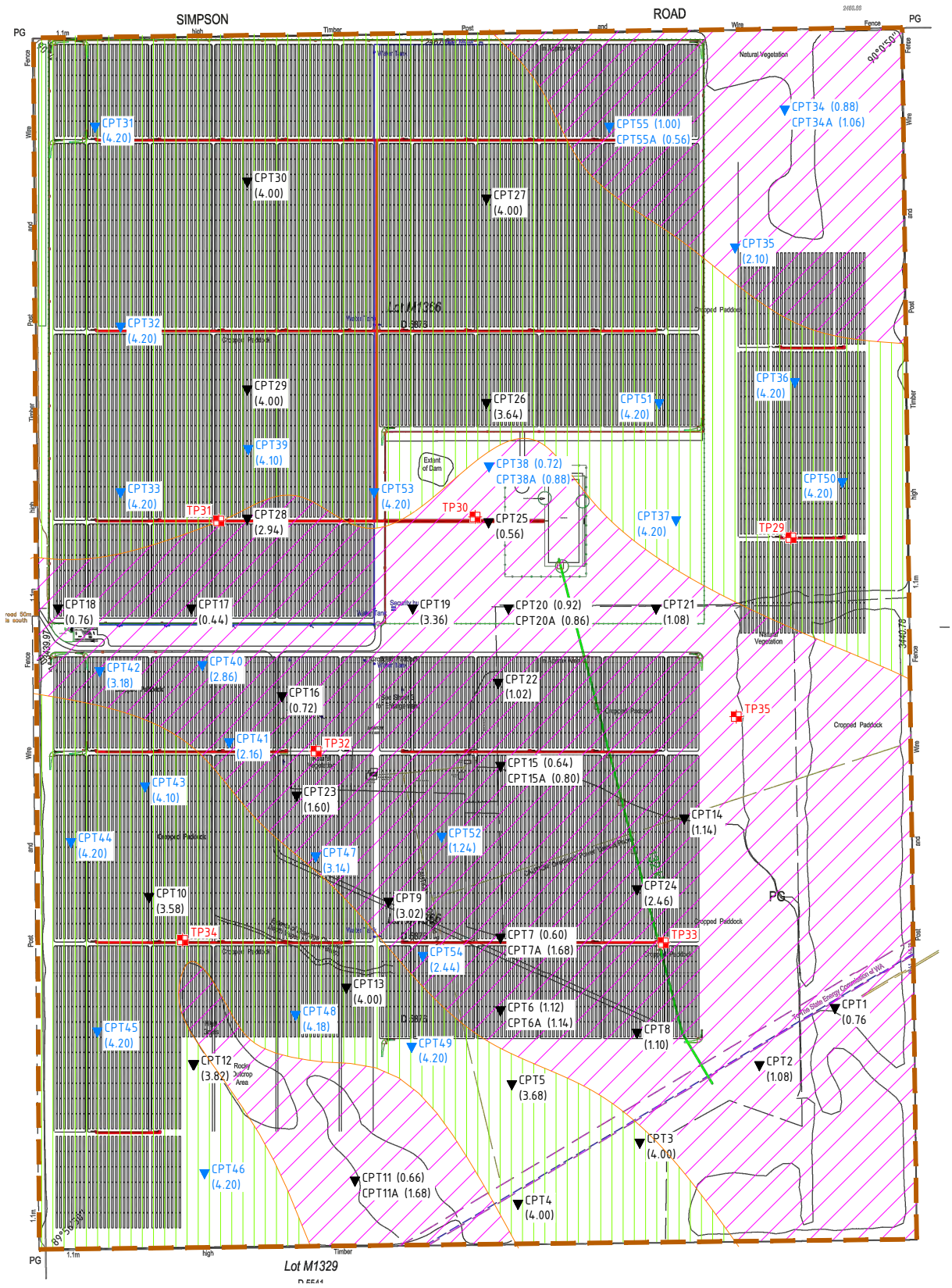
NOTE: LOCATIONS OF POTENTIAL SOURCES OF BORROW MATERIAL ARE APPROXIMATE.

Maps Image: © 2022 CNES / Airbus

GGC
Geotechnical and Geological Consultants

TITLE
Gravel Pit Location Plan
Proposed Solar Farm Development
Womarden (near Three Springs), WA

DRAWN C. STEWART	DATE 16-03-2022
CHECKED I. ROGERS	DATE 17-03-2022
PROJECT No GGC211891-R02-Rev0	A3
SCALE N.T.S.	FIGURE No 02



LEGEND

- CPT LOCATION (GGC 2022)
- CPT LOCATION (GGC 2021)
- TEST PIT LOCATION
- DRIVEN PILES LIKELY TO ENCOUNTER ODSTRUCTION ABOVE 4m DEPTH
- DRIVEN PILES LIKELY TO BE DRIVABLE TO 4m DEPTH
- (4.00) / (4.00) CPT TERMINATION DEPTH

NOTE: ALL BOUNDARIES ARE INFERRED AND MAY VARY FROM THOSE SHOWN ON THIS FIGURE.

TITLE	Interpreted CPT Plan Proposed Solar Farm Development Womarden (near Three Springs), WA	DRAWN: C. STEWART	DATE: 16-03-2022
		CHECKED: I. ROGERS	DATE: 16-03-2022
		PROJECT No: GGC211891-R02-Rev0	A3
		SCALE: N.T.S.	FIGURE No: 03

APPENDIX A:
CPT Results

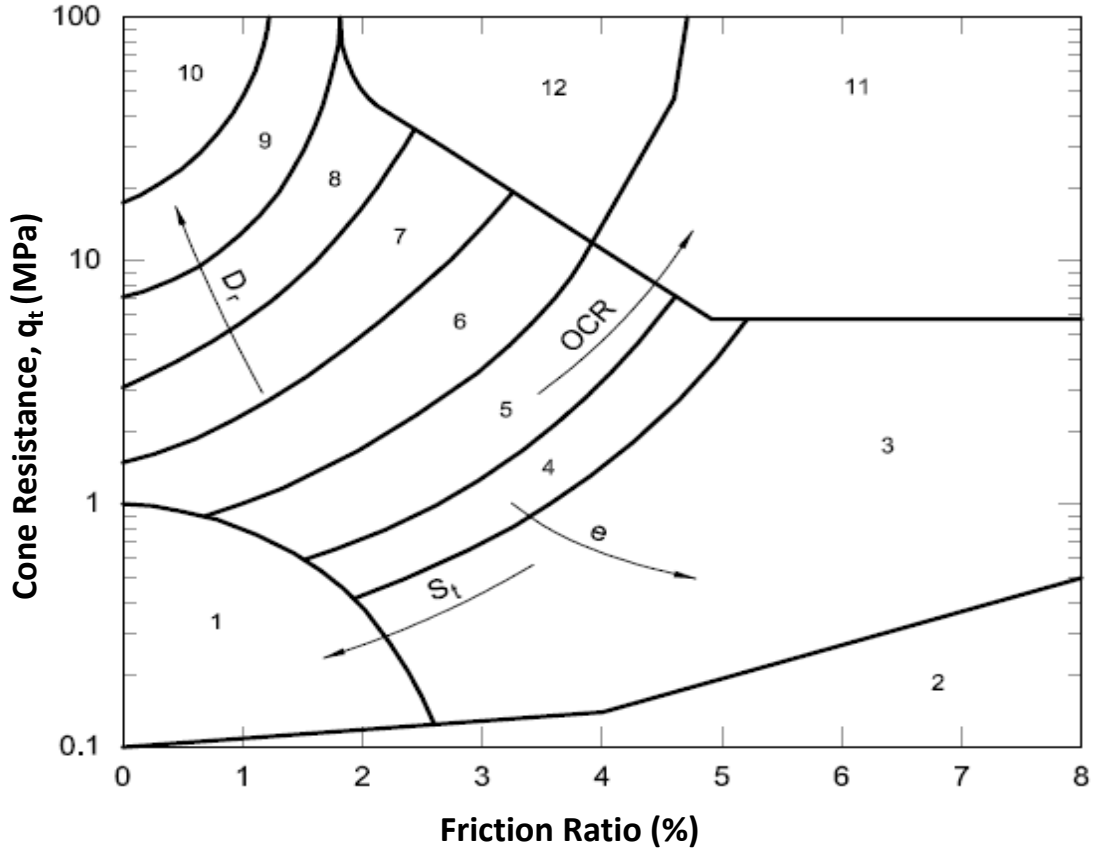
Investigation Ref.	Co-ordinates		Termination Depth (m bgl)[*1]	Reason for Termination[*2]	Interpreted Stratigraphy[*3]
	Easting	Northing			
CPT 1	397327	6743803	0.76	Probe Refusal	Loose Silty SAND over Obstruction at 0.76m
CPT 2	397113	6743626	1.08	Probe Refusal	Loose to medium dense Silty SAND/ Clayey SAND over Obstruction at 1.08m
CPT 3	396766	6743449	4.00	Target Depth	Medium dense Silty SAND over very stiff CLAY
CPT 4	396401	6743239	4.00	Target Depth	Medium dense Silty SAND over very stiff CLAY
CPT 5	396391	6743569	3.68	Probe Refusal	Very stiff CLAY over Obstruction at 3.68m
CPT 6	396377	6743794	1.12	Inclination	Dense Silty SAND over very stiff CLAY over Obstruction at 1.12m
CPT 6A	396379	6743787	1.14	Inclination	Loose Silty SAND over very stiff CLAY over Obstruction at 1.14m
CPT 7	396373	6743995	0.60	Probe Refusal	Medium dense Silty SAND over Obstruction at 0.60m
CPT 7A	396376	6743971	1.68	Inclination	Loose Silty SAND over very stiff CLAY over Obstruction at 1.68m
CPT 8	396754	6743727	1.10	Probe Refusal	Loose SAND over obstruction at 1.10m
CPT 9	396076	6744090	3.02	Probe Refusal	Very stiff CLAY over Obstruction at 3.02m
CPT 10	395403	6744090	3.58	Probe Refusal	Very stiff Clay over Obstruction at 3.58 m
CPT 11	395960	6743264	0.66	Probe Refusal	Medium dense Silty SAND over Obstruction at 0.66m
CPT 11A	395933	6743250	1.68	Probe Refusal	Very stiff CLAY over Obstruction at 1.68m
CPT 12	395551	6743618	3.82	Probe Refusal	Very stiff CLAY over Obstruction at 3.82m
CPT 13	395944	6743846	4.00	Target Depth	Very stiff CLAY/ Silty CLAY
CPT 14	396907	6744326	1.14	Probe Refusal	Medium dense Silty SAND over Obstruction at 1.14m
CPT 15	396382	6744476	0.64	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 0.64m
CPT 15A	396396	6744481	0.80	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 0.80
CPT 16	395762	6744664	0.72	Probe Refusal	Dense Silty SAND over Obstruction at 0.72m
CPT 17	395524	6744949	0.44	Probe Refusal	Medium dense Silty SAND over Obstruction at 0.44m

Investigation Ref.	Co-ordinates		Termination Depth (m bgl)[*1]	Reason for Termination[*2]	Interpreted Stratigraphy[*3]
	Easting	Northing			
CPT 18	395118	6744943	0.76	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 0.76m
CPT 19	396120	6744947	3.36	Probe Refusal	Very stiff CLAY over Obstruction at 3.36m
CPT 20	396397	6744933	0.92	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 0.92m
CPT 20A	396397	6744933	0.86	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 0.86m
CPT 21	396794	6744937	1.08	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 1.08m
CPT 22	396366	6744720	1.02	Probe Refusal	Loose to medium dense Silty SAND over Obstruction at 1.02m
CPT 23	395794	6744404	1.60	Probe Refusal	Very stiff to hard CLAY over obstruction at 1.60m
CPT 24	396771	6744138	2.46	Probe Refusal	Very stiff to hard CLAY over Obstruction at 2.46m
CPT 25	396336	6745174	0.56	Probe Refusal	Medium dense Silty SAND over Obstruction at 0.56 m
CPT 26	396334	6745496	3.64	Probe Refusal	Very stiff CLAY over Obstruction at 3.64m
CPT 27	396331	6746080	4.00	Target Depth	Very stiff CLAY
CPT 28	395641	6745175	2.94	Probe Refusal	Very stiff CLAY over Obstruction at 2.94m
CPT 29	395638	6745538	4.00	Target Depth	Very stiff to hard Silty CLAY/ CLAY
CPT 30	395654	6746128	4.00	Target Depth	Very Stiff to hard CLAY
CPT 31	395228	6746280	4.20	Target Depth	Medium dense Silty SAND over very stiff to hard CLAY
CPT 32	395297	6745712	4.20	Target Depth	Loose Silty SAND over very stiff to hard Silty CLAY
CPT 33	395277	6745248	4.20	Target Depth	Medium dense Silty SAND over hard CLAY
CPT 34	397171	6746319	0.88	Probe Refusal	Dense SAND over Obstruction at 0.88
CPT 34A	397171	6746324	1.06	Probe Refusal	Dense SAND over Obstruction at 1.06
CPT 35	397036	6745941	2.10	Probe Refusal	Medium dense Silty SAND over hard to very stiff Silty CLAY/CLAY over Obstruction at 2.10
CPT 36	397219	6745555	4.20	Target Depth	Medium dense Silty SAND over very stiff CLAY
CPT 37	396862	6745189	4.20	Target Depth	Medium dense Silty SAND over very stiff to hard CLAY

Investigation Ref.	Co-ordinates		Termination Depth (m bgl)[*1]	Reason for Termination[*2]	Interpreted Stratigraphy[*3]
	Easting	Northing			
CPT 38	396342	6745330	0.72	Probe Refusal	Dense to very dense SAND/Gravelly SAND over Obstruction at 0.72
CPT 38A	396342	6745335	0.88	Probe Refusal	Dense to very dense SAND/Gravelly SAND over Obstruction at 0.88
CPT 39	395663	6745371	4.10	Probe Refusal	Medium dense Silty SAND over very stiff to hard CLAY over Obstruction at 4.10
CPT 40	395533	6744759	2.86	Probe Refusal	Medium dense Silty SAND over hard CLAY over Obstruction at 2.86
CPT 41	395618	6744544	2.16	Probe Refusal	Loose Silty SAND over hard CLAY over Obstruction at 2.16
CPT 42	395228	6744741	3.18	Probe Refusal	Medium dense Silty SAND over very stiff to hard CLAY/Silty CLAY over Obstruction at 3.18
CPT 43	395379	6744416	4.10	Probe Refusal	Loose to medium dense Silty SAND over hard CLAY over Obstruction at 4.10
CPT 44	395168	6744252	4.20	Target Depth	Medium dense SAND over hard Silty CLAY
CPT 45	395245	6743729	4.20	Target Depth	Medium to dense Silty SAND/SAND over hard Silty CLAY/CLAY
CPT 46	395537	6743330	4.20	Target Depth	Medium dense to dense Silty SAND/SAND very stiff to hard/cemented Silty CLAY/ CLAY
CPT 47	395860	6744219	3.14	Inclination	Medium dense Silty SAND over very stiff to hard CLAY over Obstruction at 3.14
CPT 48	395811	6743779	4.18	Probe Refusal	Medium dense Silty SAND over stiff to very stiff CLAY over Obstruction at 4.18
CPT 49	396124	6743682	4.20	Target Depth	Medium Dense Silty SAND over very stiff CLAY
CPT 50	397348	6745292	4.20	Target Depth	Dense Silty SAND over very stiff CLAY
CPT 51	396838	6745511	4.20	Target Depth	Medium dense Silty SAND over very stiff CLAY
CPT 52	396214	6744283	1.24	Probe Refusal	Medium dense SAND/Silty SAND over very stiff to hard CLAY over Obstruction at 1.24
CPT 53	396020	6745255	4.20	Target Depth	Medium dense to dense Silty SAND over very stiff to hard clay
CPT 54	396165	6743941	2.44	Probe Refusal	Medium dense Silty SAND over hard CLAY over Obstruction at 2.44
CPT 55	396686	6746281	1.00	Probe Refusal	Dense to very dense SAND/Gravelly SAND over Obstruction at 1.00
CPT 55A	396686	6746286	0.56	Probe Refusal	Dense to very dense SAND/Gravelly SAND over Obstruction at 0.56

Notes:

[*1] All depths are referenced in metres below existing ground surface level.
[*2] Probe refusal = probe refused due to high pressure on cone.
[*2] Inclination = probe refused due to excessive cone inclination from vertical.
[*3] Soil types and stratigraphy interpreted using Robertson et al (1986) method.



DEFINITIONS

q_t : Cone tip resistance corrected for pore water pressure
S_t : Sensitivity
e : Void ratio
D_r : Relative density
OCR : Overconsolidation ratio

SOIL BEHAVIOUR TYPES

1. Sensitive fine grained
2. Organic material
3. Clay
4. Silty clay to clay
5. Clayey silt to silty clay
6. Sandy silt to clayey silt
7. Silty sand to sandy silt
8. Sand to silty sand
9. Sand
10. Gravelly sand to sand
11. Very stiff fine grained material (OC/cemented)
12. Sand to clayey sand (OC/cemented)

IMPORTANT NOTES

i. The above chart is intended for natural soils only and is not directly applicable to FILL materials.
ii. Some overlap in soil zones should be expected. Soil types may be confirmed visually.
iii. Correlations based on local experience should be used where available and may indicate differing boundaries to those shown in the chart.

Reference: Robertson, P.K., Campanella, R.G., Gillespie, D. and Grieg, J. (1986) "Use of Piezometer Cone Data". Proceedings of the ASCE Speciality Conference In Situ '86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, pp 1263-80, American Society of Civil Engineers (ASCE)

GGC
Geotechnical and Geological Consultants

CONE PENETRATION TESTING SOIL TYPE INTERPRETATION

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd

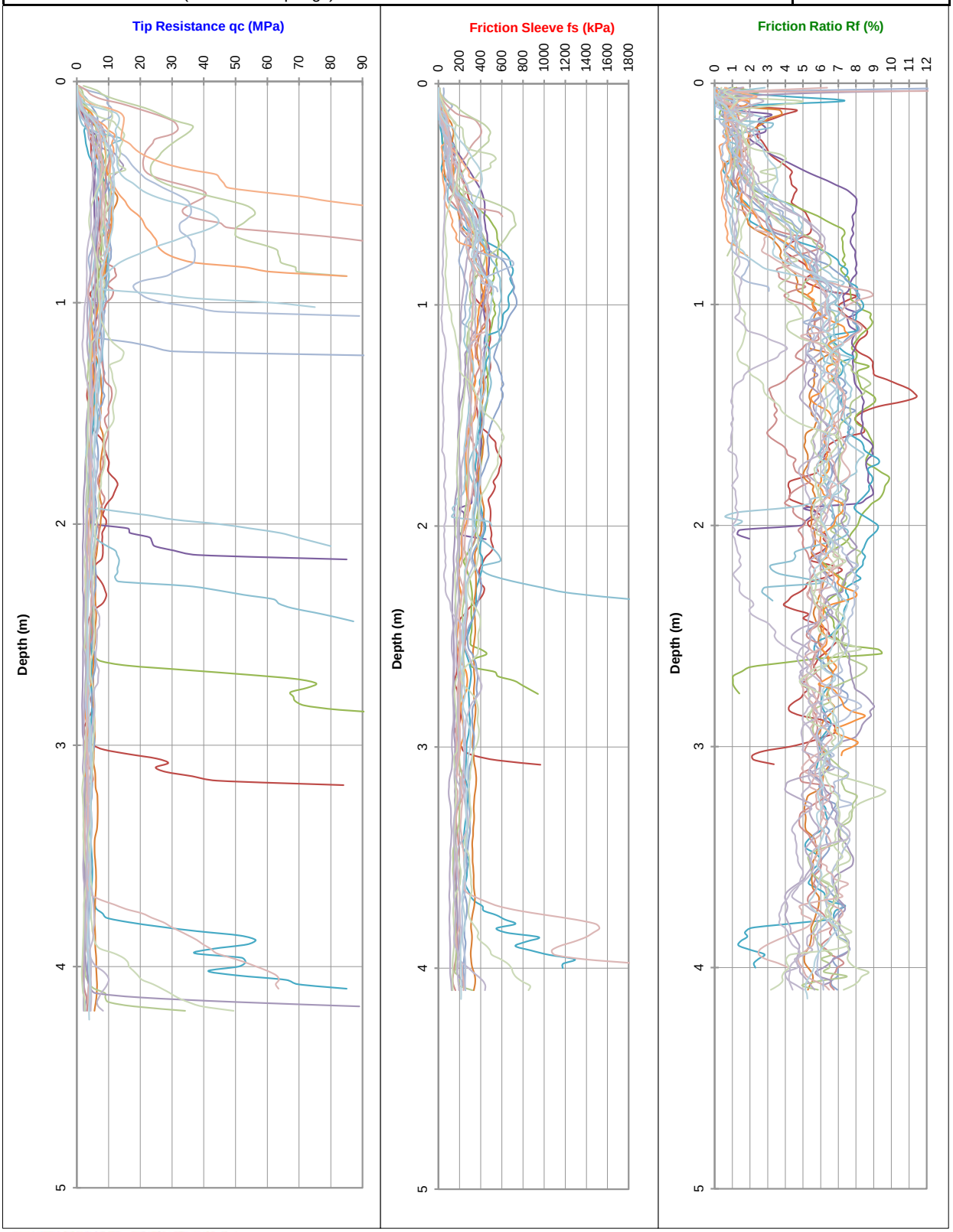
Job No.: GGC211891

PROJECT: Proposed Solar Farm

Date/s: 8&9 Mar 2022

LOCATION: Womarden (near Three Springs) WA

ALL DATA



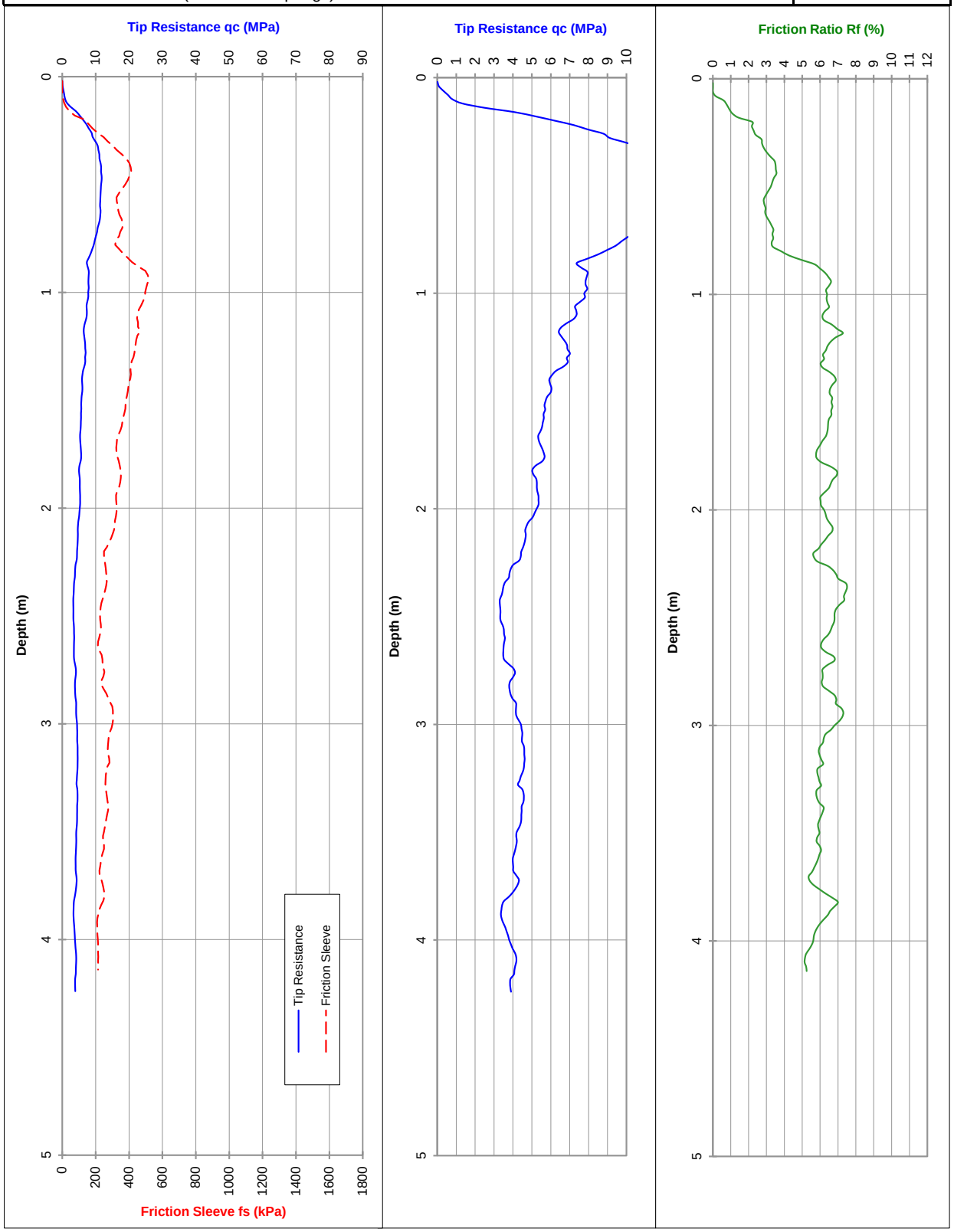
PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 31**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

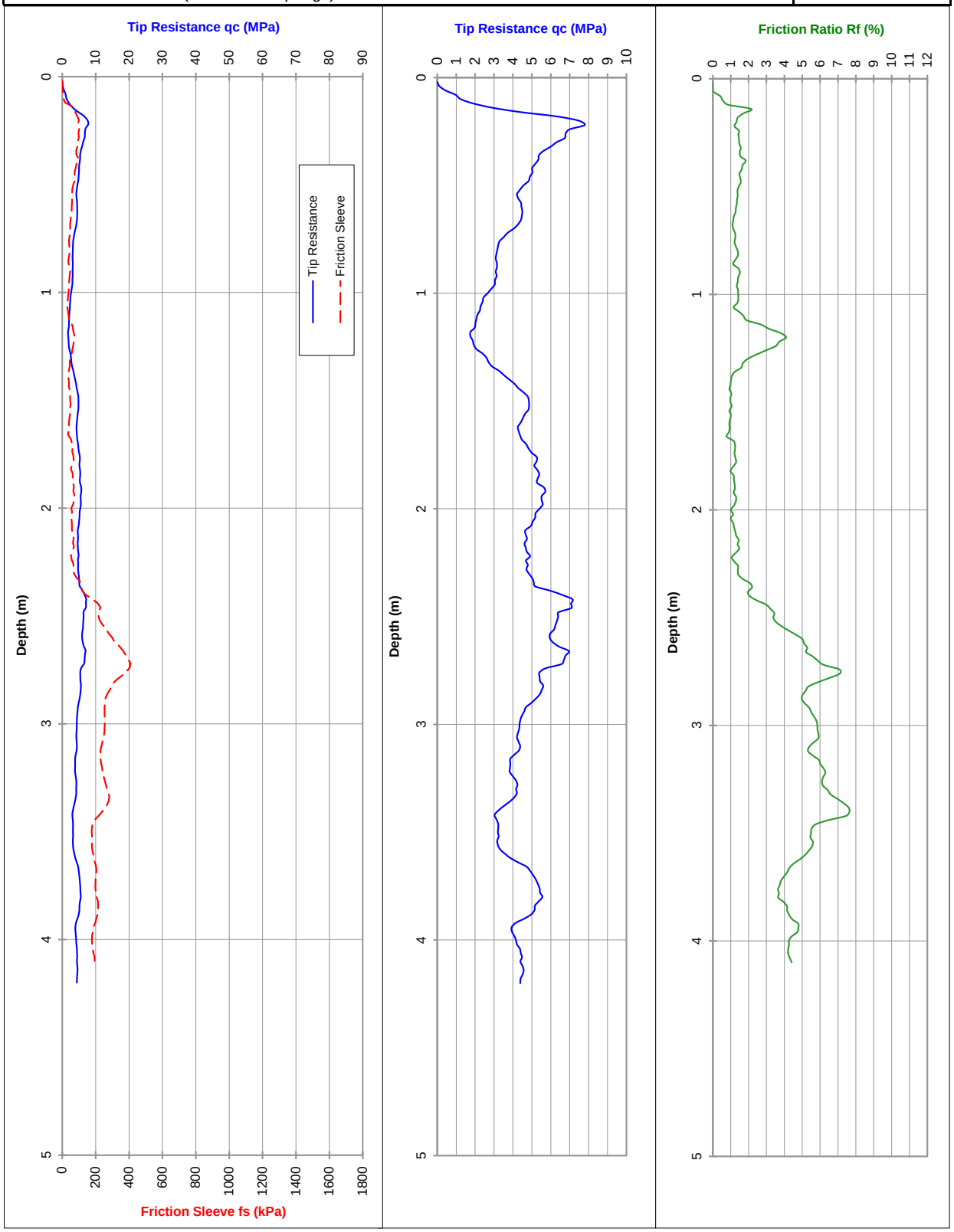
Cone I.D.: EC20

File: GG0048G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 32**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

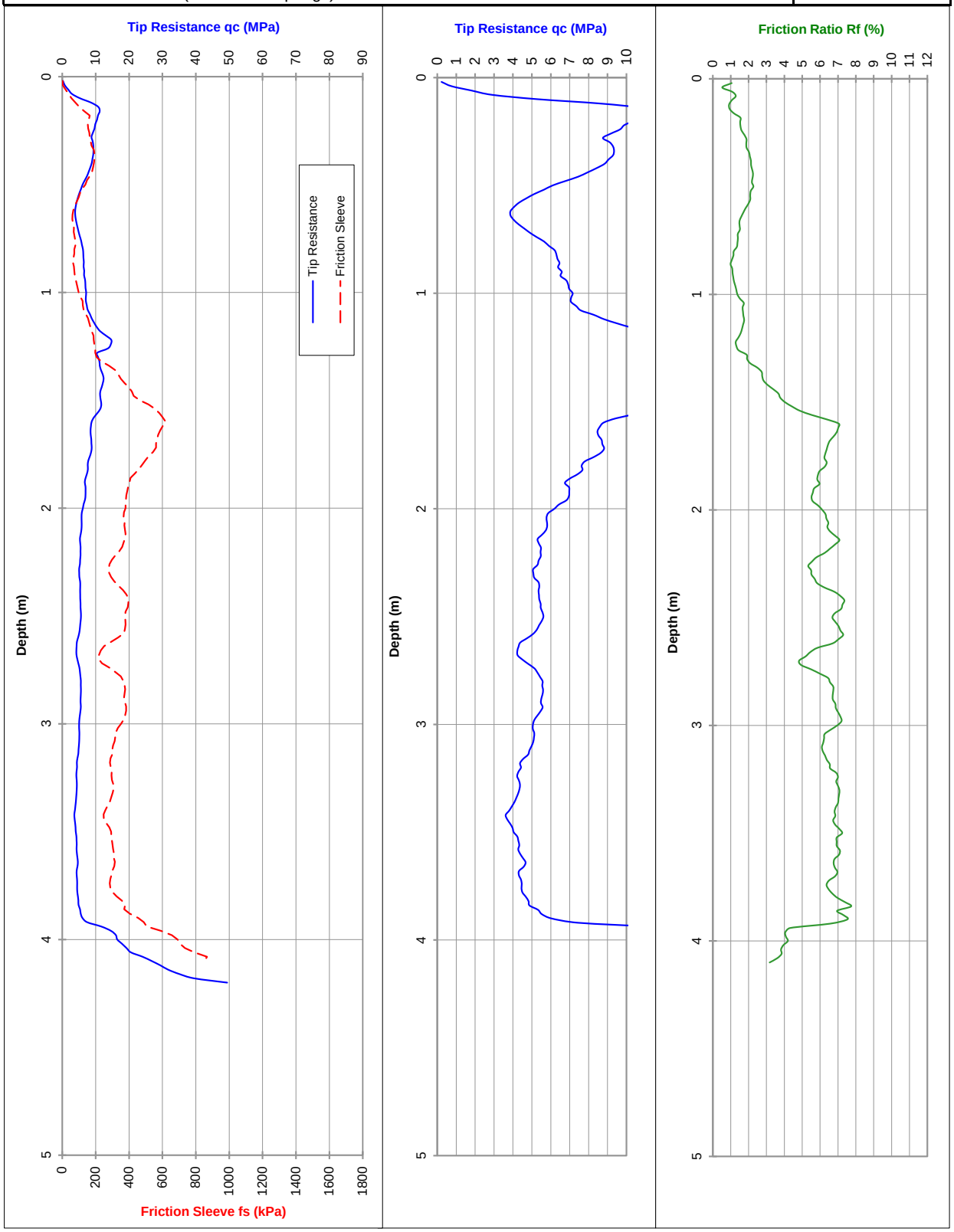
Cone I.D.: EC20

File: GG0047G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 33**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

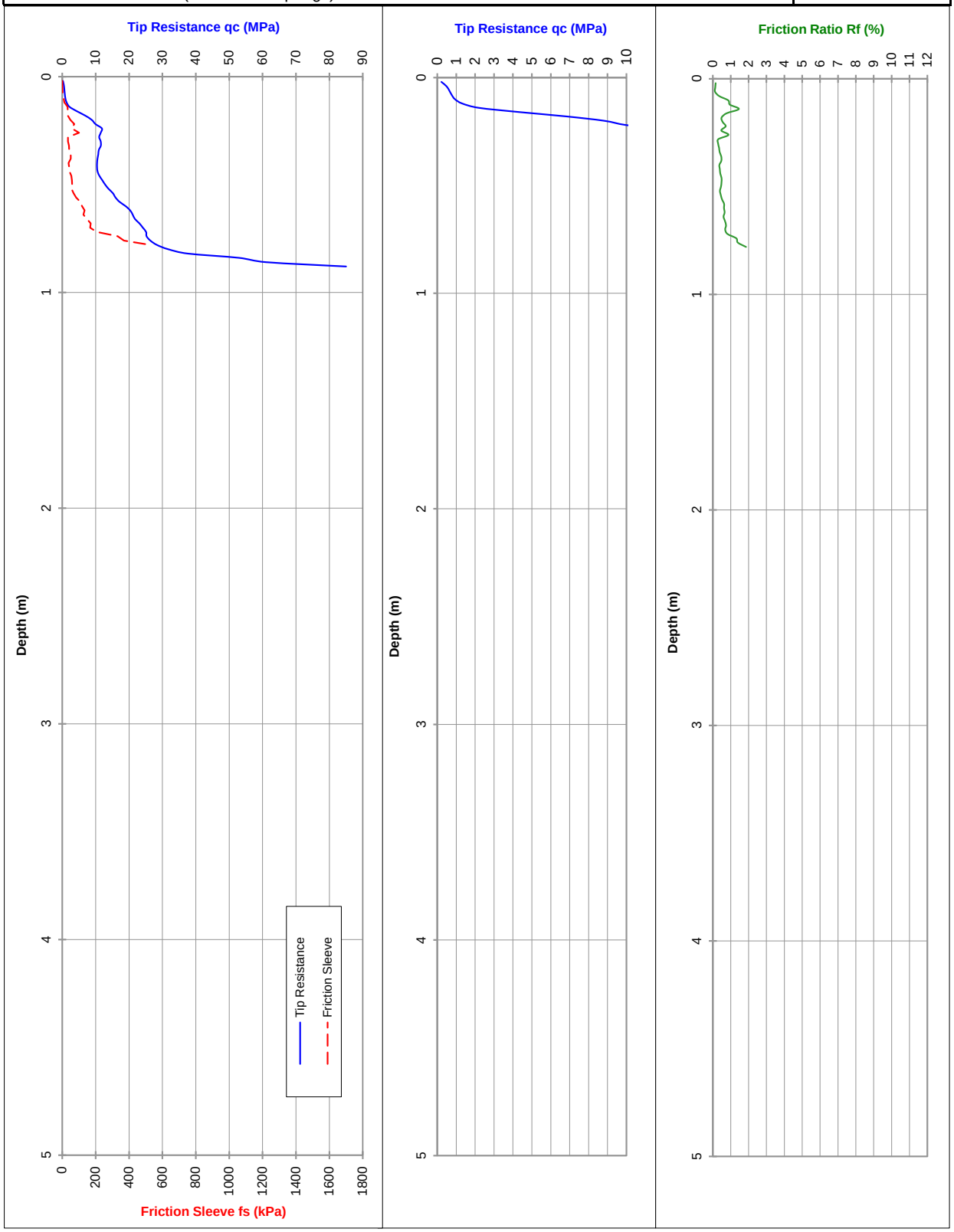
Cone I.D.: EC20

File: GG0046G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 34**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 85 MPa

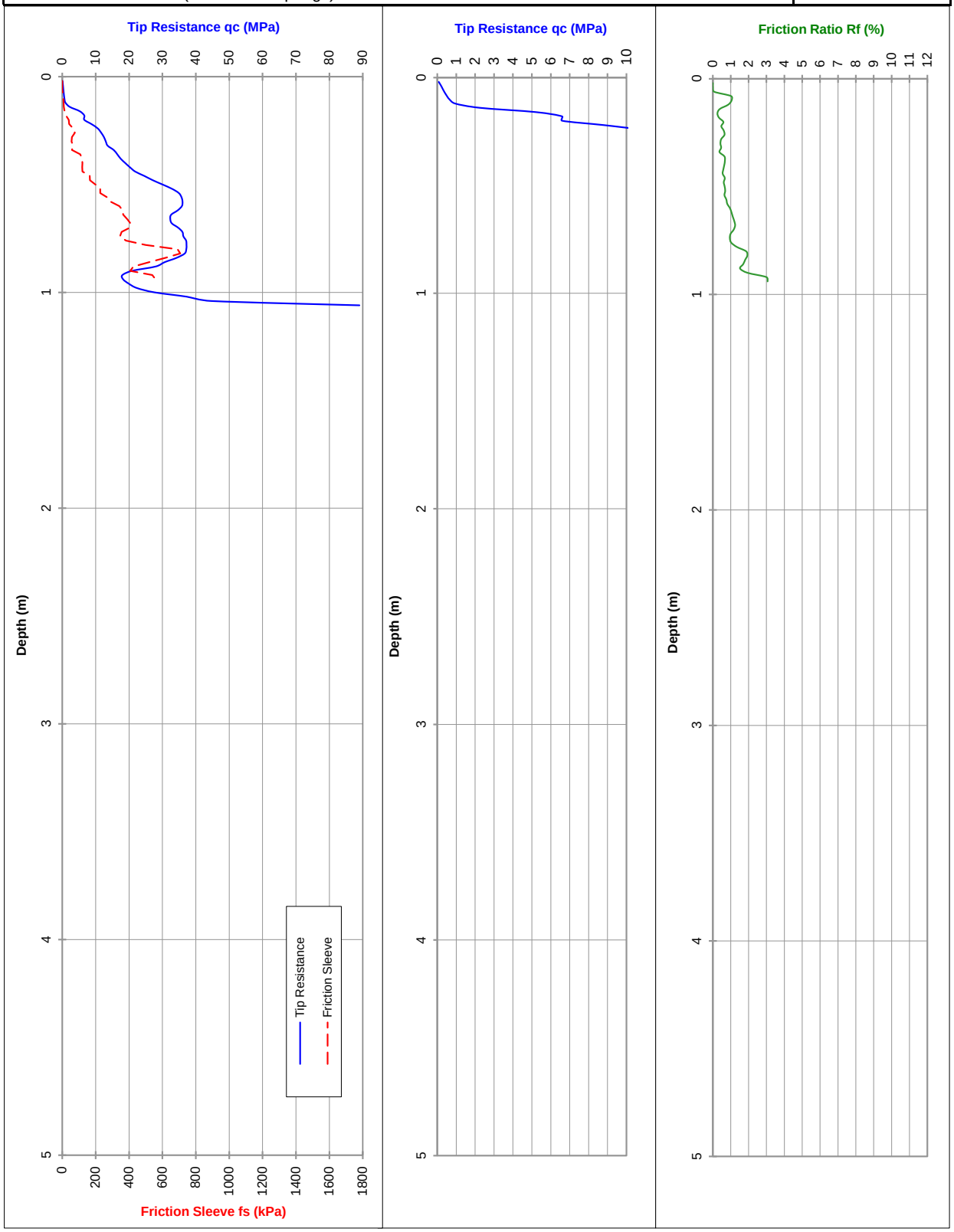
Cone I.D.: EC20

File: GG0028G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 34A**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 89 MPa

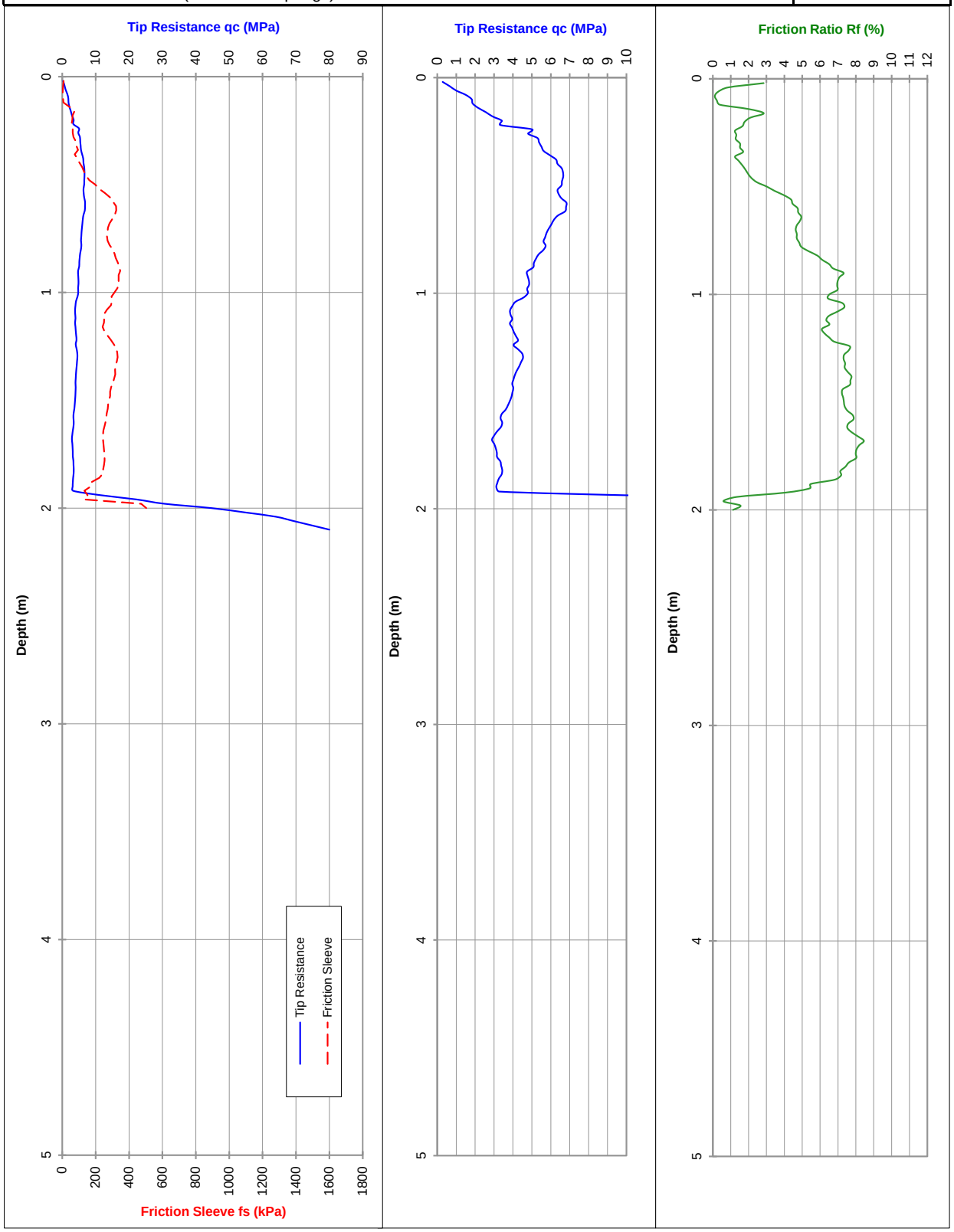
Cone I.D.: EC20

File: GG0029G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 35**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 80 MPa

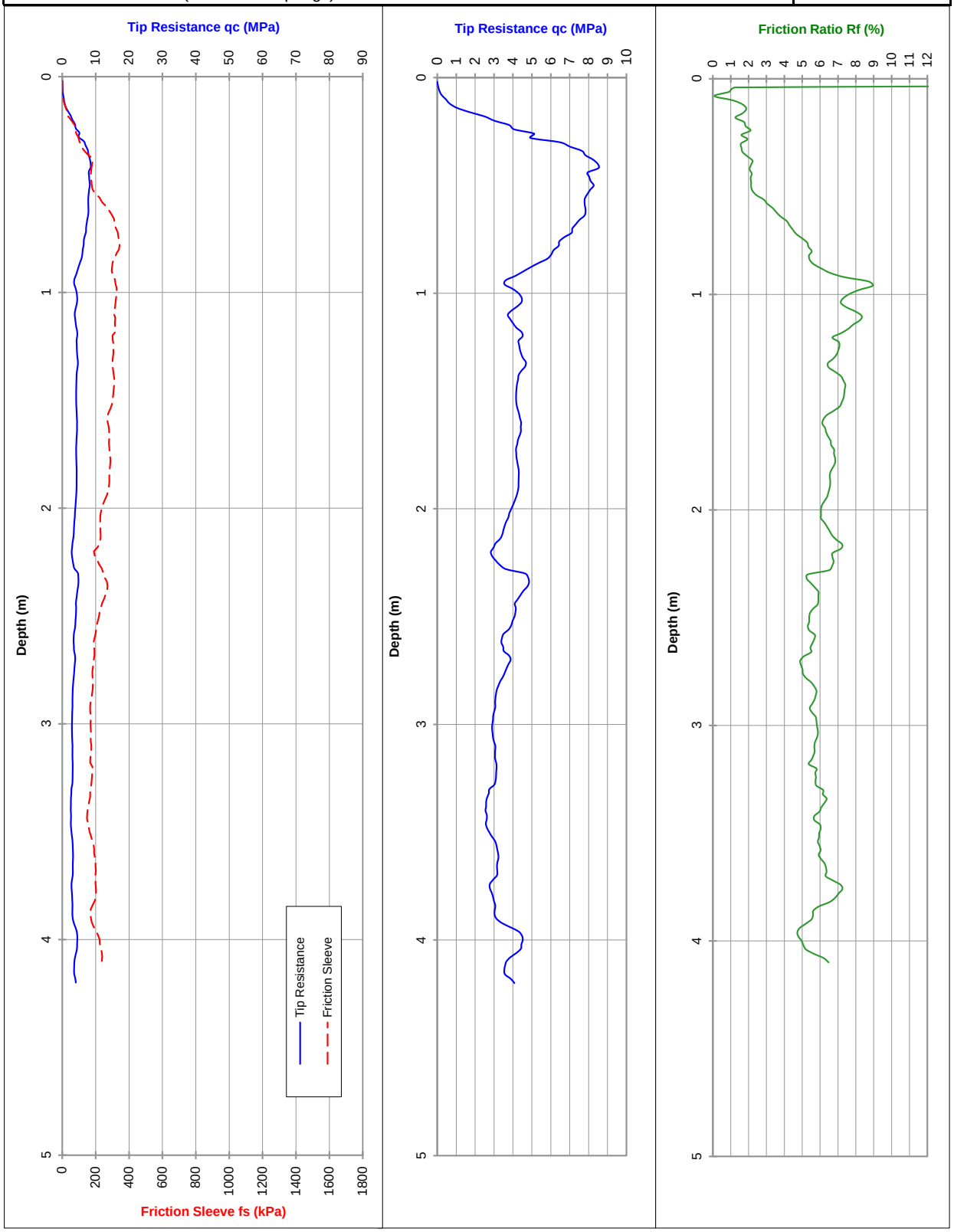
Cone I.D.: EC20

File: GG0027G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 36**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

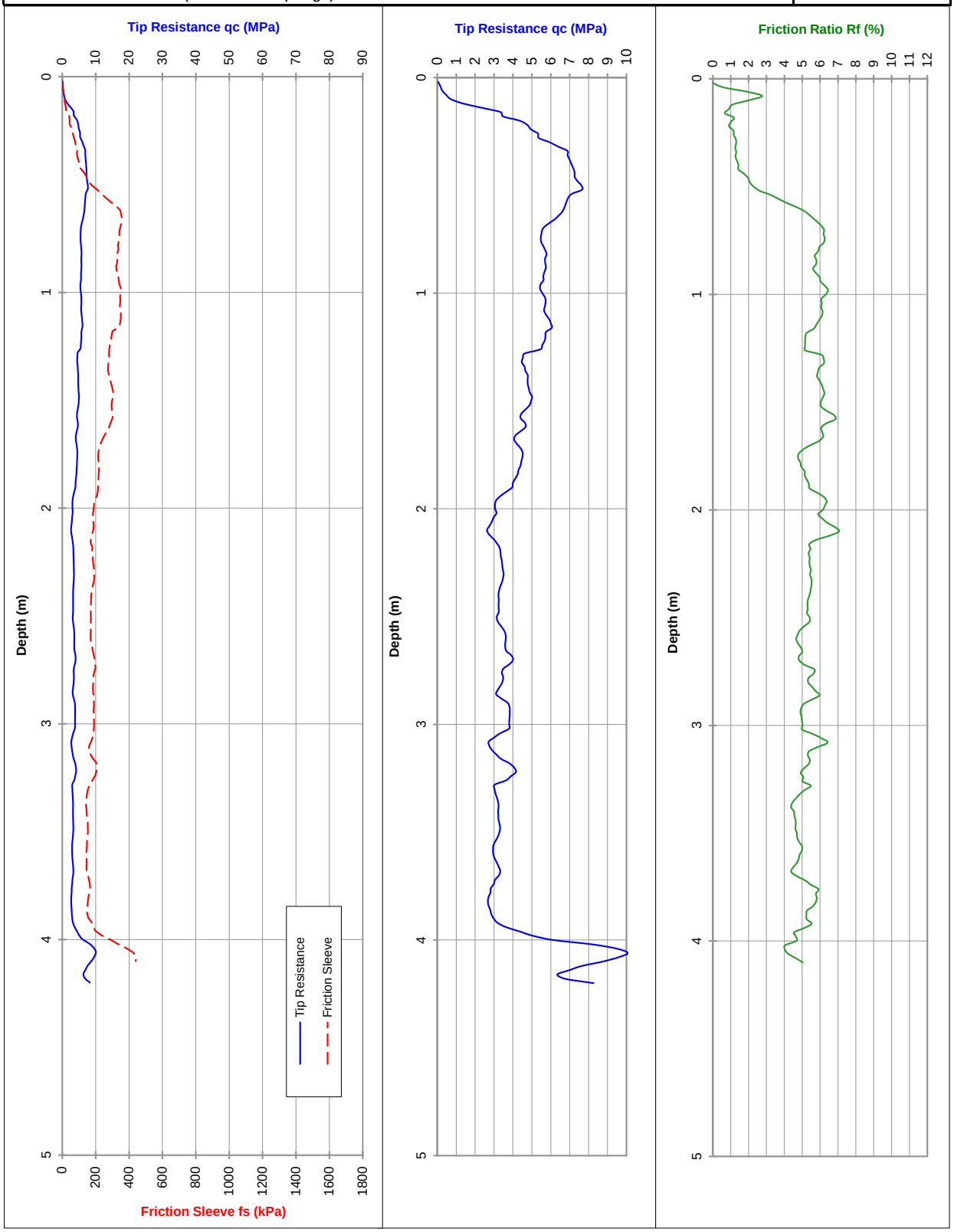
Cone I.D.: EC20

File: GG0030G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 37**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 3.4

Dummy probe to (m):

Refusal:

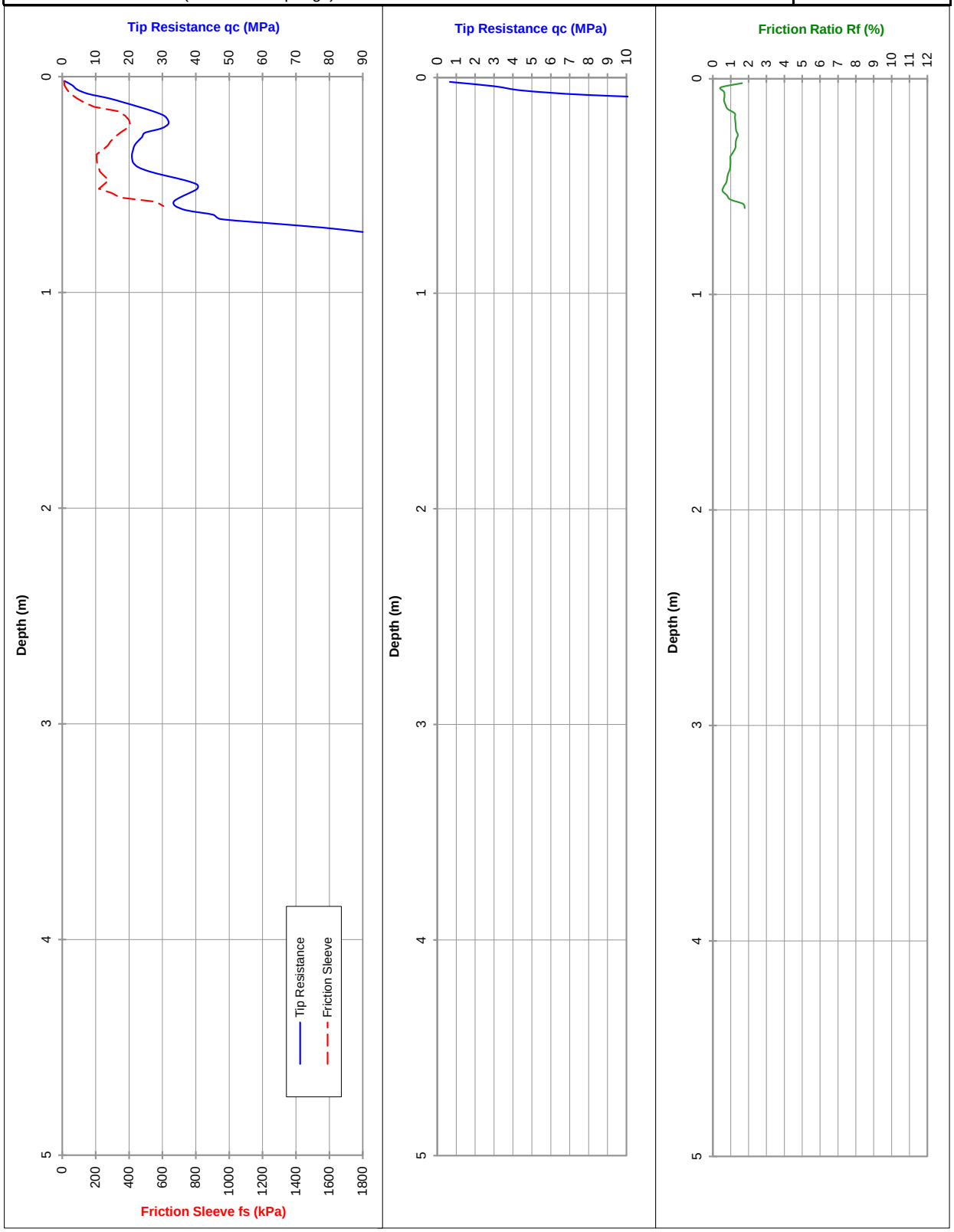
Cone I.D.: EC20

File: GG0041G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 38**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 90 MPa

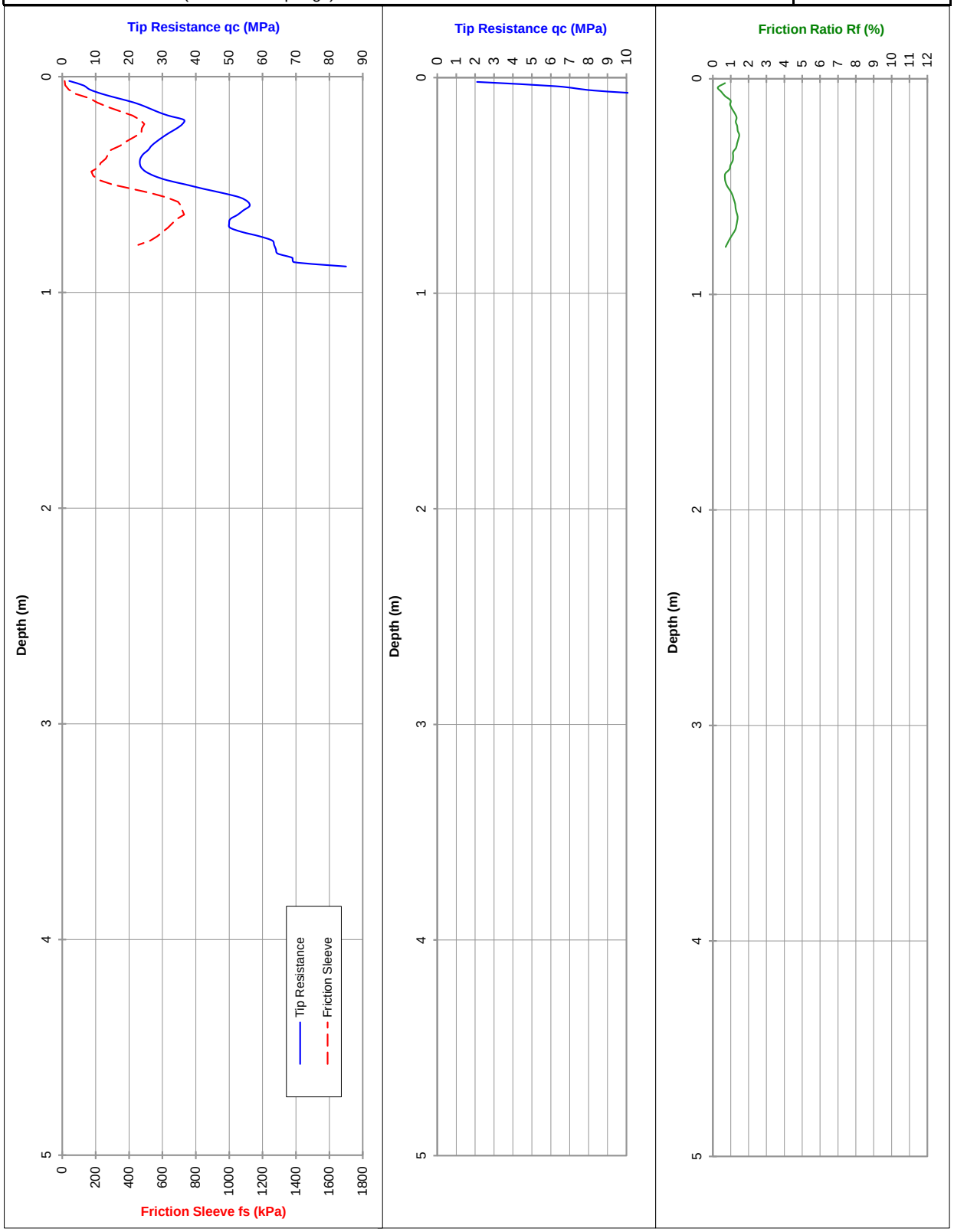
Cone I.D.: EC20

File: GG0024G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 38A**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 85 MPa

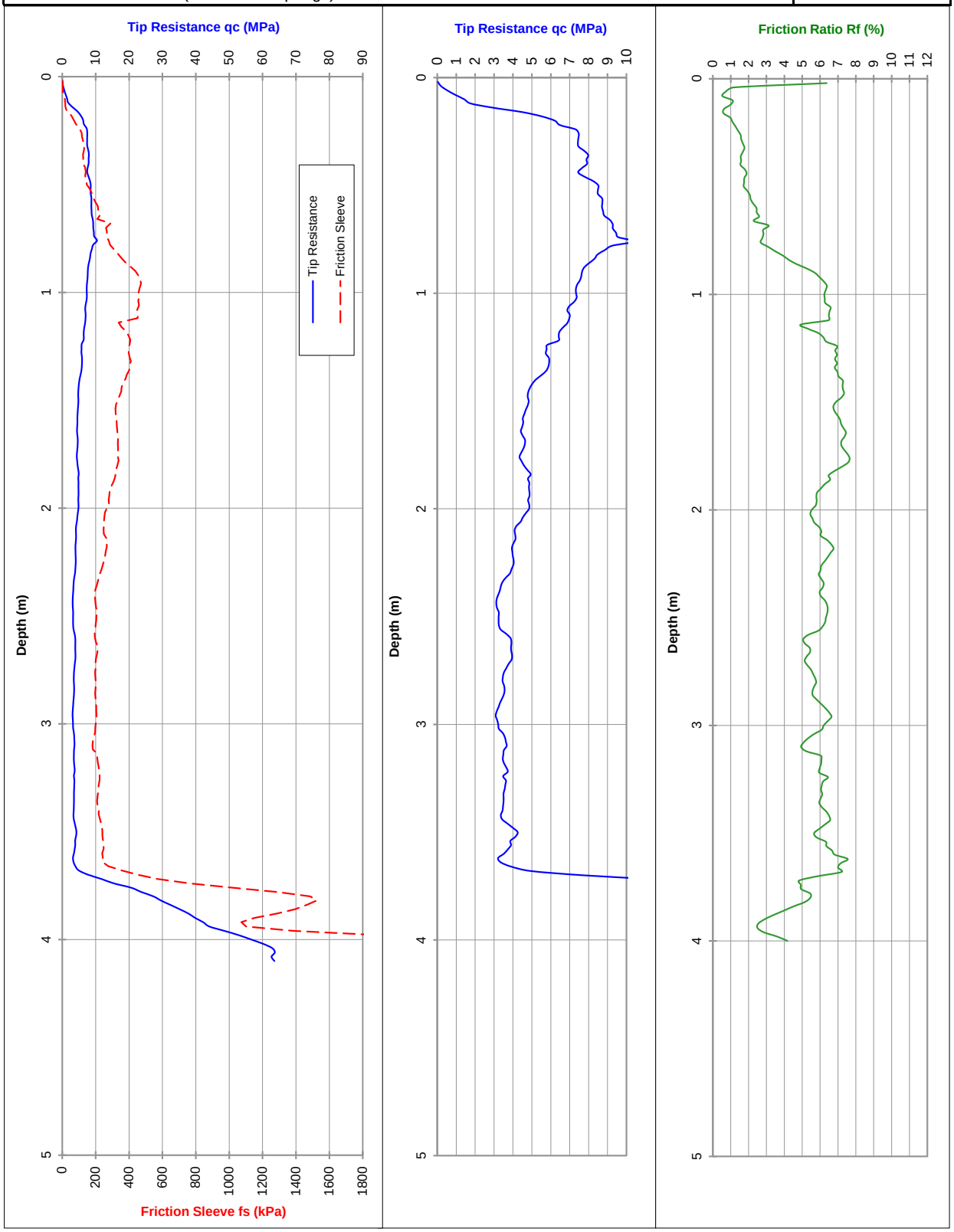
Cone I.D.: EC20

File: GG0025G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 39**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: Max FS (2300kPa)

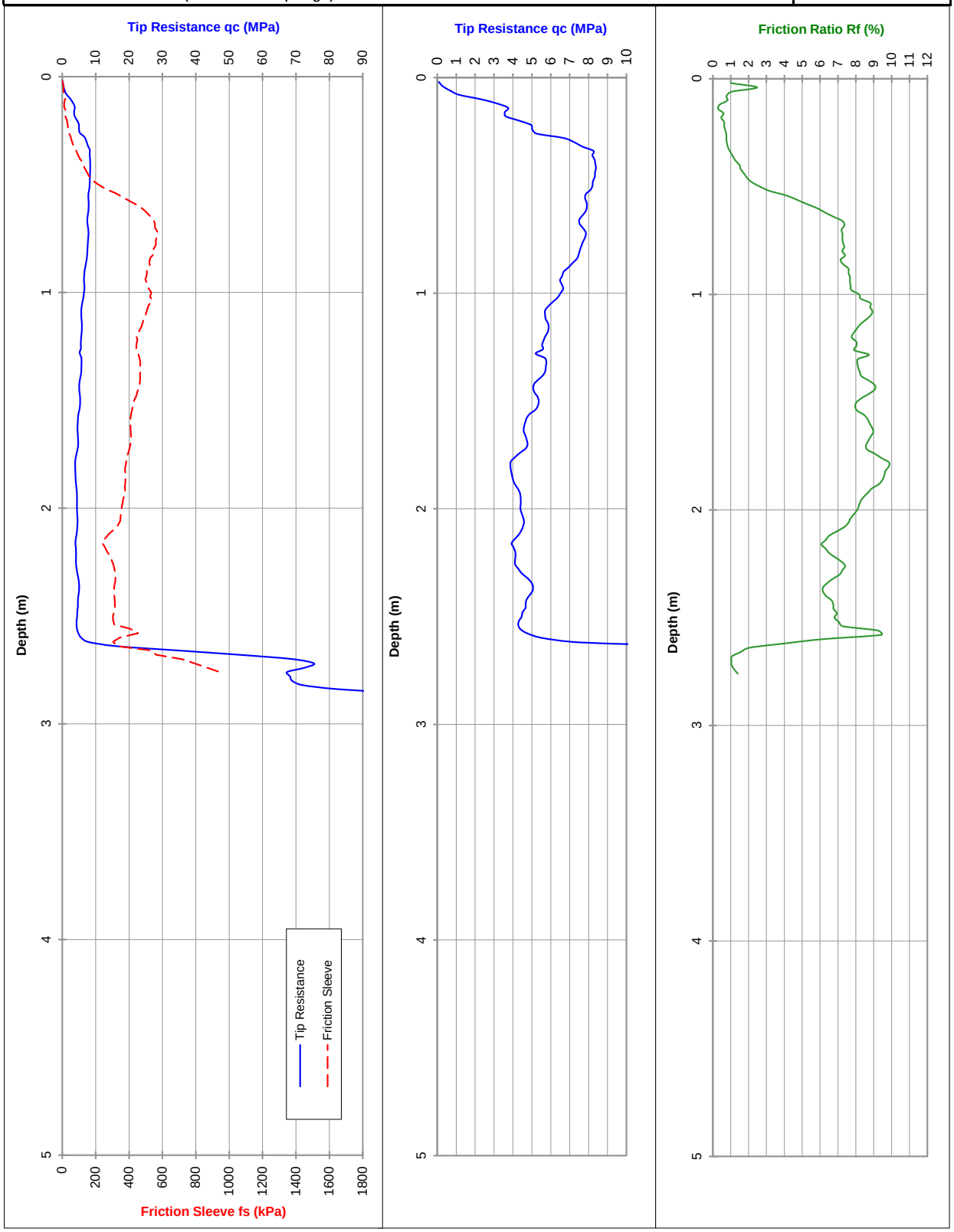
Cone I.D.: EC20

File: GG0045G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 40**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 2.6

Dummy probe to (m):

Refusal: 104 MPa

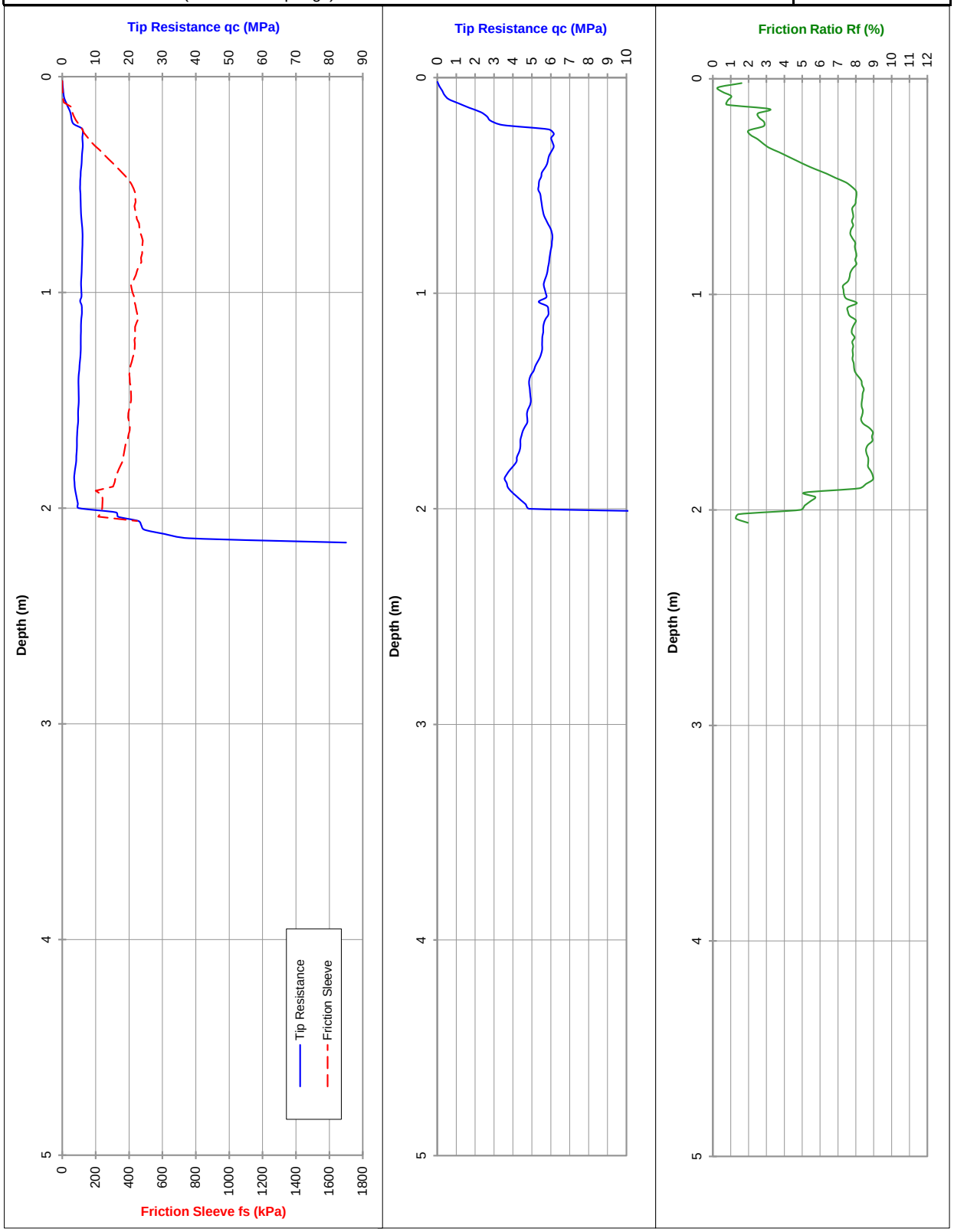
Cone I.D.: EC20

File: GG0013G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 41**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 85 MPa

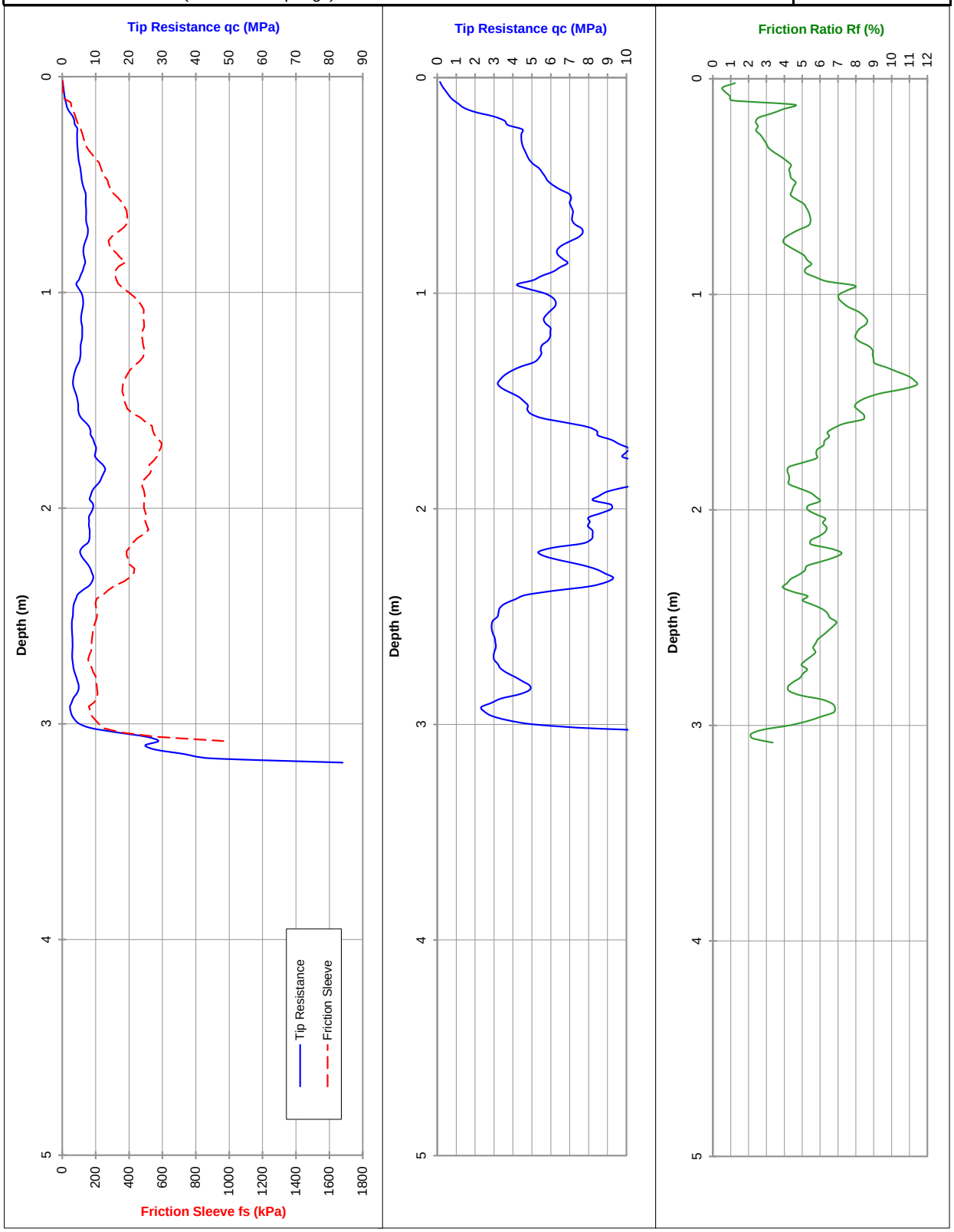
Cone I.D.: EC20

File: GG0014G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 42**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 3.1

Dummy probe to (m):

Refusal: 84 MPa

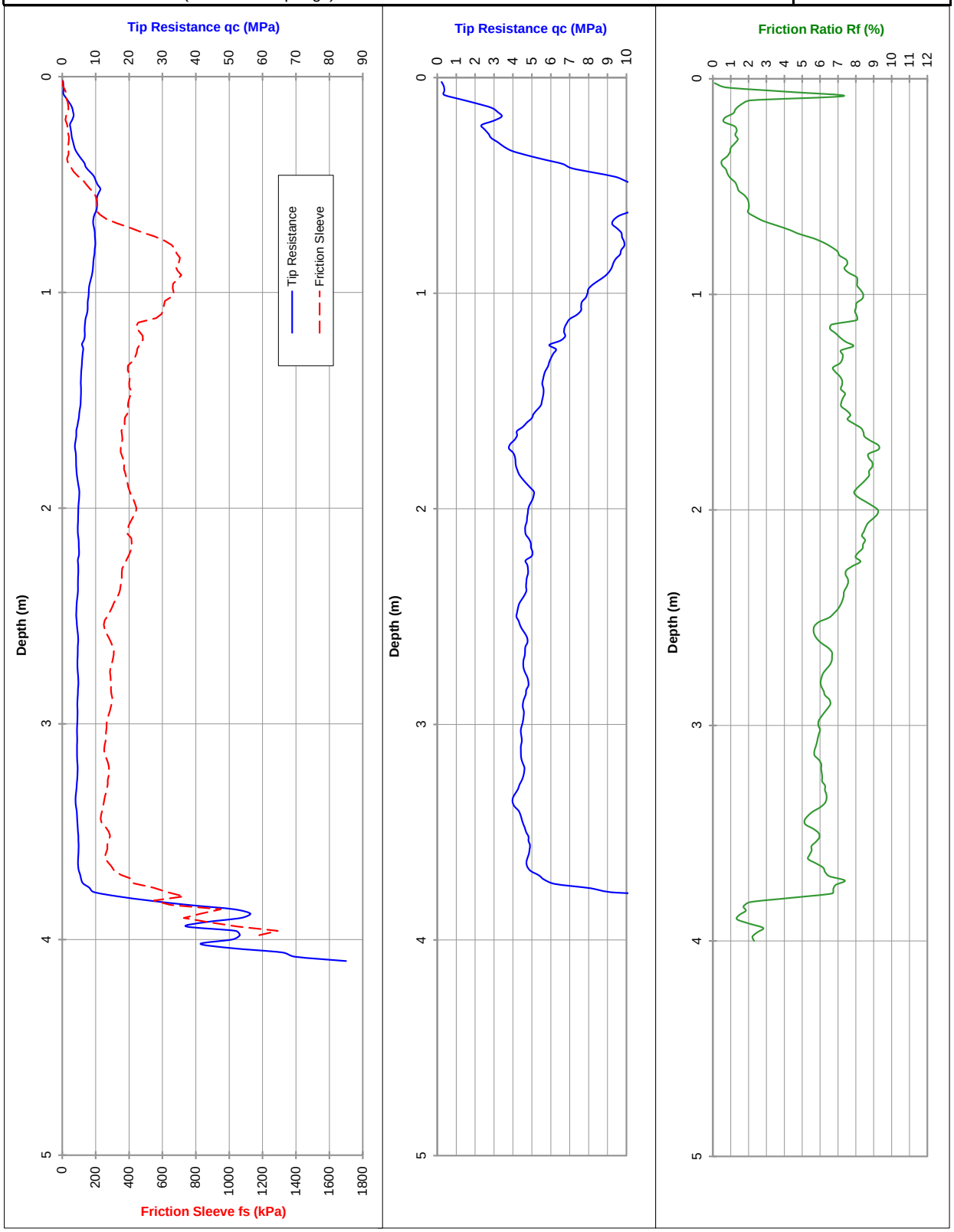
Cone I.D.: EC20

File: GG0012G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 43**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.1

Dummy probe to (m):

Refusal: 85 MPa

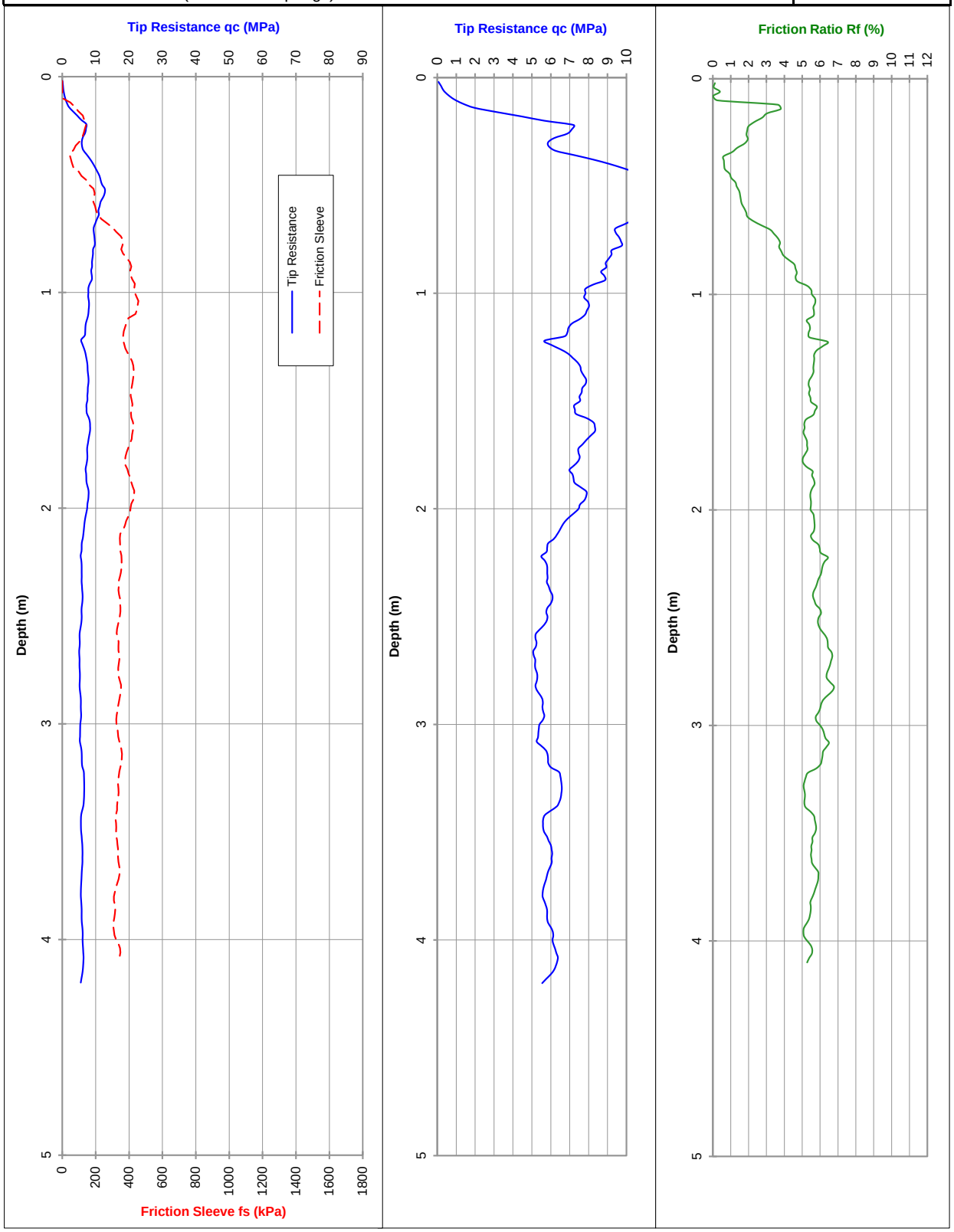
Cone I.D.: EC20

File: GG0015G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 44**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.0

Dummy probe to (m):

Refusal:

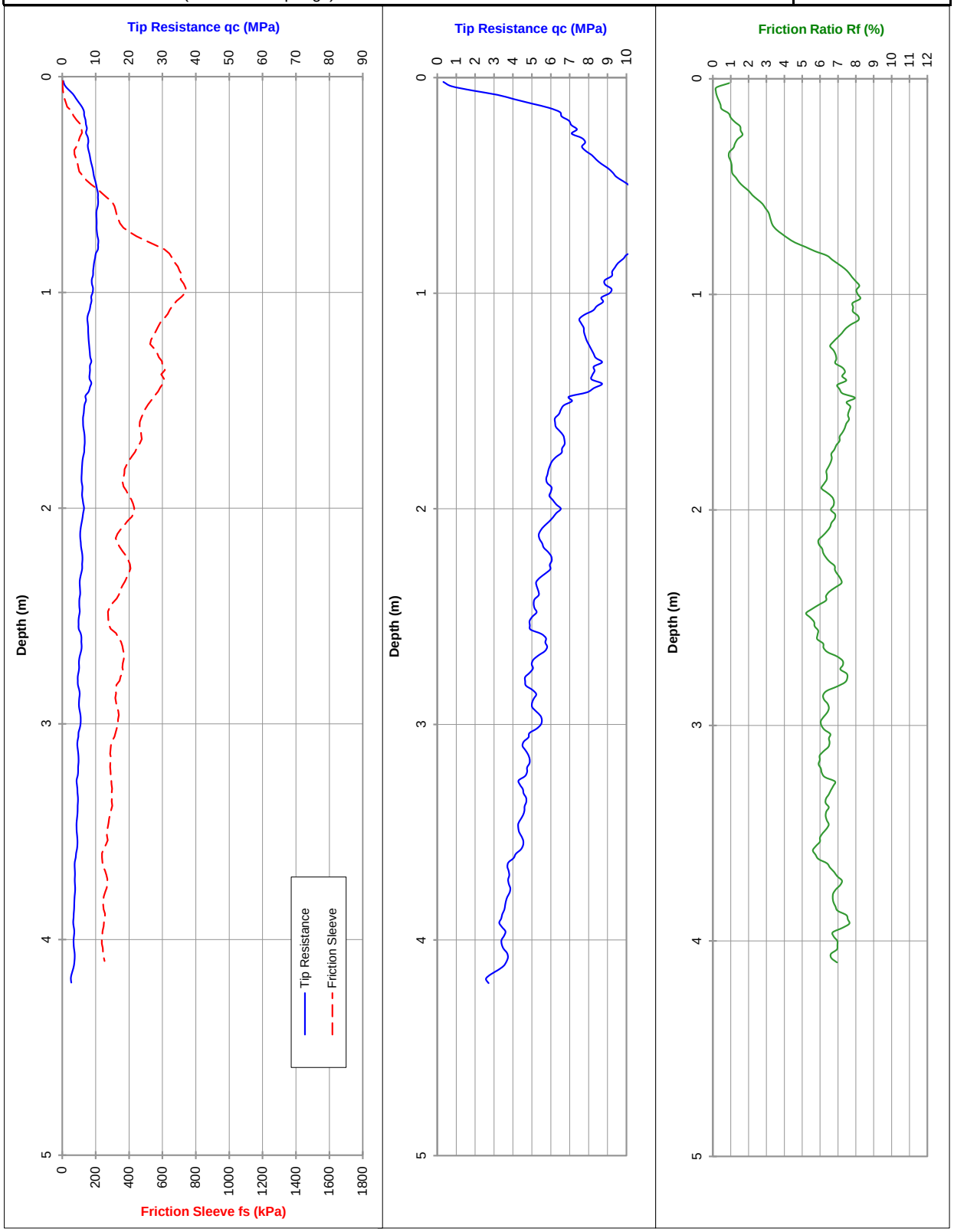
Cone I.D.: EC20

File: GG0016G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 45**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

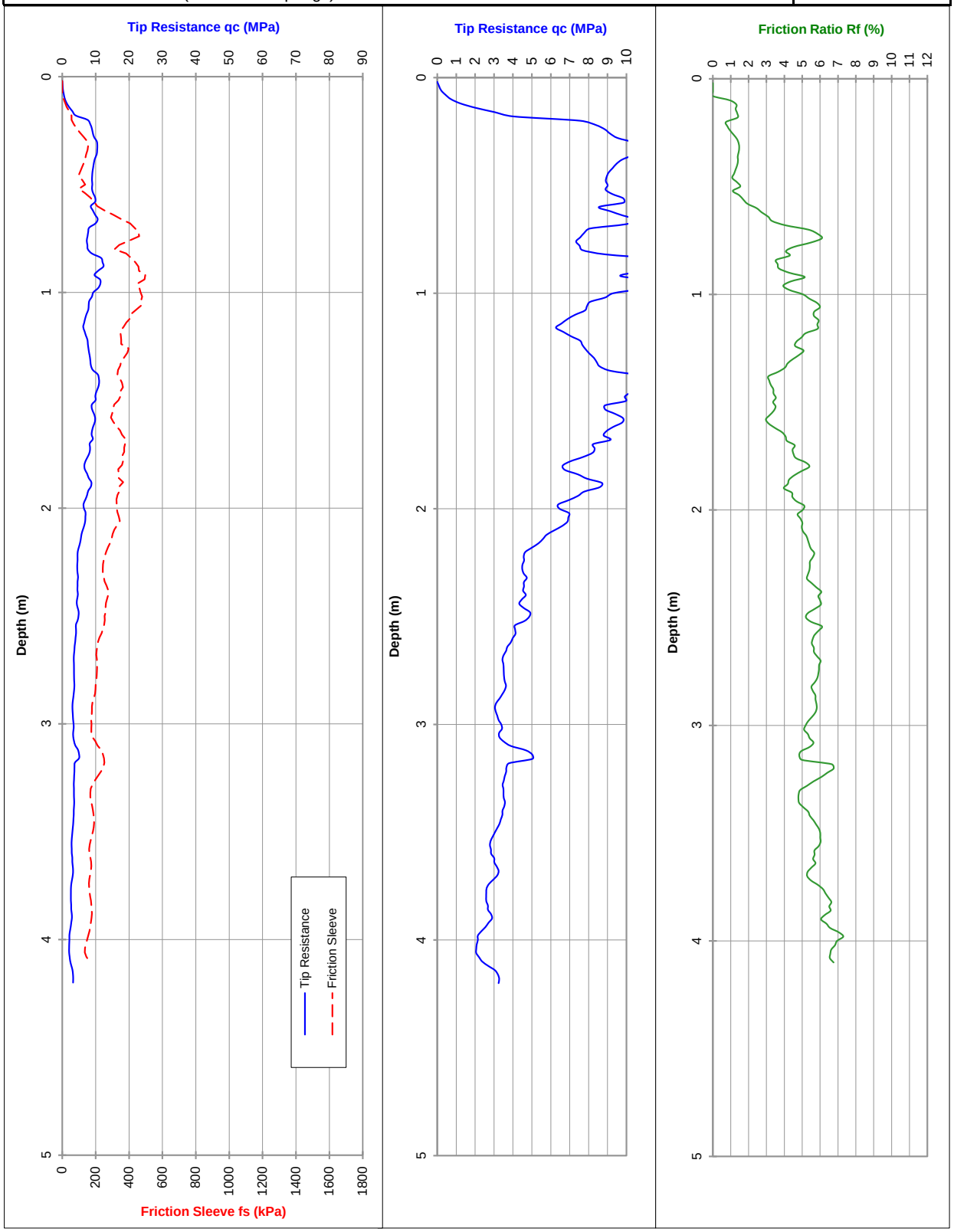
Cone I.D.: EC20

File: GG0017G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 46**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.2

Dummy probe to (m):

Refusal:

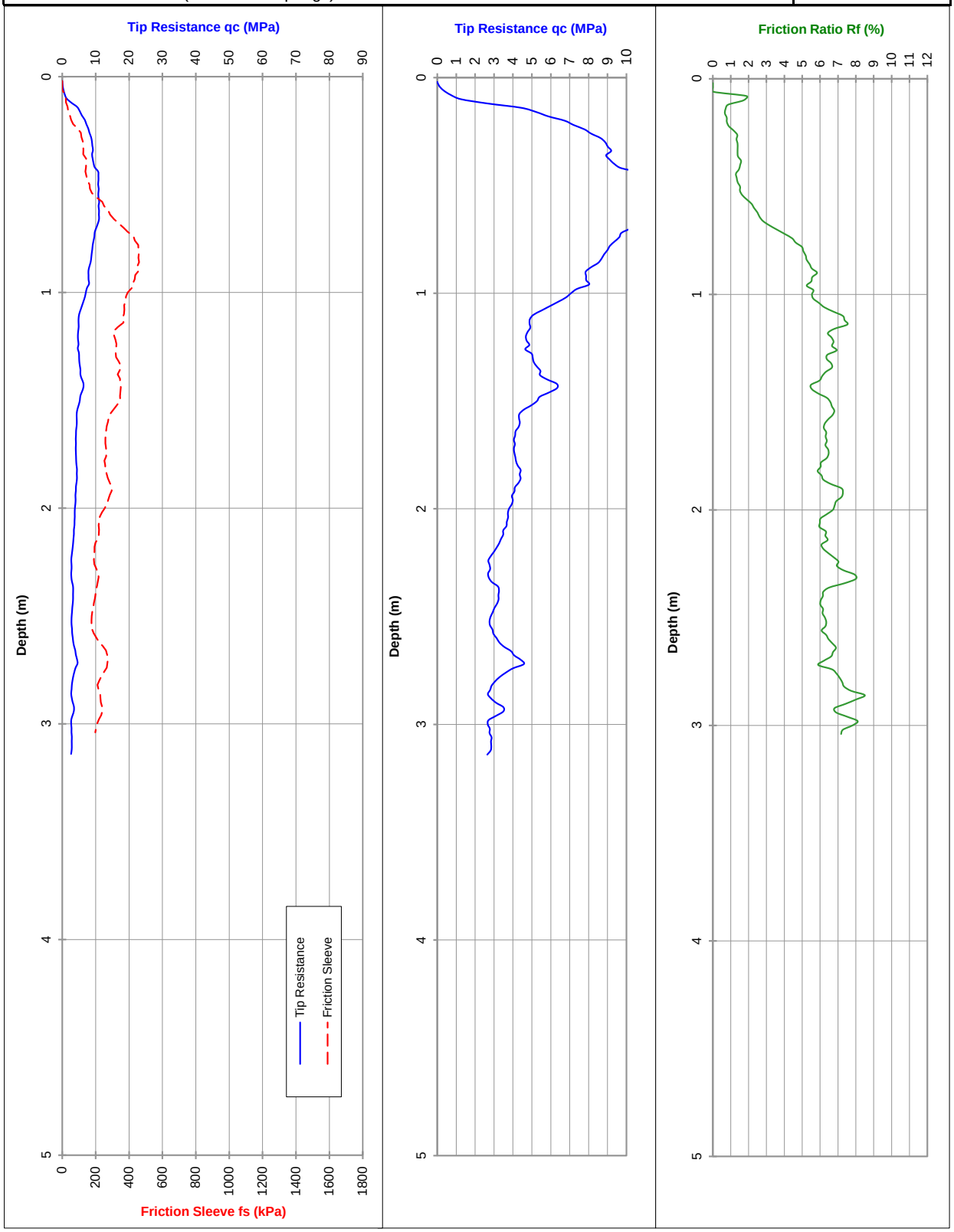
Cone I.D.: EC20

File: GG0018G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 47**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: Inclination

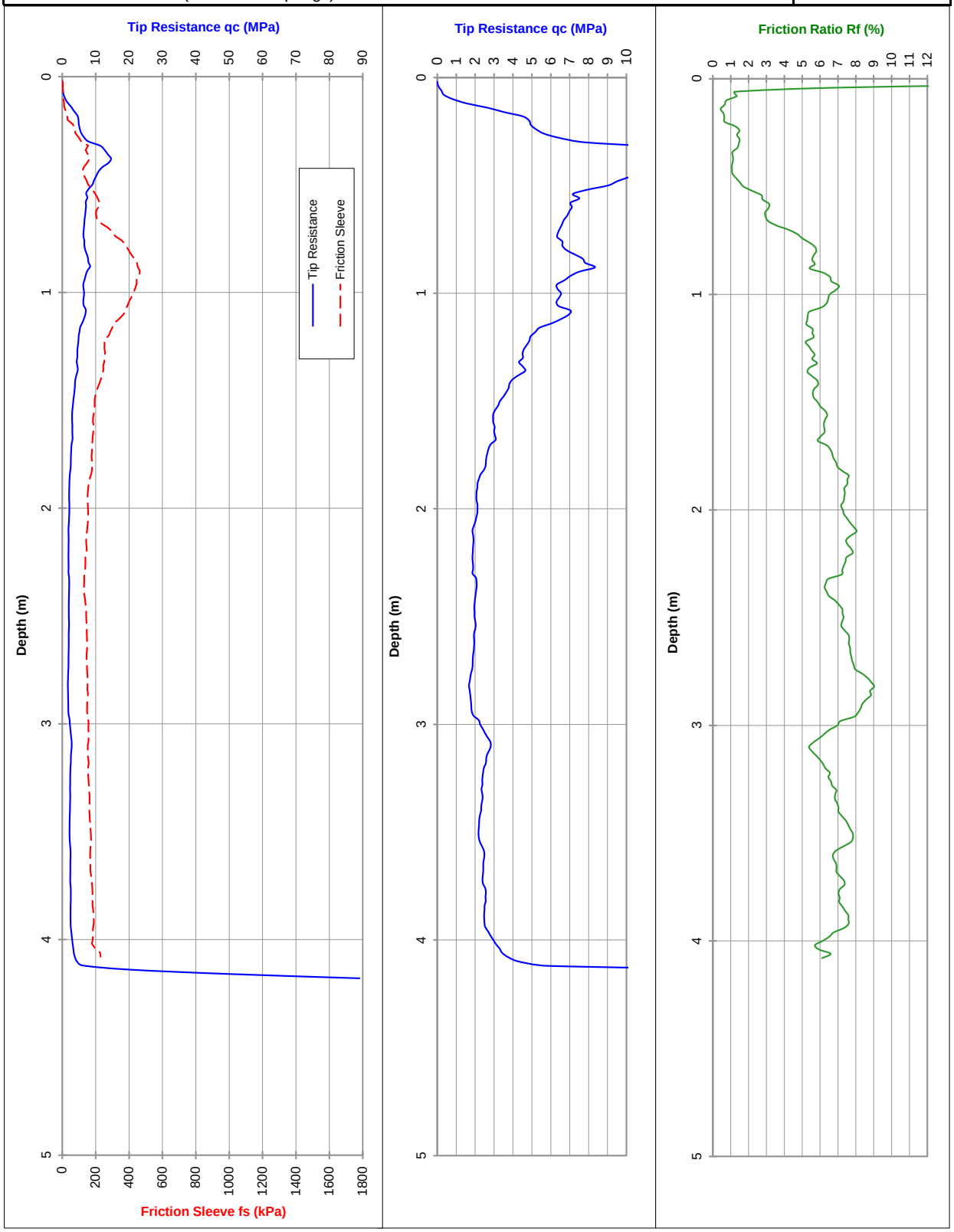
Cone I.D.: EC20

File: GG0022G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 48**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 3.9

Dummy probe to (m):

Refusal: 89 MPa

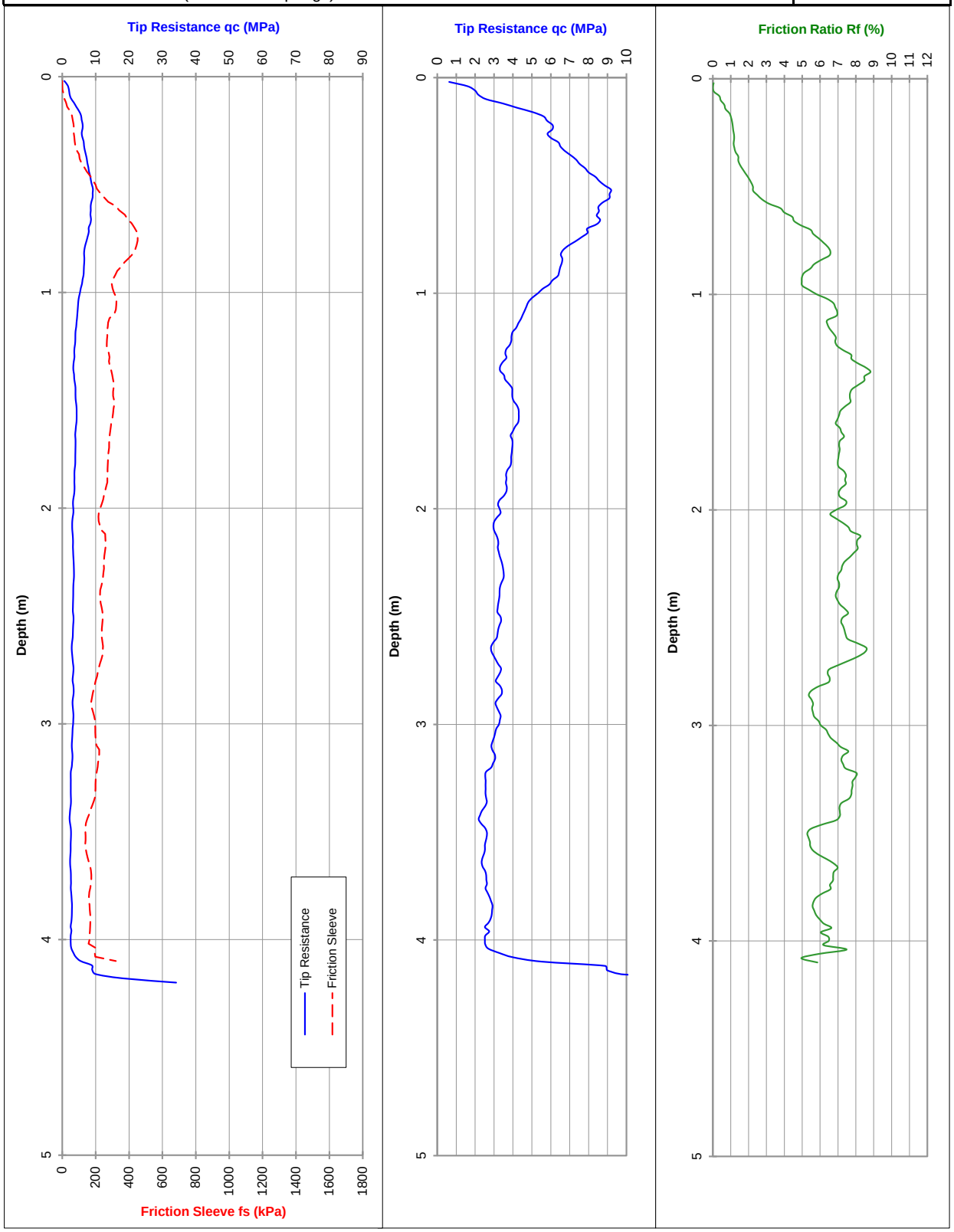
Cone I.D.: EC20

File: GG0020G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 49**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

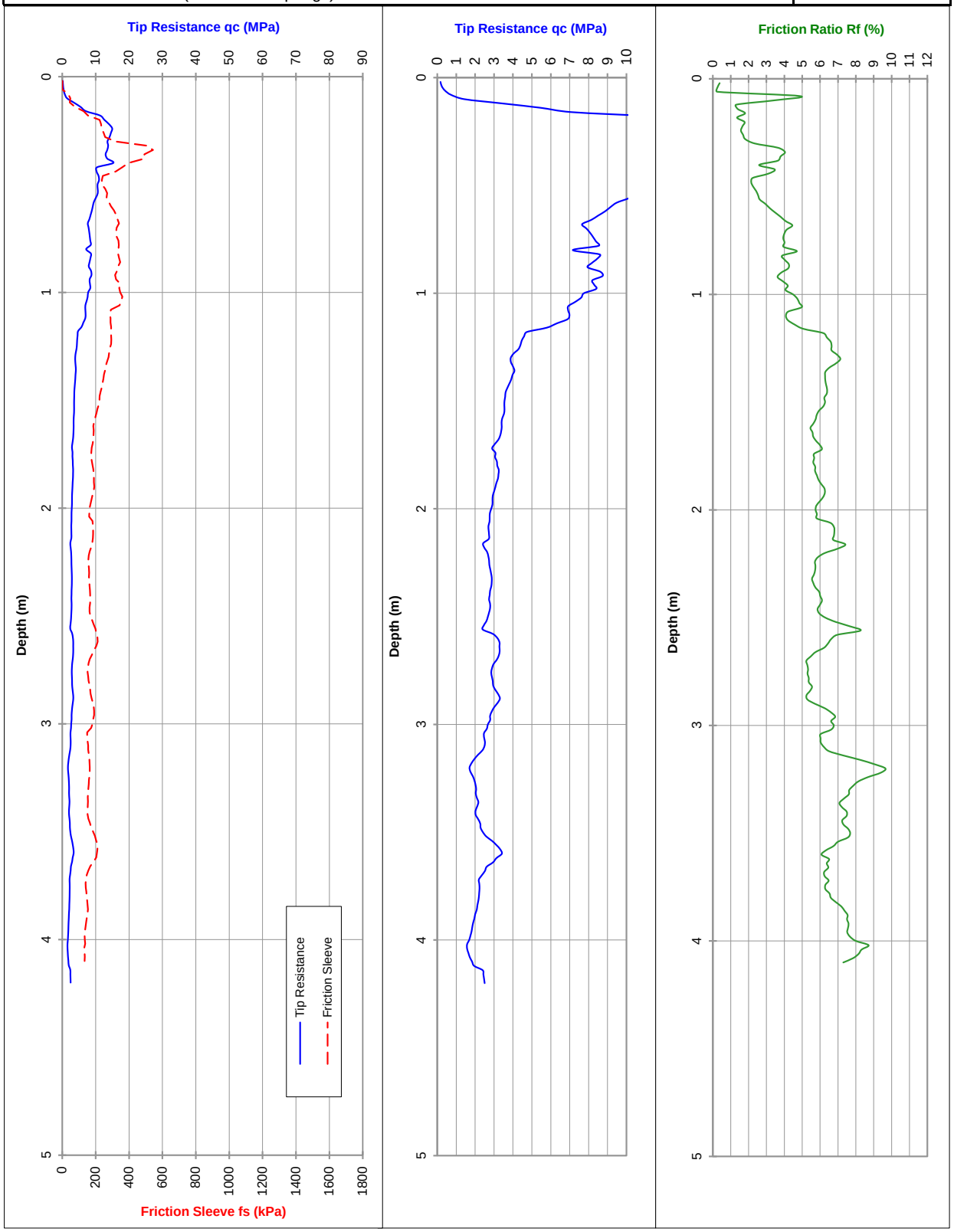
Cone I.D.: EC20

File: GG0019G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 50**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal:

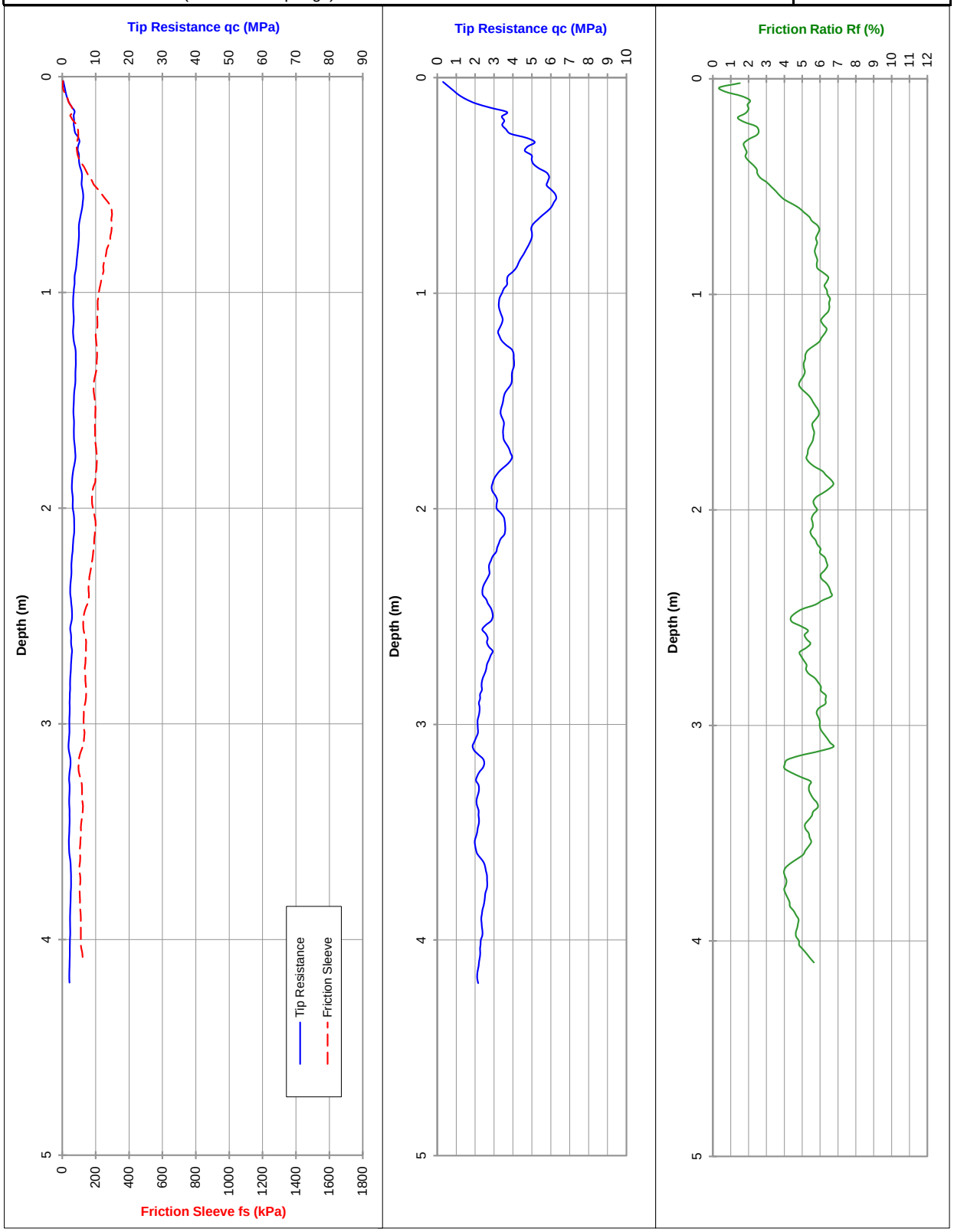
Cone I.D.: EC20

File: GG0040G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 51**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.0

Dummy probe to (m):

Refusal:

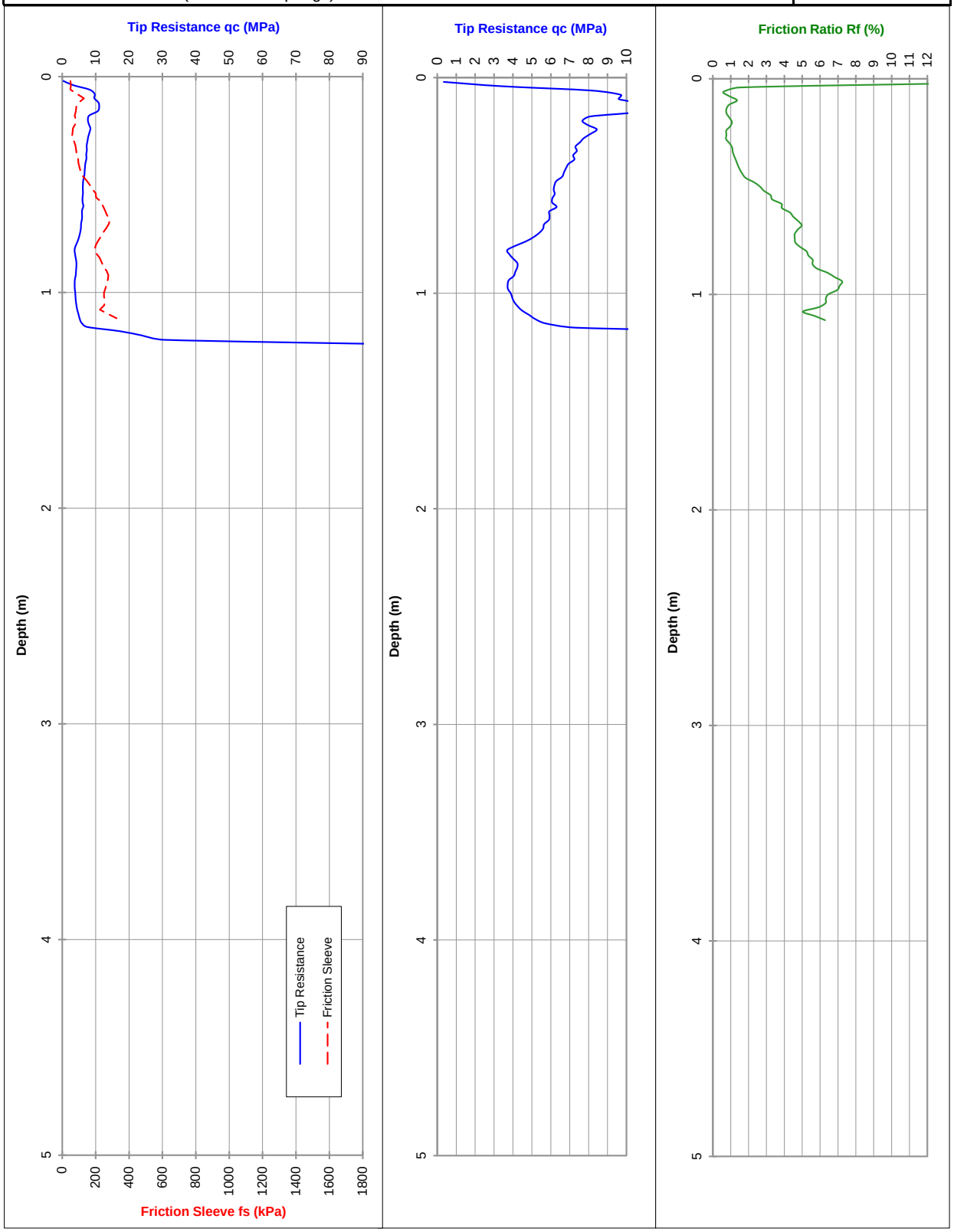
Cone I.D.: EC20

File: GG0026G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 52**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 98 MPa

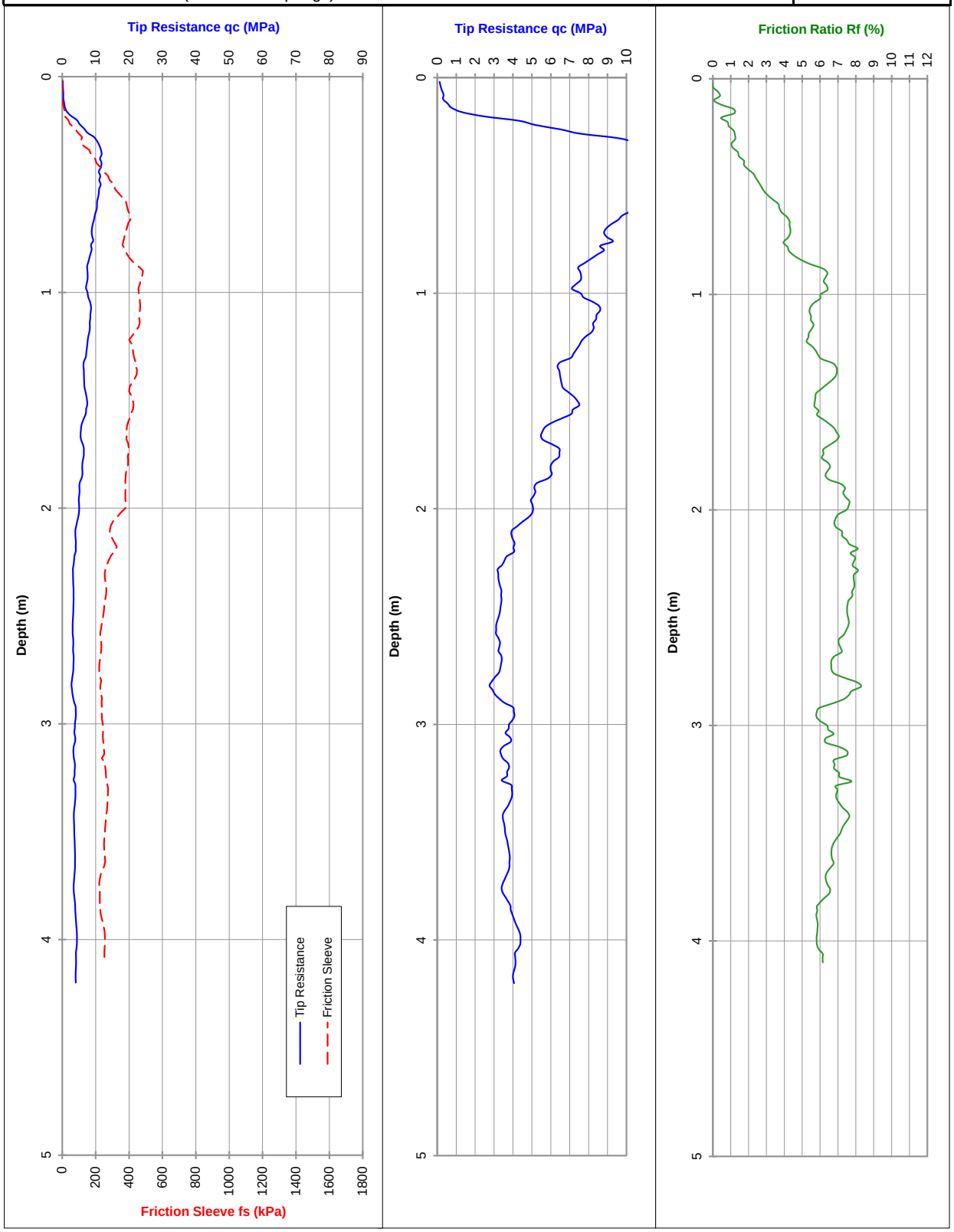
Cone I.D.: EC20

File: GG0023G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 53**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.2

Dummy probe to (m):

Refusal:

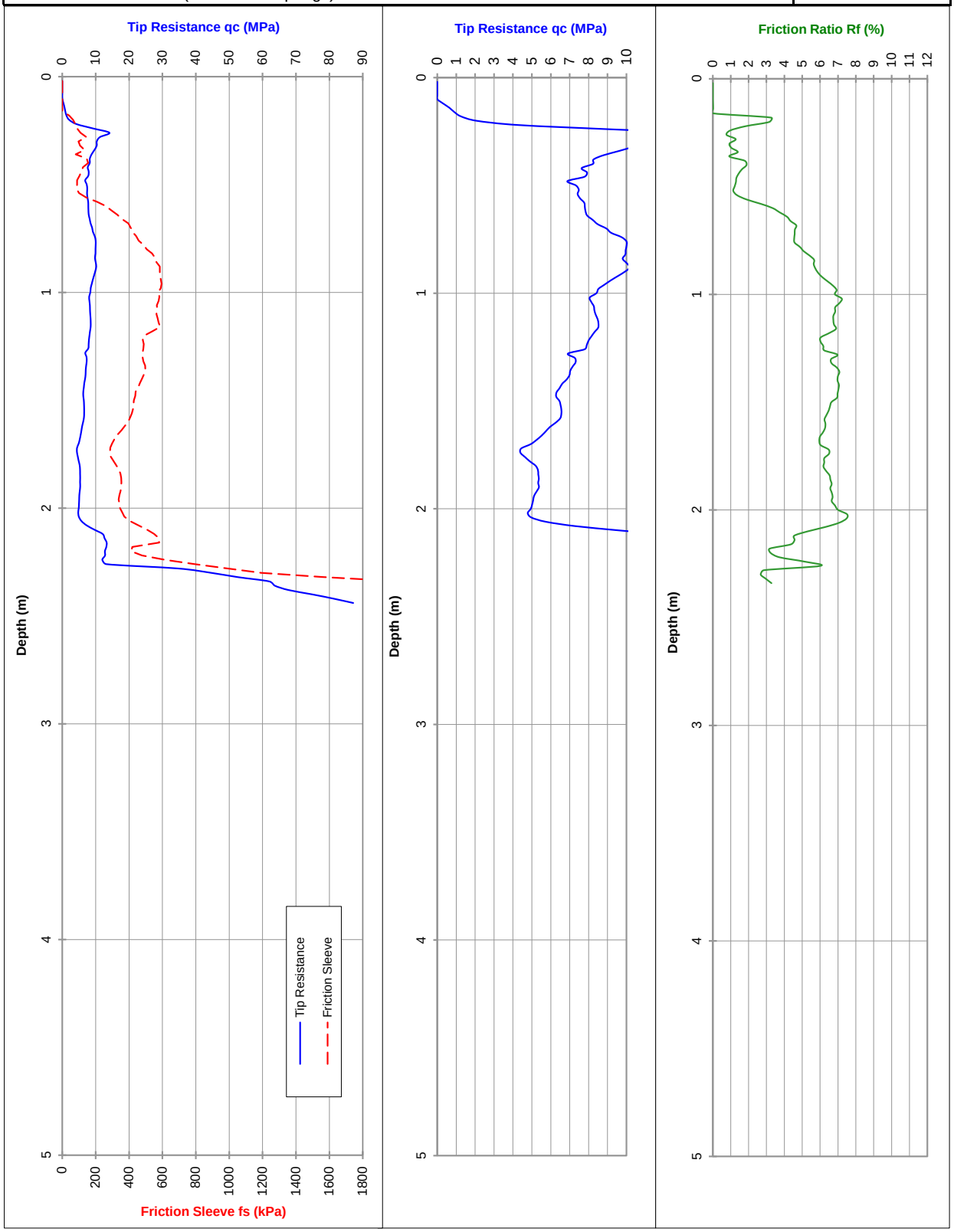
Cone I.D.: EC20

File: GG0044G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 54**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	08-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: Max FS (2200 kPa)

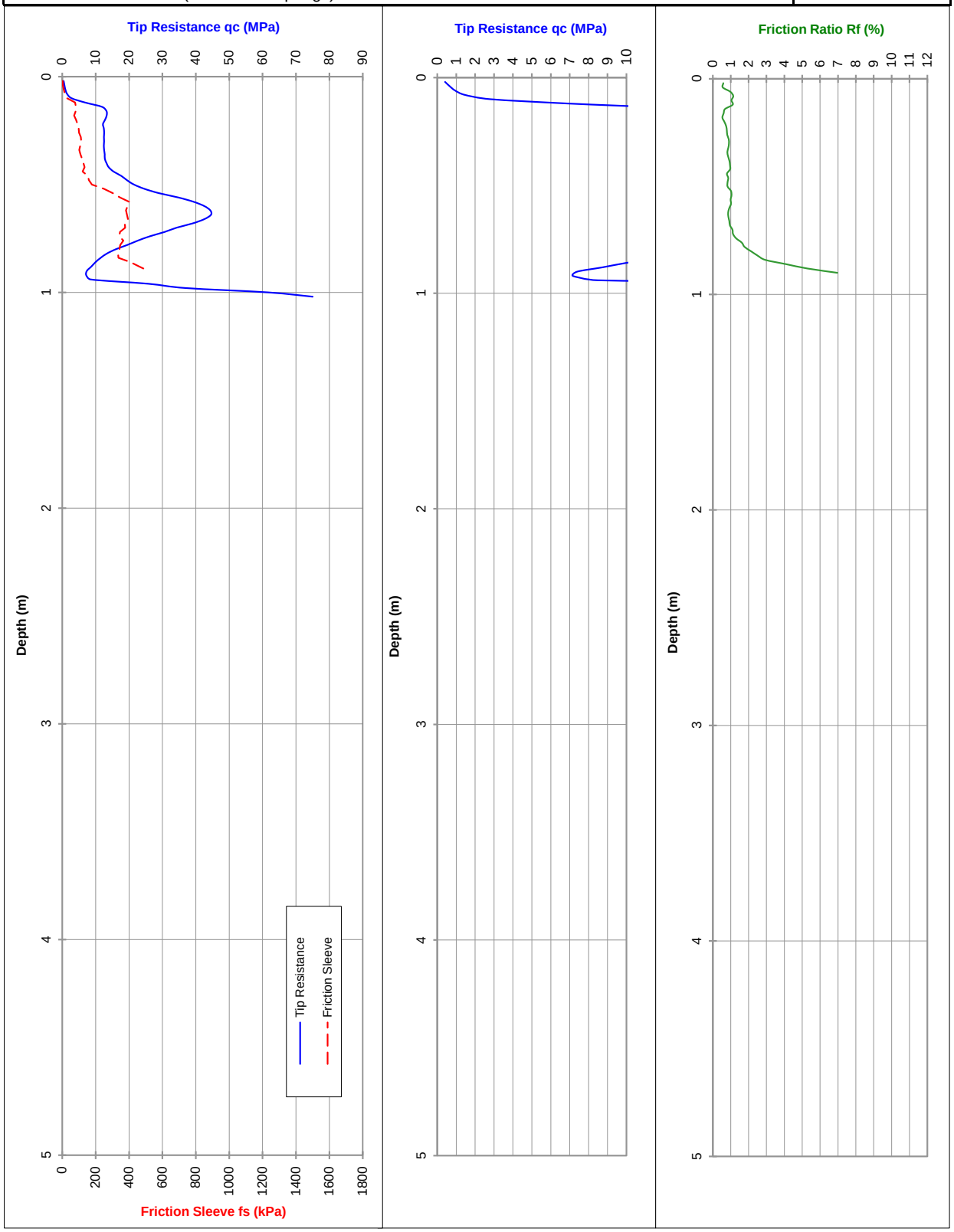
Cone I.D.: EC20

File: GG0021G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 55**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 75 MPa

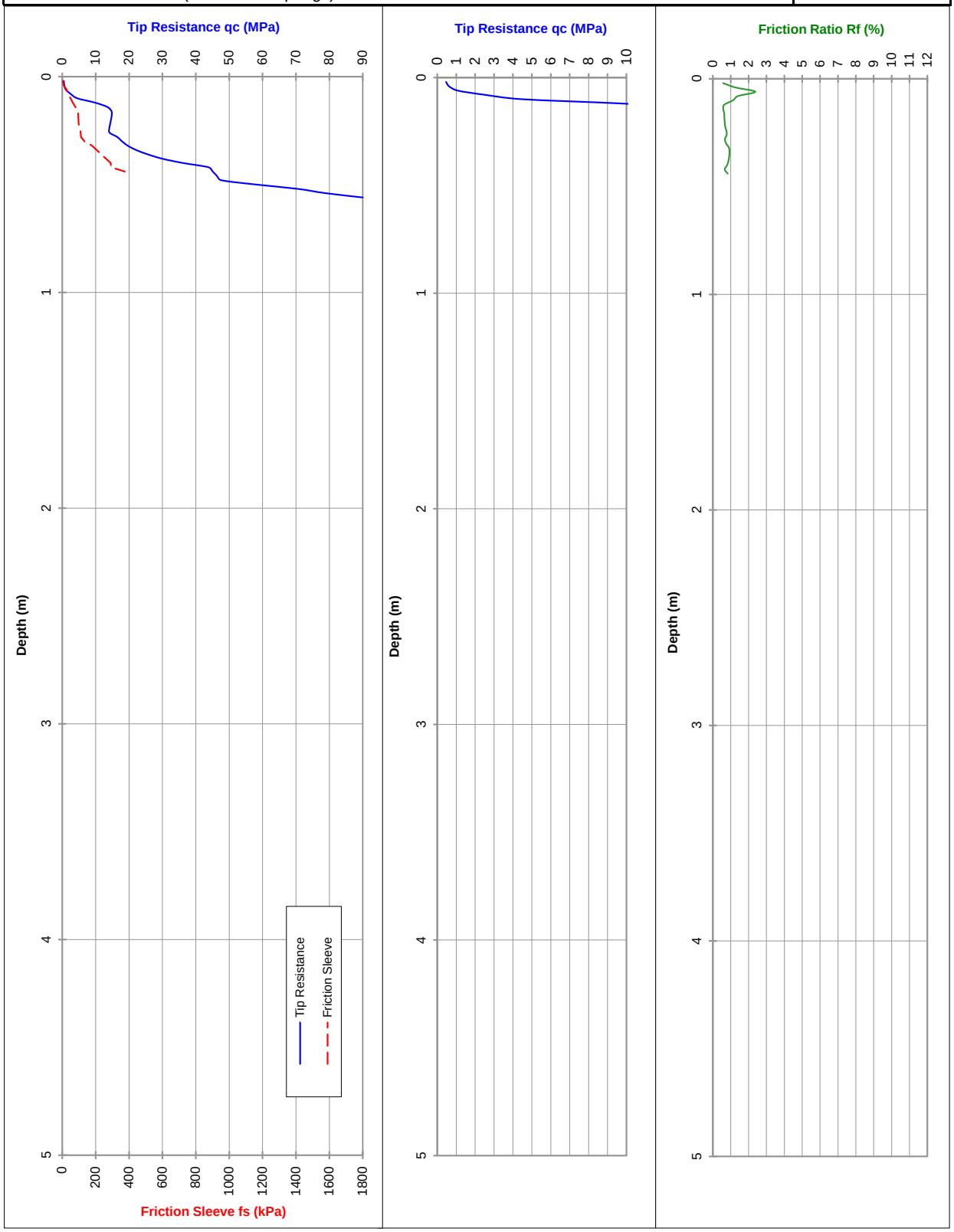
Cone I.D.: EC20

File: GG0042G

Rig Type: 22t truck (Merc)

ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Pilot Energy Ltd	Job No.: GGC211891	Probe I.D
PROJECT: Proposed Solar Farm	RL (m):	**CPT 55A**
LOCATION: Womarden (near Three Springs) WA	Co-ords:	09-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): -

Dummy probe to (m):

Refusal: 90 MPa

Cone I.D.: EC20

File: GG0043G

Rig Type: 22t truck (Merc)

APPENDIX B:
Infiltration Test Results

Permeability Calculation - Inverse Auger Hole Method

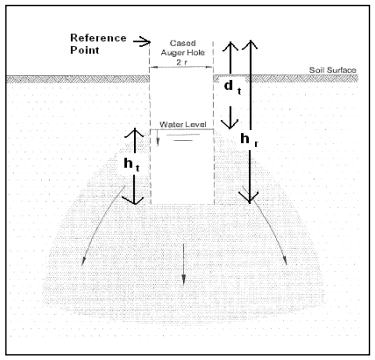
GGC

Job No:	GGC211891
Client:	Pilot Energy Limited
Site:	Proposed Solar Farm
Location:	Womarden
Calc by:	MBB/IHR
BH Name:	IT01
Test Depth:	0.63 m

Spreadsheet author:	CBD	15-Aug-16

$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114



Geotechnical and Geological Consultants

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
X	Field not used
	Fixed field

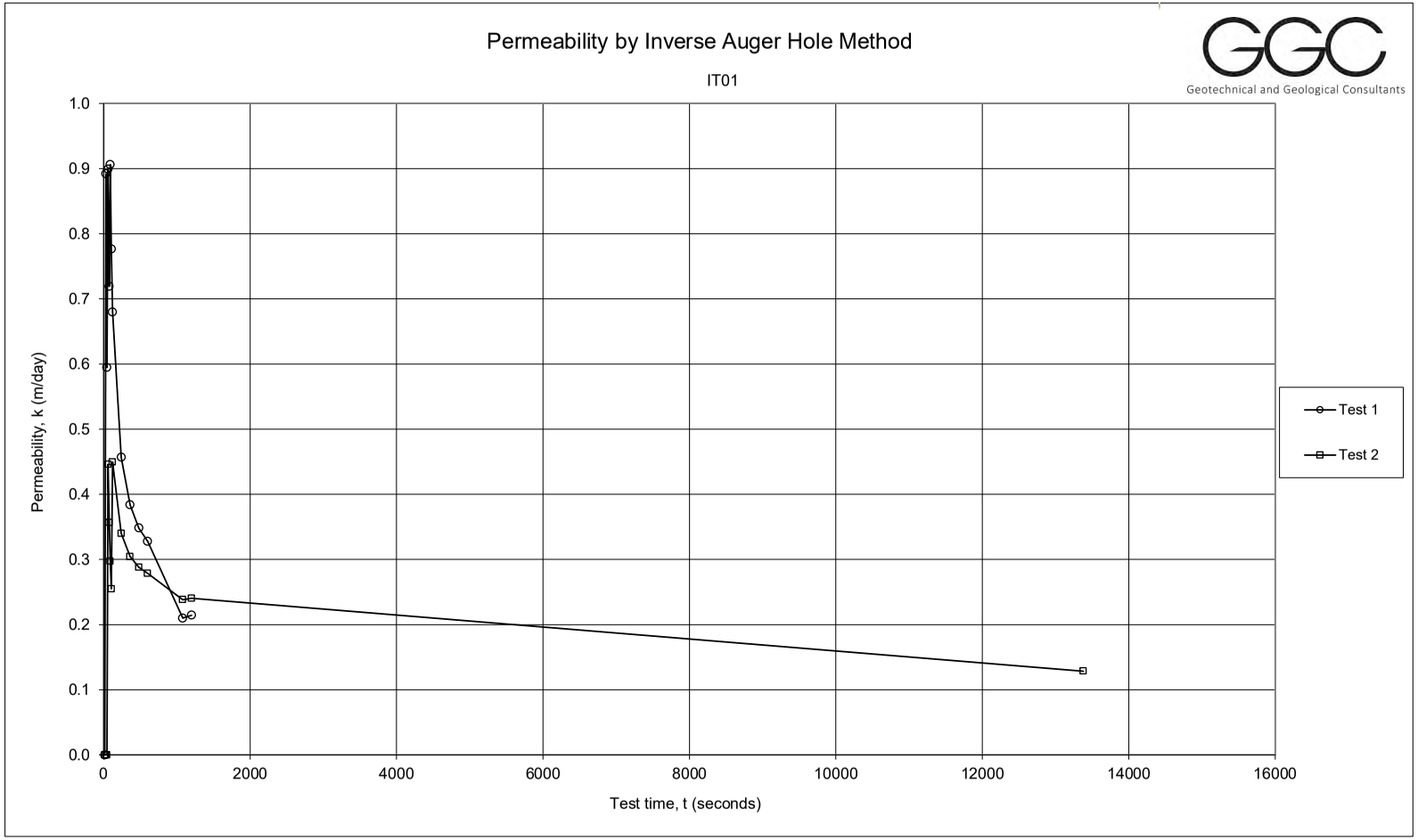
Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m

Test 1 — lowest k: 0.2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.37	0.63		
15	0.37	0.63	0.0E+00	0.0
30	0.38	0.62	1.0E-05	0.9
45	0.38	0.62	6.9E-06	0.6
60	0.39	0.61	1.0E-05	0.9
75	0.39	0.61	8.3E-06	0.7
90	0.4	0.6	1.0E-05	0.9
105	0.4	0.6	9.0E-06	0.8
120	0.4	0.6	7.9E-06	0.7
240	0.41	0.59	5.3E-06	0.5
360	0.42	0.58	4.4E-06	0.4
480	0.43	0.57	4.0E-06	0.3
600	0.44	0.56	3.8E-06	0.3
1080	0.45	0.55	2.4E-06	0.2
1200	0.46	0.54	2.5E-06	0.2
		AVERAGE	6.1E-06	0.5

Test 2 — lowest k: 0.1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.37	0.63		
15	0.37	0.63	0.0E+00	0.0
30	0.37	0.63	0.0E+00	0.0
45	0.37	0.63	0.0E+00	0.0
60	0.38	0.62	5.2E-06	0.4
75	0.38	0.62	4.1E-06	0.4
90	0.38	0.62	3.4E-06	0.3
105	0.38	0.62	2.9E-06	0.3
120	0.39	0.61	5.2E-06	0.4
240	0.4	0.6	3.9E-06	0.3
360	0.41	0.59	3.5E-06	0.3
480	0.42	0.58	3.3E-06	0.3
600	0.43	0.57	3.2E-06	0.3
1080	0.46	0.54	2.8E-06	0.2
1200	0.47	0.53	2.8E-06	0.2
13380	0.78	0.22	1.5E-06	0.1
		AVERAGE	2.8E-06	0.2


Permeability by Inverse Auger Hole Method
IT01
Geotechnical and Geological Consultants
Permeability, k (m/day)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
2000
4000
6000
8000
10000
12000
14000
16000
Test time, t (seconds)
Test 1
Test 2

Permeability Calculation - Inverse Auger Hole Method

GGC

Job No:	GGC211891
Client:	Pilot Energy Limited
Site:	Proposed Solar Farm
Location:	Womarden
Calc by:	MBB/IHR
BH Name:	IT02
Test Depth:	0.7 m

Spreadsheet author:	CBD	15-Aug-16

$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m

Spreadsheet Legend

	Required input
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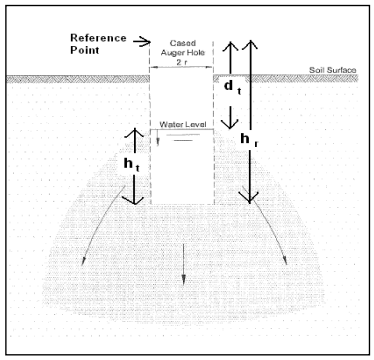


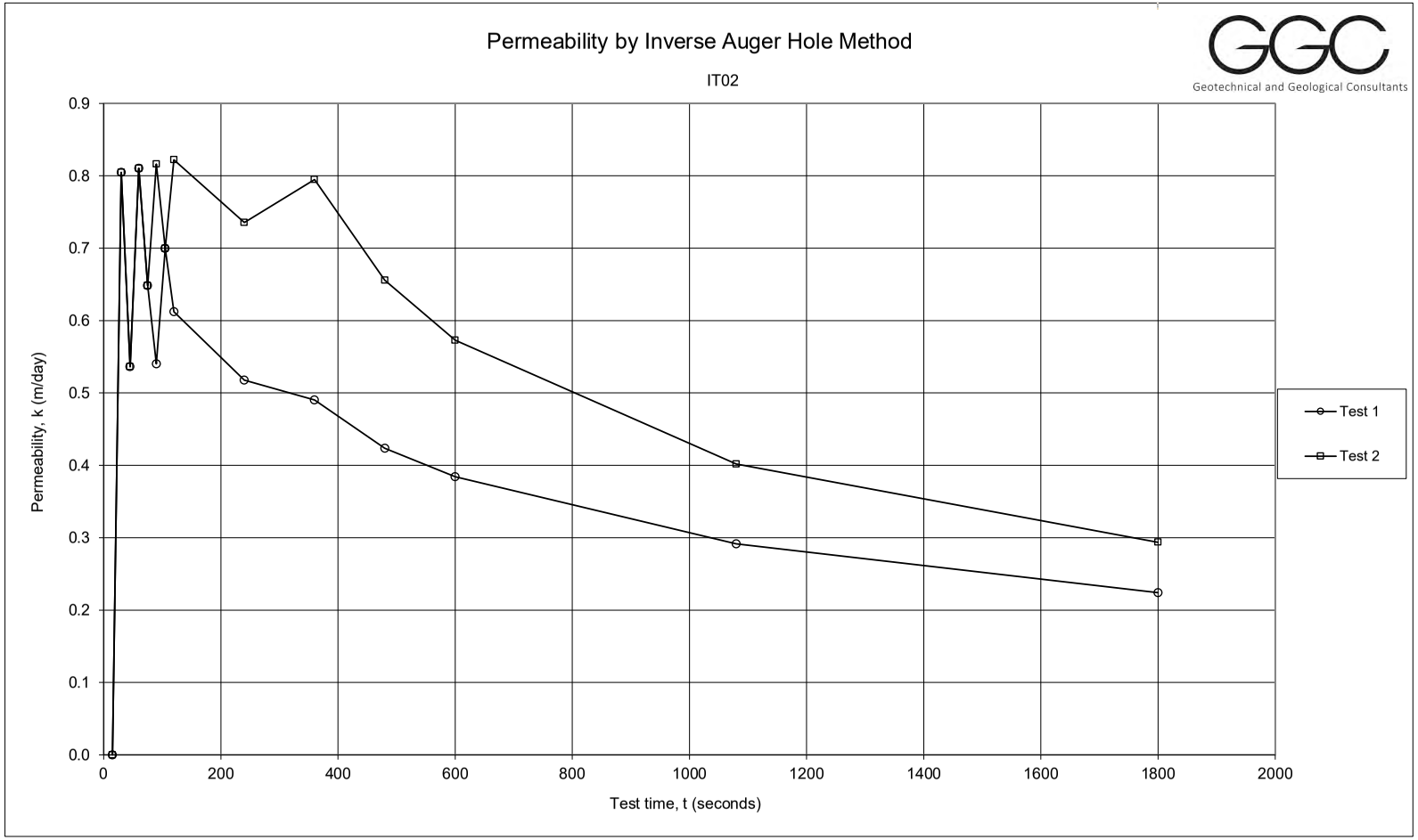
Geotechnical and Geological Consultants

Test 1 — 0.78 full depth — lowest k 0.2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.3	0.7		
15	0.3	0.7	0.0E+00	0.0
30	0.31	0.69	9.3E-06	0.8
45	0.31	0.69	6.2E-06	0.5
60	0.32	0.68	9.4E-06	0.8
75	0.32	0.68	7.5E-06	0.6
90	0.32	0.68	6.3E-06	0.5
105	0.33	0.67	8.1E-06	0.7
120	0.33	0.67	7.1E-06	0.6
240	0.35	0.65	6.0E-06	0.5
360	0.37	0.63	5.7E-06	0.5
480	0.38	0.62	4.9E-06	0.4
600	0.39	0.61	4.4E-06	0.4
1080	0.42	0.58	3.4E-06	0.3
1800	0.45	0.55	2.6E-06	0.2
		AVERAGE	5.8E-06	0.5

Test 2 — 0.76 full depth — lowest k 0.3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.3	0.7		
15	0.3	0.7	0.0E+00	0.0
30	0.31	0.69	9.3E-06	0.8
45	0.31	0.69	6.2E-06	0.5
60	0.32	0.68	9.4E-06	0.8
75	0.32	0.68	7.5E-06	0.6
90	0.33	0.67	9.4E-06	0.8
105	0.33	0.67	8.1E-06	0.7
120	0.34	0.66	9.5E-06	0.8
240	0.37	0.63	8.5E-06	0.7
360	0.41	0.59	9.2E-06	0.8
480	0.42	0.58	7.6E-06	0.7
600	0.43	0.57	6.6E-06	0.6
1080	0.46	0.54	4.6E-06	0.4
1800	0.49	0.51	3.4E-06	0.3
		AVERAGE	7.1E-06	0.6


Permeability by Inverse Auger Hole Method
IT02
Geotechnical and Geological Consultants
Permeability, k (m/day)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Test time, t (seconds)
Test 1
Test 2

Permeability Calculation - Inverse Auger Hole Method

GGC

Job No:	GGC211891
Client:	Pilot Energy Limited
Site:	Proposed Solar Farm
Location:	Womarden
Calc by:	MBB/IHR
BH Name:	IT03
Test Depth:	0.72 m

Spreadsheet author:	CBD	15-Aug-16

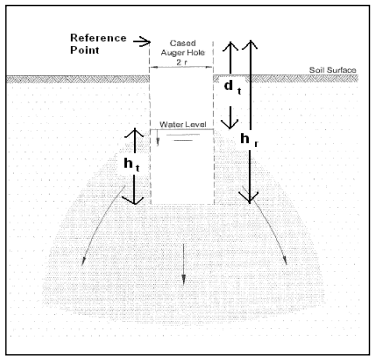
$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
X	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



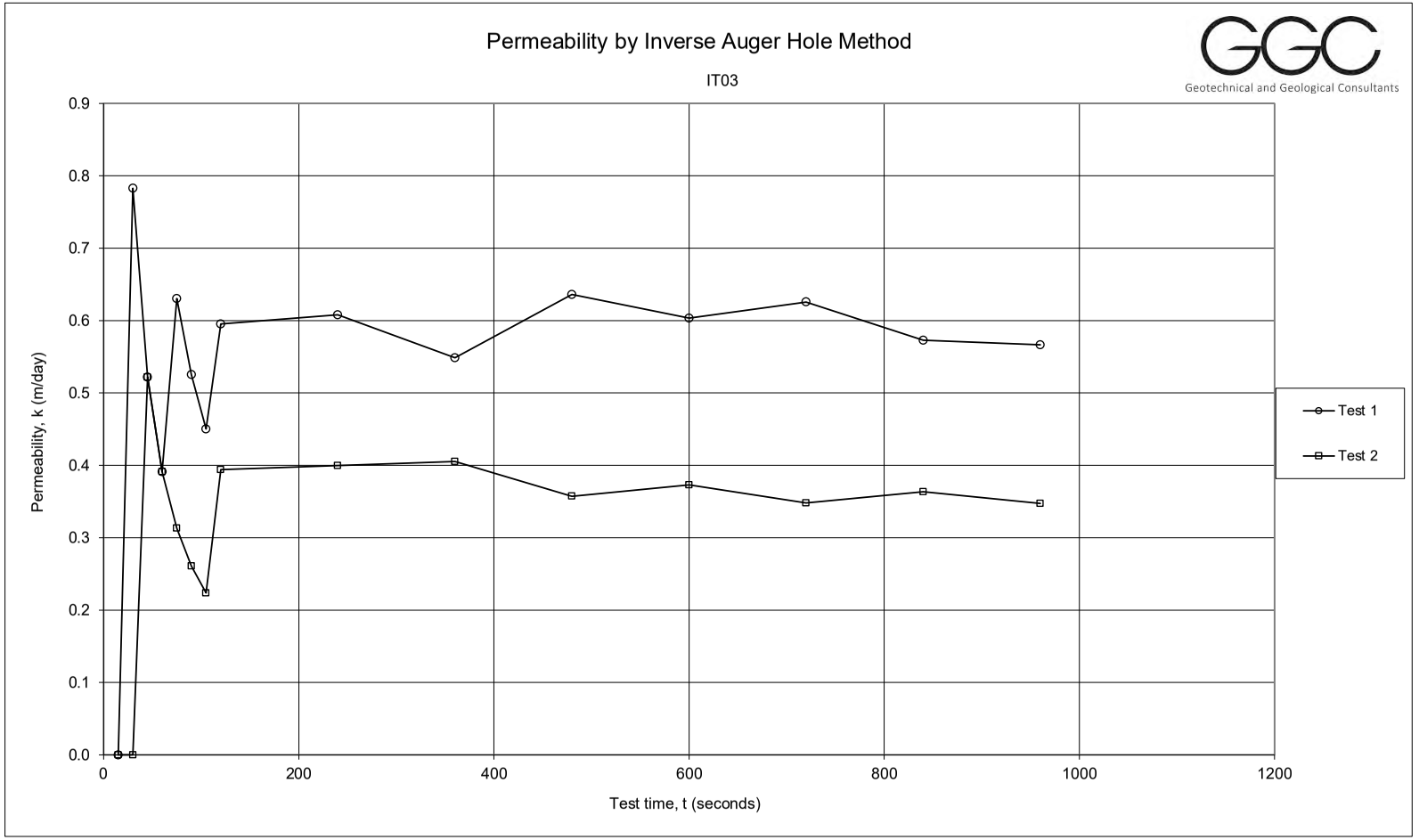
Geotechnical and Geological Consultants

Test 1 — 0.78 full depth — lowest k: 0.5

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.28	0.72		
15	0.28	0.72	0.0E+00	0.0
30	0.29	0.71	9.1E-06	0.8
45	0.29	0.71	6.0E-06	0.5
60	0.29	0.71	4.5E-06	0.4
75	0.3	0.7	7.3E-06	0.6
90	0.3	0.7	6.1E-06	0.5
105	0.3	0.7	5.2E-06	0.5
120	0.31	0.69	6.9E-06	0.6
240	0.34	0.66	7.0E-06	0.6
360	0.36	0.64	6.3E-06	0.5
480	0.4	0.6	7.4E-06	0.6
600	0.42	0.58	7.0E-06	0.6
720	0.45	0.55	7.2E-06	0.6
840	0.46	0.54	6.6E-06	0.6
960	0.48	0.52	6.6E-06	0.6
		AVERAGE	6.2E-06	0.5

Test 2 — 0.76 full depth — lowest k: 0.2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.28	0.72		
15	0.28	0.72	0.0E+00	0.0
30	0.28	0.72	0.0E+00	0.0
45	0.29	0.71	6.0E-06	0.5
60	0.29	0.71	4.5E-06	0.4
75	0.29	0.71	3.6E-06	0.3
90	0.29	0.71	3.0E-06	0.3
105	0.29	0.71	2.6E-06	0.2
120	0.3	0.7	4.6E-06	0.4
240	0.32	0.68	4.6E-06	0.4
360	0.34	0.66	4.7E-06	0.4
480	0.35	0.65	4.1E-06	0.4
600	0.37	0.63	4.3E-06	0.4
720	0.38	0.62	4.0E-06	0.3
840	0.4	0.6	4.2E-06	0.4
960	0.41	0.59	4.0E-06	0.3
		AVERAGE	3.6E-06	0.3


Permeability by Inverse Auger Hole Method
IT03
Geotechnical and Geological Consultants
Permeability, k (m/day)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
200
400
600
800
1000
1200
Test time, t (seconds)
Test 1
Test 2

Permeability Calculation - Inverse Auger Hole Method

GGC

Job No:	GGC211891
Client:	Pilot Energy Limited
Site:	Proposed Solar Farm
Location:	Womarden
Calc by:	MBB/IHR
BH Name:	IT04
Test Depth:	0.63 m

Spreadsheet author:	CBD	15-Aug-16

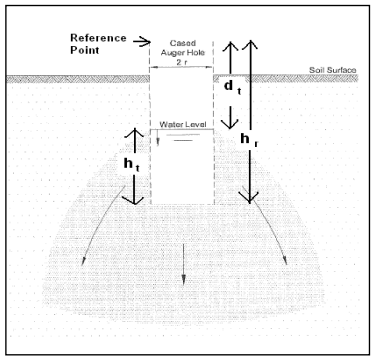
$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
X	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Permeability		m/s
r	radius of test hole	0.04	m
t	time since start of measurement		s
h_r	reference point height above base	1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



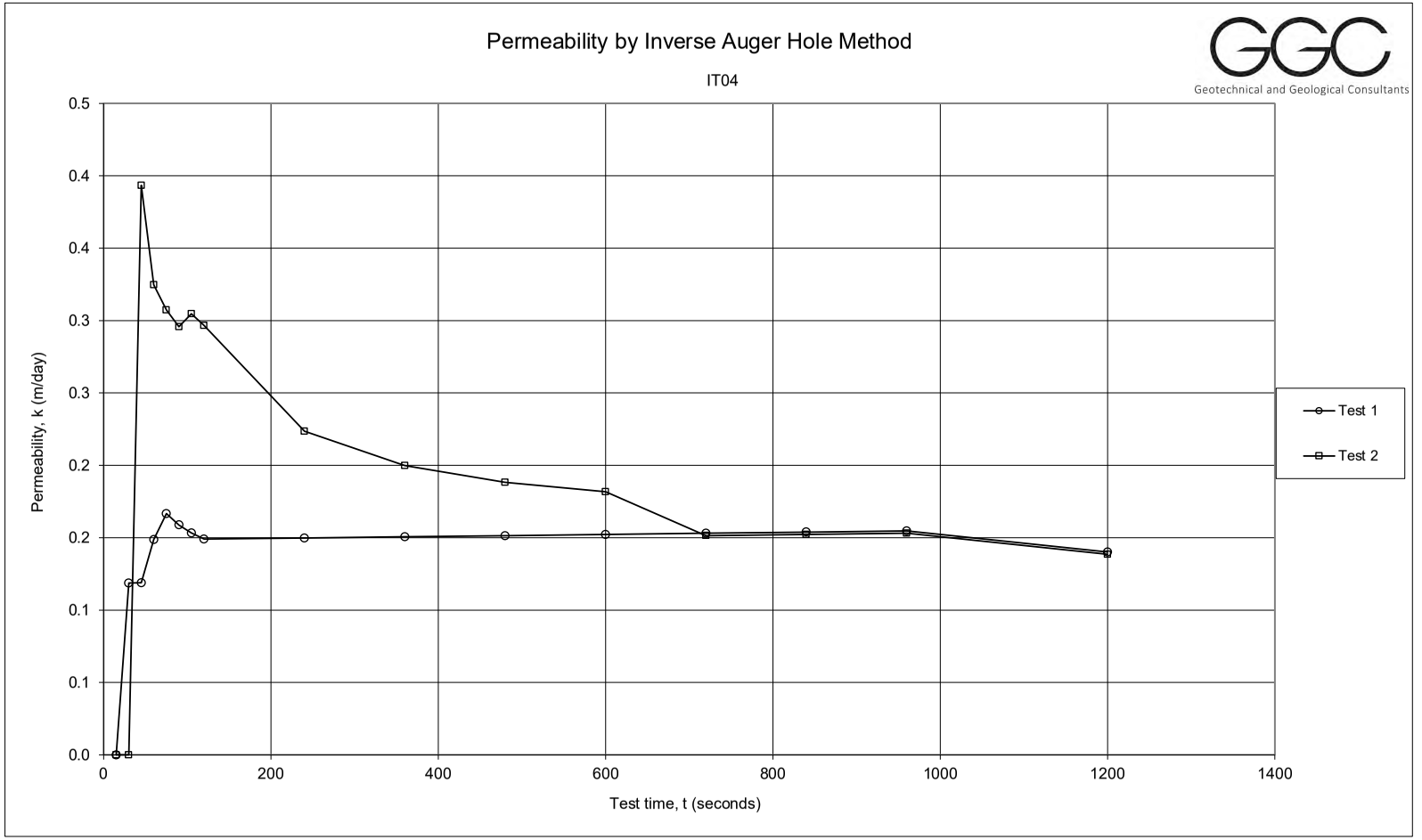
Geotechnical and Geological Consultants

Test 1 — 0.78 full depth — 0.1 — lowest k

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.05	0.95		
15	0.05	0.95	0.0E+00	0.0
30	0.052	0.948	1.4E-06	0.1
45	0.053	0.947	1.4E-06	0.1
60	0.055	0.945	1.7E-06	0.1
75	0.057	0.943	1.9E-06	0.2
90	0.058	0.942	1.8E-06	0.2
105	0.059	0.941	1.8E-06	0.2
120	0.06	0.94	1.7E-06	0.1
240	0.07	0.93	1.7E-06	0.1
360	0.08	0.92	1.7E-06	0.2
480	0.09	0.91	1.8E-06	0.2
600	0.1	0.9	1.8E-06	0.2
720	0.11	0.89	1.8E-06	0.2
840	0.12	0.88	1.8E-06	0.2
960	0.13	0.87	1.8E-06	0.2
1200	0.14	0.86	1.6E-06	0.1
		AVERAGE	1.6E-06	0.1

Test 2 — 0.76 full depth — 0.1 — lowest k

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.04	0.96		
15	0.04	0.96	0.0E+00	0.0
30	0.04	0.96	0.0E+00	0.0
45	0.05	0.95	4.6E-06	0.4
60	0.051	0.949	3.8E-06	0.3
75	0.053	0.947	3.6E-06	0.3
90	0.055	0.945	3.4E-06	0.3
105	0.058	0.942	3.5E-06	0.3
120	0.06	0.94	3.4E-06	0.3
240	0.07	0.93	2.6E-06	0.2
360	0.08	0.92	2.3E-06	0.2
480	0.09	0.91	2.2E-06	0.2
600	0.1	0.9	2.1E-06	0.2
720	0.1	0.9	1.8E-06	0.2
840	0.11	0.89	1.8E-06	0.2
960	0.12	0.88	1.8E-06	0.2
1200	0.13	0.87	1.6E-06	0.1
		AVERAGE	2.4E-06	0.2


Permeability by Inverse Auger Hole Method
IT04
Geotechnical and Geological Consultants
Permeability, k (m/day)
0.5
0.4
0.4
0.3
0.3
0.2
0.2
0.1
0.1
0.0
0
200
400
600
800
1000
1200
1400
Test time, t (seconds)
Test 1
Test 2

APPENDIX C:
Test Pit Logs and Photographs

EXPLANATORY NOTES - SOIL DESCRIPTION

FILL

SAND (SP OR SW)

CLAY (CL, CI OR CH)

COBBLES OR BOULDERS

GRAVEL (GP OR GW)

SILT (ML OR MH)

ORGANIC SOILS (OL, OH OR Pt)

Combinations of these basic symboles can be used to indicate mixed materials (eg. Clayey Gravel)

GP	Poorly Graded Gravel	SM	Silty Sand	CH	High Plasticity Clay
GW	Well Graded Gravel	SC	Clayey Sand	OL	Organic Soils (LP)
GM	Silty Gravel	ML	Low Plasticity Silt	OH	Organic Soils (HP)
GC	Clayey Gravel	MH	High Plasticity Silt	PT	Peat
SP	Poorly Graded Sand	CL	Low Plasticity Clay	-	Cobbles and Boulders
SW	Well Graded Sand	CI	Medium Plasticity Clay	Fill	Fill / Made Ground

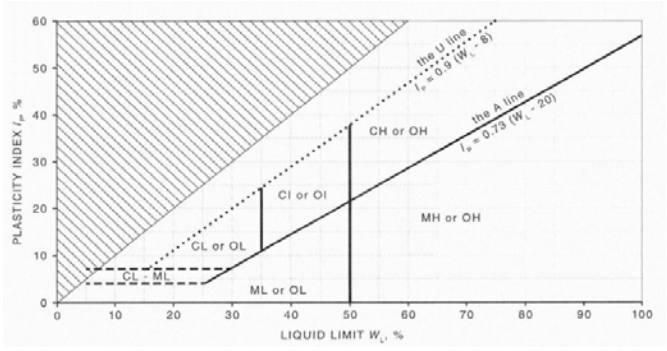
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

Soil descriptions are based on AS1726:2017, Section 6.2. Material properties are assessed in the filed by visual/tactile methods in combination with field testing techniques (where used).

PARTICLE SIZE

Soil Name		Particle Size (mm)
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	20 to 63
	Medium	6 to 20
	Fine	2 to 6
SAND	Coarse	0.6 to 2.0
	Medium	0.2 to 0.6
	Fine	0.075 to 0.2
FINES	SILT	0.002 to 0.075
	CLAY	<0.002

PLASTICITY PROPERTIES



MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties if primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

RESISTENCE TO EXCAVATION

Symbol	Term	Description
VE	Very easy	All resistences are relative to the selected method of excavation.
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

MOISTURE CONDITION

Symbol	Term	Description
D	Dry	Sands and gravels are free flowing. Clays and silts may be brittle or friable and powdery
M	Moist	Soils are darker than in the dry condition and may feel cool. Sands and gravels tend to cohere.
W	Wet	Soils exude free water. Sands and gravels tend to cohere.

CONSISTENCY AND DENSITY

Symbol	Term	Undrained Shear Strength (kPa)	SPT "N"	DCP blows per 100mm
VS	Very soft	0 to 12	0 to 2	<1
S	Soft	12 ti 25	2 to 4	<1
F	Firm	25 to 50	4 to 8	1 to 2
St	Stiff	50 to 100	8 to 15	3 to 4
VSt	Very Stiff	100 to 200	15 to 30	5 to 10
H	Hard	>200	>30	>10

Symbol	Term	Density Index (%)	SPT "N"	DCP blows per 100mm	PSP blows per 300mm
VL	Very Loose	<15	0 to 4	<1	0 to 2
L	Loose	15 to 35	4 to 10	1 to 2	2 to 6
MD	Medium Dense	35 to 65	10 to 30	2 to 3	6 to 8
D	Dense	65 to 85	30 to 50	4 to 8	8 to 15
VD	Very Dense	>85	>50	>8	>15

Note: PSP correlations only valid 450mm depth

Consistency and density may also be inferred from excavation performance and material behaviour.

Explanatory Notes - Rock Description

Geotechnical and Geological Consultants

Rock Substance

Rock Name: **Common rock names are used in preference to more detailed geological descriptions used in the mining industry.**

Particle Size (generalised)

	Sedimentary (Sandstone)	Igneous and Metamorphic
Coarse Grained	0.6mm to 2mm	2mm to >20mm
Medium Grained	0.2mm to 0.6mm	0.06mm to 2mm
Fine Grained	0.06mm to 0.2mm	0.002mm to 0.06mm

Fabric (Terms for layering of the rock mass)

Massive	No layering (homogeneous and isotropic)
Indistinct	Layering is just visible (does not affect rock properties)
Distinct	Layering readily visible (rock breaks parallel to layering)

Weathering Classification

Term	Symbol	Definition
Residual Soil	RS	Soil derived from extremely weathered rock; the mass structure and fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered	XW	Material is weathered to such an extent that it has soil properties, ie. disintegrates or can be remoulded. Original rock fabric is evident.
Highly Weathered*	HW	Rock strength is typically changed by weathering. The rock is discoloured by staining or bleaching. Some minerals are decomposed to clays. Porosity may be increased by leaching or may be increased by the depositing of minerals in pores.
Moderately Weathered*	MW	Rock strength is typically changed by weathering. The rock is discoloured by staining or bleaching such that the colour of the fresh rock is no longer recognisable.
Slightly Weathered	SW	The rock is slightly discoloured but shows little to no change in strength from that of the fresh rock
Fresh	FR	Rock shows no sign of decomposition or staining.

Note: The term Distinctly Weathered (DW) may be used where it is not possible to delineate between the weathering conditions of HW and MW.

Strength of Rock Materials

Term	Symbol	Point Load Index (MPa) Is50	Field Guide
Very Low	VL	>0.03 ≤0.1	Material crumbles under firm blows with the sharp end of a pick; can be peeled wit knife; pieces up to 3cm thick can be broken by finger pressure.
Low	L	>0.1 ≤0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm blows of a pick point; has dull sound under hammer. A piece 150mm long by 50mm diameter. May be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	>0.3 ≤1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	>1.0 ≤3	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rings under a hammer.
Very High	VH	>3 ≤ 10	Hand specimen breaks with many blow of a pick to break intact material; rings under a hammer.
Extremely High	EH	>10	Hand specimen breaks with more than one blow of a pick; rings under a hammer.

TEST PIT NUMBER: TP29

PROJECT NUMBER: **GGC211981**
PROJECT NAME: **Proposed Solar Farm Development**
PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **3.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **397194**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **MBB**
NORTHING (m): **6745141**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **IHR**

EXCAVATION | MATERIAL

VE / PENETRATION E F H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			SC	Clayey SAND: Fine to coarse grained, sub-angular to subrounded; red brown; clay low plasticity; trace fine to medium grained Gravel.	D		0.0-0.2 m With some roots and roots fibres
								0.40m			
				0.5				CLAY: High plasticity; red brown; with some fine to coarse grained, sub-angular to sub-rounded Sand; trace fine to medium grained Gravel; weakly cemented. ...0.5 - 1.0 m becoming red brown mottled off white; with some fine to coarse grained, angular to subangular weakly cemented Calcrete nodules.			
				1.0							
				1.5			CH		D - M		
				2.0							
				2.5							
								2.70m			
				3.0				Hole Terminated at 2.70 m Target depth			
				3.5							

METHOD
- N Natural Exposure
- X Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT
- T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
- U - Undisturbed Sample
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fr	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

GGC 2.00.3 LIB:BETA PLI IMPORT GLB Log GGC TEST PIT GGC211891 THREE SPRINGS SOLAR FARM V1.GPJ <<DrawingFile>> 17/03/2022 13:58 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Lib: GGC 2.00.2 2020-05-08 Prj: JDSI 1.00 2015-12-09

GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP29	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP30

PROJECT NUMBER: **GGC211981**
PROJECT NAME: **Proposed Solar Farm Development**
PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **4.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **396310**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **MBB**
NORTHING (m): **6745193**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **IHR**

EXCAVATION | MATERIAL

VE / E PENETRATION / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			SM	Silty SAND: Fine to coarse grained, sub-angular to sub-rounded, red brown; silt non-plastic.	D		'0.0-0.2 m With some roots and roots fibres
								0.30m			
				0.5			SP	Gravelly SAND: Fine to coarse grained, sub-angular to sub-rounded; red brown; Gravel fine to medium grained, sub-angular to sub rounded; red brown stained yellow; with some low plasticity clay.			
								0.80m	D - M		
				1.0				FERRICRETE: Recovered as Gravelly SAND: Fine to coarse grained, sub-angular to sub-rounded; red brown mottled off white; Gravel is fine to coarse grained, angular to sub-angular, tabular; stained purple, red, dark grey; with some low plasticity clay.			
								1.30m			
				1.5				Hole Terminated at 1.30 m Refusal - FERRICRETE			
				2.0							
				2.5							
				3.0							
				3.5							

METHOD
N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION
Based on Unified Classification System

MOISTURE
D - Dry
M - Moist
W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fr	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

GGC 2.00.3 LIB BETA PLI IMPORT GLB Log GGC TEST PIT GGC211981 THREE SPRINGS SOLAR FARM V1.GPJ <<DrawingFile>> 17/03/2022 13:58 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Ldx: GGC 2.00.2 2020-05-08 Prj: JDSI 1.00 2015-12-09

GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP30	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP31

PAGE: 1 OF 1

PROJECT NUMBER: **GGC211981**

PROJECT NAME: **Proposed Solar Farm Development**

PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **3.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **395577**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **MBB**
NORTHING (m): **6745175**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **IHR**

EXCAVATION							MATERIAL					
VE / E PENETRATION / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			SC	Clayey SAND: Fine to coarse grained, sub-angular to sub-rounded; red brown; clay low plasticity.	D - M		'0.0-0.4 m With some roots and roots fibres
				0.5				0.60m			
				1.0			GP	Sandy GRAVEL: Fine to coarse grained, angular to sub-angular including Calcrete nodules; red brown mottled off white; Sand is fine to coarse grained, sub-angular to subrounded; with some low plasticity clay; 10% very low to low strength cobbles up to 250 mm of weakly to moderately cemented Calcrete.			
				1.5				1.60m			
				2.0			SM	Silty Gravelly SAND: Fine to coarse grained, sub-angular to subrounded; red brown mottled off white; Gravel is fine to coarse grained, sub-angular to subrounded; Silt is non plastic.			
			2.50m	2.5				2.50m			
			B				CH	CLAY: High plasticity; red brown mottled off white; with some fine to coarse grained, subangular to subrounded Sand.			
			3.00m	3.0							
				3.5				...3.3 m becoming of 10% subrounded cobbles up to 100 mm of Ferricrete/Weathered Gneiss			
								3.50m			
				4.0				Hole Terminated at 3.50 m Target depth			

METHOD

- N Natural Exposure
- X Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT

- T Timbering

PENETRATION

VE E F H VH — No Resistance

WATER

- 10 Oct., 73 Water Level on Date shown
- water inflow
- water outflow

SAMPLES & FIELD TESTS

- U - Undisturbed Sample
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION

Based on Unified Classification System

MOISTURE

- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fr	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

GGC 2.00.3 LIB:BETA PLI IMPORT GLB Log GGC TEST PIT GGC211891 THREE SPRINGS SOLAR FARM V1.GPJ <<DrawingFile>> 17/03/2022 13:58 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Lib: GGC 2.00.2 2020-05-08 Prj: JDSI 1.00 2015-12-09

GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP31	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP32

PAGE: 1 OF 1

PROJECT NUMBER: **GGC211981**

PROJECT NAME: **Proposed Solar Farm Development**

PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **3.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **395869**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **IHR**
NORTHING (m): **6744526**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **MBB**

EXCAVATION						MATERIAL					
VE / E PENETRATION / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			GP	Sandy GRAVEL: Fine to medium grained, sub-angular to sub-rounded, mixed lithics; pale brown to grey; Sand is fine to coarse grained , sub-angular to subrounded; trace fines.			'0.0-0.2 m With some roots and roots fibres
								0.30m FERRICRETE: Recovered as cemented Sandy GRAVEL: Fine to medium grained, sub-angular to sub-rounded, mixed lithics; pale brown to grey; Sand is fine to coarse grained, subangular to subrounded; 5% very low to low strength cobbles up to 250 mm.	D		
				0.5				0.70m Hole Terminated at 0.70 m Refusal - FERRICRETE/ WEATHERED GNEISS			
				1.0							
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							

METHOD

- N Natural Exposure
- X Existing Excavation
- BH Backhoe Bucket
- B Bulldozer Blade
- R Ripper

SUPPORT

- T Timbering

PENETRATION

VE E F H VH — No Resistance

WATER

- 10 Oct., 73 Water Level on Date shown
- water inflow
- water outflow

SAMPLES & FIELD TESTS

- U - Undisturbed Sample
- D - Disturbed Sample
- B - Bulk Disturbed Sample
- MC - Moisture Content
- HP - Hand Penetrometer (UCS kPa)
- VS - Vane Shear; P-Peak, R-Remouded (uncorrected kPa)
- PBT - Plate Bearing Test

CLASSIFICATION SYMBOLS & SOIL DESCRIPTION

Based on Unified Classification System

MOISTURE

- D - Dry
- M - Moist
- W - Wet

CONSISTENCY/ RELATIVE DENSITY

VS	- Very Soft
S	- Soft
F	- Firm
St	- Stiff
VSt	- Very Stiff
H	- Hard
Fr	- Friable
VL	- Very Loose
L	- Loose
MD	- Medium Dense
D	- Dense
VD	- Very Dense

See Explanatory Notes for details of abbreviations & basis of descriptions.

GGC 2.00.3 LIB BETA PLI IMPORT GLB Log GGC TEST PIT GGC211981 THREE SPRINGS SOLAR FARM V1.GPJ <<DrawingFile>> 17/03/2022 13:58 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Lib: GGC 2.00.2 2020-05-08 Prj: JDSI 1.00 2015-12-09

GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP32	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP33

PAGE: 1 OF 1

PROJECT NUMBER: **GGC211981**

PROJECT NAME: **Proposed Solar Farm Development**

PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **3.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **396851**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **MBB**
NORTHING (m): **6743996**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **IHR**

EXCAVATION						MATERIAL					
VE / E PENETRATION / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			SM	Silty SAND: Fine to coarse grained, subangular to subrounded; brown; silt non plastic; trace fine to medium grained Gravel.	D		'0.0-0.2 m With some roots and roots fibres
								0.40m			
				0.5			GP	Sandy GRAVEL: Fine to coarse grained, subangular to sub-rounded, pisoliths; pale red, yellow brown; Sand fine to coarse grained, sub-angular to sub-rounded; with some non plastic fines.	D - M		
								…0.8 m 10% Cobbles and boulders up to 330 mm of Low to high strength Weathered Gneiss			
				1.0				1.00m Hole Terminated at 1.00 m Refusal - PROBABLY WEATHERED GNEISS			
				1.5							
				2.0							
				2.5							
				3.0							
				3.5							

METHOD

N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION

VE E F H VH — No Resistance

WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

U - Undisturbed Sample
D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
HP - Hand Penetrometer (UCS kPa)
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Based on Unified Classification System

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VSt	- Very Stiff
H	- Hard
Fr	- Friable
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L	- Loose
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See Explanatory Notes for details of abbreviations & basis of descriptions.

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GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP33	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP34

PROJECT NUMBER: **GGC211981**
PROJECT NAME: **Proposed Solar Farm Development**
PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**
ELEVATION (mAHD):
EASTING (m): **395497**
NORTHING (m): **6744000**

EQUIPMENT: **PC 300 KOMATSU 30t Excavator**
EXCAVATION LENGTH: **4.5 m**
EXCAVATION WIDTH: **0.8 m**
EXCAVATION ORIENTATION: **-**

DATE STARTED: **9/03/2022**
DATE COMPLETED: **9/03/2022**
LOGGED BY: **IHR**
CHECKED BY: **MBB**

EXCAVATION | MATERIAL

VE / PENETRATION (E F H)	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0				CLAY: Low to medium plasticity; orange brown; with some fine to coarse grained, sub-angular to subrounded Sand.	D		Gilgai and trace cobbles at surface, possibly dolerite, medium grained dark grey with off white cortex; 0.0-0.2 m With some roots and roots fibres
				0.5			CL-CI	...0.3 m becoming orange brown mottled off white; with some fine to coarse gravel of weakly to moderately cemented Calcrete nodules.			
								0.90m			
				1.0			CI	CLAY: Medium plasticity; mottled off white, orange brown; trace Sand; trace fine to coarse grained, angular to subangular, mixed lithics mainly weakly cemented Calcrete nodules.	D - M		
				1.5							
								1.80m			
				2.0			CH	CLAY: High plasticity; orange brown; mottled red brown, grey green; trace sand; possibly Residual Soil.			
				2.5							
								2.70m			
				3.0				Hole Terminated at 2.70 m Target depth			
				3.5							

METHOD
N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT
T Timbering

PENETRATION
VE E F H VH — No Resistance

WATER
10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS
U - Undisturbed Sample
D - Disturbed Sample
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GGC 2.00.3 LIB BETA PLI IMPORT GLB Log GGC TEST PIT GGC211891 THREE SPRINGS SOLAR FARM V1.GPJ <<DrawingFile>> 17/03/2022 13:58 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Lib: GGC 2.00.2 2020-05-08 Prj: JDSI 1.00 2015-12-09

GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP34	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

TEST PIT NUMBER: TP35

PAGE: 1 OF 1

PROJECT NUMBER: **GGC211981**

PROJECT NAME: **Proposed Solar Farm Development**

PROJECT LOCATION: **WOMARDEN (NEAR THREE SPRINGS)**

Geotechnical and Geological Consultants

DATUM: **MGA94 Zone 50**	EQUIPMENT: **PC 300 KOMATSU 30t Excavator**	DATE STARTED: **9/03/2022**
ELEVATION (mAHD):	EXCAVATION LENGTH: **3.5 m**	DATE COMPLETED: **9/03/2022**
EASTING (m): **397056**	EXCAVATION WIDTH: **0.8 m**	LOGGED BY: **MBB**
NORTHING (m): **6744632**	EXCAVATION ORIENTATION: **-**	CHECKED BY: **IHR**

EXCAVATION						MATERIAL					
VE / E PENETRATION / F / H	SUPPORT	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	Elevation (m AHD)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION Soil Name, Plasticity or Particle Characteristic, Colour, Secondary Soil Components, Minor Components and Origin	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
		Not Encountered		0.0			SC	Clayey SAND: Fine to coarse grained, sub-angular to sub-rounded; red brown; clay medium plasticity.	D		'0.0-0.2 m With some roots and roots fibres
				0.5							
								0.70m			
				1.0				CLAY: High plasticity; red brown; with some fine to coarse grained, sub-angular to sub-rounded Sand; trace fine to medium gravel; weakly cemented.			
				1.5			CH		D - M		
				2.0							
				2.5				2.70m			
				3.0				Hole Terminated at 2.70 m Target depth			
				3.5							

METHOD

N Natural Exposure
X Existing Excavation
BH Backhoe Bucket
B Bulldozer Blade
R Ripper

SUPPORT

T Timbering

PENETRATION

VE E F H VH — No Resistance

WATER

10 Oct., 73 Water Level on Date shown
water inflow
water outflow

SAMPLES & FIELD TESTS

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D - Disturbed Sample
B - Bulk Disturbed Sample
MC - Moisture Content
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GGC Geotechnical and Geological Consultants	PROPOSED SOLAR FARM WOMARDEN NEAR THREE SPRINGS Test Pit Photographs TP35	Drawn:	MBB	Date:	17/03/2022
		Checked:	IHR	Date:	17/03/2022
		Scale:	Not To Scale	Page Size	A4
		Project No.	GGC211891	Plate No.	1 of 1

APPENDIX D:
Geophysical Investigation Results

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Jandakot, WA 6964
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Email: info@gbgmaps.com.au
A.B.N. 45 129 251 225

GEOPHYSICAL INVESTIGATION FOR SOIL RESISTIVITY TESTING.

SOLAR FIELD DEVELOPMENT, THREE SPRINGS WA.

Date: 15 March 2022
Report No.: 70686
Revision: 0
Author: Andrew Spyrou

Distribution
GGC

TABLE OF CONTENTS

1. DATA ACQUISITION 3

2. DATA PROCESSING 4

3. RESULTS 4

1. DATA ACQUISITION

Soil resistivity testing was carried out at 3 locations beneath the proposed substation footprint using the Wenner Array Vertical Electrical Sounding (VES) method. The results of the investigation will be used to assist with the calculation of suitable earthing parameters for proposed infrastructure to be constructed at the site.

The site work for the investigation was carried out on the 8 and 9 March 2022 by engineers from GGC. Data from a two orthogonal VES traverses was acquired at each test location to measure variations in the subsurface electrical properties.

VES data was acquired using a Syscal Kid (Iris Instruments) resistivity meter using a Wenner 4-point array whereby electrical current of known magnitude is injected through 2 outer electrodes (C1 and C2) and with the resulting potential difference measured at 2 inner electrodes (P1 and P2) as shown in the schematic in Figure 1. Acquisition parameters used during the VES testing are given in Table 2.

Prior to each test reading being made, saline water was used to wet the ground about the electrodes to improve electrical contact. Multiple readings were made at each test point to satisfy statistical repeatability of the measurement.

Table 1. VES Data Acquisition Parameters

Parameter	Value
Electrode configuration	Wenner 4 point
Electrode A spacing	1, 2, 4, 8, 16, 24, 32m
Max. output voltage	200 V
Min / Max reading stacks	4 / 8
Quality factor	5.0 %
Injection on/off time	500 ms

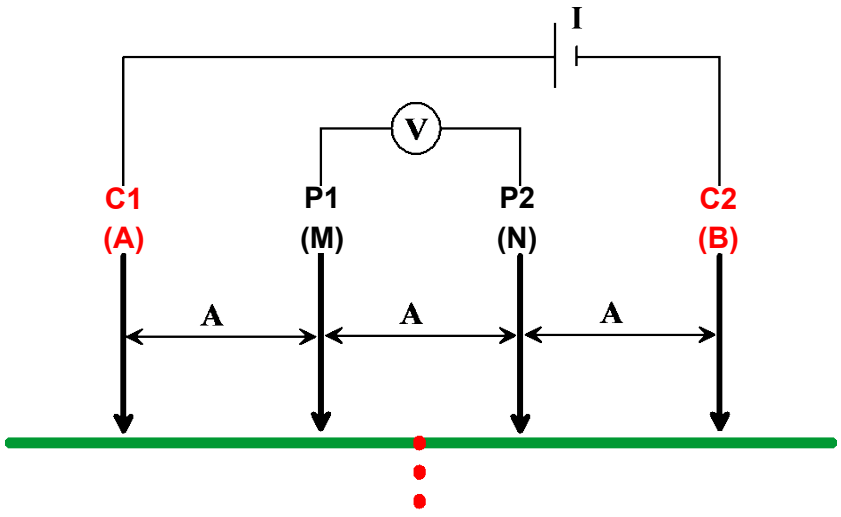


Figure 1: Schematic of the Wenner 4 Point VES method.

2. DATA PROCESSING

Resistance (R) was calculated from the measured current (I) and potential difference (V) for each 'A' spacing using Ohm's Law ***(R = V/I)***. Resistance was then converted to apparent resistivity (ρ) using the geometric factor for the Wenner 4-point array ***(ρ = 2πAR)***.

Inversion of the apparent resistivity values for each VES sounding was carried out using EarthImager 1D version 2.0.6 (Advanced Geosciences Inc., 2020) to obtain 1D resistivity layer models showing the variation in subsurface electrical resistivity with depth centred at each sounding location.

The validity of 1D inversion of electrical resistivity datasets is based on the following assumptions:

- The subsurface consists of horizontal layers, with each layer having a consistent thickness over the distance between the test electrodes. For certain geological situations this is not the case such as where layers are upturned or faulted, pinch out or thicken.
- Each layer must be homogeneous in terms of electrical resistivity. This is not always the case such as where laterally discrete features including caverns, boulders or voids, or where changes in material type or fluid content interrupts homogeneity.

3. RESULTS

The results of the soil resistivity testing using the Wenner Array VES method are provided in Appendix A of this report. The results have been provided in graphical format including:

- The calculated apparent resistivity values for each A spacing
- The inverted 1D resistivity layer models for each sounding

The graphs have been provided in base 10 logarithmic scale as per VES standards presentation.

A summary of the results for each VES test location are provided in Tables 2 to 4.

Note interpretation and use of the inverted 1D resistivity layer models obtained using the VES method are required to be carried out with knowledge of the geological conditions at the site. In particular, caution should be taken where the geological conditions as described in Section 2 of this report are not met.

Table 2: Resistivity Layer Model at Site WA01-A.

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	0.30	0.30	1332	0.35	0.35	481
2	11.82	11.52	114.1	0.63	0.28	28.6
3	∞	∞	3100	2.13	1.50	680
4				3.11	0.98	22.3
5				∞	∞	190

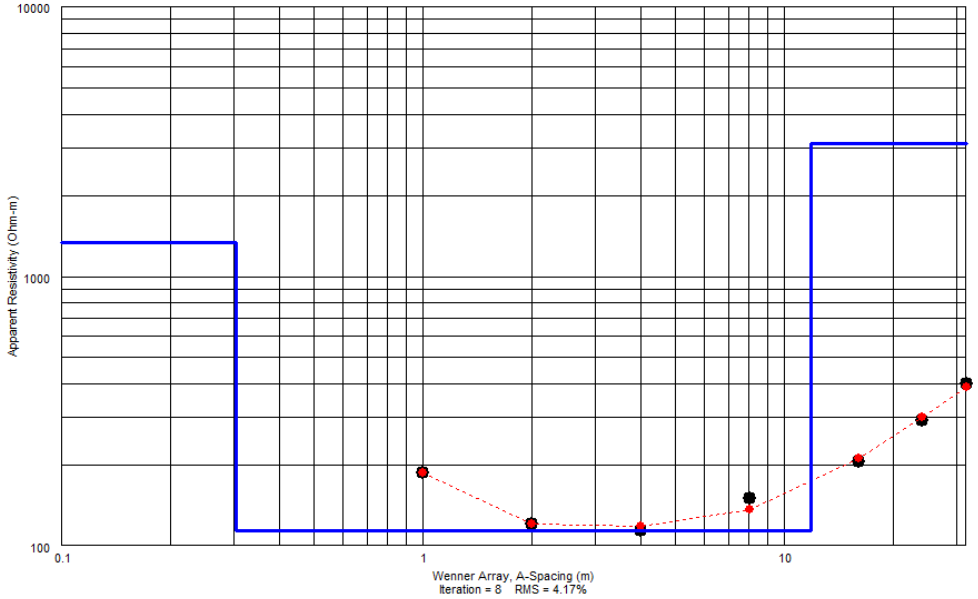
Table 3: Resistivity Layer Model at Site WA02-A.

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	1.46	1.46	64.4	0.64	0.64	87.6
2	2.56	1.10	12.6	1.47	0.83	9.77
3	2.89	0.33	17.6	∞	∞	435
4	∞	∞	364			

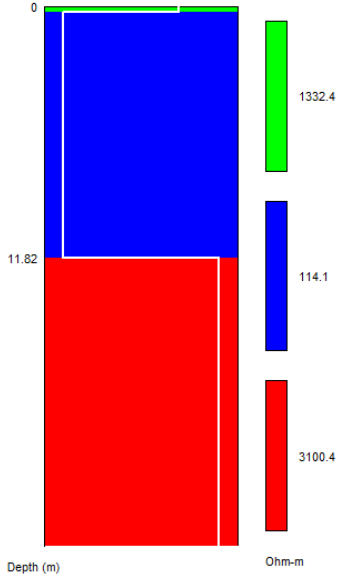
Table 4: Resistivity Layer Model at Site WA03-A.

Layer #	Sounding 1 (North-South)			Sounding 2 (East-West)		
	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)	Bottom Depth (m)	Thickness (m)	Modelled resistivity (Ohm.m)
1	0.65	0.65	4.15	1.23	1.23	2.97
2	2.56	1.90	2.26	2.91	1.68	0.76
3	5.22	2.66	1.63	3.26	0.35	2.50
4	∞	∞	30.4	∞	∞	30.1

WA-01A - North-South

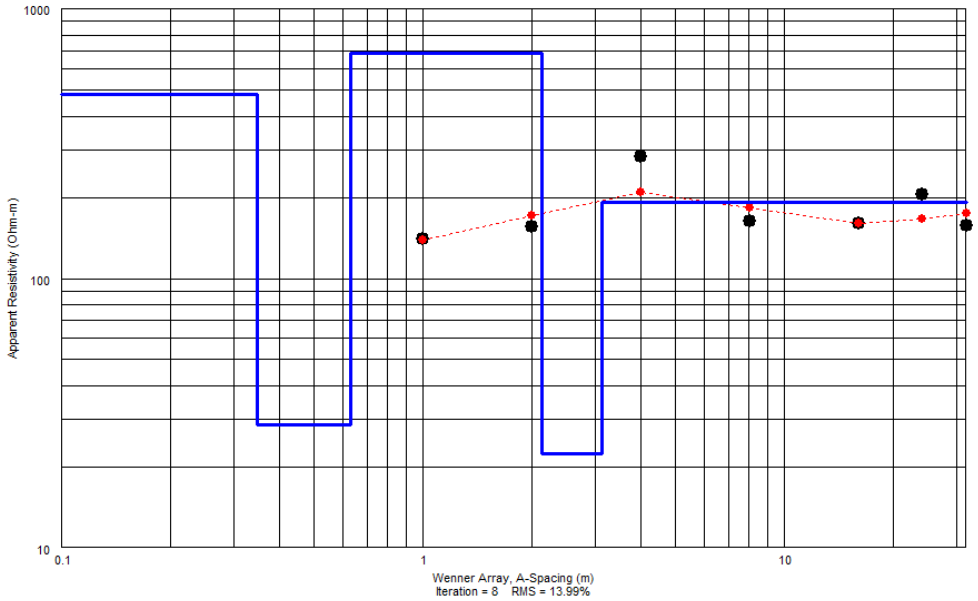


Layered Resistivity Model

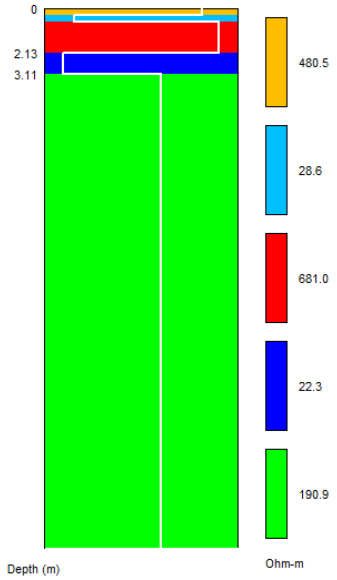


GBGMAPS			
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	ElarthImager 1D
Data File	70686-1a.dat		

WA-01A - East-West

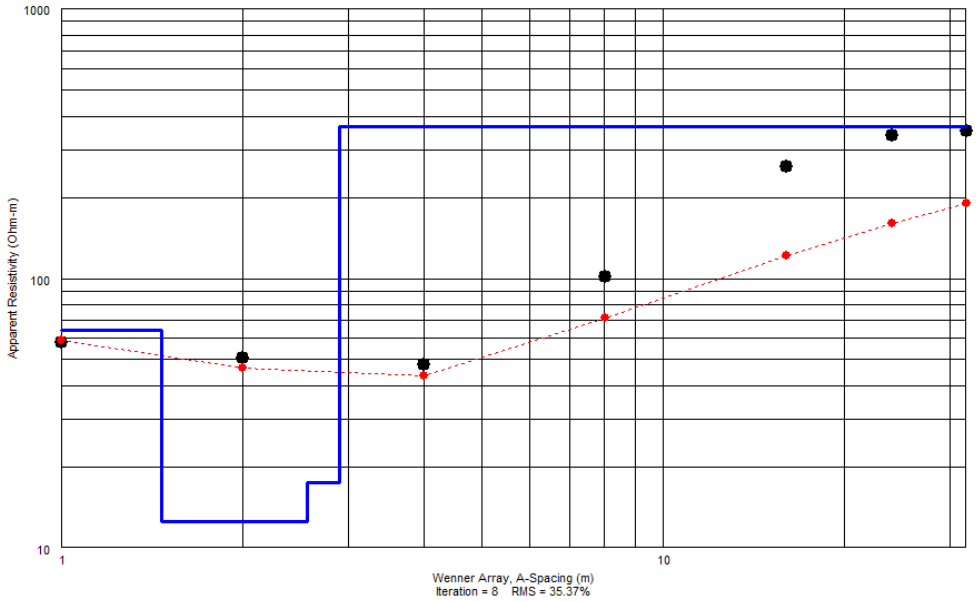


Layered Resistivity Model

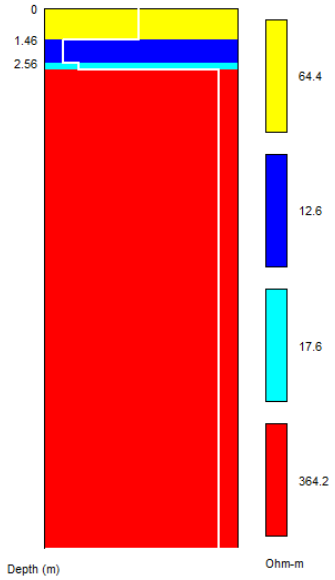


GBGMAPS			
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	ElarthImager 1D
Data File	70686-1b.dat		

WA-02A - North-South



Layered Resistivity Model



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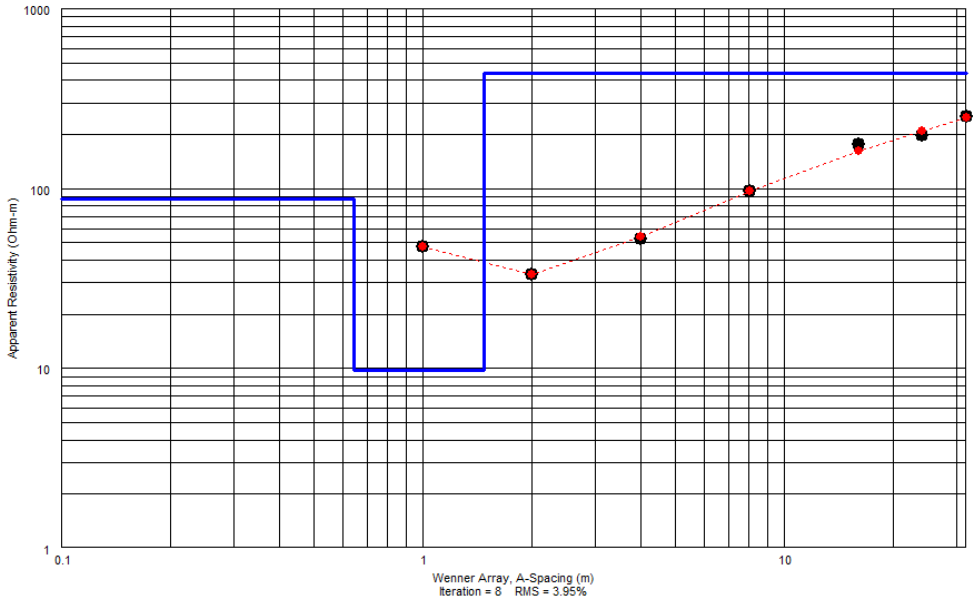
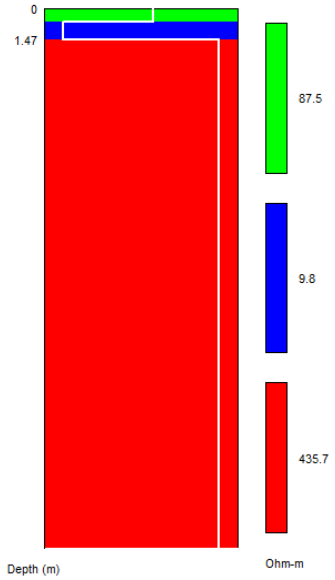
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	ElarthImager 1D
Data File	70686-2a.dat		

WA-02A - East-West

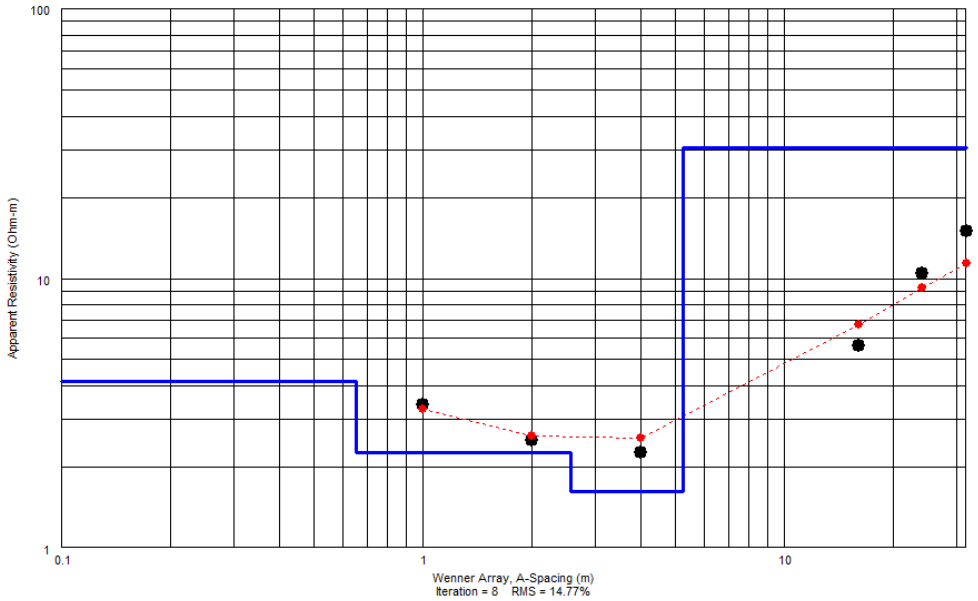


Layered Resistivity Model

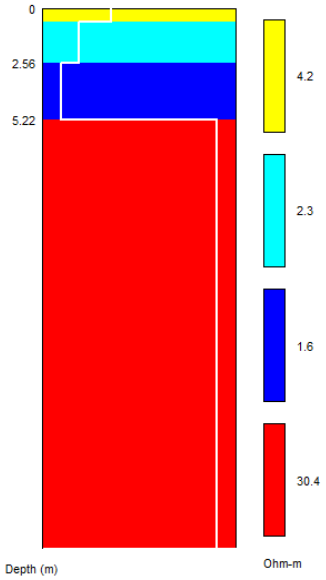


GBGMAPS			
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	ElarthImager 1D
Data File	70686-2b.dat		

WA-03A - North South



Layered Resistivity Model



GBGMAPS			
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	ElarthImager 1D
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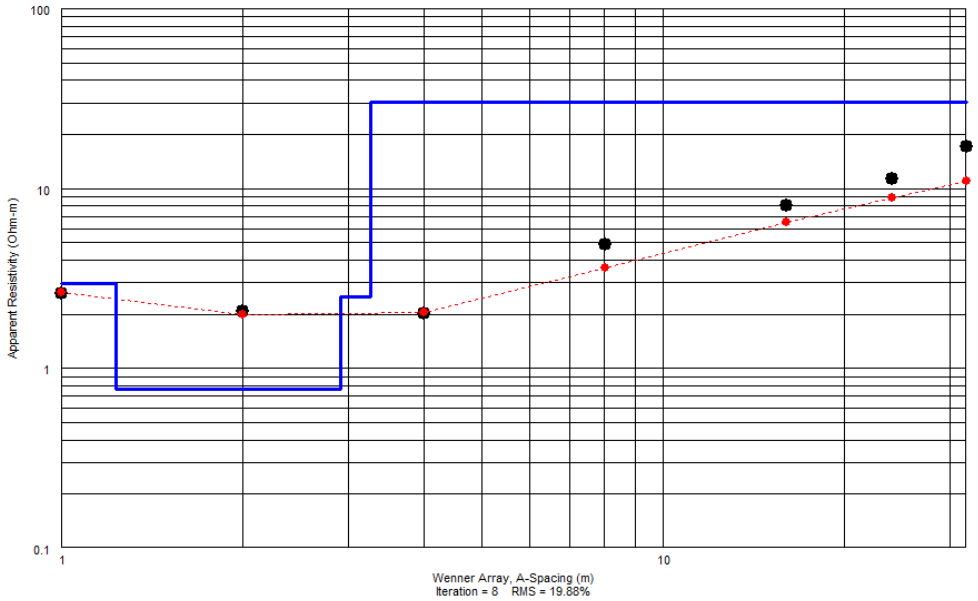
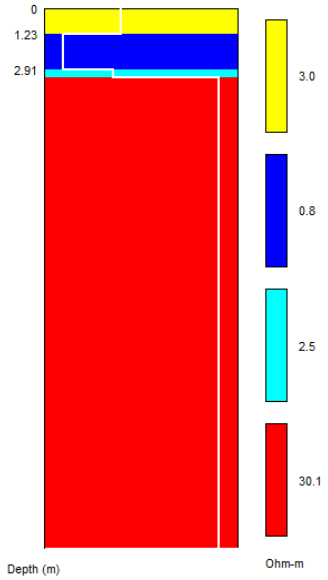
WA-03A - East-West



Layered Resistivity Model



GBGMAPS			
Job Code	70686	Survey Date	Mar 10, 2022
Project Site		Instrument	Syscal Kid
Approved By	PJE	Software	EarthImager 1D
Data File	70686-3b.dat		

APPENDIX E:
Existing Road Inspection Photographs

Broad Road looking West

Broad Road surface

Hunt Road looking West

Hunt Road surface

Wilson Road looking South

Wilson Road surface

APPENDIX F:
Existing Road Inspection Photographs

Gravel Pit 3 – Existing borrow pit

Gravel Pit 3 – Outcropping rock in base of existing borrow pit

Gravel Pit 3 – Sidewall of existing borrow pit

Gravel Pit 3 – Lateritic gravel material in existing borrow pit

Gravel Pit 4 – Existing potential borrow pit

Gravel Pit 4 – Outcropping rock adjacent to existing potential borrow pit

Gravel Pit 4 – Stockpile of lateritic gravel in existing potential borrow pit

Gravel Pit 4 – Lateritic gravel material in existing potential borrow pit

APPENDIX G:
Previous Laboratory Test Certificate

CERTIFICATE OF ANALYSIS

Work Order	: **EP1703156**	Page	: 1 of 2
Client	: **JDSI Ground Engineering**	Laboratory	: Environmental Division Perth
Contact	: Mr Colin Dickson	Contact	: Customer Services EP
Address	: Level 6, 1 Nash Street Perth 6000	Address	: 10 Hod Way Malaga WA Australia 6090
Telephone	: 92270595	Telephone	: +61-8-9209 7655
Project	: Three Springs	Date Samples Received	: 03-Apr-2017 17:00
Order number	: JDS171243	Date Analysis Commenced	: 06-Apr-2017
C-O-C number	: ----	Issue Date	: 12-Apr-2017 14:25
Sampler	: Colin Dickson		
Site	: ----		
Quote number	: ----		
No. of samples received	: 5		
No. of samples analysed	: 5		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics, Malaga, WA
Indra Astuty	Instrument Chemist	Perth Inorganics, Malaga, WA
Jeremy Truong	Laboratory Manager	Perth Inorganics, Malaga, WA

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				Client sample ID	**CPT8 - 0.50 m**	**CPT12 - 0.4 to 0.5 m**	**CPT22 - 0.3 to 0.4 m**	**CPT27 - 0.5 m**	**CPT28 - 0.5 m**
				Client sampling date / time	30-Mar-2017 00:00	30-Mar-2017 00:00	31-Mar-2017 00:00	31-Mar-2017 00:00	31-Mar-2017 00:00
Compound	*CAS Number*	*LOR*	*Unit*		**EP1703156-001**	**EP1703156-002**	**EP1703156-003**	**EP1703156-004**	**EP1703156-005**
					Result	Result	Result	Result	Result
EA002 : pH (Soils)									
pH Value	----	0.1	pH Unit		**5.4**	**8.8**	**5.5**	**8.8**	**9.4**
EA010: Conductivity									
Electrical Conductivity @ 25°C	----	1	µS/cm		**27**	**441**	**48**	**148**	**154**
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1	%		**7.3**	**11.7**	**4.4**	**10.8**	**15.9**
EA080: Resistivity									
Resistivity at 25°C	----	1	ohm cm		**37000**	**2270**	**20800**	**6760**	**6490**
ED040S : Soluble Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	10	mg/kg		**40**	**100**	**70**	**20**	**30**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg		<10	**570**	**10**	**90**	**30**

ANNEXURE F - BUSHFIRE ASSESSMENT & BUSHFIRE MANAGEMENT PLAN

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lot 1366 Wilson Road		
Suburb: Three Springs	**State:** WA	**P/code:** 6519
Local government area: Shire of Three Springs		
Description of the planning proposal: Development of Solar Farm		
BMP Plan / Reference Number: 170299	**Version:** v1.4	**Date of Issue:** 10/11/2021
Client / Business Name: Green Fuel Development		

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☒
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☐	☒
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Kathy Nastov	Level 3	BPAD 27794	1/08/2022
Company Bushfire Prone PLanning		**Contact No.** 64771144	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner **Date** 10/11/2021

Bushfire Management Plan

Three Springs Solar Farm

Lot 1366 Wilson Road, Womarden

Shire of Three Springs

Planning Stage:	Development Application (Standard BMP)
Planning Development Type:	N/A
Bushfire Policy – Specific Development or Use Type:	N/A

Job Number:	170299
Assessment Date:	9 May 2017
Report Date:	10 November 2021

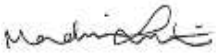
BPP Group Pty Ltd t/a Bushfire Prone Planning
ACN: 39 166 551 784 | ABN: 39 166 551 784

Level 1, 159-161 James Street
Guildford WA 6055

PO Box 388
Guildford WA 6935

08 6477 1144 | admin@bushfireprone.com.au

DOCUMENT CONTROL

PREPARATION		
Author:	Madison Smith	
Co-Author:	-	
Review/Authorise:	Kathy Nastov (BPAD Level 3 - No. 27794)	

VERSION HISTORY		
Version	**Version Details**	**Date**
1.4	Original (redesign of site) – updated mapping	10 November 2021
-		
BMP (Standard DA-Non-Tourism) Template v8.5		

DISTRIBUTION				
Destination	**Version**	**No. Copies**	**Hard Copy**	**Electronic Copy**
Person/Business: Green Fuel Development **Email:** xtauler@greenfueldevelopment.com	V1.4	1	☐	☒
Person/Business: **Email:**			☐	☐

Limitation of Liability: The measures contained in this Bushfire Management Plan, are considered to be minimum requirements and they do not guarantee that a building will not be damaged in a bushfire, persons injured, or fatalities occur either on the subject site or off the site while evacuating. This is substantially due to the unpredictable nature and behaviour of fire and fire weather conditions. Additionally, the correct implementation of the required bushfire protection measures will depend upon, among other things, the ongoing actions of the landowners and/or operators over which Bushfire Prone Planning has no control.

All surveys, forecasts, projections and recommendations made in this report associated with the proposed development are made in good faith based on information available to Bushfire Prone Planning at the time. All maps included herein are indicative in nature and are not to be used for accurate calculations.

Notwithstanding anything contained therein, Bushfire Prone Planning will not, except as the law may require, be liable for any loss or other consequences whether or not due to the negligence of their consultants, their servants or agents, arising out of the services provided by their consultants.

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EXECUTIVE SUMMARY

This Bushfire Management Plan (BMP) has been prepared to accompany the development application for a solar photovoltaic panel farm at Lot 1366 Wilson Road, Womarden within the Shire of Three Springs.

The development site (849.7535 ha) contains areas within the designated bushfire prone area and the Proposal requires the application of *State Planning Policy No 3.7: Planning in Bushfire Prone Areas* (SPP 3.7). The assessed bushfire risk is considered to be manageable and will be achieved by the identified stakeholders implementing and maintaining the bushfire risk management measures that are present in this BMP.

Assessment of the planned location, vegetation and consideration of planned infrastructure indicates that compliance is able to be achieved against all applicable bushfire related legislation, policy, standards and guidelines, including the Bushfire Protection Criteria.

The indicative BAL rating that can be achieved by the proposed infrastructure is BAL-12.5 with the installation of 20 m and 35 m Asset Protection Zone (APZ) surrounding the solar photovoltaic panels, tourism area, solar array storage, substation and any other proposed infrastructure. The APZ will be comprised of internal road networks and low threat vegetation.

Vehicle access to the site will be by existing public roads that are proposed to be upgraded to allow the increased traffic during construction period and allow semi-trailer vehicles to access the site. The upgraded roads allow two-way access for personnel to access and egress from the site in the event of a bushfire. The access to the site is through cropped paddocks that allow vehicles to pass through in the event of any bushfire incidents if required.

All internal access roads will be designed and constructed to allow semi-trailer vehicle access, and appropriate turn around areas that will also be suitable for 3.4 fire appliances. The internal road network will allow semi-trailer vehicles to move around site to all proposed infrastructure without issues.

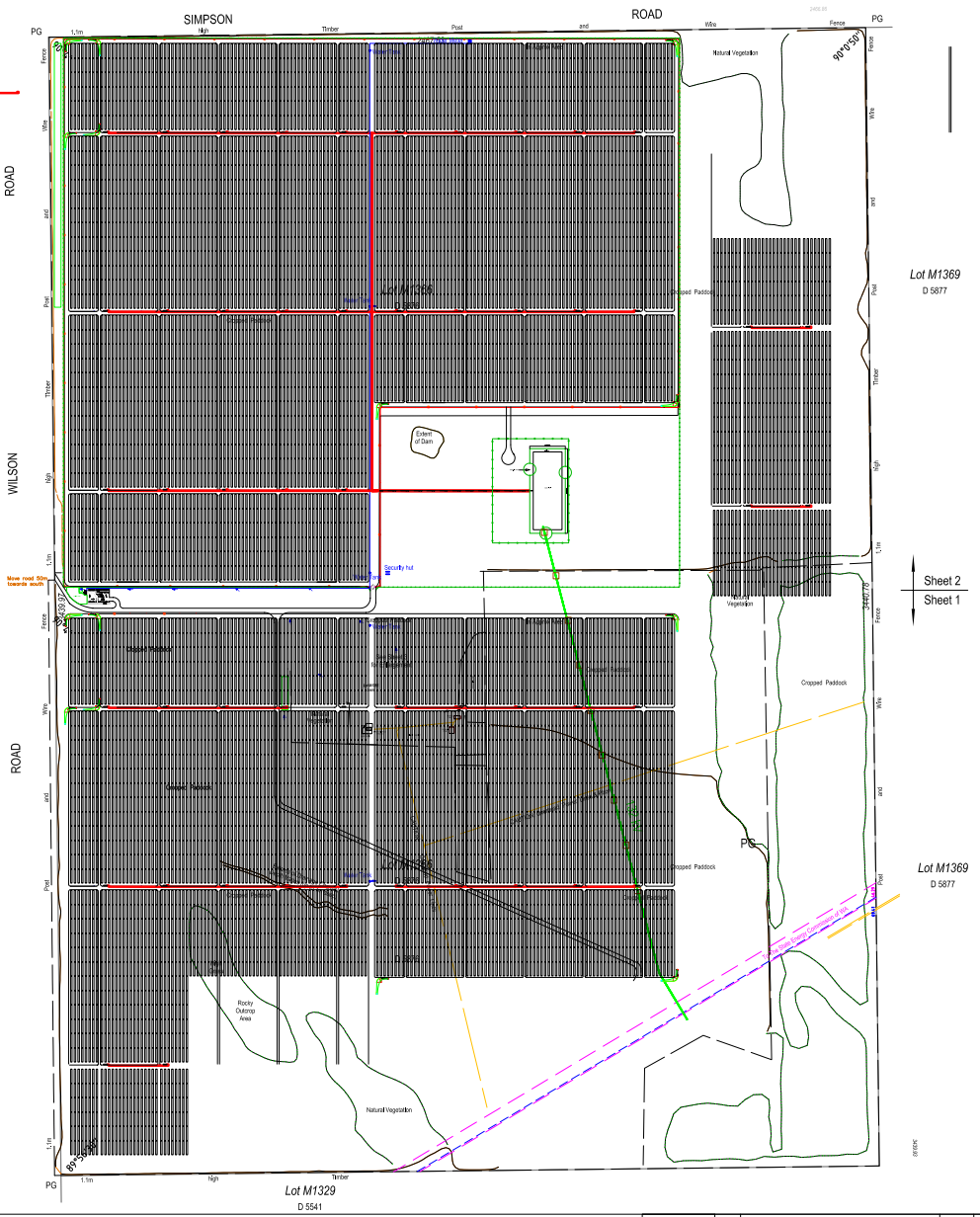
There is currently a reticulated water supply to the development site for domestic purposes and the closest hydrant is in the townsite of Three Springs approximately 28 km west. It is proposed to install 5 x 50 00 litre emergency water tanks for emergency services to utilise with the appropriate fittings and 3.4 fire appliance hardstand.

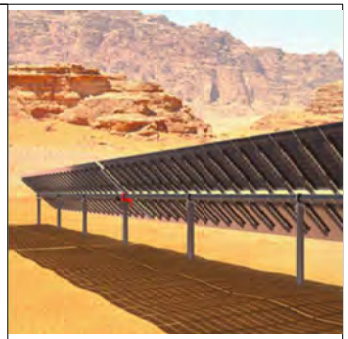
The existing homestead will be removed for solar photovoltaic panels.

1 PROPOSAL DETAILS

1.1 Description and Associated Plans and Maps

Landowner / Proponent:	Green Fuel Development
Bushfire Prone Planning Commissioned to Produce the Bushfire Management Plan (BMP) By:	Green Fuel Development
For Submission To:	The Shire of Three Springs
Purpose of the BMP:	To accompany a development application
'Development' Site Total Area:	8 497 535 square metres
No. of Existing/Proposed Lots:	N/A
Description of the Proposed Development/Use:	
Proposed solar farm in existing cropped paddock.	
Staged Development and Management of Potential Bushfire Hazard Issues	
N/A	





MAIN PROPERTIES

Solar Module MFG	Rizen
Solar Module Model	RSM120-8-600BMDG
Total N° of modules	626,688
Total N° of strings	19,584
Module per string	32
Mounting system MFG	Soltec
Mounting system Type	SF7 Bifacial Ground Mount Horizontal Single-Axis
Solar Inverster MFG	SunGrow
Total N° of Inverters	(56 units) 6.8MW MV Power Station 6800HV-MV
Total DC system size	376,012.8 kWp

Legend

- Panel marco
- Tracker axis
- 5MW block
- DC cable from CB to Inverter
- 33 kV AC line
- Road
- Solar park fence
- Inverter pad
- Camera

ORIENTATION

N

Rev.	Description	Drawn	Date	Checked
A	Initial Issue.	CD	09/03/2021	CD

GENERAL VIEW
WHEATBELT SOLAR PLANT 1

Client: Pilot Energy

GREEN FUEL DEVELOPMENTS

Scale	1:4000
Datum	Assumed
Drawn	Cónie Geldme
Surveyor	Cónie Geldme
Date	09/06/2021
Job No.	GFD 021
Drawing	GFD-021-001
Plan No.	GFD 021-001
Sheet 1 of 50	
Rev.	A
SHEET SIZE	A1

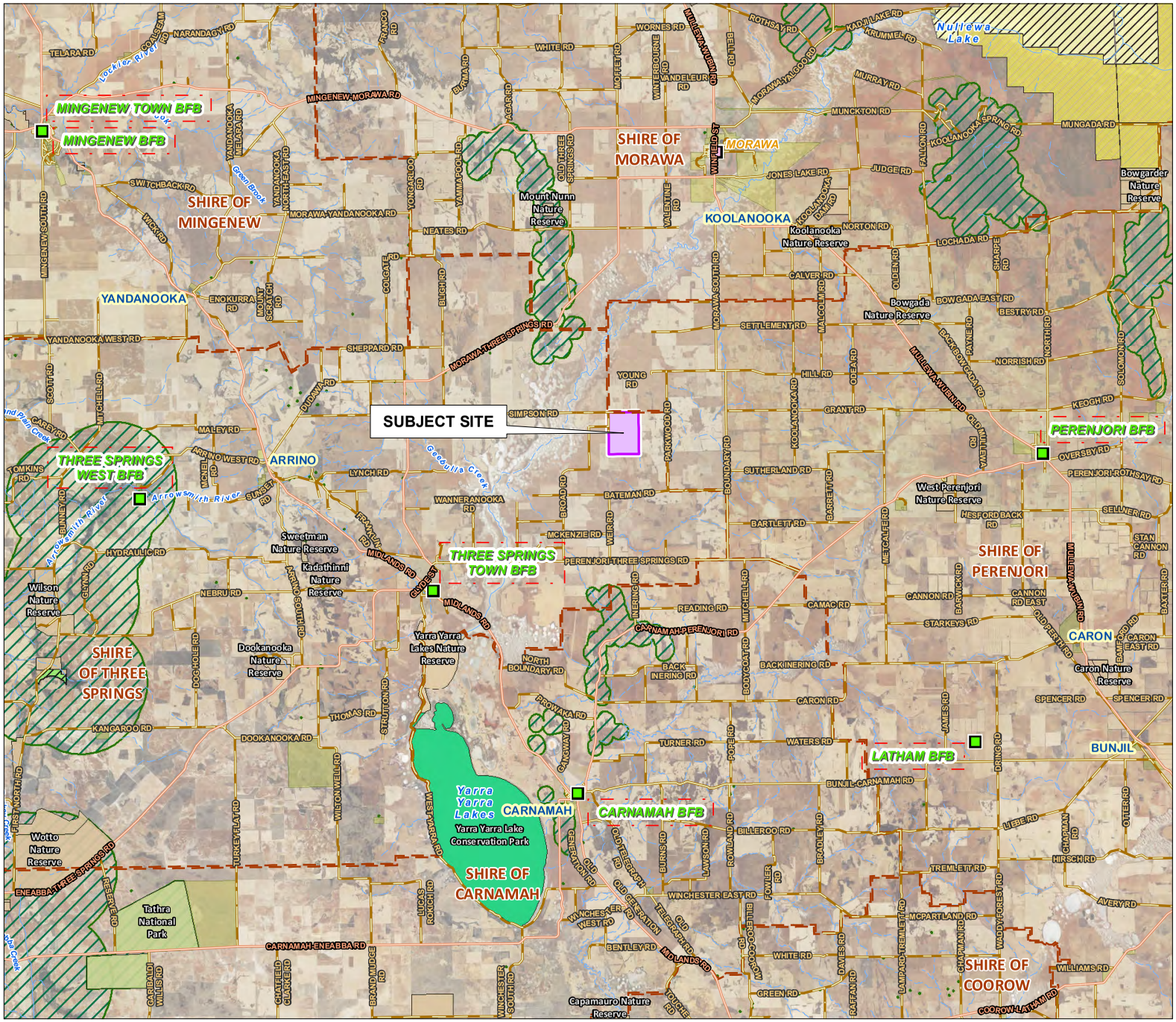


Figure 1.2

Location Plan

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site
- Local Government Authority
- Bush Fire Brigade
- Volunteer Fire & Emergency Service Unit
- Reserves

Legislated Lands and Waters

- Timber Reserve
- Nature Reserve
- Conservation Park
- National Park

DBCA Lands of Interest

- Crown Freehold - Dept Interest
- UCL - Dept Interest
- Clearing Regulations

0 5 10 15 20
Kilometres

------ LOCALITY ------

Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 15/04/2021
Map updated by: Ian 15/04/2021

BUSHFIRE PRONE PLANNING

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Map Document Path / Name: K:\Projects\Jobs 2017\170299 - Three Springs Solar (BMP)\170299 - BMP Updates - March 21\Mapping\MXD\170299_Fig1-2_LOC_Three_springs_solar.mxd

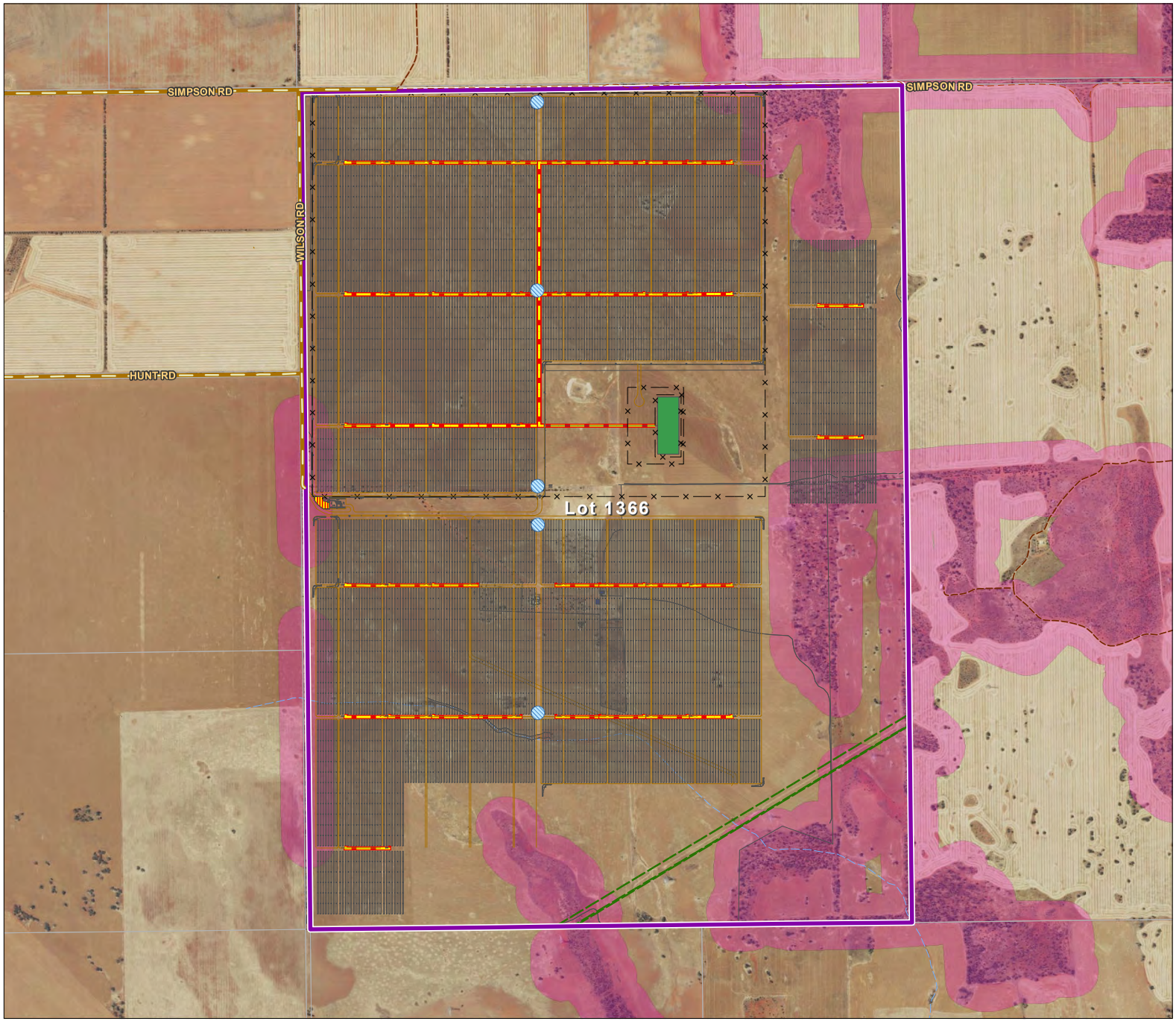


Figure 1.3

Bushfire Prone Area

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

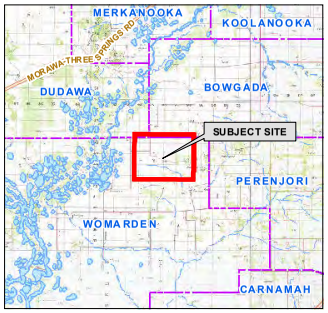
- Subject Site

Solar Plant Development

- Development
- Easement
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank
- Bushfire Prone Areas (2019)

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 10/11/2021
Map updated by: Ian Ross 10/11/2021

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Map Document Path / Name: K:\Projects\Jobs 2017\170299 - Three Springs Solar (BMP)\Mapping\MXD\170299_Fig1-3_BPA_Three_springs_solar.mxd

1.2 Existing Documentation Relevant to the Construction of this Plan

This section acknowledges any known reports or plans that have been prepared for previous planning stages, that refer to the subject area and that may or will impact upon the assessment of bushfire risk and/or the implementation of bushfire protection measures and will be referenced in this Bushfire Management Plan.

Table 2.1: Existing relevant documentation.

RELEVANT EXISTING DOCUMENTS		
Existing Document	Copy Provided by Client	Title
Structure Plan	No	-
Environmental Report	Yes	*Figure 1. Environmental Considerations SpringSolar Project* – PGV Environmental (07/04/2017)
Landscaping (Revegetation) Plan	No	-
Bushfire Risk Assessments	Yes	*Bushfire Management Plan v1.1 (Development Application) Lot 1366 Wilson Road, Three Springs* – Bushfire Prone Planning (24/06/2017)

2 ENVIRONMENTAL CONSIDERATIONS

2.1 Native Vegetation – Restrictions to Modification and/or Clearing

Many bushfire prone areas also have high biodiversity values. SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values (Guidelines s2.3).

There is a requirement to identify any need for onsite modification and/or clearing of native vegetation and whether this may trigger potential environmental impact/referral requirements under State and Federal environmental legislation. Confirmation that any proposed native vegetation modification and/or clearing is acceptable, should be received from the relevant agencies by the proponent and provided to the bushfire consultant for inclusion in the Bushfire Management Plan if it will influence the required bushfire planning assessments and outcomes. The following table details any potential environmental restrictions of which the author of this report is aware.

Table 2.2: Native vegetation and potential environmental considerations and restrictions.

NATIVE VEGETATION MODIFICATION / CLEARING - POTENTIAL ENVIRONMENTAL RESTRICTIONS IDENTIFIED				
Environmental Considerations / Features	Potential Mapping Data Source (SLIP / Local Planning)	Relevant to Proposed Development	Data Applied	Action Required
Onsite clearing of native vegetation is required.		Yes		
Environmental impact/referral requirements under State and Federal environmental legislation may be triggered.		Unlikely		
National Park / Nature Reserve	DBCA-011	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None
Conservation Covenant	DPIRD-023	Not Known	Data Not Readily Available to Bushfire Consultant	Proponent to Seek Advice
Bush Forever Site	DPLH-019	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None
RAMSAR Wetland	DBCA-010	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None
Geomorphic and Other Wetland	DBCA-011-019, 040, 043, 044	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None
Threatened and Priority Ecological Communities (TECs or PECs)	DBCA-038	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None
Threatened and Priority Flora including Declared Rare Flora (DRFs)	DBCA-036	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None

Land Identified as significant through a Local Biodiversity Strategy	LG - Intramaps	No- Confirmed by Bushfire Consultant	Relevant Database Reviewed by Bushfire Consultant	None

Statement of how the identified environmental feature(s) is dealt with in this Bushfire Management Plan (and the location of relevant information):

No environmentally sensitive or ecologically valuable areas have been identified onsite.

However, the assessments and bushfire protection measures detailed the BMP, assume that environmental approval will be achieved or clearing permit exemptions will apply.

It is advised that the proponent seek further advice from an Environmental Consultant or the WA Department of Biodiversity Conservation and Attractions for further information on the condition and species contained within the proposed development area and the requirement for referral of the proposal.

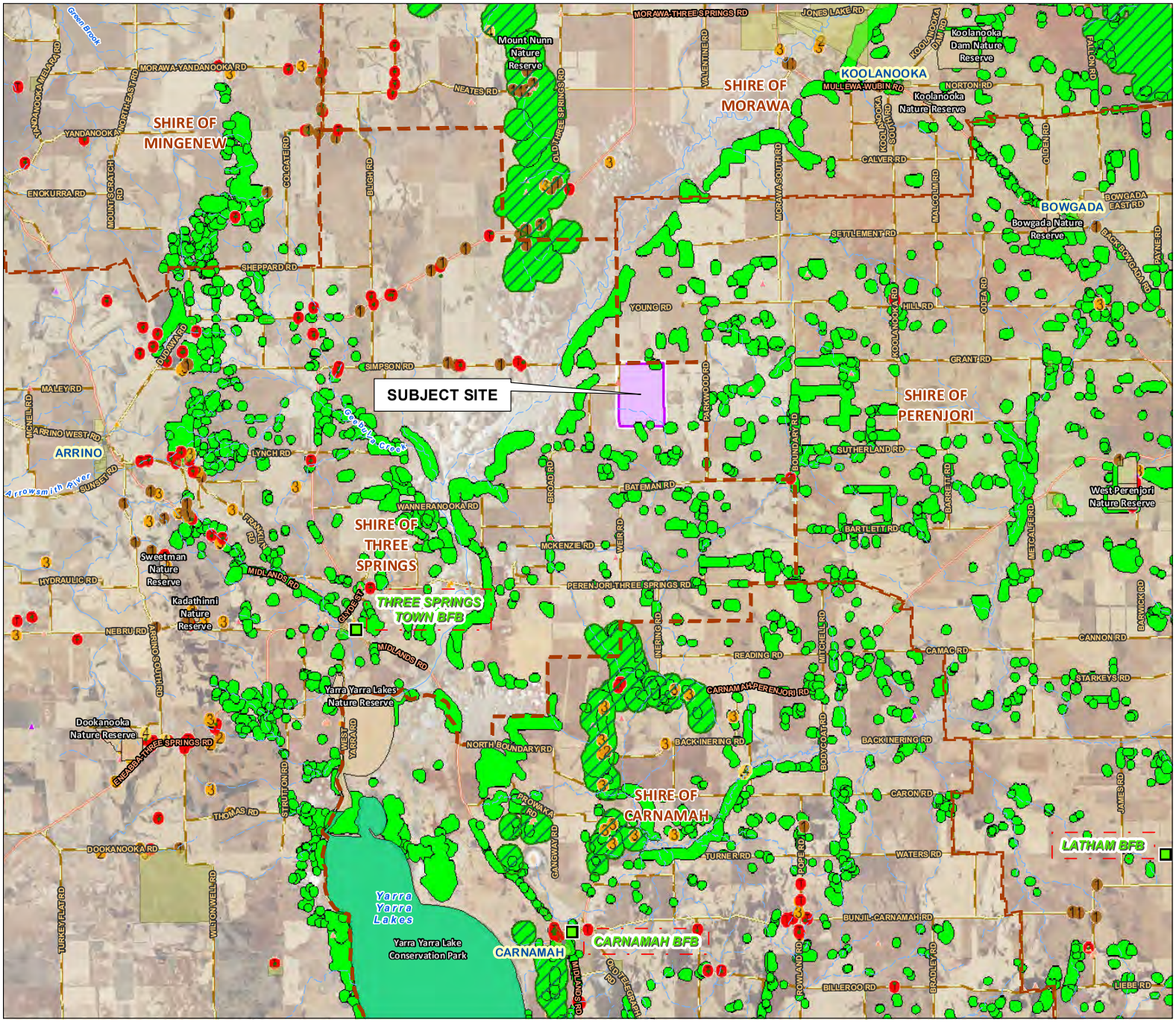

Figure 2.1

Environmental Considerations Map

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site
- Local Government Authority
- Bush Fire Brigade
- Reserves

Legislated Lands and Waters

- Nature Reserve
- Conservation Park
- Clearing Regulations
- Ecological Community

Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 23/04/2021
Map updated by: Ian Ross 23/04/2021

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Map Document Path / Name: K:\Projects\Jobs 2017\170299 - Three Springs Solar (BMP)\170299 - BMP Updates - March 21\Mapping\MXD\170299_Fig2-1_ENV_v2_Three_springs_solar.mxd

Development Design Considerations

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation of lots and/or asset protection zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available design options to minimise the removal of native vegetation.

Table 2.3: Development design.

MINIMISE THE REMOVAL OF NATIVE VEGETATION	
Design Option	Assessment / Action
Reduction of lot yield	N/A
Cluster development	N/A
Construct building to a standard corresponding to a higher BAL as per BCA (AS 3959:2018 and/or NASH Standard)	N/A
Modify the development location	N/A
The development is for a solar power station comprised of industrial infrastructure. Small areas of Class B Woodland will be removed for solar PV panels. Vegetation surrounding the infrastructure will be maintained in a low threat state in perpetuity. Trees can remain ensuring the understory and canopy cover is managed and meets the requirements of the Guidelines.	
IMPACT ON ADJOINING LAND	
Is this planning proposal able to implement the required bushfire protection measures within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes
There will be no increased impact of surrounding properties with respect to bushfire risk. Vegetation within the asset protection zones will be maintained at a low threat state. Remaining areas of the subject site will continue to be cropped and grazed at a low-threat state. Remnant vegetation outside of the APZ requirements will not be modified.	

2.2 Retained Vegetation / Re-vegetation / Landscape Plans (including POS)

Riparian zones, wetland/foreshore buffers, road verges and public open space may have plans to re-vegetate or retain vegetation as part of the proposed development. Vegetation corridors may be created between offsite and onsite vegetation and provide a route for fire to enter a development area.

All retained/planned vegetation and its management will be considered in the development of this Bushfire Management Plan.

Is re-vegetation of riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	No
N/A	
Is the requirement for ongoing maintenance of existing vegetation in riparian zones and/or wetland or foreshore buffers and/or public open space a part of this Proposal?	No
N/A	
Has a landscape plan been developed for the proposed development?	No
N/A	

3 POTENTIAL BUSHFIRE IMPACT ASSESSMENT

3.1 Assessment Input

3.1.1 Fire Danger Index (FDI) Applied

AS 3959:2018 Table 2.1 specifies the fire danger index values to apply for different regions. The values used in the model calculations are for the Forest Fire Danger Index (FFDI) and for which equivalent representative values of the Grassland Fire Danger Index (GFDI) are applied as per Appendix B. The values can be modified if appropriately justified.

Table 3.1: Applied FDI Value

FDI VALUE			
Vegetation Areas	As per AS 3959:2018 Table 2.1	As per DFES for the Location	Value Applied
1-12	80	N/A	80

3.1.2 Vegetation Classification and Effective Slope

Classification: Bushfire prone vegetation identification and classification has been conducted in accordance with AS 3959:2018 s2.2.3 and the Visual Guide for Bushfire Risk Assessment in WA (DoP February 2016).

When more than one vegetation type is present, each type is identified separately, and the applied classification considers the potential bushfire intensity and behaviour from the vegetation types present and ensures the worst-case scenario is accounted for – this may not be from the predominant vegetation type.

The vegetation structure has been assessed as it will be in its mature state (rather than what might be observed on the day). Areas of modified vegetation are assessed as they will be in their natural unmodified state (unless maintained in a permanently low threat, minimal fuel condition, satisfying AS 3959:2018 s2.2.3.2(f) and asset protection zone standards). Vegetation destroyed or damaged by a bushfire or other natural disaster has been assessed on its revegetated mature state.

Effective Slope: Refers to the ground slope under each area of classified vegetation and is described in the direction relative to the view from the building or proposed development site. Effective slope is not the same as 'average slope', rather it is the slope which most significantly influences fire behaviour. This slope has a direct and significant influence on a bushfire's rate of spread and intensity.

Where there is a significant change in effective slope under an area of classified vegetation, that will cause a change in fire behaviour, separate vegetation areas will be identified to enable the correct assessment.

When the effective slope, under a given area of bushfire prone vegetation, will be different relative to multiple proposed development sites, then the effective slopes corresponding to the different locations, are separately identified.

Planned Re-vegetation/Landscaping Considerations/Public Open Space Management

Where post-development considerations that have been applied to vegetation classification, if any such vegetation is excluded from classification due to proposed management, there is the obligation to manage the vegetation to a minimal fuel, low threat state, in perpetuity. Preliminary revegetation plans should not have an impact on the BAL ratings ensuring the required separation distances are maintained.

Table 3.1.2: Vegetation classification and effective slope.

ALL VEGETATION WITHIN 150 METRES OF THE PROPOSED DEVELOPMENT				
Vegetation Area	Identified Vegetation Types [1] or Description if 'Excluded'	Applied Vegetation Classification [1]	Effective Slope (degrees)[2] (AS 3959:2018 Method 1)	
			Assessed	Applied Range
1	Low woodland B-07	Class B Woodland	0.5	downslope >0-5
2	Low shrubland C-12	Class C Shrubland	0.5	downslope >0-5
3	Low woodland B-07	Class B Woodland	1	downslope >0-5
4	Low open shrubland G-19	Class G Grassland	0.5	downslope >0-5
5	Low woodland B-07	Class B Woodland	0.5	downslope >0-5
6	Low open shrubland G-19	Class G Grassland	0.5	downslope >0-5
7	Low open woodland B-08	Class G Grassland	0.5	downslope >0-5
8	Low woodland B-07	Class B Woodland	0.5	downslope >0-5
9	Low woodland B-07	Class B Woodland	0.5	downslope >0-5
10	Open heath C-11	Class C Shrubland	0.5	downslope >0-5
11	Sown pasture G-26	Class G Grassland	0.5	downslope >0-5
12	Sown pasture G-26	Class G Grassland	0.5	downslope >0-5
13	Low-Threat Vegetation	Excluded as per Section 2.2.3.2 (f)	-	-
Representative photos of each vegetation area, descriptions and classification justification, are presented on the following pages. The areas of classified vegetation are defined, and the photo locations identified on Figure 3.1, the vegetation and topography map. When more than one vegetation type is present each type is classified separately with the worst-case scenario being applied. The predominant vegetation is not necessarily the worst-case scenario.				
Note[1]: Described and classified as per AS 3959:2018 Table 2.3 and Figures 2.3 and 2.4 (A)-(H) Note[2]: Effective slope measured as per AS 3959:2018 Section 2.2.5 and Appendix B Part B4				

VEGETATION AREA 1	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Open woodland, remanent salmon gums ~12 m tall, with 5% foliage cover along road reserve/boundary, grass and minor low shrub, including sapphire shrub, for understory.

Photo ID: 1a

Photo ID: 1b

VEGETATION AREA 2	
AS 3959:2018 Vegetation Classification Applied:	Class C Shrubland
Vegetation Types Present:	Low shrubland C-12
Description/Justification:	Shrubland with sparse acacia shrubs and grassy understory. Rocky outcrops along ridge of dolerite.

Photo ID: 2a

Photo ID: 2b

VEGETATION AREA 3	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Open woodland, eucalyptus and acacia shrubs, numerous dead trees, grass understory
Post Dev. Assumptions:	Vegetation onsite is to be retained after development.

Photo ID: 3a

Photo ID: 3b

Photo ID: 3c

Photo ID: 3d

VEGETATION AREA 4	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Low open shrubland G-19
Description/Justification:	Low open Shrubland, open paddocks, samphire shrubs
Post Dev. Assumptions:	The vegetation is onsite and can be managed and or removed and is classified as worst-case scenario.
Photo ID: 4a	

VEGETATION AREA 5	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Low open woodland, with trees 10-15 m tall. Unmanaged grass understory
Photo ID: 5a	Photo ID: 5b

VEGETATION AREA 6	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Low open shrubland G-19
Description/Justification:	Open shrubland, rocky outcrop area, very sparsely vegetated

Photo ID: 6a

Photo ID: 6b

VEGETATION AREA 7	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Low open woodland B-08
Description/Justification:	Onsite open woodland, fenced area, low trees, grassy understory
Post Dev. Assumptions:	Vegetation to be retained post-development. Areas of the vegetation are to be managed post-development to ensure appropriate APZ are upkept.

Photo ID: 7a

VEGETATION AREA 8	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Open woodland, remanent eucalyptus along road reserve/boundary, grass and minor low shrub understory.

Photo ID: 8a

Photo ID: 8b

VEGETATION AREA 9	
AS 3959:2018 Vegetation Classification Applied:	Class B Woodland
Vegetation Types Present:	Low woodland B-07
Description/Justification:	Offsite open woodland, windbreak along fence line, grass and shrub understory
Post Dev. Assumptions:	Vegetation is offsite and cannot be managed or removed. The vegetation is classified as worst-case scenario.

Photo ID: 9a

VEGETATION AREA 10	
AS 3959:2018 Vegetation Classification Applied:	Class C Shrubland
Vegetation Types Present:	Closed heath C-10
Description/Justification:	Offsite open shrubland, remanent shrubland on boundary fence, sporadic trees, grass understory
Post Dev. Assumptions:	Area is offsite and classified as worst-case scenario. The vegetation cannot be managed or removed.
Photo ID: 10a	

VEGETATION AREA 11	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Sown pasture G-26
Description/Justification:	Onsite grassland, cropped and grazed paddocks
Post Dev. Assumptions:	Vegetation is onsite and can be managed or removed. It is classified as worst-case scenario. Some vegetation is expected to be removed during the development and required areas of vegetation will be managed in a low-threat state as short-cropped grass to ensure appropriate APZ is maintained.
Photo ID: 11a	Photo ID: 11b

VEGETATION AREA 11	
Photo ID: 11c	Photo ID: 11d

VEGETATION AREA 12	
AS 3959:2018 Vegetation Classification Applied:	Class G Grassland
Vegetation Types Present:	Sown pasture G-26
Description/Justification:	Offsite grassland, cropped and grazed paddocks
Photo ID: 12a	Photo ID: 12b
Photo ID: 12c	Photo ID: 12d

Figure 3.1

Topography & Classified Vegetation (Pre Development)

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site
- Photo & Direction

Solar Plant Development

- Development
- Easement
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank

Vegetation Assessment Area

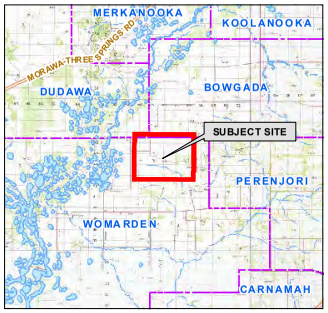
- 150m from Subject Site

Classified Vegetation

- Class (B) Woodland
- Class (C) Shrubland
- Class (G) Grassland
- Exclusion 2.2.3.2

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator Units: Metre
Map compiled by: Ian Ross 10/11/2021
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Figure 3.1.1

Topography & Classified Vegetation (Post Development)

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site

Solar Plant Development

- Development
- Easement
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank

Vegetation Assessment Area

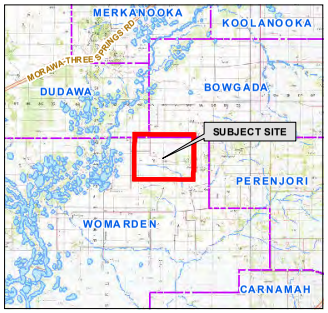
- 150m from Subject Site

Classified Vegetation

- Class (B) Woodland
- Class (C) Shrubland
- Class (G) Grassland
- Exclusion 2.2.3.2

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
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3.1.3 Vegetation Separation Distance

The vegetation separation distance is the horizontal distance measured from the relevant parts of an existing building or a future building's planned location (within a lot), to the determined edge of an area of classified vegetation.

This separation distance applied to determining a Bushfire Attack Level (BAL) can be either:

- The *measured distance* – for which the location of the building relative to the edge of classified vegetation must be known. This will result in single determined BAL that will apply to a building. (The measured distance is a required calculation input); or
- A *calculated minimum and maximum distance (range)* that will correspond to each individual BAL. The calculated distances provide an indicative (or achievable) BAL for which the determined BAL will be dependent on the known location of the building relative to the edge of classified vegetation.

  The calculated range of distances corresponding to each BAL can be presented in different formats (tables or a BAL contour map), dependent on the form of information that is most appropriate for the proposed development/use. These distance ranges corresponding to BAL(s) will be presented in Section 3.2: 'Assessment Output".

For the proposed development/use, the applicable vegetation separation distances will be presented within the Bushfire Management Plan in this location:	In Section 3.2 'Assessment Output' as a table containing the calculated ranges of distance corresponding to each BAL and illustrated as a BAL Contour Map.

3.2 Assessment Output

UNDERSTANDING THE RESULTS OF THE BUSHFIRE IMPACT ASSESSMENT

Bushfire Attack Levels (BALs) – Their Application in the Building Environment is Different to the Planning Environment

In the building environment, a ***determined BAL*** is required for the proposed construction at the building application stage. This is to inform approval considerations and establish the bushfire construction standards that are to apply. An indicative BAL is not acceptable for a building application.

In the planning environment, through the application of SPP 3.7 and associated Guidelines, the deemed to satisfy requirement for a proposed 'development site' or sites (defined by the LPS Amendment Regulations 2015 as "that part of a lot on which a building that is the subject of development stands or is to be constructed"), is that a BAL-29 or lower rating can be achieved once all works associated with the proposal are completed. For planning approval purposes, an ***indicative BAL*** can provide the required information.

Determined Bushfire Attack Level

A determined BAL is to apply to an existing building or the 'development site' on which the building is to be constructed and not to a lot or building envelope. Its purpose is to state the potential radiant heat flux to which the building will be exposed, thereby determining the construction standard to be applied.

A determined BAL cannot be given for a future building whose design and position on the lot are unknown or the vegetation separation distance has not been established. It is not until these variables have been fixed that a determined BAL can be stated, and a BAL Certificate can be issued.

The one exception is when a building ***of any dimension*** can be ***positioned anywhere*** on a proposed lot (within R-Code building setbacks) or within a defined building envelope, and always remain subject to the same BAL, regardless of the retention of any existing classified vegetation either onsite or offsite.

Indicative Bushfire Attack Level

If a BAL is not able to achieve 'determined' status it will be an indicative BAL. It indicates the BAL that can be achieved by the proposed development/use. However, it is conditional upon an assessment variable(s) being confirmed at a later stage (e.g. the building location is established/changed, or vegetation is modified/removed to establish the vegetation separation distance).

A BAL certificate cannot be issued for an indicative BAL – unless that BAL cannot vary (refer to 'Determined BAL' above).

In table form, a single or a range of indicative BAL(s) may be presented. If a single indicative BAL is stated for a defined area (i.e. the lot or building envelope), this will be the highest indicative BAL impacting the defined area.

In BAL contour map form (refer to Section 3.2.1), the illustrated BAL contours visually identify areas of land for which if any part of an existing or proposed building is located on that land and within the BAL contours, then the highest BAL affecting that building (or part of the land on which the building will be constructed), will be the indicative BAL that is to apply.

The BAL can only become a determined BAL once the actual location of that building on the land is known and/or the required minimum vegetation separation distance corresponding to the relevant BAL contour is established (refer to Table 3.2.2).

3.2.1 Bushfire Attack Level Results - BAL Contour Map Format

INTERPRETATION OF THE BUSHFIRE ATTACK LEVEL (BAL) CONTOUR MAP

The contour map will present different coloured contour intervals extending from the areas of classified bushfire prone vegetation. These represent the different bushfire attack levels that will exist at varying distances away from the classified vegetation in the event of a bushfire in that vegetation.

The areas of classified vegetation to be considered in developing the BAL contours, are those that will remain as the intended end state of the subject development once earthworks, clearing and/or landscaping and re-vegetation have been completed (or each stage completed).

Each bushfire attack level corresponds to a set range of radiant heat flux that is generated by a bushfire. That range is defined by the AS 3959:2018 BAL determination methodology.

The width of each shaded BAL contour is a diagrammatic representation of the separation distances from the classified vegetation that correspond to each BAL for each separately identified area of classified vegetation. They have been calculated by the application of the unique site variables including vegetation types and structure, ground slope and applied fire weather.

(Refer to Section 3.2 'Understanding the Results of the Bushfire Impact Assessment' for the explanation of how BAL(s) for buildings will be assessed from the BAL Contour Map).

Construction of the BAL Contours

VEGETATION AREAS APPLIED TO THE DEVELOPMENT OF THE BAL CONTOUR MAP

All identified areas of classified vegetation have been applied with the following exceptions:

1. Classified vegetation within the Asset Protection Zones on Lot 1366 is to be managed and or removed during development and is therefore excluded and the BAL contours are constructed from any unmanaged classified vegetation inside and outside the boundaries of Lot 1366 (see Figure 3.2); and

This approach is applied to indicate the achievable bushfire attack levels within the specified lot and the resultant area of developable land (i.e. subject to BAL-29 or less). It is based on the following assumptions:

1. Any classified vegetation within the lot can potentially be managed by the landowner to meet asset protection zone standards and dimensions corresponding to an indicated BAL; and
2. The lot must be considered independent of what development may or may not take place on adjoining lots.

VEGETATION SEPARATION DISTANCES APPLIED

The distances that have been applied to illustrating the width of each BAL contour shown in Figures 3.2 are stated in Table 3.2.2. These correspond to each Bushfire Attack Level and are specific to the proposed development site.

Table 3.2.2: Vegetation separation distances applied to construct the BAL contours.

BAL CONTOUR MAP – APPLIED VEGETATION SEPARATION DISTANCES								
Derived from the Application of Method 1 BAL Determination Methodology (AS 3959:2018 Section 2, Table 2.5)[1]								
Vegetation Area	Vegetation Classification	Effective Slope (degree range)	BAL and Corresponding Separation Distance (m)					
			BAL-FZ	BAL-40	BAL-29	BAL-19	BAL12.5	BAL-LOW
1	Class B Woodland	downslope >0-5	<13	13-<17	17-<25	25-<37	37-<100	>100
2	Class C Shrubland	downslope >0-5	<7	7-<10	10-<15	15-<22	22-<100	>100
3	Class B Woodland	downslope >0-5	<13	13-<17	17-<25	25-<37	37-<100	>100
4	Class G Grassland	downslope >0-5	<7	7-<9	9-<14	14-<20	20-<100	>100
5	Class B Woodland	downslope >0-5	<13	13-<17	17-<25	25-<37	37-<100	>100
6	Class G Grassland	downslope >0-5	<7	7-<9	9-<14	14-<20	20-<50	>50
7	Class G Grassland	downslope >0-5	<7	7-<9	9-<14	14-<20	20-<100	>100
8	Class B Woodland	downslope >0-5	<13	13-<17	17-<25	25-<37	37-<100	>100
9	Class B Woodland	downslope >0-5	<13	13-<17	17-<25	25-<37	37-<100	>100
10	Class C Shrubland	downslope >0-5	<7	7-<10	10-<15	15-<22	22-<100	>100
11	Class G Grassland	downslope >0-5	<7	7-<9	9-<14	14-<20	20-<50	>50
12	Class G Grassland	downslope >0-5	<7	7-<9	9-<14	14-<20	20-<50	>50

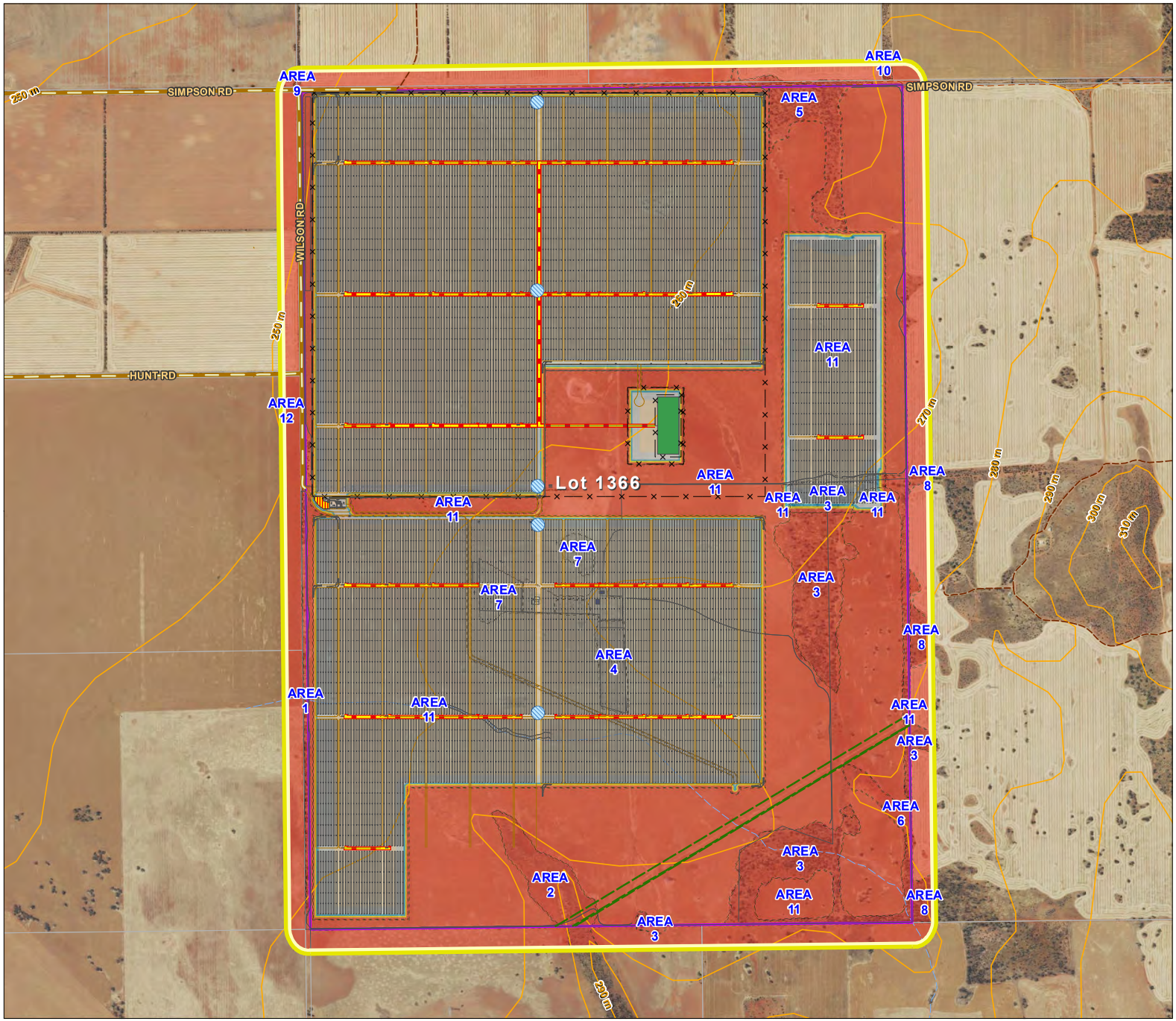


Figure 3.2

BAL Contour Map (Post Development)

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site

Solar Plant Development

- Development
- Easement
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank

Vegetation Assessment Area

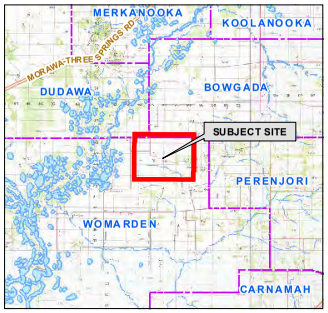
- 100m from Subject Site
- Classified Vegetation Boundary

Indicative Bushfire Attack Levels

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

0 200 400 600 800 1,000
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
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Map updated by: Ian Ross 10/11/2021

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Figure 3.2.1

BAL Contour Map (Post Development, North)

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site

Solar Plant Development

- Development
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank

Vegetation Assessment Area

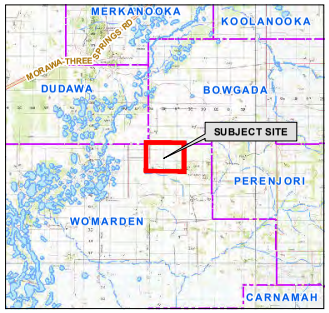
- 100m from Subject Site
- Classified Vegetation Boundary

Indicative Bushfire Attack Levels

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
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Figure 3.2.2

BAL Contour Map (Post Development, South)

Lot m1366 on Diagram 5876, Area : 849.7535 ha
163 Wilson Road,
WOMARDEN 6519
SHIRE OF THREE SPRINGS

------ LEGEND ------

- Subject Site

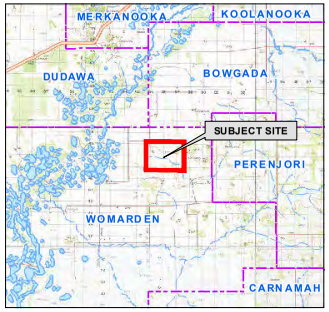
Solar Plant Development
- Development
- Easement
- Electrical Line
- Fence
- Roads and Paths
- Sheds
- Substation
- Tourism Area
- Water Storage Tank

Vegetation Assessment Area
- 100m from Subject Site
- Classified Vegetation Boundary

Indicative Bushfire Attack Levels
- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

0 100 200 300 400 500
Metres

------ LOCALITY ------



Aerial Imagery : Landgate/SLIP
Image Date : Nov 2016

Coordinate System: GDA 1994 MGA Zone 50
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BUSHFIRE PRONE PLANNING

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Map Document Path / Name: K:\Projects\Jobs 2017\170299 - Three Springs Solar (BMP)\Mapping\MXD\170299_Fig3-2-2_BAL_SOUTH_Three_springs_solar.mxd

3.2.2 Bushfire Attack Level Results - Derived from The BAL Contour Map

Table 3.2.3: Indicative BAL(s) for proposed infrastructure works.

BUSHFIRE ATTACK LEVEL FOR EXISTING/PLANNED BUILDINGS/STRUCTURE	
BAL Determination Methodology Applied[1]	Method 1 as per AS 3959:2018 s2.2.6 and Table 2.5.
Building/Structure Description (planned/existing)	Indicative BAL (refer to start of s3.2)
Planned Solar Array	BAL-12.5
Planned Sub-Station	BAL-12.5
Planned Visitors Area	BAL-12.5
Note[1] Assessment inputs applied are presented in Section 3.1.	
Note[2] The indicative BAL rating for the Sub-Station is based on the grassland and area within the fence line being managed as low short, cropped grass at all times	

4 IDENTIFICATION OF BUSHFIRE HAZARD ISSUES

In response to the Bushfire Management Plan requirements established by Appendix 5 of the Guidelines for Planning in Bushfire Prone Areas (WAPC 2017 v1.3), the following statements are made to assist in the understanding of whether the proposal is likely to be able to comply with the bushfire protection criteria now or in subsequent planning stages.

Spatial Context - Broader Landscape Considerations	
Wider road network and access constraints	The surrounding area has an extensive public road network at the larger scale associated with the rural zoning and corresponding large lot sizes. At a more local level access options can be limited to a single road in two directions for a significant distance before other options are available. There is no access constraint for the subject site with regard to what is considered acceptable from a planning perspective, however, where development opportunities can increase local access options within the surrounding area, this would have merit that should be considered as benefiting local residents as well as workers.
Proximity of settlements and emergency services	The subject site is in a rural area, with the surrounding area comprised of lakes, paddocks, and mines. The Three Springs townsite is 28.9 km and 26 minutes travel time. Emergency services are located in Three Springs (32.1 km 26 minutes travel).
Bushfire prone vegetation types and extent (including conserved vegetation)	Significant extents of bushfire prone vegetation exist across the broader landscape as retained native vegetation but interspersed with improved pastures (grassland), lakes and asset protection zones around existing dwellings. Most of the vegetation is on private land and subject to various levels of fuel load management. Remnant native vegetation adjoins the subject lot's eastern boundary. The woodlands vegetation will produce embers and firebrands in a bushfire event primarily due to the type of bark.
Topography and fire behaviour interactions.	The topography is undulating rather than rugged. Some areas of flat land but most has slopes of zero to five degrees over significant areas. Bushfire rates of spread can double for every ten degrees of upslope while downslopes will slow the rate of spread.
Potential for extreme fire behaviour and pyro convective events.	Possible but limited likelihood due to the fragmentation of areas of bushfire prone vegetation due to significant areas of cleared land, pastured areas, and fuel load management by landowners.
Environmental Considerations	
Constraints to implementing required and/or additional bushfire protection measures	The environment considerations have not identified any issues primary bushfire hazard identified.
Provision of Access Within the Subject Site	
Potential constraints	No constraints to establishing the required access will exist.
Potential Bushfire Impacts	
Flame and radiant heat and ability to establish an APZ	The lot size will allow a minimum BAL-29 dimensioned APZ to be established within the lot. This will prevent flame contact from the classified vegetation. Application of the minimum BAL-29 bushfire construction standard will mitigate the risks from radiant heat impact to what is considered an acceptable level.
Embers/firebrands, smoke and fire-driven wind	These will be the major impacts to the subject site. The appropriate protection measures of building construction and strict management of the APZ will mitigate the risk to what is considered an acceptable level.
Issues to be Considered at Subsequent Planning Stages (additional assessments/documents)	
Specific land uses to be addressed	N/A

Additional assessments	N/A
Additional documents	N/A
Discretionary Decision Making and the Precautionary Principle (SPP 3.7 and Guidelines)	
Does the bushfire consultant consider there are issues that need to be addressed in this space?	No.

5 ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA ESTABLISHED BY THE GUIDELINES

For a development application that is not a 'Tourism Land Use' to be considered compliant with SPP 3.7, it must satisfy (achieve) the intent of each of the four elements of the bushfire protection criteria. These criteria are established by the *Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3*). Compliance can be achieved by either:

- Meeting all applicable acceptable solutions corresponding to each element (i.e. the minimum bushfire protection measures that are deemed to satisfy planning requirements); or
- Where an acceptable solution cannot be met, by developing a performance solution that satisfies the established requirements.

5.1 Local Government Variations to Apply

Local governments may add to or modify the acceptable solutions of the Bushfire Protection Criteria (BPC) and/or apply technical requirements that vary from those specified in the Guidelines for Planning in Bushfire Prone Areas (WAPC). In such instances, this Proposal will be assessed against these variations and/or any specific local government technical requirements for emergency access and water. Refer to Appendices 2 and 3 for relevant technical requirements.

Will local or regional variations (endorsed by WAPC / DFES) to the applicable acceptable solutions established by the *Guidelines* or the *Position Statement: Tourism land uses in bushfire prone areas WAPC October 2019,* apply to this Proposal?	N/A

5.2 Summary of Assessment Against the Bushfire Protection Criteria

SUMMARISED OUTCOME OF THE ASSESSMENT AGAINST THE BUSHFIRE PROTECTION CRITERIA					
Element of the Bushfire Protection Criteria	Basis for the Proposal Achieving Full Compliance with SPP 3.7			The Proposal Cannot Achieve Full Compliance with SPP 3.7	
	Acceptable Solutions Met	Achieves the Intent of the Element			
	All applicable solutions are fully met	All applicable solutions are not fully met. A merit based assessment and/or a bushfire performance comparison of the proposals residual risk with that of the residual risk of the acceptable solution is conducted (refer Note 4)	A performance principle-based solution is applied	Bushfire planning development type that may not require full compliance is applied	An improvement in bushfire performance compared to the existing development is detailed (refer Note 4)
1. Location	✓			N/A	
2. Siting and Design of Development	✓				
3. Vehicular Access	✓				
4. Water	✓				

Note: The development proposal has been assessed:

1. Against the requirements established in Appendix 4 of the *Guidelines for Planning in Bushfire Prone Areas, WAPC 2017 v1.3 (Guidelines)*. The Guidelines are found at https://www.planning.wa.gov.au/8194.aspx; and
2. Applying the interpretation guidance provided in *Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)*.
3. Applying any endorsed variations to the Guideline's acceptable solutions and associated technical requirements that have been established by the local government. If known and applicable these have been stated in Section 5.1 with the detail included as an appendix if required by the local government.
4. When non-compliant with SPP 3.7 and when appropriate, by utilising additional compliance pathways that include the application of merit based assessment and comparative bushfire performance. The validity of this approach is derived from relevant decisions made by the responsible authorities (refer Appendix 2).

5.3 Assessment Detail

Element 1: Location	
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.	
Compliance: How the proposed development achieves the intent of Element 1:	By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines (WAPC 2017 v1.3)* and apply the interpretation guidance established by the *Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)*.

Acceptable Solution: A1.1: Development Location

ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE GUIDELINES

The proposed building sites will provide an area of land within the lot that can be considered suitable for development as BAL-40 or BAL-FZ construction standards will not be required to be applied. This meets the requirements established by Acceptable Solution A1.1 and its associated explanatory note.

ASSESSMENT AGAINST THE REQUIREMENTS ESTABLISHED BY THE POSITION STATEMENT

The position statement establishes that:

- The source of risk (the hazard) to be considered in Element 1 is the "level of bushfire exposure" from the type and extent of bushfire prone vegetation and the topography of the land on which it exists; and
- "Consideration should be given to the site context" which includes the land both "within and adjoining the subject site". The "hazards remaining within the site should not be considered in isolation of the hazards adjoining the site, as the potential impact of a bushfire will be dependent on the wider risk context."

The position statement also recognises:

- That the proposed development site and its surrounding land may be part of an area "identified for development or intensification of land use prior to the release of SPP 3.7"; consequently
- Consideration by decision-makers "should also be given to improving bushfire management of the site and surrounding area, thereby reducing the vulnerability of people property and infrastructure to bushfire"; and
- The application of mitigation measures to lessen the risk to the broader area would include improvements to the local road network (including emergency access ways), improvements/additions to firefighting water supply and increasing separation distance from the hazard.

The Hazard Within the Subject Site

The existing lot is entirely vegetated with native vegetation classified as Class B Woodlands, Class C Shrubland and Class G Grassland except for the asset protection zone established around the existing dwelling and shed. The impact of the slopes under the vegetation will be dependent on a bushfire's direction of travel, but slopes in the range of zero to five degrees do exist and bushfire travelling upslope will have increased intensity and rate of spread.

Significantly intense bushfire behaviour is possible, particularly if vegetation within the lot is ignited by bushfire in the adjoining hazard and they are involved together.

Element 1: Location

However, the ability to establish a minimum BAL-29 dimensioned APZ within the lot's boundaries removes the threat of greater levels of radiant heat or flame contact upon a future dwelling. A BAL-12.5 APZ will exist over a significant area of the lot, surrounding 20 m or 35 m from the proposed infrastructure.

The primary bushfire threat from bushfire prone vegetation remaining within the lot will be embers. This threat will be mitigated by the application of appropriate building design, bushfire construction standards and the ongoing maintenance of the APZ to ensure infrastructure will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

The Hazard Adjoining the Subject Site

Bushfire prone vegetation within the rural residential locality exists as native vegetation classified as Class B Woodland, Class C Shrubland, and Class G Grassland. Most of the land within the locality supports this vegetation except for the asset protection zones surrounding existing dwellings and managed pastures.

The impact of the slope under the vegetation will be dependent on a bushfire's direction of travel, but slopes in the range of zero to five degrees downslope from the proposed lots do exist. Bushfire travelling upslope will have increased intensity and rate of spread. However, the adjoining land cannot be considered as rugged (which would present the potential for more extreme and variable fire behaviour).

Bushfire prone vegetation adjoining the lot exists as native vegetation classified as Class B Woodlands and it surrounds the lot. The extent of this hazard is shown in Figure 1.2.

The potential exists for intense bushfire behaviour to occur within these areas of bushfire prone vegetation. The potential bushfire impact on persons and property within the proposed lots will be to increase the level of ember attack in the event of a bushfire.

This ember threat will be mitigated by the application of appropriate building design, bushfire construction standards and the ongoing maintenance of the BAL-12.5 dimensioned APZ, to ensure the buildings or infrastructure will not be impacted by consequential fire within combustible materials used, stored or accumulated within the APZ.

Consequently, there are limited scenarios in which the subject development site is likely to be subject to a significant bushfire event.

The proposed development is located within a bushfire prone area. By Implementing the positioning and vegetation management measures identified in this Plan the proposed development can meet the acceptable solution of being subject to BAL-12.5 or below in result in the bushfire risk being able to be managed.

Element 2: Siting and Design of Development

Intent: To ensure that the siting and design of development (note: not building/construction design) minimises the level of bushfire impact.

Compliance: How the proposed development achieves the intent of Element 2:	By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines (WAPC 2017 v1.3)* and apply the interpretation guidance established by the *Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC Nov 2019)*.

Acceptable Solution: A2.1: Asset Protection Zone

THE APZ - DEVELOPMENT SITING AND DESIGN PLANNING REQUIREMENTS

The necessary outcome of bushfire planning for development siting and design, is to ensure that a building can be located within the developable portion of any lot (i.e. outside those parts of the lot that form the required R-Code building setbacks, or any other excluded area), and be subject to potential radiant heat from a bushfire not exceeding 29 kW/m^2 (i.e. a maximum BAL of BAL-29).

This will be achieved when the size of the "low fuel area immediately surrounding a building", the asset protection zone (APZ), is large enough. This requires a certain separation distance to exist between the building and areas of classified vegetation. These are the BAL-29 APZ dimensions and they will vary dependent on site specific parameters.

The APZ should be contained solely within the boundaries of each lot, except in instances where the neighbouring lot(s) or adjacent public land will be managed in a low-fuel state on an ongoing basis, in perpetuity.

Where possible, planning for siting and design should incorporate elements that include non-vegetated areas (e.g. roads/parking/drainage) and/or formally managed areas of vegetation (public open space/recreation areas/ services installed in a common section of land), as either part of the required APZ dimensions or to additionally increase separation distances to provide greater protection. These elements create robust and easier managed asset protection zones.

THE ASSESSMENT

The future development on the lot can be surrounded by an APZ that will ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2 (BAL-29). The required APZ specifications of width, location and management can be achieved.

APZ Width: The required APZ dimensions to ensure buildings and infrastructure are subject to a maximum BAL of BAL-29 (measured from any external wall or supporting post or column to the edge of the classified vegetation), has been determined in Section 3.2 of this BMP and are:

BAL-29 APZ Dimensions		
Applicable to Following Lot:	Building to Vegetation Area 1	Minimum 17 metres
	Building to Vegetation Area 2	Minimum 10 metres
	Building to Vegetation Area 3	Minimum 17 metres
Lot 1366	Building to Vegetation Area 4	Minimum 9 metres
	Building to Vegetation Area 5	Minimum 17 metres
	Building to Vegetation Area 6	Minimum 9 metres
	Building to Vegetation Area 7	Minimum 9 metres
	Building to Vegetation Area 8	Minimum 17 metres
	Building to Vegetation Area 9	Minimum 17 metres

	Building to Vegetation Area 10	Minimum 10 metres
	Building to Vegetation Area 11	Minimum 9 metres
	Building to Vegetation Area 12	Minimum 9 metres

APZ Location: Asset protection zones of the widths stated above can be contained solely within the boundaries of the lot. Onsite vegetation will be required to be modified/removed, the authority for which will need to be received from the local government.

The proposed location of the solar array and other proposed infrastructure will result in it being subject to a maximum BAL rating of BAL-12.5. As such, it is located appropriately but the required separation distances from the classified vegetation will need to be maintained.

APZ Management: All vegetation that will require modification/removal and future management is onsite and therefore under the control of the landowner. Vegetation removal may require authority from the local government.

Trees >6 from the proposed infrastructure within the APZ can be retained ensuring that the understory is managed to a low threat state and the canopy cover does not exceed the requirements of the Guidelines (under-pruning and canopy cover management may be required).

Retained vegetation will be managed in accordance with the technical requirements established by the Schedule 1: 'Standards for Asset Protection Zones (Guidelines). The APZ specifications are also detailed in Appendix 1 and the Shire of Three Springs may have additional requirements established by their Fire Break Notice.

THE APZ – REQUIRED DIMENSIONS TO SATISFY FUTURE BUILDING (AND ONGOING MANAGEMENT)

It is important for the landowner to be aware that the APZ dimensions that will be required to be physically established and maintained on each lot surrounding relevant future buildings, may be different to those stated above for the BAL-29 APZ - which is the minimum dimension a planning proposal needs to show can be established to comply with SPP 3.7.

The actual APZ dimensions to be physically established and maintained, will be based on which of the following establishes the larger APZ dimension:

- The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or
- The APZ dimensions established by the local government's Firebreak Notice.

If the dimensions of the APZ that are to be established are known at this time, they will be stated below.

There is the potential to reduce future construction BAL's for future development below BAL-12.5 if additional classified onsite vegetation is removed and or managed.

The APZ Dimensions to be Established and Maintained Determined BAL for the Proposed Development/Use is BAL-12.5		
Applicable to Following Building(s): Proposed Infrastructure including: Substation, Solar PV Panels, Sheds	Building to Vegetation Area 1	Minimum 35 metres
	Building to Vegetation Area 2	Minimum 22 metres
	Building to Vegetation Area 3	Minimum 35 metres
	Building to Vegetation Area 4	Minimum 20 metres
	Building to Vegetation Area 5	Minimum 35 metres
	Building to Vegetation Area 6	Minimum 20 metres
	Building to Vegetation Area 7	Minimum 20 metres
	Building to Vegetation Area 8	Minimum 35 metres

Element 2: Siting and Design of Development

	Building to Vegetation Area 9	Minimum 35 metres
	Building to Vegetation Area 10	Minimum 22 metres
	Building to Vegetation Area 11	Minimum 20 metres
	Building to Vegetation Area 12	Minimum 20 metres

The proposed development meets the acceptable solution by:

- Being able to establish an APZ of the required dimensions (as determined by the classified vegetation impacting the site and the relevant ground slopes) within the lot boundary and;
- The landowner/s having the responsibility of implementing the requirements of the 'Standards for APZ's' and continuing to manage the APZ to the required specifications, maintaining it in a low fuel state

Element 3: Vehicular Access

Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

Compliance: How the proposed development achieves the intent of Element 3:	By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)

ASSESSMENT (COMPLIANCE) STATEMENTS

For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines (WAPC 2017 v1.3)*.

Acceptable Solution: A3.1: Two Access Routes

Simpson Road and Hunt Road provide safe access and egress to two different destinations. As public roads, they are available to all residents and the public at all times and under all weather conditions.

Access to Simpson Road and Hunt Road is via Wilson Road at a distance of approximately 450 metres from the proposed development and it is considered that this route has an associated low bushfire risk as the roads pass through cropped and over grazed paddocks. Minor tree lined road verges will not impact greatly on the bushfire behaviour and any grass fires that may be in the area will allow people to travel along the roads relatively safely if required.

The development is proposing to update several public roads to allow the increased traffic movement from Three Springs to assist access and egress to the site.

Acceptable Solution: A3.2: Public Road

All roads that are to be used to access the development are currently existing public roads. They currently comply with the Guidelines with respect to width and surface clearance. The proponent has plans to upgrade some of the public road to allow for increased road traffic and semi-trailers accessing the site.

Acceptable Solution: A3.3: Cul-de-sacs (including a dead-end road)

N/A

Acceptable Solution: A3.4: Battle-axe

N/A

Acceptable Solution: A3.5: Private Driveways

All internal roads are currently gravel roads suitable for 3.4 fire appliances with width and turn around possible in multiple areas. The proposed development allows for semi-trailer vehicles to access the site and will allow vehicles to pass on the majority of the internal roads with turn around areas at the main infrastructure areas.

Acceptable Solution: A3.6: Emergency Access Way

N/A

Acceptable Solution: A3.7: Fire Service Access Routes

N/A

Acceptable Solution: A3.8: Firebreak Width

The proposed lot will comply with the requirements of the Shire of Three Spring's annual firebreak notice issued under s33 of the Bush Fires Act 1954. Firebreaks to be installed prior to subdivision clearance.

Element 4: Water	
Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	
Compliance: How the proposed development achieves the intent of Element 4:	By fully meeting all applicable acceptable solutions established by the bushfire protection criteria (Guidelines v1.3 WAPC 2017)
ASSESSMENT (COMPLIANCE) STATEMENTS For each applicable acceptable solution, the following statements present the results of the assessment of the proposed development/use against the requirements established by the *Guidelines (WAPC 2017 v1.3)*.	
Acceptable Solution: A4.1: Reticulated Areas	
A reticulated water supply does exist for the proposed development site but is only for domestic water supply, there are no reticulated hydrants in the area, the closest hydrant is in the townsite of Three Springs approximately 28 km west.	
Acceptable Solution: A4.2: Non-Reticulated Areas	
It is proposed to install five 50 000 litre water tanks for firefighting purposes within the development site to allow emergency services access to a water supply for the suppression of bushfires onsite or in the immediate area. The water tanks will be fitted with the appropriate fittings as per the Guidelines and Local Government. These requirements are set out in Appendix 3. The main bushfire risk to the site is grass fires travelling through the paddocks that may impact on the infrastructure with emergency services providing asset protection of the development to restrict flame contact on the infrastructure. With the implementation of the appropriate APZ's only limited water will be required to protect the infrastructure.	
Acceptable Solution: A4.3: Non-Reticulated Areas – Individual Lots	
N/A	

6 RESPONSIBILITIES FOR IMPLEMENTATION AND MANAGEMENT OF THE BUSHFIRE PROTECTION MEASURES

Table 6.1: BMP Implementation responsibilities prior to occupancy or building.

6.1 Landowner (Developer) - Prior to Occupancy or Building	
No.	Implementation Actions
1	The local government may condition a development application approval with a requirement for the landowner/proponent to register a notification onto the certificate of title and deposited plan. This will be done pursuant to Section 70A *Transfer of Land Act 1893* as amended ('Factors affecting use and enjoyment of land, notification on title'). This is to give notice of the bushfire hazard and any restrictions and/or protective measures required to be maintained at the owner's cost. This condition ensures that: 1. Landowners/proponents are aware their lot is in a designated bushfire prone area and of their obligations to apply the stated bushfire risk management measures; and 2. Potential purchasers are alerted to the Bushfire Management Plan so that future landowners/proponents can continue to apply the bushfire risk management measures that have been established in the Plan.
2	Prior to post planning approval, the entity responsible for having the BMP prepared should ensure that anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information and informed that it contains their responsibilities. This includes the landowners/proponents (including future landowners where the Plan was prepared as part of a subdivision approval), local government and any other authorities or referral agencies ('Guidelines' s4.6.3).
3	Establish the Asset Protection Zone (APZ) surrounding proposed buildings to the largest dimension as determined by either: • The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or • The dimensions corresponding to the Shire of Three Spring's Firebreak Notice. Establish the APZ to the above dimensions and to the standards established by the Guidelines (refer to Appendix 1) or as varied by the local government through their Firebreak Notice (refer to the following responsibility). This is the responsibility of the landowner/s.
4	Prior to occupancy, install the required emergency static water supply (5 x 50,000 litre tank within the lot) and associated vehicle access, to the standards stated in the relevant acceptable solution and applying the guidance provided in Appendix 3, or to the specific requirements of the local government.
5	Prior to occupancy, install the internal roads to the standards stated in the BMP.
6	Prior to any building work, inform the builder of the existence of this Bushfire Management Plan and the responsibilities it contains, regarding the required construction standards. This will be: • The standard corresponding to the determined BAL, as per the bushfire provisions of the Building Code of Australia (BCA); and/or • A higher standard because the BMP establishes that the construction standard is to correspond to a higher BAL as an additional bushfire protection measure.

Table 6.2: Ongoing management responsibilities for the Landowner/Occupier.

6.2 Landowner/Occupier - Ongoing	
No.	Ongoing Management Actions
1	Maintain the Asset Protection Zone (APZ) surrounding proposed buildings to the largest dimension as determined by either: • The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 for explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL); or • The dimensions corresponding to the local government's Firebreak Notice. Maintain the APZ to the above dimensions and to the standards established by the Guidelines (refer to Appendix 1) or as varied by the local government through their Firebreak Notice (refer to the following responsibility).
2	Comply with the Shire of Three Spring's Fire Break Notice issued under s33 of the Bush Fires Act 1954. This may include specifications for asset protection zones that differ from the Guideline's APZ Standards, with the intent to better satisfy local conditions. When these are more stringent than those created by the Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with. Refer to Appendix 1.
3	Maintain vehicular access routes within the lot to the required surface condition and clearances as stated in the BMP.
4	Maintain the emergency water supply tank and its associated fittings and vehicular access in good working condition.
5	Ensure that any builders (of future structures on the lot) are aware of the existence of this Bushfire Management Plan and the responsibilities it contains regarding the application of construction standards corresponding to a determined BAL.
6	Ensure all future buildings the landowner has responsibility for, are designed and constructed in full compliance with: 1. the requirements of the WA Building Act 2011 and the bushfire provisions of the Building Code of Australia (BCA); and 2. with any identified additional requirements established by this BMP or the local government.

Table 6.3: Ongoing management responsibilities for the Local Government.

6.3 Local Government - Ongoing	
No.	Ongoing Management Actions
1	Monitor landowner compliance with the Bushfire Management Plan and the annual Firebreak and Fuel Load notice.
2	Develop and maintain district bushfire fighting services and facilities.

APPENDIX 1: TECHNICAL REQUIREMENTS FOR ONSITE VEGETATION MANAGEMENT

A1.1 Requirements Established by the Guidelines – Standards for Asset Protection Zones

(Source: Guidelines for Planning in Bushfire Prone Areas - WAPC 2017 v1.3 Appendix 4, Element 2, Schedule 1 and Explanatory Note E2.1)

DEFINING THE ASSET PROTECTION ZONE (APZ)

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation and varies corresponding to the BAL rating determined for a building (lower BAL = greater dimensioned APZ).

For planning applications, the minimum sized acceptable APZ is that which is of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It will be site specific.

For subdivision planning, design elements and excluded/low threat vegetation adjacent to the lot(s) can be utilised to achieve the required vegetation separation distances and therefore reduce the required dimensions of the APZ within the lot(s).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space, which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity.

The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

[Note: Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation that can be involved in a bushfire, is unsafe.]

Schedule 1: Standards for APZ

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

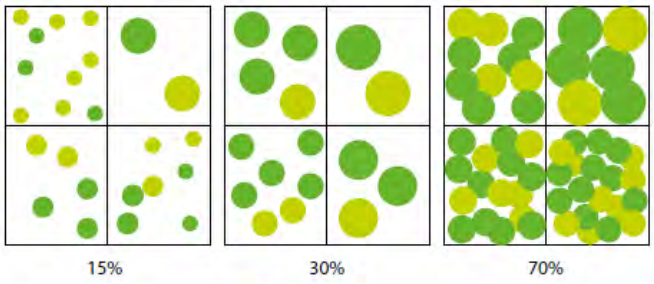
Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare (example below).

Example: Fine fuel load of 2 t/ha
(Image source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice)

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.

Tree canopy cover – ranging from 15 to 70 per cent at maturity



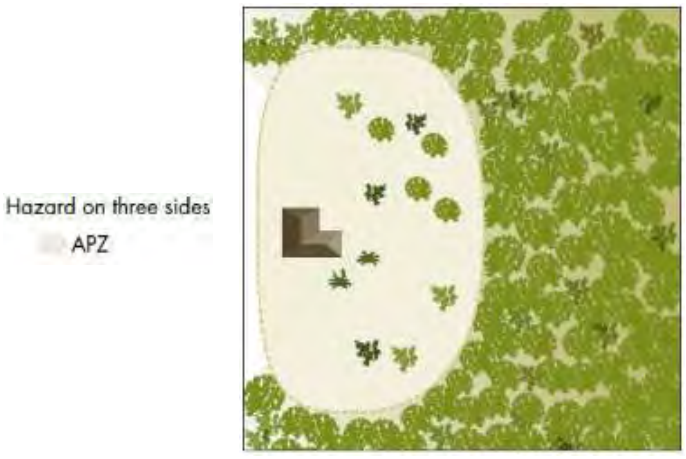
(Source: Guidelines for Planning in Bushfire Prone Areas 2017, Appendix 4)

Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

The following example diagrams illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation.



A1.2 Requirements Established by the Local Government – the Firebreak Notice

The local government's current Firebreak Notice is available on their website, at their offices and is distributed as ratepayer's information. It must be complied with.

These requirements are established by the local government's Firebreak Notice created under s33 of the Bushfires Act 1954 and issued annually (potentially with revisions). The Firebreak Notice may include additional components directed at managing fuel loads, accessibility and general property management with respect to limiting potential bushfire impact.

If Asset Protection Zone (APZ) specifications are defined in the Firebreak Notice, these may differ from the Standards established by the Guideline's, with the intent to better satisfy local conditions. When these are more stringent than those created by the Guidelines, or less stringent and endorsed by the WAPC and DFES, they must be complied with.

The APZ dimensions to be physically established and maintained, will be based on which of the following establishes the larger APZ dimension:

- The dimensions corresponding to the determined BAL of a building (refer to Section 3.2 explanation of the 'planning' versus 'building' requirements and 'indicative' versus 'determined' BAL(s)); or
- The APZ dimensions established by the Shire of Three Spring's Firebreak Notice.

A1.3 Requirements Recommended by DFES – Property Protection Checklists

Further guidance regarding ongoing/lasting property protection (from potential bushfire impact) is presented in the publication 'DFES – Fire Chat – Your Bushfire Protection Toolkit'. It is available from the Department of Fire and Emergency Services (DFES) website.

A1.4 Requirements Established by AS 3959:2018 – 'Minimal Fuel Condition'

This information is provided for reference purposes. This knowledge will assist the landowner to comply with Management Requirement No. 3 set out in the Guidance Panel at the start of this Appendix. It identifies what is required for an area of land to be excluded from classification as a potential bushfire threat.

"Australian Standard - AS 3959:2018 Section 2.2.3.2: Exclusions - Low threat vegetation and non-vegetated areas:

The Bushfire Attack Level shall be classified BAL-LOW where the vegetation is one or a combination of the following:

a) Vegetation of any type that is more than 100m from the site.

b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified vegetation.

c) Multiple area of vegetation less than 0.25ha in area and not within 20m of the site or each other or other areas of vegetation being classified vegetation.

d) Strips of vegetation less than 20m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified vegetation.

e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

f) *Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a* ***minimal fuel condition,*** *(means insufficient fuel available to significantly increase the severity of a bushfire attack – for example, recognisable as short cropped grass to a nominal height of 100mm), mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks (single row of trees)."*

APPENDIX 2: TECHNICAL REQUIREMENTS FOR VEHICULAR ACCESS

Each local government may have their own standard technical requirements for emergency vehicular access, and they may vary from those stated in the Guidelines.

When required, these are stated in Section 5.1 of this bushfire management plan.

Requirements Established by the Guidelines – The Acceptable Solutions

(Source: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4)

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 1

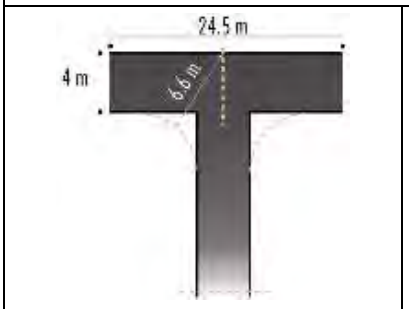
Acceptable Solution 3.5: Private Driveways

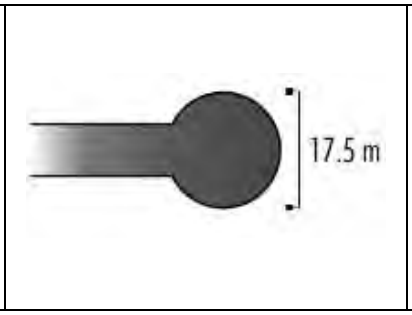
The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).





Acceptable Solution 3.8: Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 2

Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

VEHICULAR ACCESS TECHNICAL REQUIREMENTS - PART 1
* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

Non-Reticulated Areas – Single Lot Subdivision

Each local government may have their own standard technical requirements for firefighting water supplies, and they may vary from those stated in the Guidelines.

Table A4.2: Non-reticulated areas – Subdivision (single lot) water supply technical requirements.

TECHNICAL REQUIREMENTS FOR STATIC WATER SUPPLY (EXAMPLE ONLY – CHECK WITH LOCAL GOVERNMENT)	
Application:	Single lots above 500 m^2 need a dedicated static water supply on the lot. This solution is only for use if creating one additional lot and cannot be applied cumulatively.
Volume:	Minimum 10,000 litres per tank dedicated to firefighting purposes. The storage tank must not facilitate sharing the water for domestic use due to the potential of contamination from firefighting foam.
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried at least 300mm below ground).
Vehicle Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate valve (not ball valve) and a 50mm or 100mm cam-lock coupling of metal/alloy construction (example below).
Signage:	Multiple buildings and/or firefighting water supplies may require directional signage to guide firefighters to the emergency water supplies.
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity always.
[Sources: Guidelines for Planning in Bushfire Prone Areas WAPC 2017 v1.3, Appendix 4, Element 4 with example construction / coupling requirements from various sources including FESA (DFES) Operational Circular 07/2011 and Planning for Bushfire Protection Guidelines WAPC 2010]	

ANNEXURE G - ABORIGINAL HERITAGE ASSESSMENT

TERRA ROSA
CONSULTING

Impact and Risk Assessment for Pilot Energy Limited's proposed Wheatbelt Solar Plant

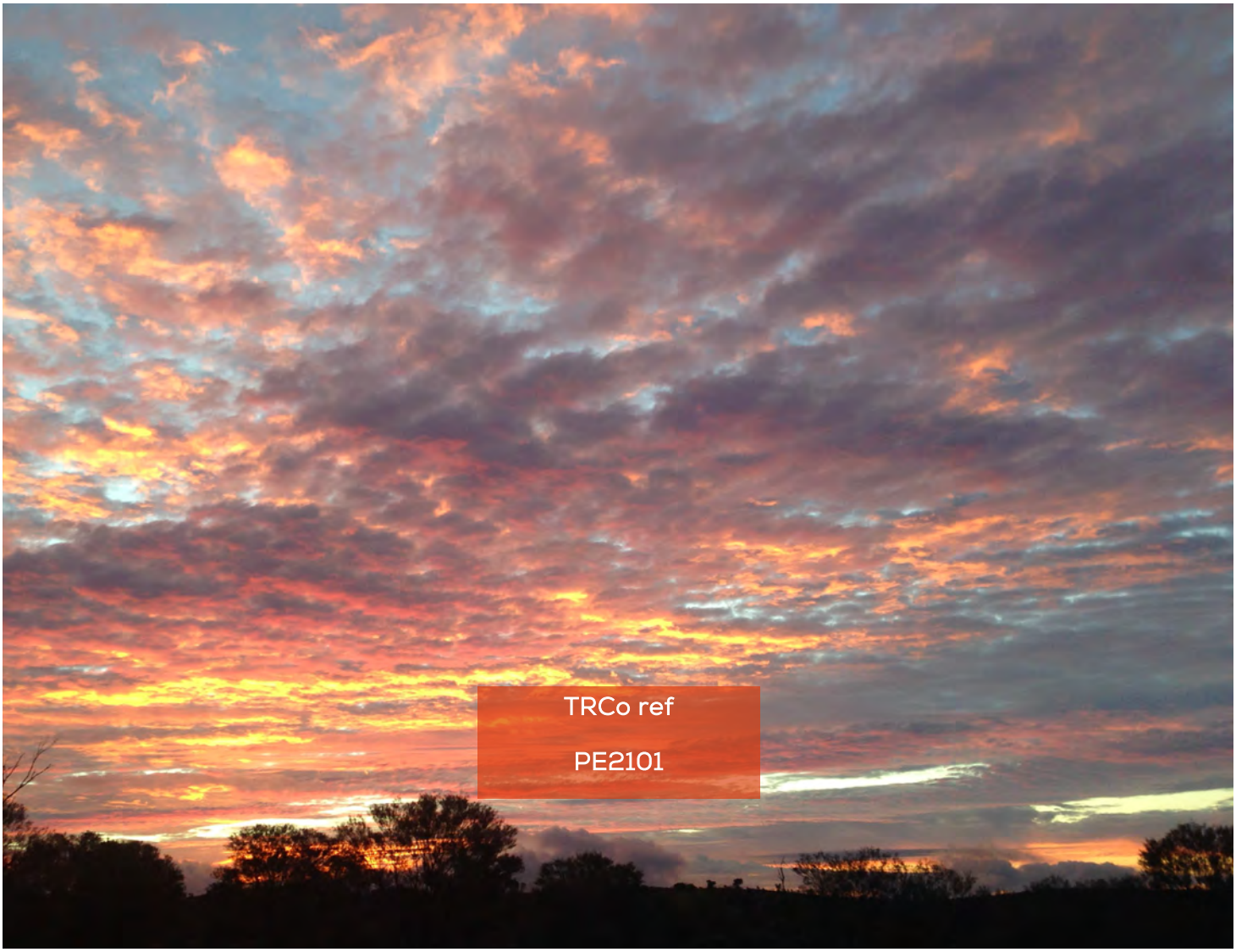
December 2021

Acknowledgement of Country

Terra Rosa acknowledge the Yamatji Nation people, who are the Traditional Custodians of the Country described in this document, and to the Whadjuk Noongar people, who are the Traditional Custodians of the Country in which Terra Rosa's office is situated.

We pay our respects to their Elders past, present, and emerging, and to their continuing cultural and spiritual connections to their lands.

https://www.reconciliation.org.au



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Disclaimer

The information, opinion, ideas, and recommendations presented in this document is partly based on the experience of the authors, research, and recognised procedures, which are believed to be accurate, but not infallible. The advice contained herein is given in good faith and follows acceptable professional standards and procedures, but is not meant to encourage any activity, practice, or exercise, which may have ceased, changed or have been superseded for any reason without the knowledge of the authors. The authors assume no responsibility or liability for any loss or damage caused directly or indirectly by the information presented in this document.

Coordinate Capture

The authors advise that all coordinates quoted in this document using the GDA datum. All grid references are projected in MGA Zone 50, unless otherwise stated. Dependent on external conditions, these units afford an optimal spatial accuracy of ± 5 m.

Heritage project participants and contacts

The contact details of the heritage project stakeholders are provided below. The authors would like to thank everyone that participated in the heritage research and assisted in organising the fieldwork.

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Report authors	Jade O'Brien
Editor	Megan Tehnas
Executive sign-off	Scott Chisholm
Proponent	**Pilot Energy Limited**
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Acronyms and definitions

The following terms and acronyms are utilised throughout the report. Definitions are provided below for reference.

Term / Abbreviation	Definition
ACMC	Aboriginal Cultural Materials Committee
BYAC	Bundi Yamatji Aboriginal Corporation
DAA	Department of Aboriginal Affairs (former department name)
DPLH	Department of Planning, Lands and Heritage
MGA	Map grid of Australia
OHP	Other Heritage Place, which are heritage places catalogued by the DPLH but not included on the Register of Aboriginal Sites for one of the following reasons: 1. Information about the OHP has been lodged with the DPLH but is pending assessment by the ACMC (status L – lodged; also see definition for 'potential site', below); or 2. The ACMC assessed the OHP and considered it not to meet the evaluation criteria for inclusion on the Register of Sites (i.e. not a registered Aboriginal site) (status S – stored / not a site).
Registered Aboriginal site	A heritage place which has been determined as meeting criteria under section 5 of the *Aboriginal Heritage Act 1972 (WA),* and has been registered by the Registrar of Aboriginal Sites (DAA status R - registered).
Terra Rosa	Terra Rosa Consulting
The Act	*Aboriginal Heritage Act 1972 (WA)*

1 Heritage project brief

Pilot Energy Limited (Pilot Energy) intends to develop solar technology, and in the future build a solar grid and associated infrastructure in the Shire of Three Springs. As part of their due diligence, Pilot Energy commissioned Terra Rosa Consulting (Terra Rosa) to undertake a review of the proposed Wheatbelt Solar Plant development envelope to identify any potential heritage impacts or risks associated with the project and provide advice for future planning.

Pilot Energy's development envelope is located at the junction of Simpson and Wilson Roads, 18.5 to 22 km northeast of the town of Three Springs, and 22.5 to 26.5 km southwest of Morawa. The project area detailed in this report is a 350 MW project, with construction aiming to commence in 2024.

2 Method

This review followed the *Aboriginal Heritage Due Diligence Guidelines* (DAA 2013) and the following was taken into consideration:

- The landscape in which the activities will be undertaken;
- Assessing the proposed activity and its impact;
- A search of the Aboriginal sites register;
- Identifying the relevant Aboriginal people; and
- Providing advice for management strategies.

A desktop assessment was undertaken to both assess the landscape, provide an overview of heritage research completed within the area and if there are any Native Title Claims or other Traditional Owner groups have claim over project areas.

Desktop research focused on the identification of any registered Aboriginal sites and surveys within the area, which may need to be considered in the heritage approval process for the project. Desktop research for heritage values relies largely on the Register of Sites maintained by the Department of Planning, Lands and Heritage (DPLH), which provides an indication as to the presence and nature of any heritage values previously recorded and registered within the area.

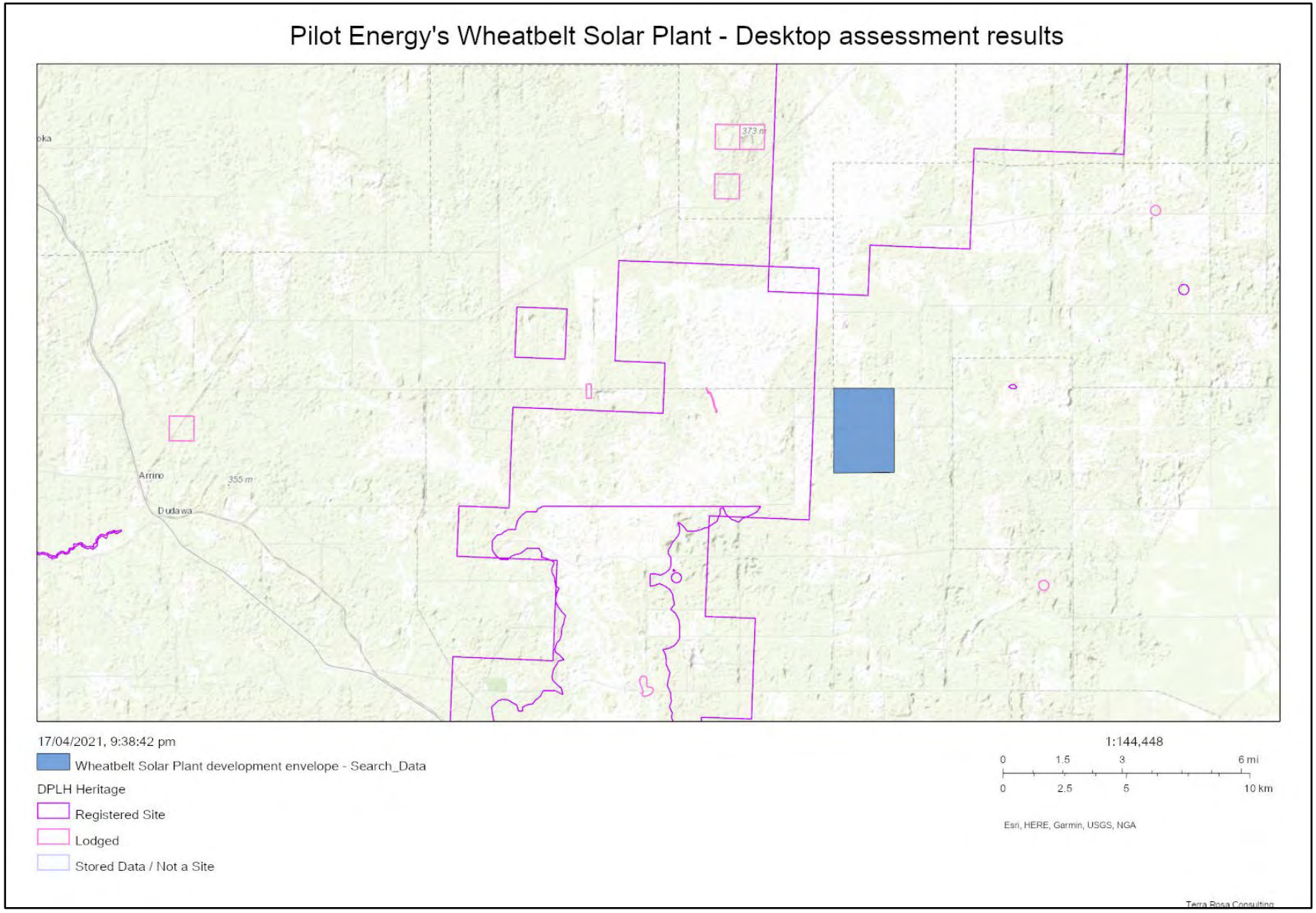
The project area boundaries were entered into the DPLH's Aboriginal Heritage Inquiry System (AHIS) to ascertain whether any registered Aboriginal sites or other heritage places (OHPs) have been recorded within the area. This search is also utilised to ascertain whether any heritage assessments have previously been conducted within the application area and if any heritage reports containing information relevant to the application area have been registered with the DPLH.

The relevant registered Aboriginal sites, OHP files and heritage reports held by the DPLH are accessed and studied. Some of the information held by the DPLH is not publicly accessible due to file restriction, or due to temporary access suspension as a result of DPLH administrative processes. In such cases, the inability to access information is noted in the heritage assessment results for the relevant sites.

The results of the AHIS review are presented in section 3 below.

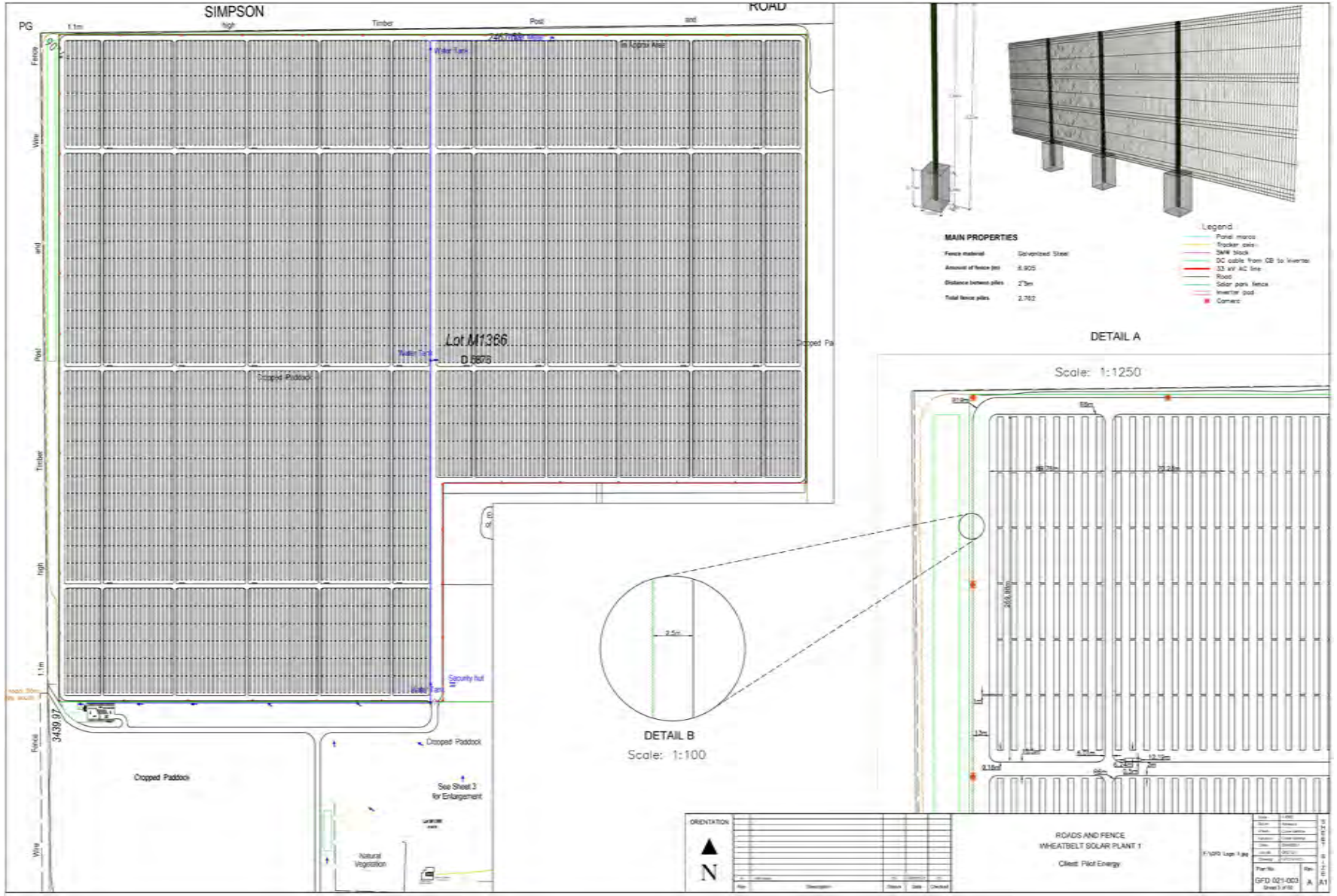
Further to the review of the AHIS, a search of the Native Title Claim boundaries was undertaken of the Native Title register. Information relating to this is provided in section 4 below.

Map 1: Project area location and desktop assessment results

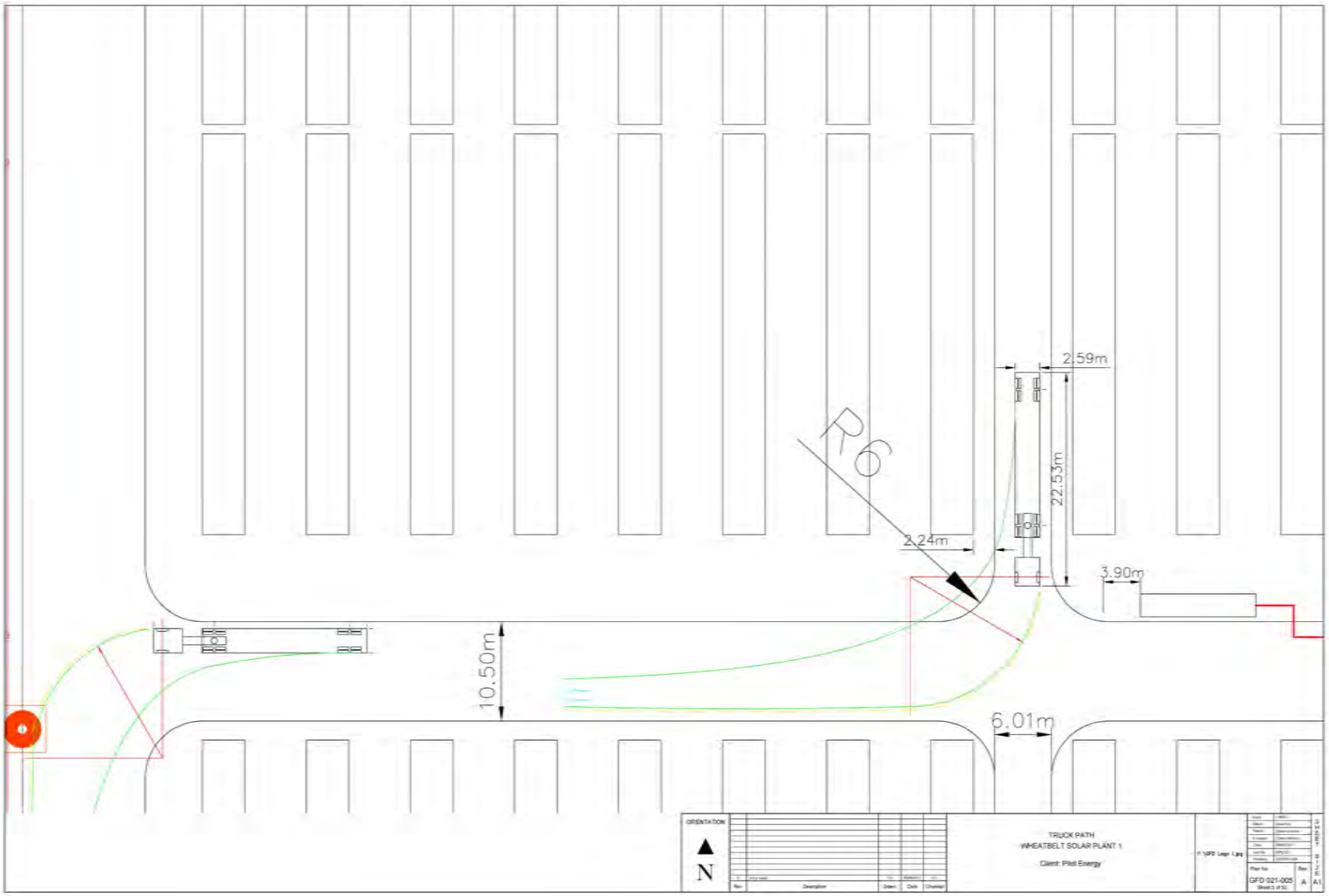


Map 2: General View – Wheatbelt Solar Plant 1, map provided by Pilot Energy

Map 3: Roads and Fence – Wheatbelt Solar Plant 1, map provided by Pilot Energy



Map 4: Truck Path – Wheatbelt Solar Plant 1, map provided by Pilot Energy



3 Review of the Landscape and the Activities

Pilot Energy intends to construct a solar farm near Three Springs, Western Australia. The works will utilise existing roads in the area but will require some ground disturbing during construction. As per the Aboriginal Heritage Due Diligence Guidelines (DAA 2013, p. 14), these works are considered to be significant disturbance as the work will involve "land clearing over more than a small area".

A review of satellite imagery and discussions with Pilot Energy have identified that these works will take place on areas historically used for farming and other pastoral activities. This is considered to be a significantly altered environment (DAA 2013, p.15).

Overall, the landscape and the activities provide a **moderate** risk to impacting Aboriginal heritage (see Appendix 1 for the Due Diligence Guidelines risk matrix).

4 Traditional Owners

Pilot Energy proposed project envelope is located within the combined Yamatji Nation Native Title determination area (WCD2020/001), incorporating the former claim areas of the Amangu People (WC2004/002) and Widi Mob (WC1997/072).

Both the Amangu and Widi Mob people maintain interests in the area and continue to practice law and culture on their traditional lands.

An Indigenous Land Use Agreement (ILUA) was reached with the State Government for the Yamatji Nation determination area in October 2020, which covers more than 48,000 square kilometres of land in the Mid West. Bundi Yamatji Aboriginal Corporation (BYAC) is the Prescribed Body Corporate for Yamatji Nation, who hold the native title rights and interests on trust for the Yamatji People.

5 DPLH AHIS Review

Table 1 below presents a summary of the AHIS search of the Pilot Energy development envelope.

Table 1: Results of the AHIS search

Classification of findings	Site ID	Comments
Registered Aboriginal sites	None	AHIS search revealed no registered Aboriginal sites within the Pilot Energy development envelope.
Other Heritage Places	None	AHIS search revealed no lodged or stored OHPs within the Pilot Energy development envelope.

5.1 DPLH Registered Sites

As no sites were recorded within or intersecting the proposed project area, a broader search of the DPLH AHIS was conducted. Two registered sites were identified as being significant to the cultural landscape surrounding the Pilot Energy development envelope.

Table 2: DPLH registered Aboriginal Sites in close proximity to the Pilot Energy project area

Site ID	Place type	Comments
22432 (Bimara)	Natural feature	• Open site file / open boundary / no gender restrictions • Summary in section 5.1.1
24382 (Yarra Yarra Lakes)	Mythological, natural feature	• Closed site file / restricted boundary / no gender restrictions • Summary in section 5.1.2

5.1.1 DPLH ID 22342 – Bimara

This site refers to a site system that incorporates Bimara Claypan and Bimara Hill. It is described in the site file as forming part of a Dreaming track associated with the waterbodies in the area. It is suggested that this connects to a Dreaming story that travels from the Western Desert to Cue. The Bimara is a mythological being well-known in the Murchison district as a guardian of waterways. Both Amangu and Widi Mob Traditional Owners hold an ongoing belief in the Bimara and its importance to the cultural health of their Country.

5.1.2 DPLH ID 24382 – Yarra Yarra Lakes

Yarra Yarra Lakes is a closed site identified by the Widi Mob Traditional Owners. It is recorded as being part of the regional wetlands system. It is believed to be associated with the Bimara site as their boundaries intersect. As the site is closed, only limited information can be provided.

5.2 Previous surveys registered with the DPLH

In addition to the search of registered Aboriginal sites, a search of previous surveys registered with the DPLH was conducted to gain an understanding of previous work in the area.

Area covered by 15 previous surveys intersect the proposed development area. These have all been undertaken for the construction of infrastructure associated with mining operations in the vicinity, including a slurry pipeline (report ID 23496) and a linear Infrastructure Corridor for Karara Mining Limited (report ID 23496). These two corridors surveyed for ethnographic values, and cut through the Pilot Energy's proposed development envelope across its northern extent and across the southwestern corner, respectively. Narrower corridors following approximately the same path surveyed for archaeological values. A full list of these reports is provided in the bibliography.

Most of Pilot Energy's proposed development has not been subject to prior archaeological or ethnographic survey.

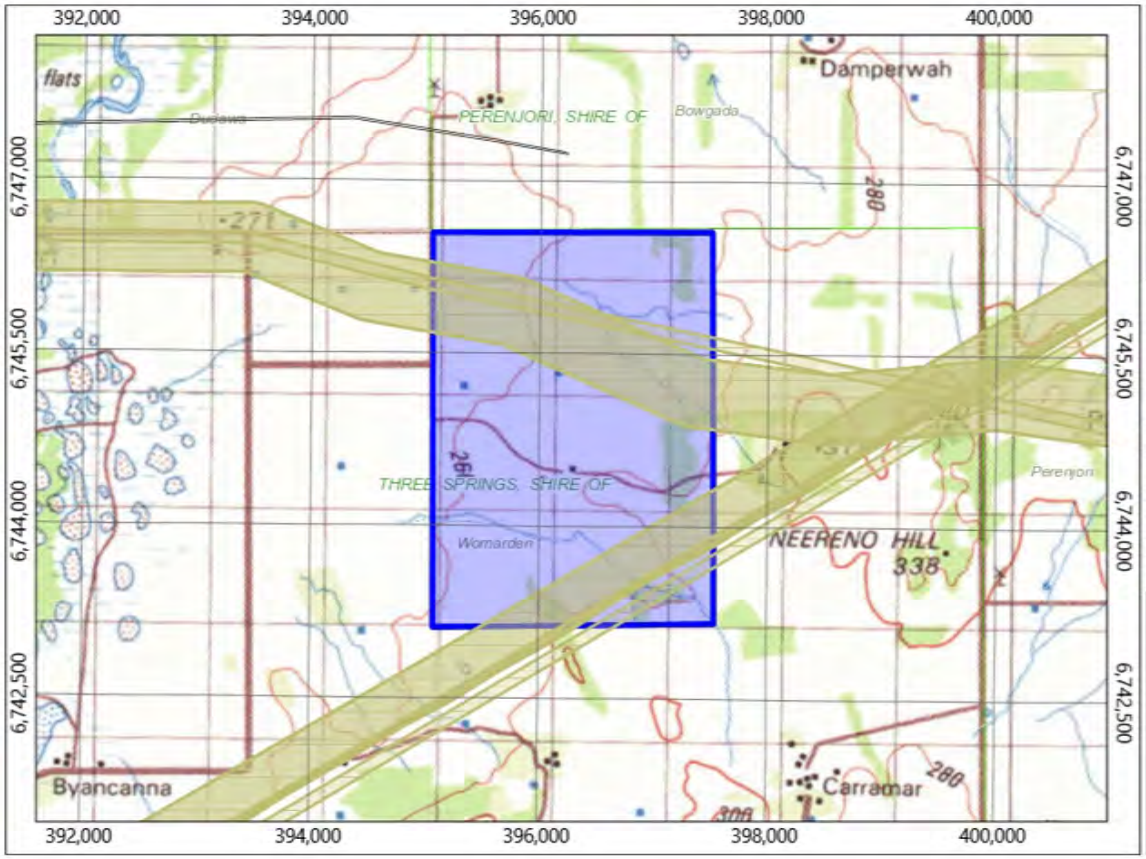
Map 5: AHIS search results for previous heritage surveys in Pilot Energy's

Department of Planning, Lands and Heritage

Aboriginal Heritage Inquiry System

Map of Heritage Survey Areas

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website



Legend

- Heritage Survey Area
- Search Area
- Town
- Road
- River
- Local Government Authority

1.72 kilometres

Map Scale 1 : 52,100

MGA Zone 50 (GDA94)

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Page 2

6 Results and recommendations

Upon review of the site information, previous survey areas, proposed works and its location, Terra Rosa concludes the following:

1. There are **no** registered Aboriginal sites in the project area, though culturally significant sites associated with the Bimara exist within a couple of kilometres of it;
2. The works are defined as having significance disturbance to land which has been significantly altered through both pastoral activities and infrastructure projects. As per the Due Diligence Guidelines, they have a **medium risk** of impacting unknown sites in the project area; and
3. Both the Amangu People and the Widi Mob maintain interests in this area.

As a result of this assessment, Terra Rosa advises:

- That there is potential for remnant Aboriginal artefacts and/or heritage sites to exist within the project area.
    - Based on the AHIS inquiry, archaeological heritage values may exist in the unsurveyed portions of the proposed development envelope considering the proximity of the project area to culturally significant waterways;
    - If Pilot Energy's proposed works will impact any Aboriginal sites (whether they are registered sites or not), an application under section 18 of the Aboriginal Heritage Act 1972 will be required.
- The risk of impacting Aboriginal sites can be minimised by engaging with the identified Traditional Owners through BYAC. Through this engagement, Pilot Energy can establish:
    - Whether the Traditional Owners believe there may be Aboriginal sites on the land;
    - If a heritage survey or consultation is required; and
    - If any heritage management strategies are required.

It is recommended that this engagement should commence once the development has been approved but prior to starting ground disturbing works.

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National Native Title Tribunal 2021, National Native Title Register Details WCD2020/001 - Yamatji Nation, available from: http://www.nntt.gov.au/searchRegApps/NativeTitleRegisters/Pages/NNTR_details.aspx?NNTT_Fileno=WCD2020/001

DPLH Registered Aboriginal Site Files

DPLH ID 22432 – Bimara

DPLH ID 24382 – Yarra Yarra Lakes

DPLH heritage reports

Australian Interaction Consultants, no date, *Report of an Ethnographic Survey with Amangu NTC of A Proposed Slurry Pipeline between Mt Gibson and Geraldton*, Western Australia, DPLH report ID 28195.

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8 Appendix 1 – *DAA Aboriginal Heritage Due Diligence Guidelines* Risk Matrix (2013: 15)

SCHEDULE 2 – THE ABORIGINAL HERITAGE RISK MATRIX

Previous Land Use	LAND ACTIVITIES – CATEGORIES 1-5					
		1. Negligible disturbance	**2. Minimal disturbance**	**3. Moderate disturbance**	**4. Significant disturbance**	**5. Major disturbance**
	Built Environment - e.g. urban environment, towns, metropolitan region.	Low	Low	Low	Low	Medium
	Significantly Altered Environment - e.g. cultivated and cleared land.	Low	Low	Low	Medium	High
	Moderately Altered Environment - e.g. partially cleared lands, re-vegetated landscape.	Low	Low	Medium	Medium	High
	Minimally Altered Environment - e.g. urban bush land, regrowth areas	Low	Medium	Medium	High	High
	Unaltered Environment - e.g. protected areas or pristine environment.	Low	Medium	High	High	High

Risk Assessment	**Actions**
Low Risk (Review)	Review the landscape and proposed activity (see sections 2.4 - 2.8 - assessing the landscape and the activity). Refer to the AHIS.
Medium Risk (Review /Exercise Caution)	Review the landscape and proposed activity (as above). The precautionary principle (see page 2) applies. Refer to the AHIS and contact the DAA. A range of actions may be recommended, including: no action, consultation with the relevant Aboriginal people, an Aboriginal heritage survey or modification of the proposed activity to avoid or minimise site impact.
High Risk (Consult / Survey / Approvals)	Refer to the AHIS. Consult with the DAA and the relevant Aboriginal people. Dependent on consultation outcomes you may need to include: an Aboriginal heritage survey, modification of the proposed activity to avoid or minimise (see sections 2.24 - 2.28) impact to the site and/or other heritage management strategies. The land user may also need to apply for approval or consent (see section 2.26) to the activity.
For major development projects refer to sections 2.10 - 2.12 for further advice.	

ANNEXURE H - EXAMPLE SOLAR PANEL TRACKING SYSTEM SUNPOWER OASIS 3.0 ‘P’ SERIES TRACKER OVERVIEW

SUNPOWER®

Oasis 3.0 “P” Series Tracker Overview

January 2017

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Oasis 3.0 Introduction

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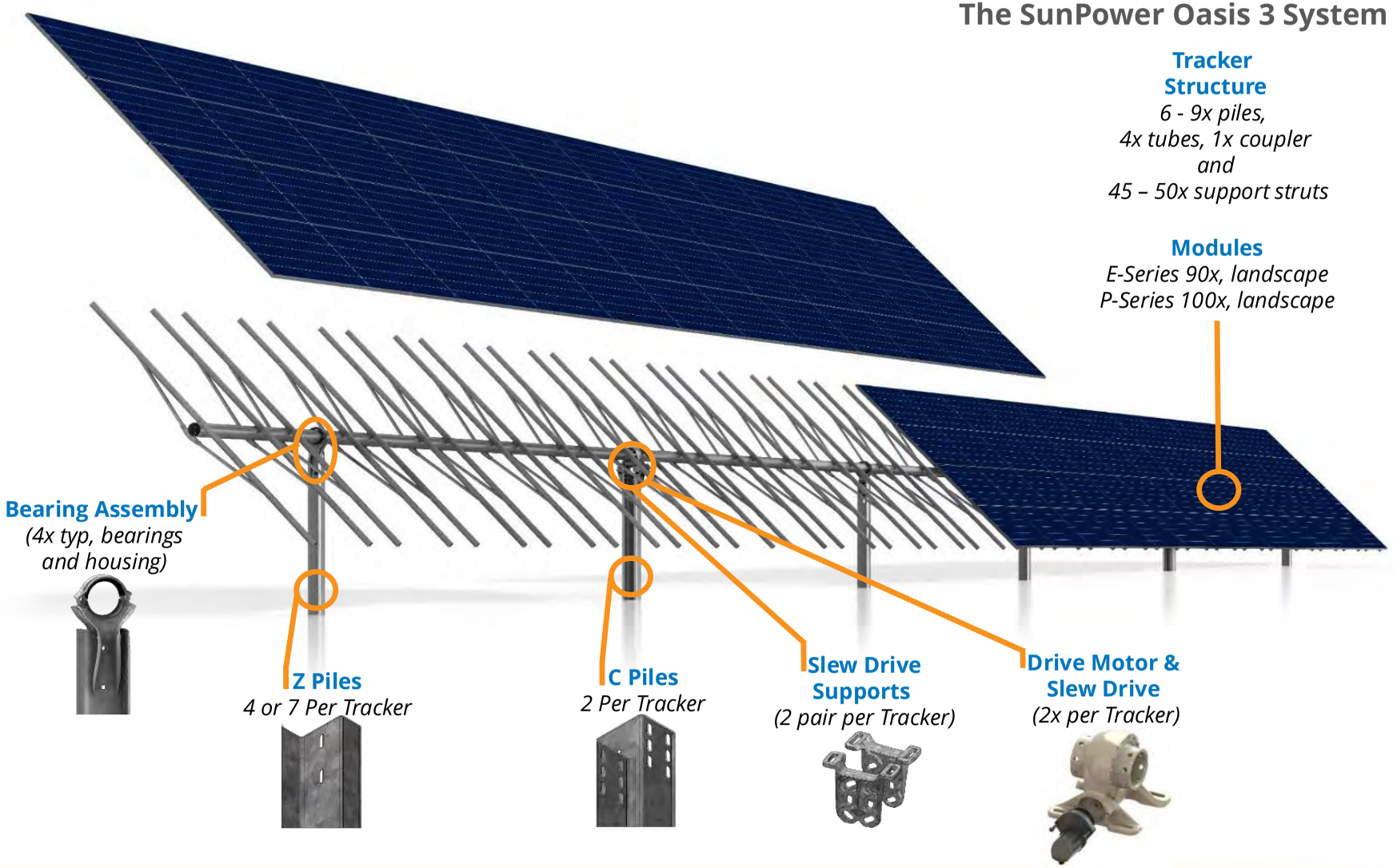
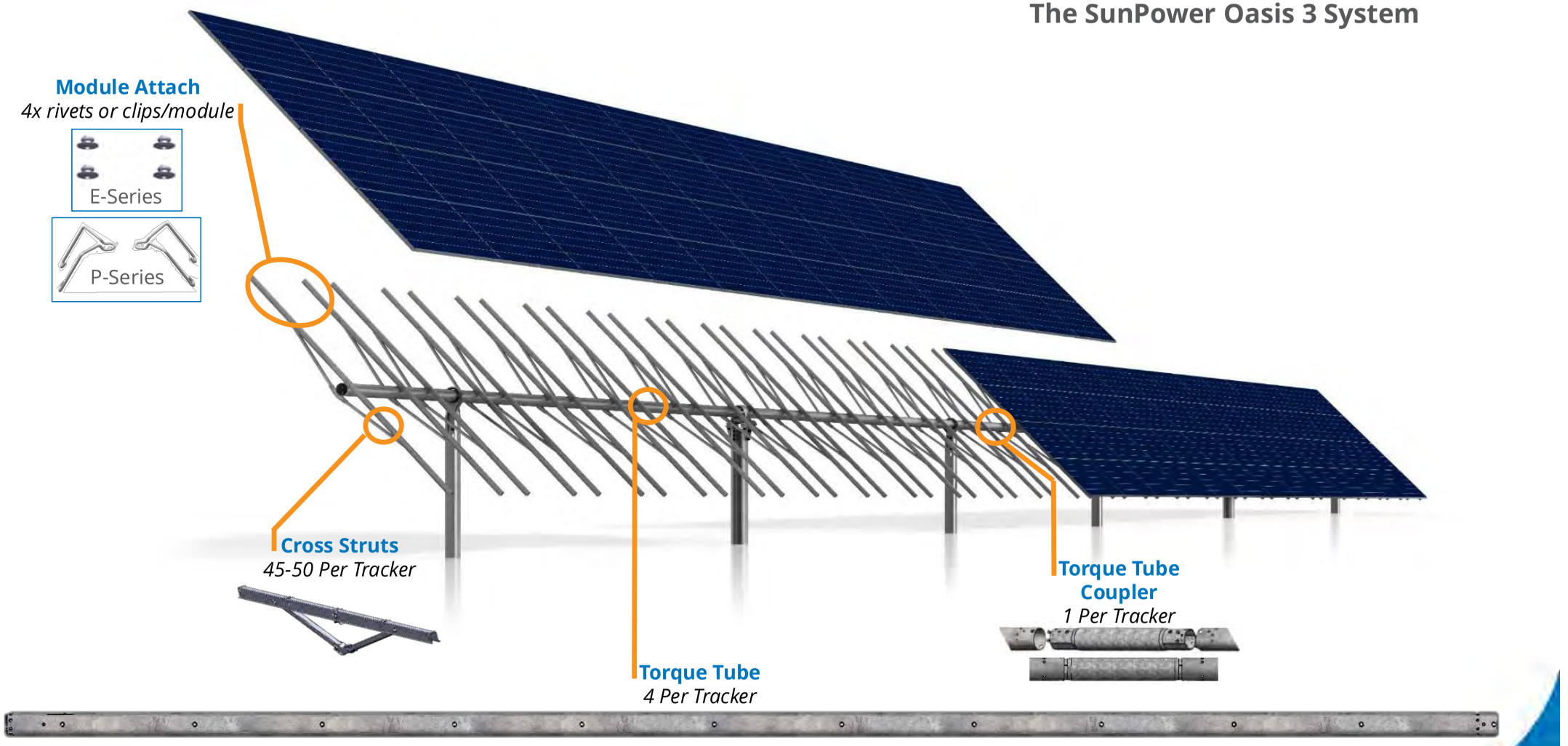
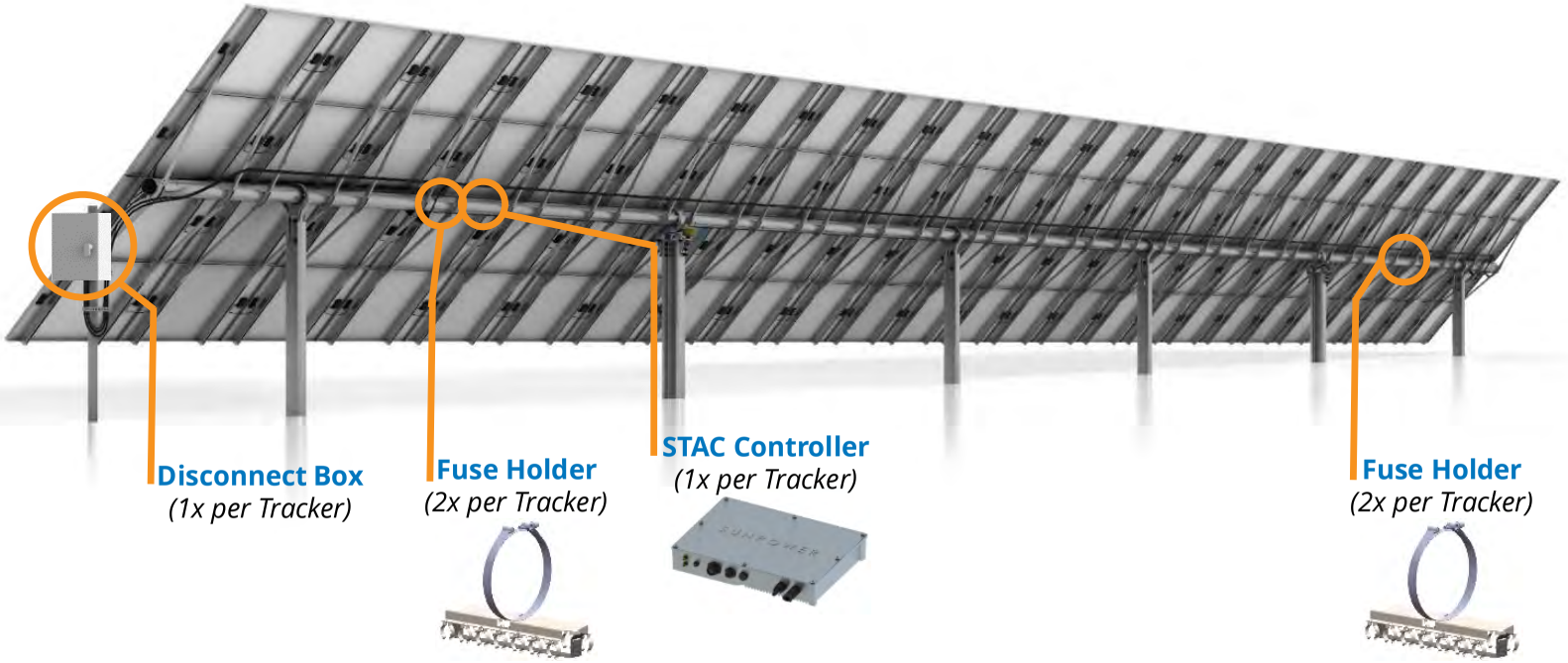
The SunPower Oasis 3 System



The SunPower Oasis 3 System



The SunPower Oasis 3 System



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Installation Steps

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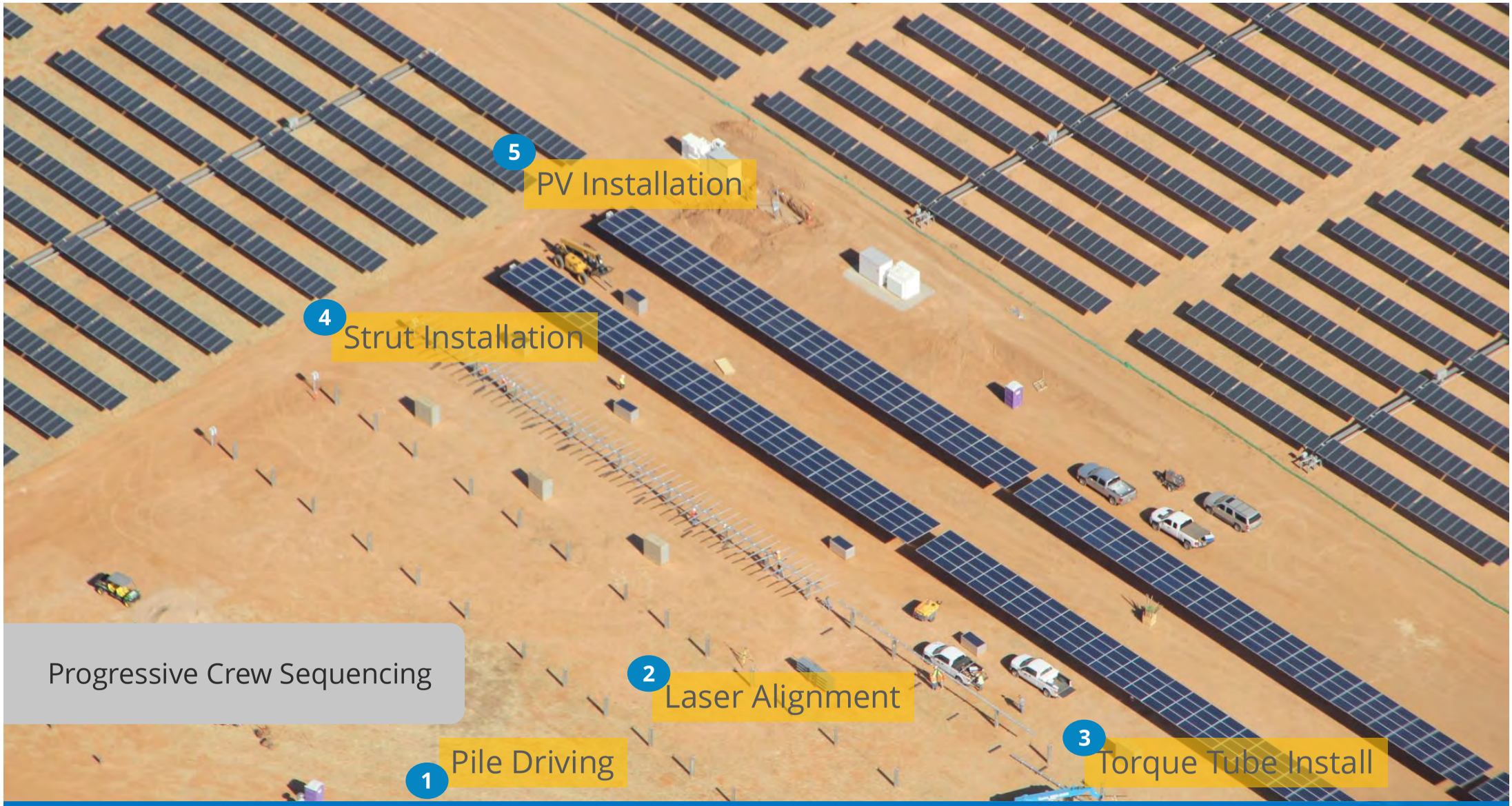
Oasis 3 Construction Activities

- Pile Driving
- Pre-assembly before lifting (module struts/saddles attached, slews attached to TT, coupler attached to tube)
- Pile Cap Alignment
- Placement of Torque Tube (with or w/o struts)
- Installation of slew drives and TT Connections
- Module Attach
- DC String Combination Wiring
- DC Collection “Combine-as-you-go” Wiring
- DC Switch Installation



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1
Laser Alignment
2
Torque Tube Installation
3
Module Installation
Progressive Crew Sequencing

Build Highlights

Video Highlights

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Custom Tools

Tracker Assembly

Laser Jig

Z Pile Laser Target

Slew Pile Target

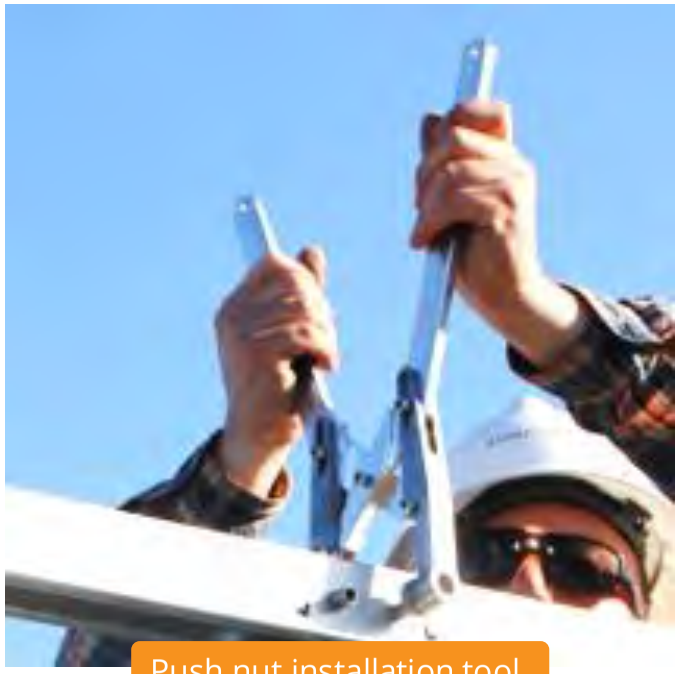
Custom Tools

Tracker Assembly

C pile - torque tube installation jig

Custom Tools

Tracker Assembly



Push nut installation tool

Cross strut pre-assembly jig

Cross strut cassette/ shakeout jig

Custom Tools

Tracker Assembly

Torque tube North-South adjustment lever

Slew clocking tool

Tracker clocking tool

Custom Tools

Tracker Assembly

Slew Bracket Hardware Cassette

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Pile Install

SUNPOWER

Vermeer

Slew Drive, Coupler, Saddle Pre-Install

SUNPOWER

Saddle Pre-Install on Torque Tubes

Tracker Assembly

Saddle hardware staged on torque tubes

Small top saddle, large lower saddle, through bolt, 2 through bolt collars

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Saddle Pre-Install on Torque Tubes

Tracker Assembly

Small saddle on top, large saddle on bottom, bolt with boss piece goes through torque tube and second boss piece is threaded

Saddles installed loosely

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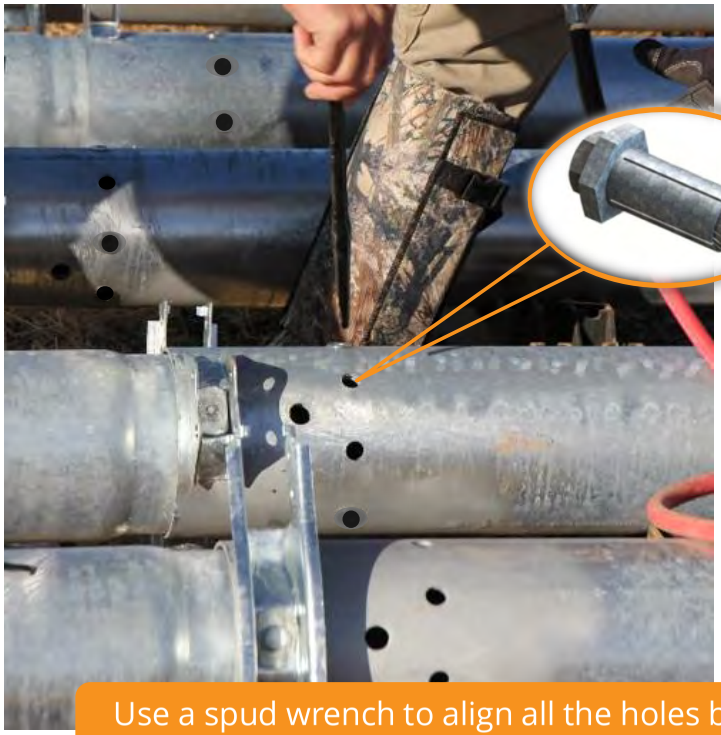
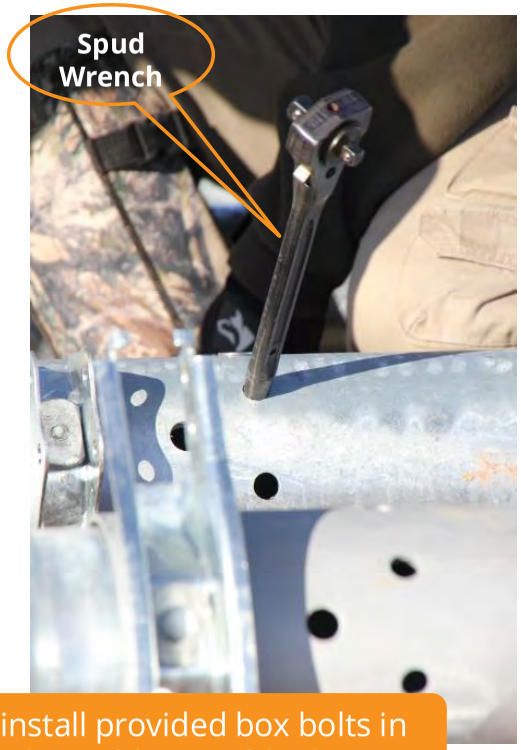
Coupler Alignment

Tracker Assembly





Use a spud wrench to align all the holes between the torque tube and torque tube coupler, install provided box bolts in all torque tube to coupler holes. Box bolts will be tightened a specific torque value found in the Field assembly sheets

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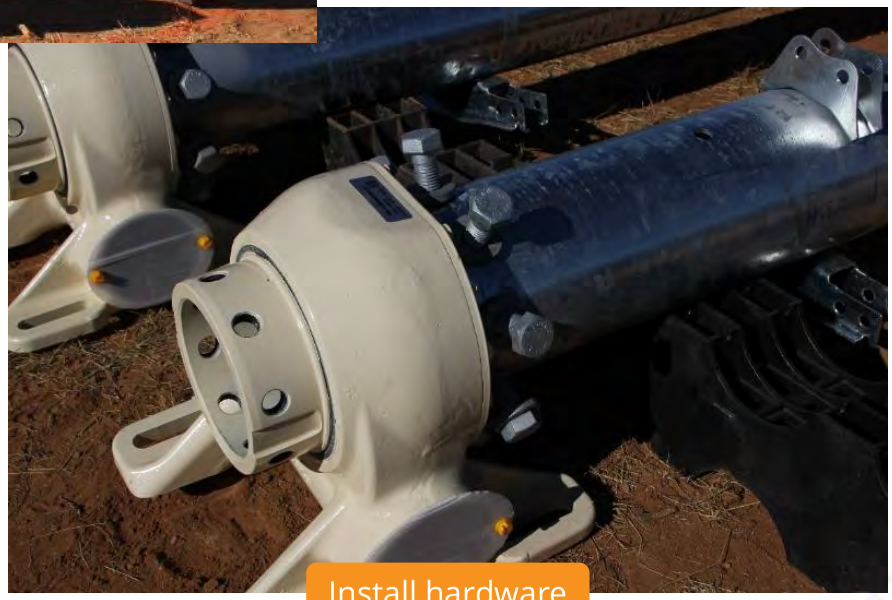
Install Slew to Torque Tube

Tracker Assembly

Black paint mark on torque tube always to the slew drive side

Align top of slew to saddle holes for correct orientation



Install hardware

Install Slew

Tracker Assembly

Tighten to torque value provided in Field Assembly Sheets, an 18 – 24v battery impact drill can be used to achieve the required torque.

Match Mark to Show Torqued

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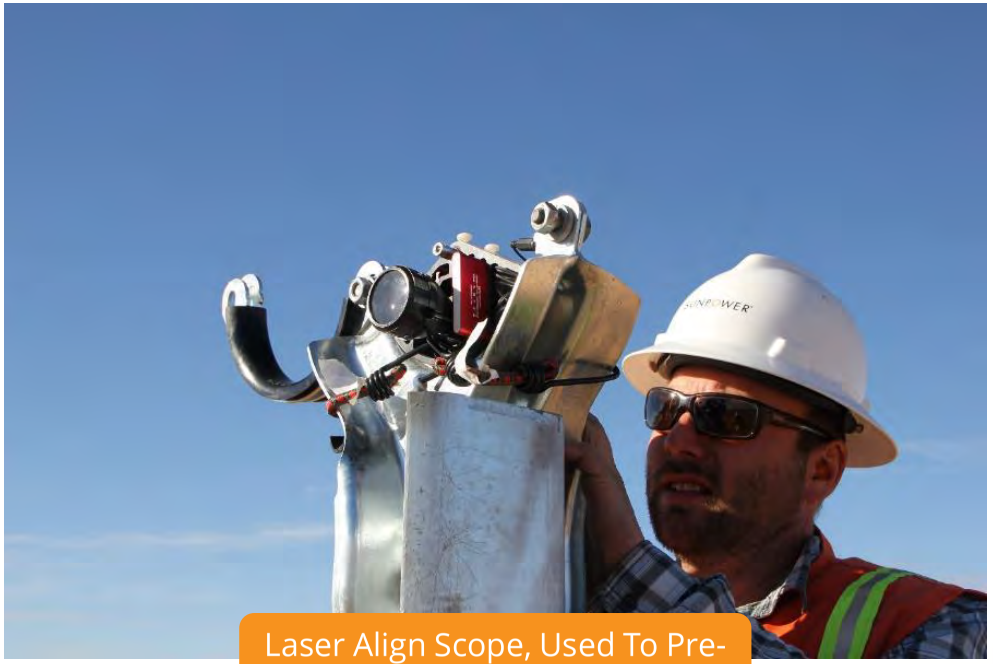
Torque Tube Align and Install

SUNPOWER

Bearing & Drive Support Alignment Laser

Tracker Assembly

Laser Align Jig w/ Scope & Rechargeable Battery (Provided By SPWR)



Laser Align Scope, Used To Pre-Align Torque Tube Supports

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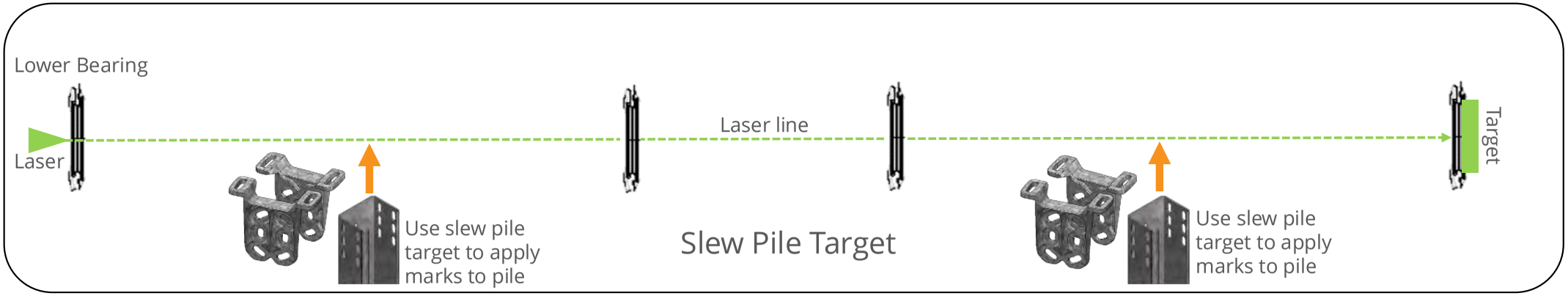
Create Torque Tube Centerline

Tracker Assembly



Laser Jig

Slew Pile Target

Slew Pile Target

Laser Target

Bearing Support Alignment (Z Piles)

Tracker Assembly

Laser Jig (North End Z Pile)

Bearing Support Target (South End Z Pile)

Align All Inner Z Pile Supports Using Laser Target, Snug Hardware

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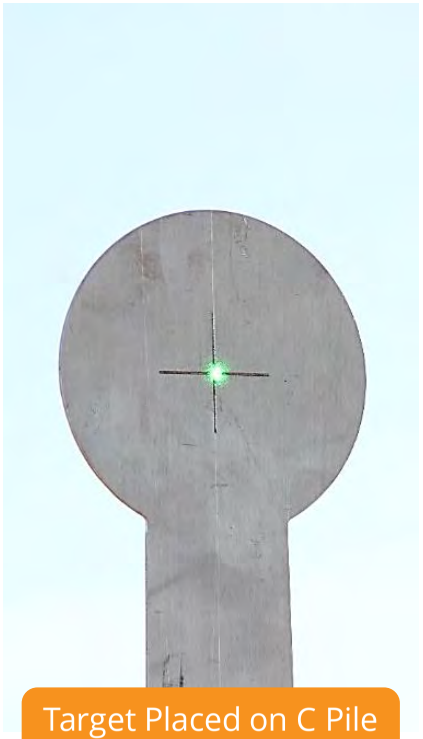
Drive Support Pre-Alignment

Tracker Assembly

Drive Support Laser Target w/ Marking Feature



Target Placed on C Pile and Aligned to Laser

Provides Shim Count When Placing Slew Drive

Use Marking Feature to Place Mark on C Pile

Write Shim Count on C Pile – 0, 1, or 2

Mark Used to Align Installation Jig

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Drive Support Alignment

Tracker Assembly

Installation Jig Placed on C Pile and Aligned to Pre-Alignment Marks

Installation Jig Aligned to Marks

Installation Jig Secured and Shim Count Applied to C Pile

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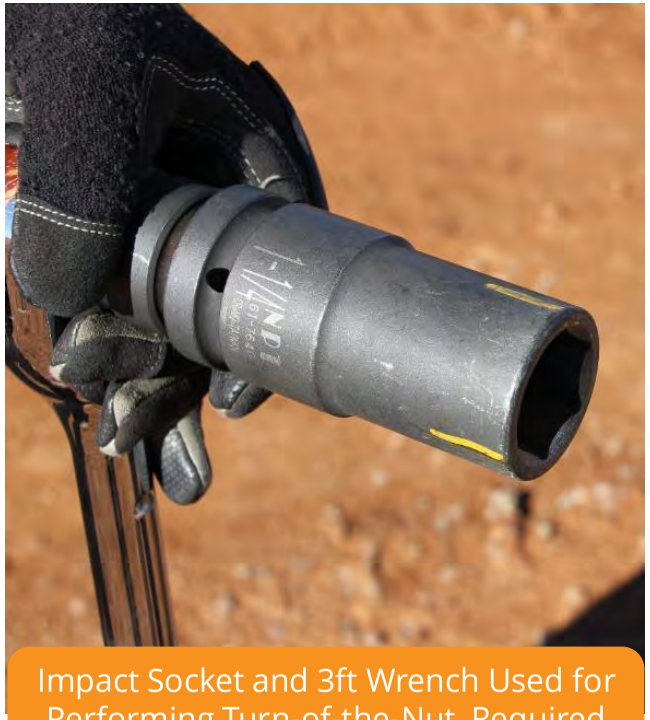
Bearing Support Securement

Tracker Assembly



Impact Socket and 3ft Wrench Used for Performing Turn-of-the-Nut, Required for Bearing Support Hardware

After Z Pile Bearing Supports Have All Been Aligned Within a Tracker, Tighten Hardware to 1/3 Turn

Hardware Match Marked and 1/3 Turned

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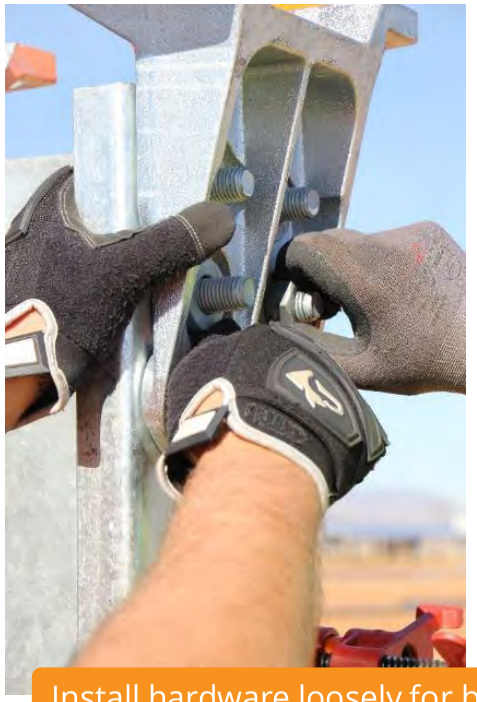
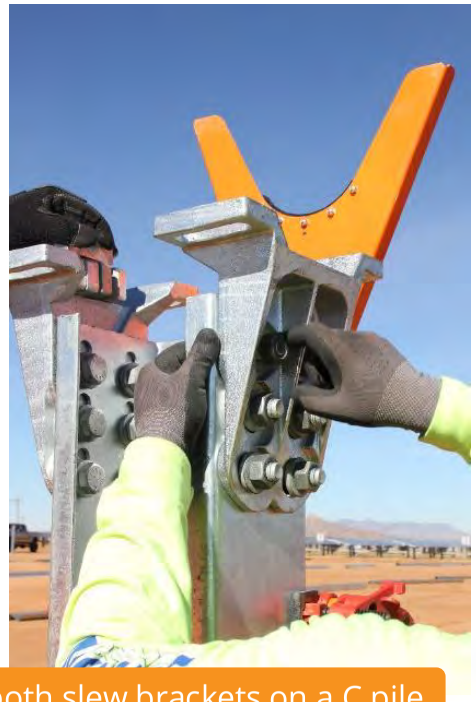
Drive Support Installation

Tracker Assembly

Use jig to manage hardware while installing slew brackets





Install hardware loosely for both slew brackets on a C pile

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Torque Tube Placement

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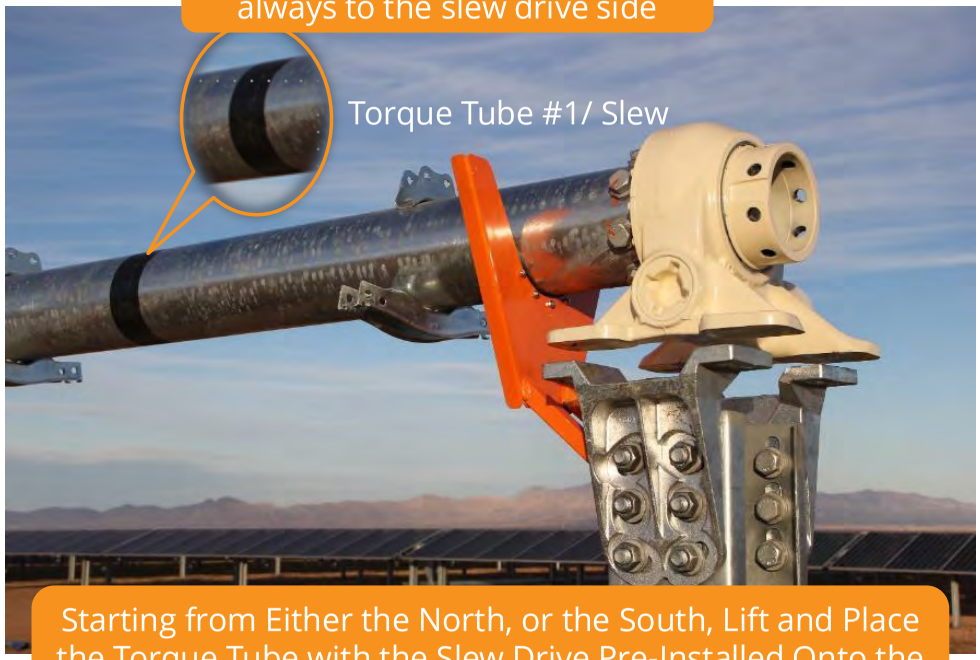
Torque Tube Placement

SUNPOWER

Torque Tube Landing

Tracker Assembly



Starting from Either the North, or the South, Lift and Place the Torque Tube with the Slew Drive Pre-Installed Onto the Z Pile Bearing and the Slew Installation Jig as Shown

Install second torque tube with coupler pre-installed

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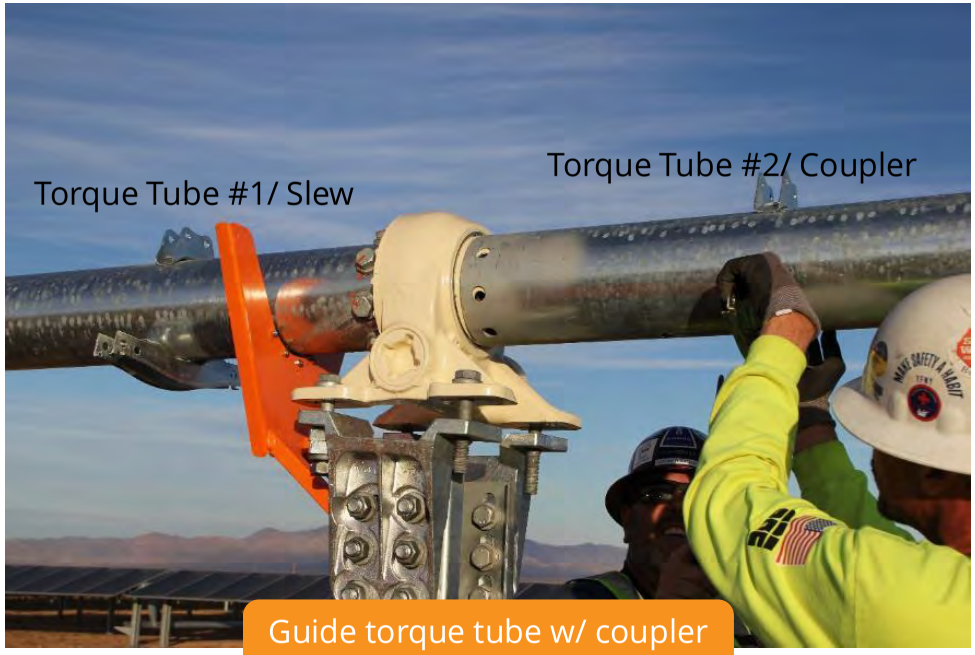
Torque Tube Landing

Tracker Assembly



Guide torque tube w/ coupler onto the slew drive collar

Align torque tube holes to slew drive collar holes and install hardware

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Torque Tube Landing

Tracker Assembly

Slide torque tube #3 w/ slew attached onto coupler, align holes and install box bolt hardware

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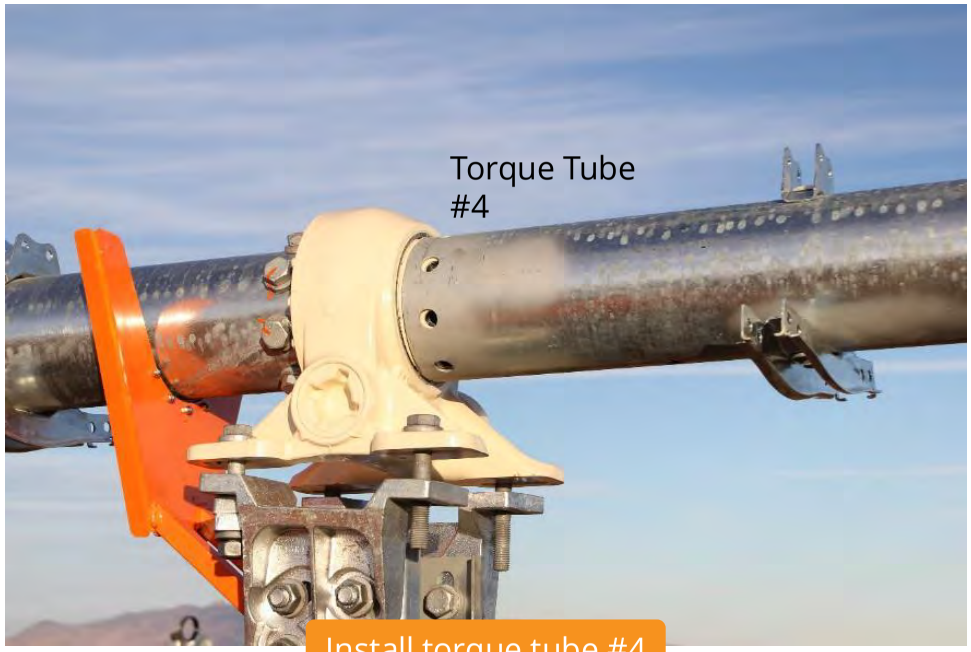
Torque Tube Landing

Tracker Assembly

With torque tube # 3 installed, install torque tube #4.



Install torque tube #4

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Bolt Torque Tubes to Slew drives

Tracker Assembly

Align torque tube bolts so that the small saddle is at 12 o'clock and install hardware

Hardware will be tightened to a torque value provided in the Field Assembly Sheets, an 18 – 24v battery impact drill can be used to achieve the required torque

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Drive Support Assembly

Tracker Assembly

Install all the slew drive to slew bracket hardware. Two shims per slew foot are *required* in all configurations

Spacers should always point towards the torque tube and will be used in a 0, 1, or 2. shim configuration

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Drive Support Assembly

Tracker Assembly

One slew foot is required to have one grounding washer between the flat washer and slew foot, the tooth side should be down against the slew as shown

Slide slew bracket up until it is pressed firmly against the slew drive feet.

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Drive Support Assembly

Tracker Assembly

Tighten all slew bracket hardware for both brackets

Once hardware is snugged, match mark nut to end of bolt

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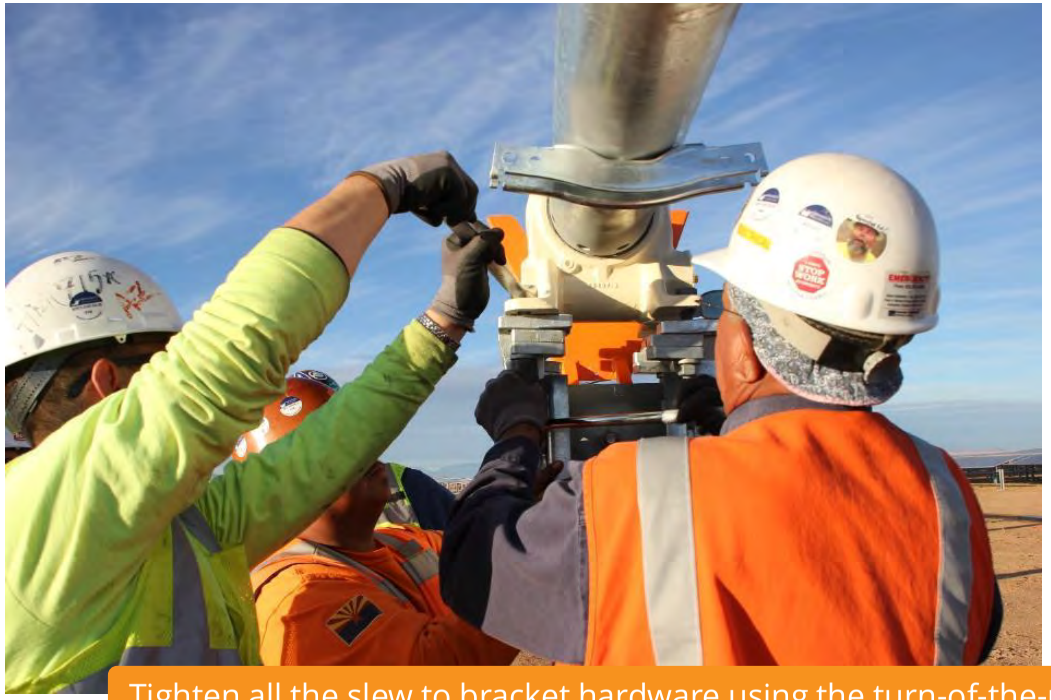
Drive Support Assembly

Tracker Assembly



Tighten all the slew to bracket hardware using the turn-of-the-nut method, this connection will be to ½ turn past snug

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Bearing Support

Tracker Assembly

Once torque tubes have been placed and all hardware installed and tightened, install the top bearing supports and tighten hardware to 1/3 turn past snug

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Cross Strut Pre-Assembly and Install

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Cross Strut Pre-Assembly

Tracker Assembly

Pre-assembly jig

Parts are placed on jig which aligns all cross strut holes for push pin installation

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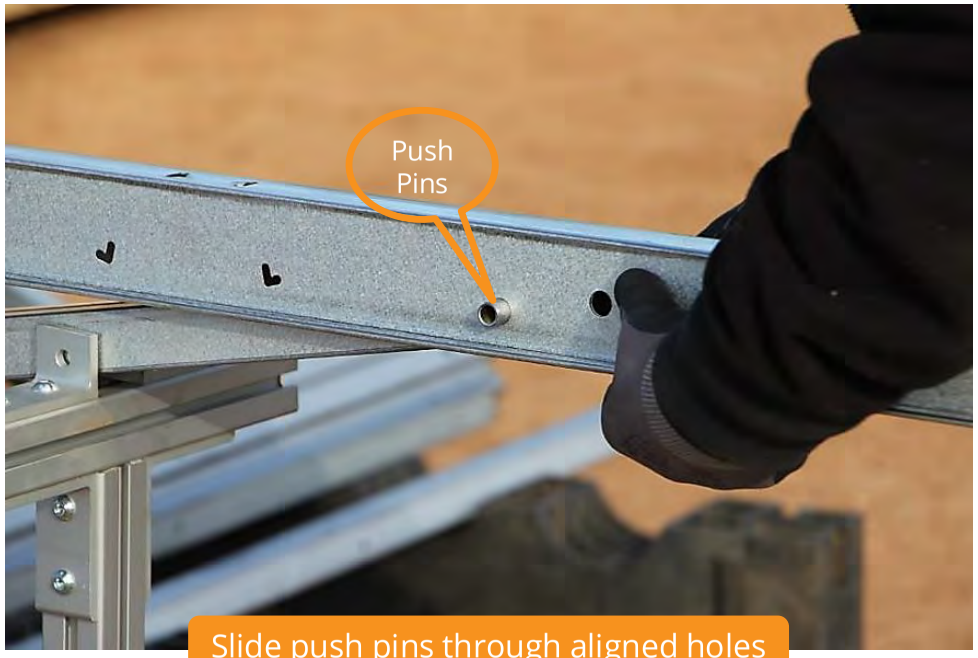
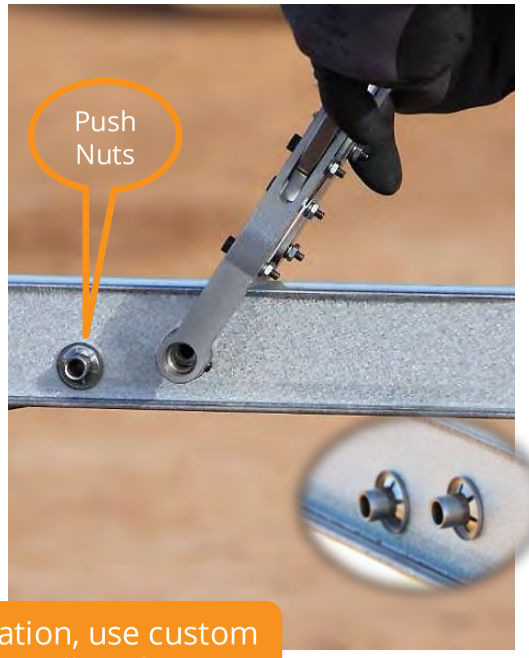
PV Strut Pre-Assembly

Tracker Assembly



Slide push pins through aligned holes



To complete installation, use custom push nut tool to install push nuts

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Cross Strut Shakeout/ Staging

Tracker Assembly

Use cross strut cassette to load completed cross struts and layout at trackers

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Cross Strut Installation

Tracker Assembly

Use push nut tool to install push pins and push nuts on the upper saddle

Use push nut tool to install push pins and push nuts on the lower saddle

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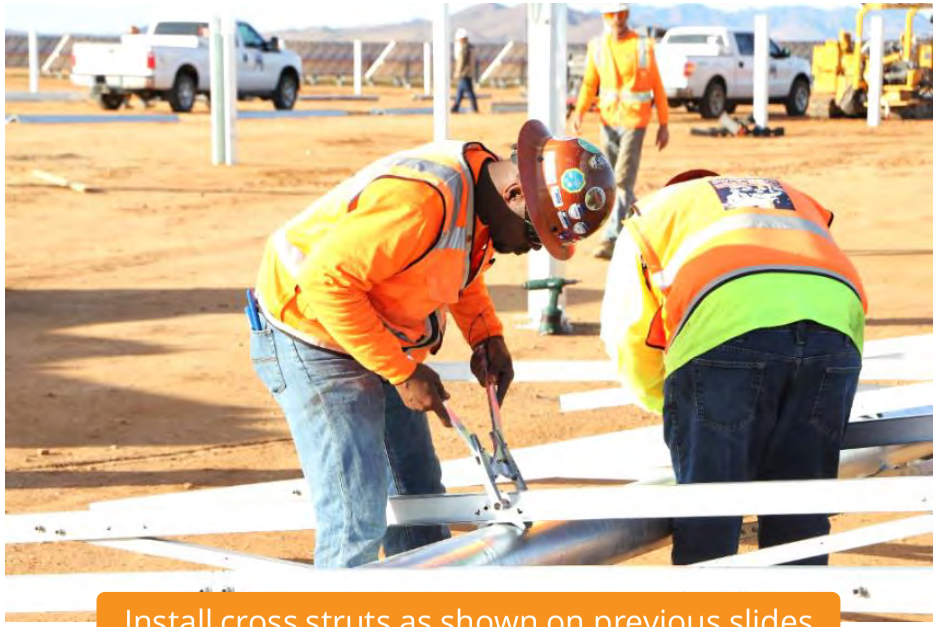
Cross Strut Install from the Ground

Tracker Assembly

Set torque tube on some type of supports approved for the weight



Install cross struts as shown on previous slides

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Torque Tube Lift with Struts Attached

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Cross Struts Installed

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PV Install

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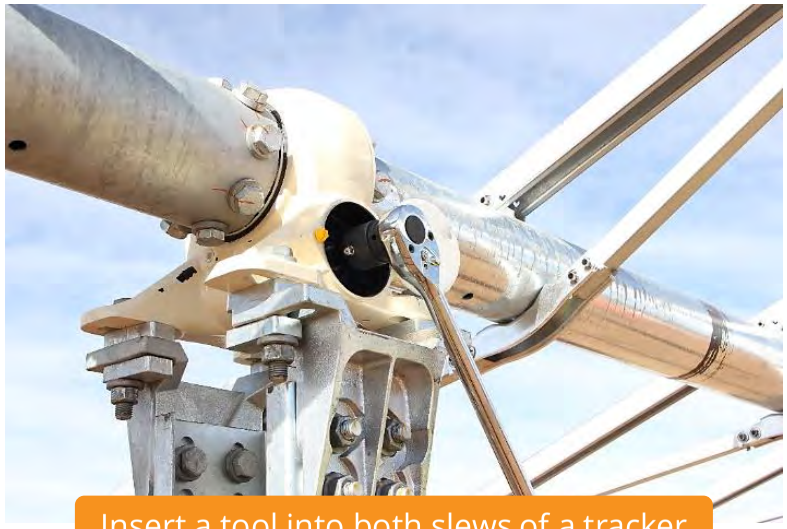
Tracker Rotation for PV Module Installation

Tracker Assembly



Insert a tool into both slews of a tracker

Each worker will simultaneously track over the tracker to 10-20 degrees for PV install

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PV Module Installation

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Module Attachment

PV Installation

Lift PV from pallet stack and place on cross struts

Do not leave PV un-manned until at least two clips have been installed

Install 4 custom installation clips per module

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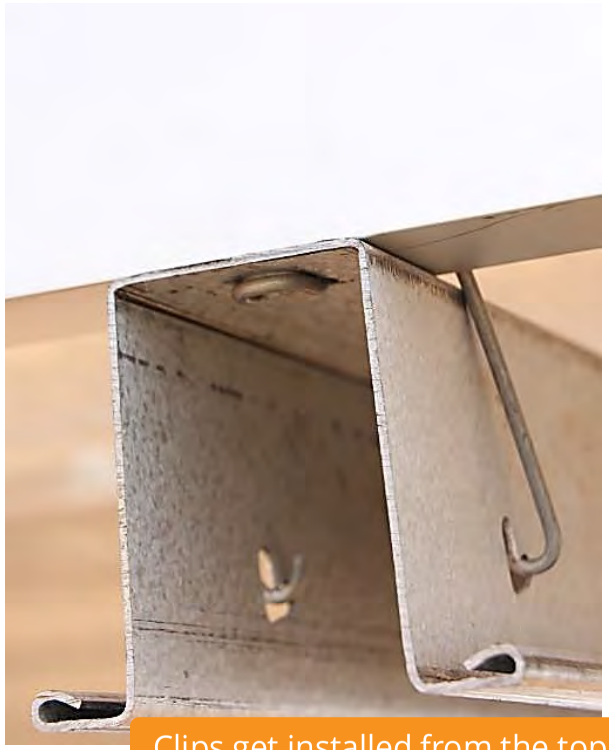
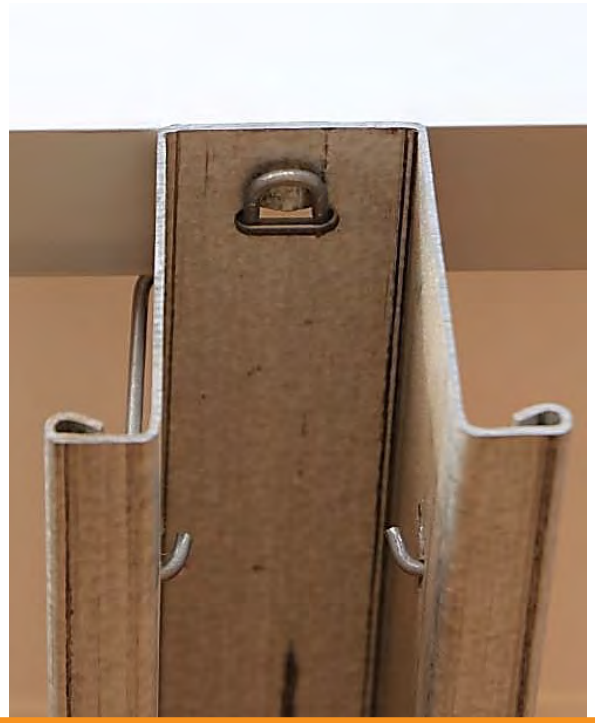
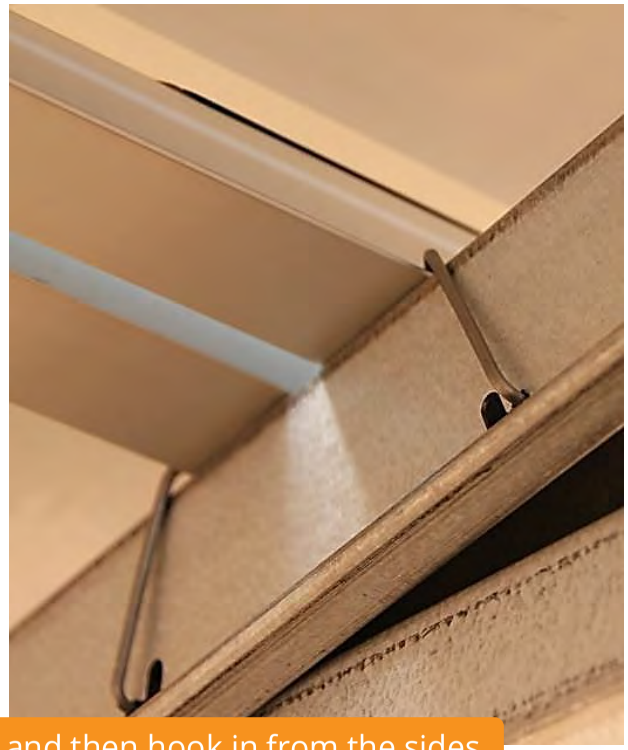
Installed PV Clip

PV Installation







Clips get installed from the top of the frame and then through the cross strut top, and then hook in from the sides

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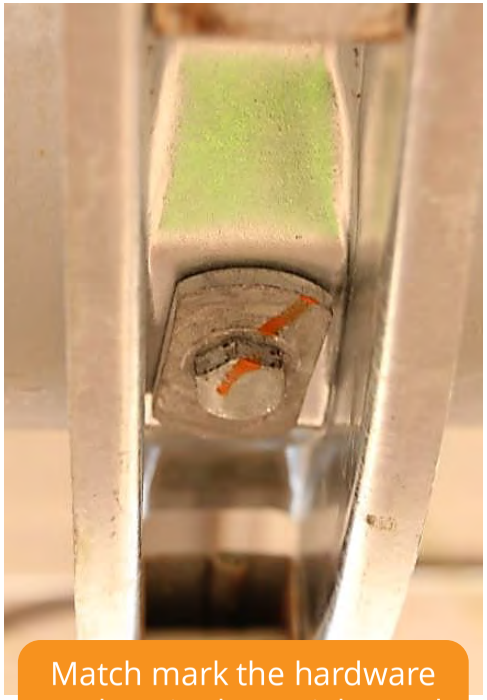
PV Saddle Torque & Marking

PV Installation

Once PV has been installed, all the saddle hardware can be tighten to a torque value provided in the Field Assembly Sheets



Match mark the hardware to show it's been tightened to torque value

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PV Installation Complete

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DC Collection

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DC Collection

DC Wiring

Both positive and negative DC harness spools can be trailer mounted and pealed of along the length of the tracker for installation

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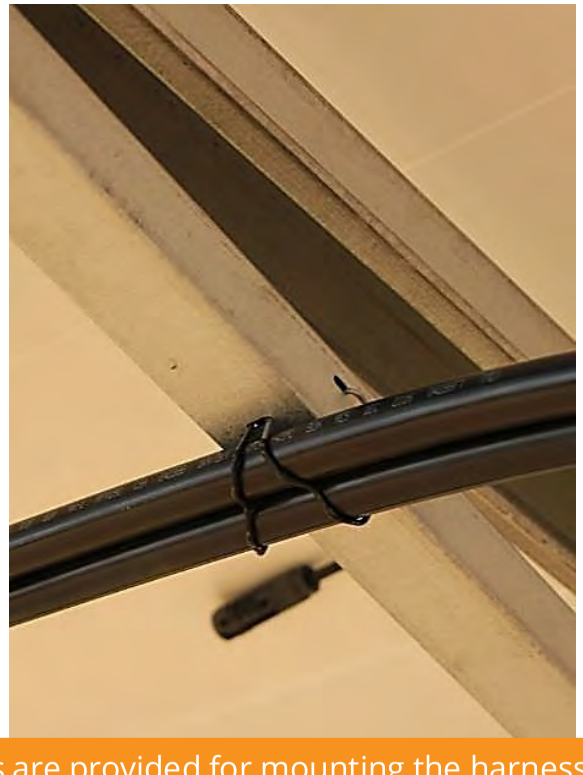
DC Collection

DC Wiring



Custom DC harness clips are provided for mounting the harnesses to the Cross strut short arms

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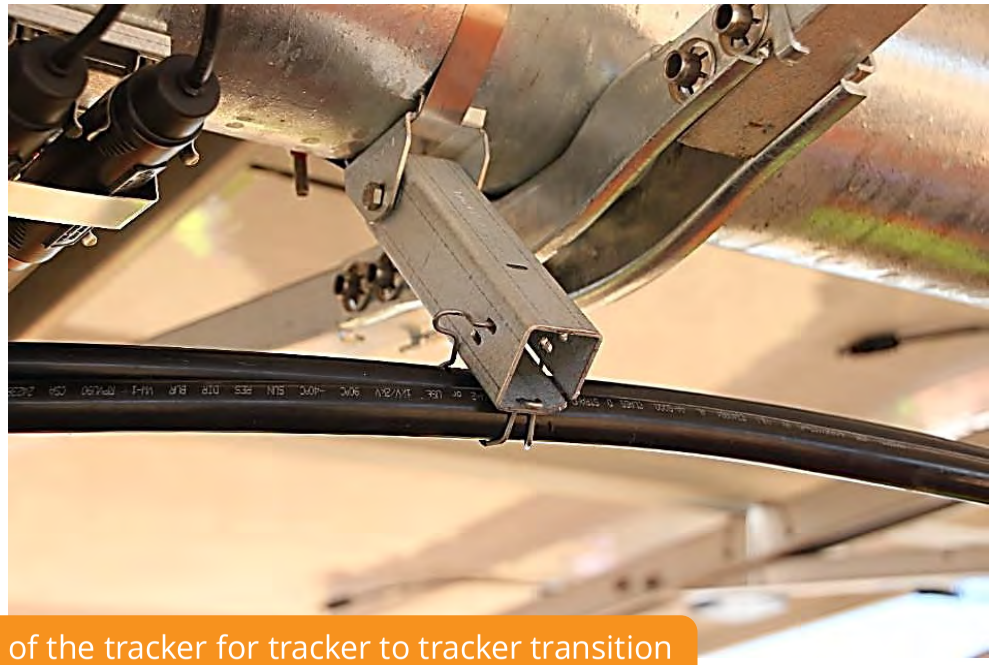
Tracker-to-Tracker Transition

DC Wiring



Two swivel brackets are required at both ends of the tracker for tracker to tracker transition and DC disconnect transition, the same DC harness clips will be used for this connection

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Tracker-to-Tracker Service Loops

DC Wiring

Depending on the gap length from tracker to tracker, both the positive and negative DC harness cables slack will need to be taken up and dressed as shown. Finished result will be one loop on each tracker

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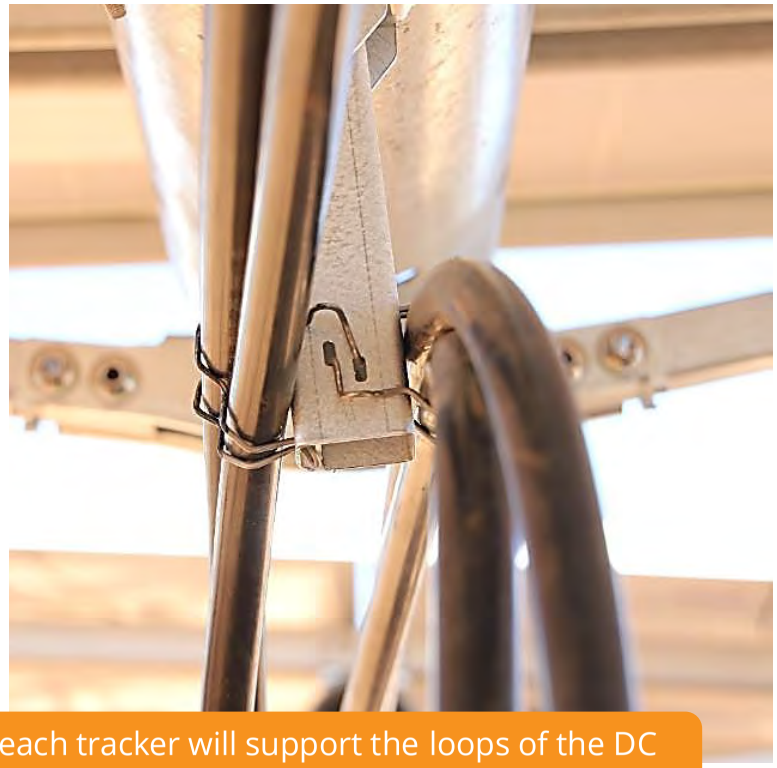
Tracker-to-Tracker Transition

DC Wiring



The outer swivel support on each tracker will support the loops of the DC harnesses as shown

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Tracker-to-Tracker Transition

DC Wiring

There will be a messenger cable from tracker to tracker to support the DC harnesses, there are holes at the end of the torque tubes for mounting the messenger support clips

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Tracker-to-Tracker Transition

DC Wiring

Custom clips will be used to support the DC harnesses to the messeger cable as shown

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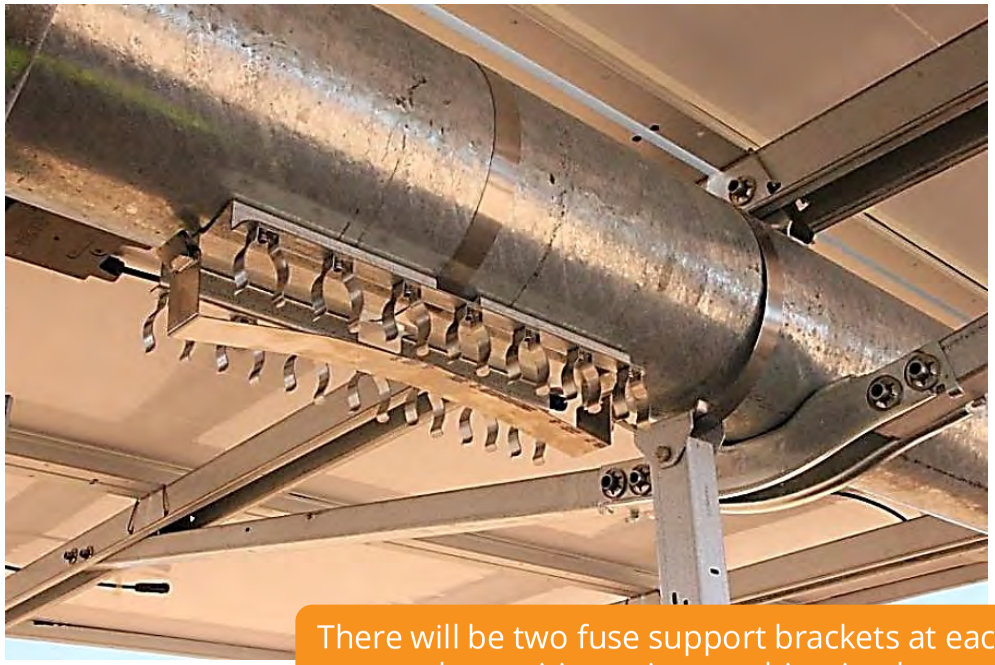
Tracker Harness & Fuse Holder

DC Wiring



There will be two fuse support brackets at each end of the tracker transitions for supporting the positive string combination harnesses and positive string controller input

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DC Collection (+)

DC Wiring

Cable management for the last positive DC harness of the last tracker within a row

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DC Collection and Controller

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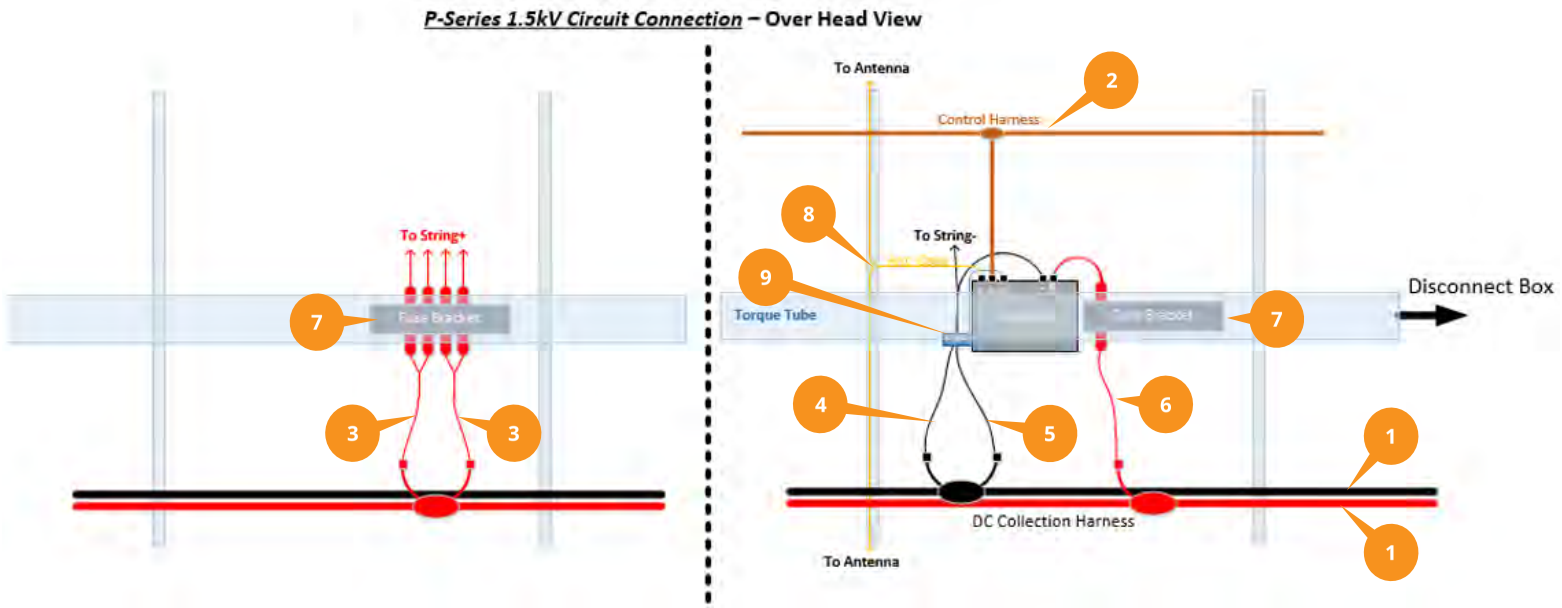
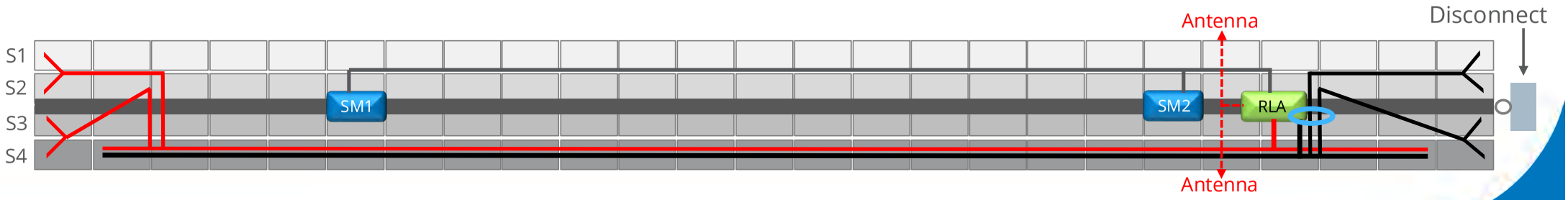
1. DC Collection Harness
2. Motor Controller Cable
3. Positive String Combination Harness
4. Negative String Combination Harness
5. Negative Controller Input Harness
6. Positive Controller Input Harness
7. Fuse Bracket
8. Antenna Cable
9. CT





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Tracker to DC Disconnect Transition

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DC Disconnect

SUNPOWER

DC Disconnect Installation

eBOS Installation

DC feeder conduit hole needs to drilled out in the field

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DC Disconnect Installation

eBOS Installation

Cut conduit, glue on terminal adapter and land in disconnect

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DC Disconnect Installation

eBOS Installation

Use provided parts to install disconnect to elevation provided in Field Assemble Sheets

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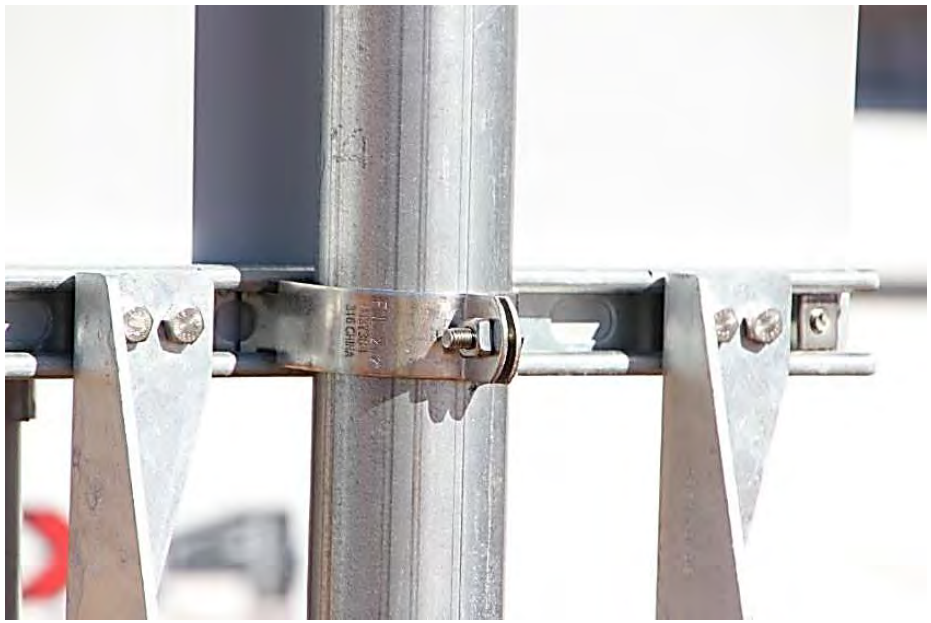
DC Disconnect Installation

eBOS Installation



All measurements for the support brackets are provided in the Field Assembly Sheets, all hardware is provided

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DC Disconnect Installation

eBOS Installation

Install transition and conduit support brackets

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DC Disconnect Installation

eBOS Installation

Install lock ring and plastic bushing

© 2017 SunPower Corporation | Confidential |

DC Disconnect Installation

eBOS Installation

Install disconnect, DC conduit stub and DC harness

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DC Disconnect Transition

DC Wiring

Refer to the Field Assembly Sheets for all the transition measurements

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DC Disconnect Transition

DC Wiring

Hardware provided for securing DC harnesses

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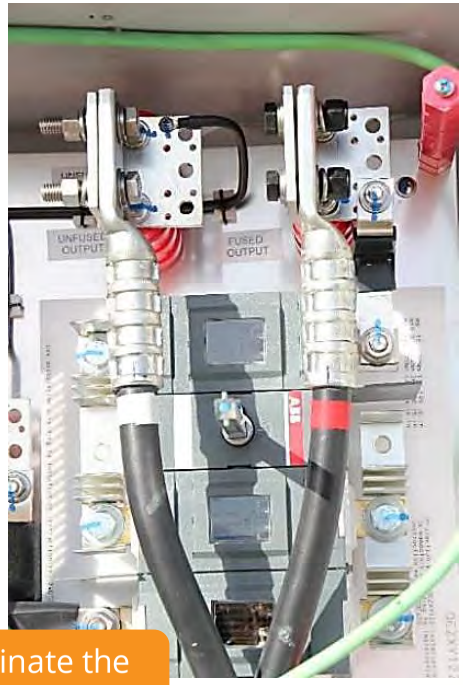
DC Disconnect Termination

eBOS Installation



Once DC transitions have been completely installed and supported, cut and terminate the DC harnesses, ground and DC feeders to the disconnect terminals

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Tracker to DC Disconnect Transition

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SUNPOWER

Thank you

Let’s change the way our world is powered.

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Turn-of-the-Nut Procedure

SUNPOWER

Turn-of-the-Nut Procedure

Tracker Install

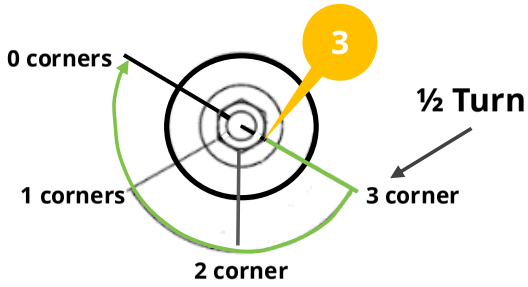
1. Bring bolted connections to snug (all ply's of material together with no gaps.) Match mark the end of the bolt to a corner on the nut with a Paint Pen.
2. Tighten the nut until its at 2 corners from the Paint Pen marked corner.
3. ½ turn detail.

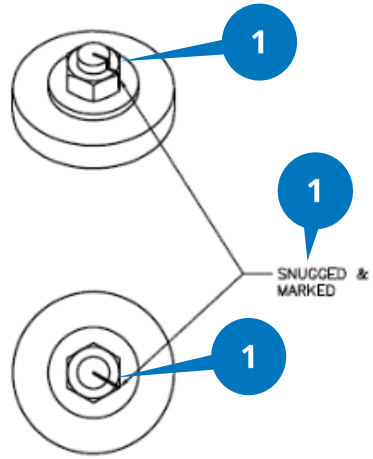
Notes:

A. Slew drive bracket to pile, and bearing top to bearing support require 1/3 turn past snug.

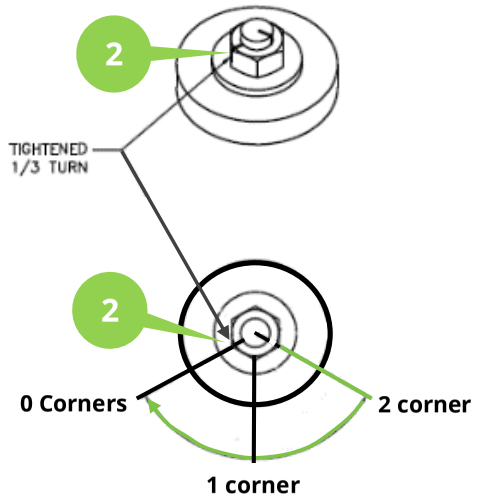
B. Slew drive to slew drive brackets require ½ turn past snug.

C. Boxed end wrenches and sockets are required with a 3’ breaker bar.





DETAIL B
NUT TIGHTENING DETAIL



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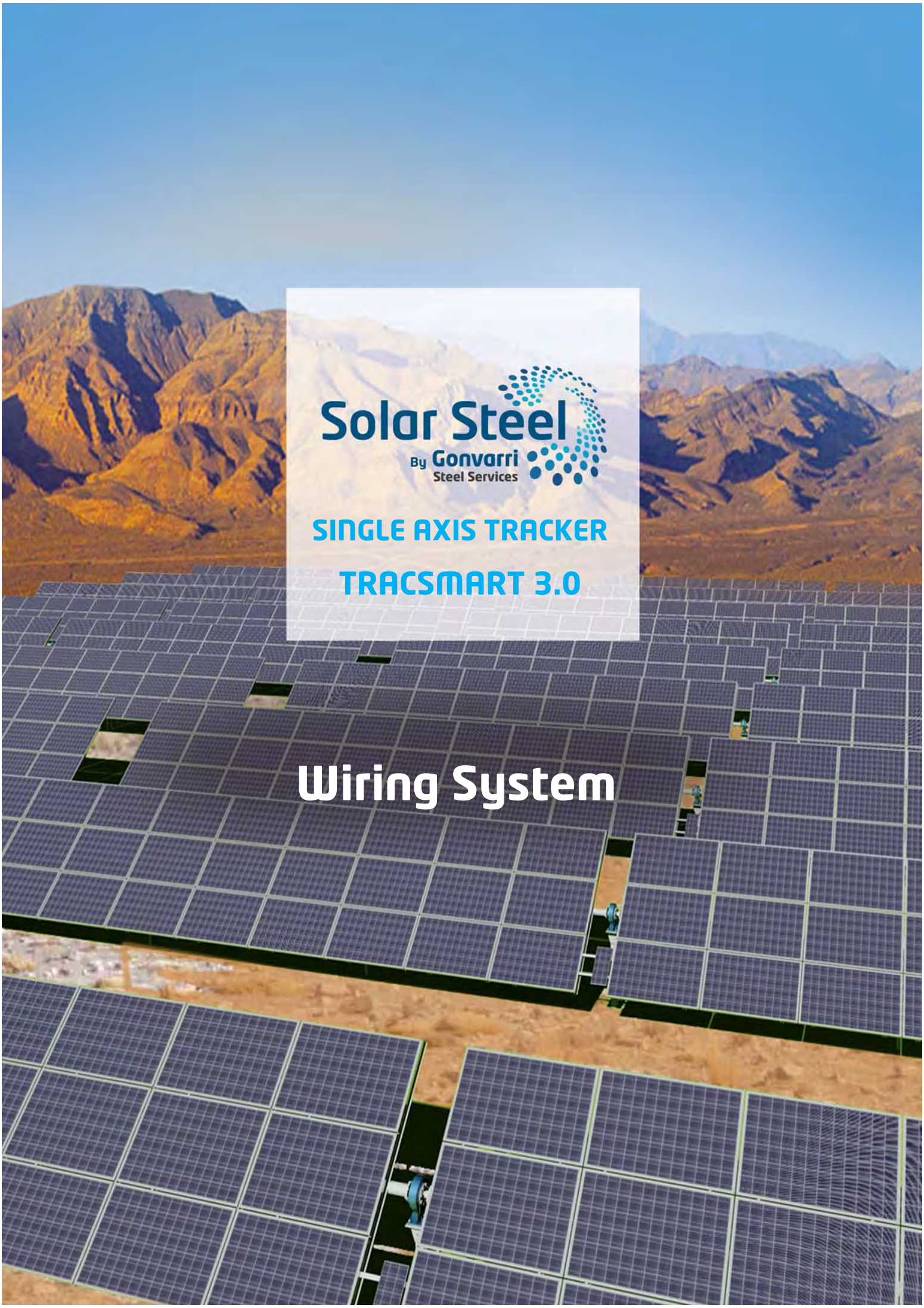
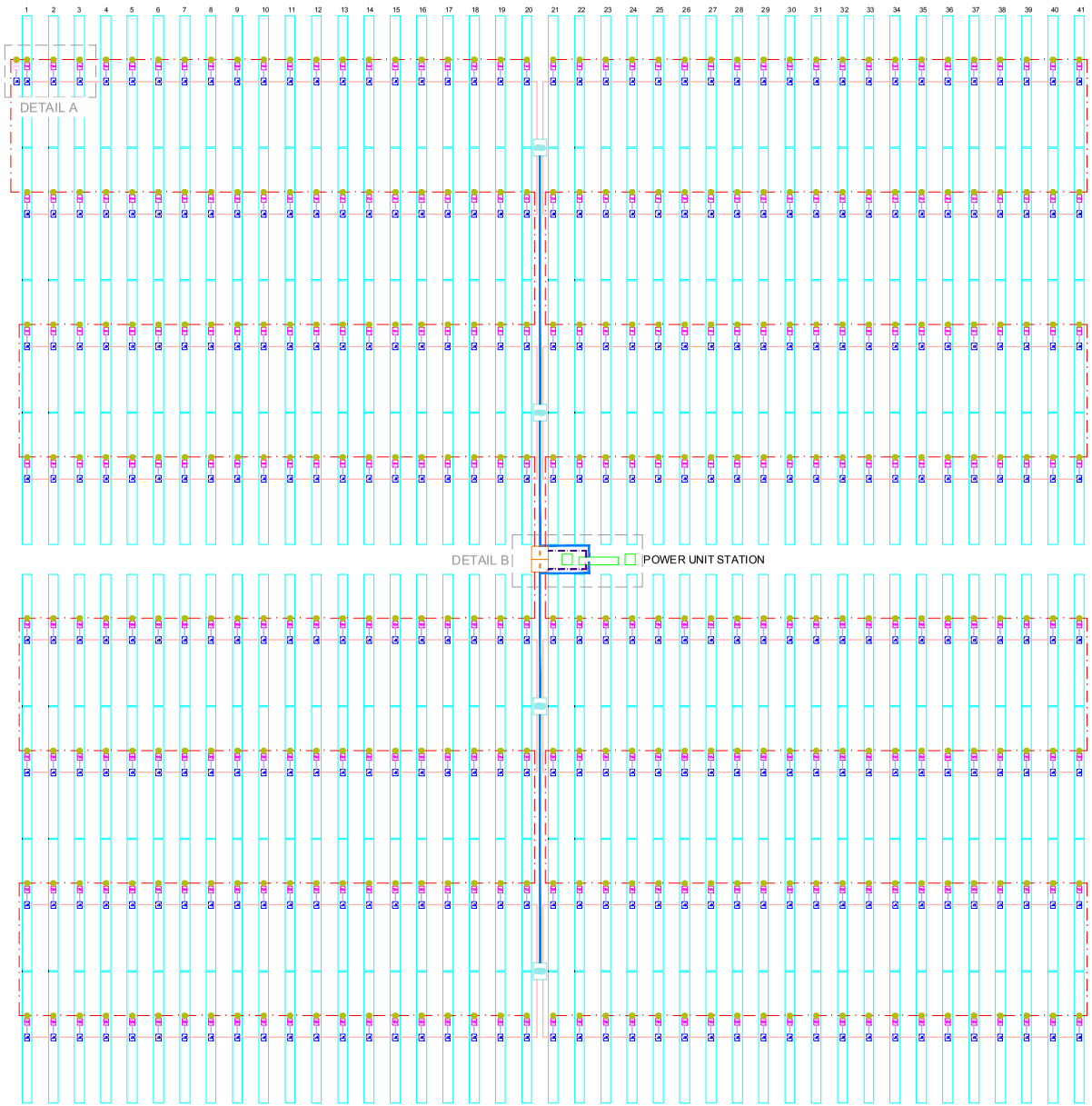
ANNEXURE I - EXAMPLE WIRING SYSTEM SOLAR STEEL, SINGLE AXIS TRACKER, TRACKSMART 3.0


Solar Steel
By Gonvarri
Steel Services
SINGLE AXIS TRACKER
TRACSMART 3.0
Wiring System

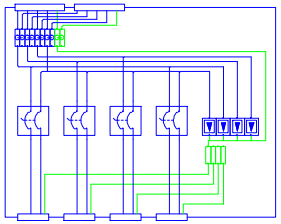
DOCUMENT UPDATES RECORD

DATE	REV	UPDATE	DONE	CHECKED	APPROVED
AG016	0	Preliminary release	IAO	IAO	IAO

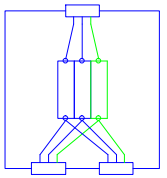


LEGEND	
Items	**Description**
	POWER UNIT STATION
	TRACKER STRUCTURE
	DAISY CHAIN COMMUNICATION T JOIN CONNECTOR
	PRIMARY LINE, POWER SUPPLY DISTRIBUTION TO PANEL BOARD 3F+N+PE 25m2 SECTION AREA
	SECONDARY LINE, POWER SUPPLY DISTRIBUTION TO TCU F+N+PE 6m2 SECTION AREA
	TCU POWER SUPPLY, F+N+PE 1.5m2 SECTION AREA
	MODBUS-RTU COMMUNICATION RS485 BELDEN 3106A WIRE OR SIMILAR
	MODBUS-TCP COMMUNICAITION UTP CAT 6
	DISTRIBUTION PANEL BOARD
	JUNCTION BOX
	NCU
	TCU
	RSU

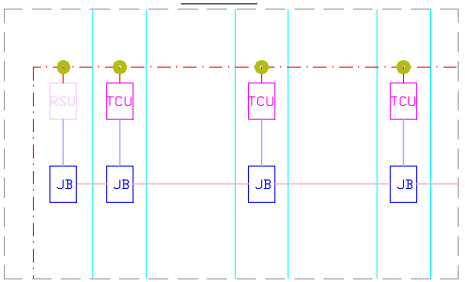
DISTRIBUTION PANEL BOARD



JUNCTION BOX

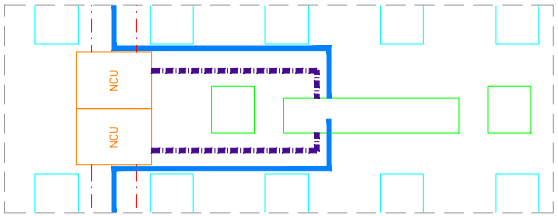


DETAIL A



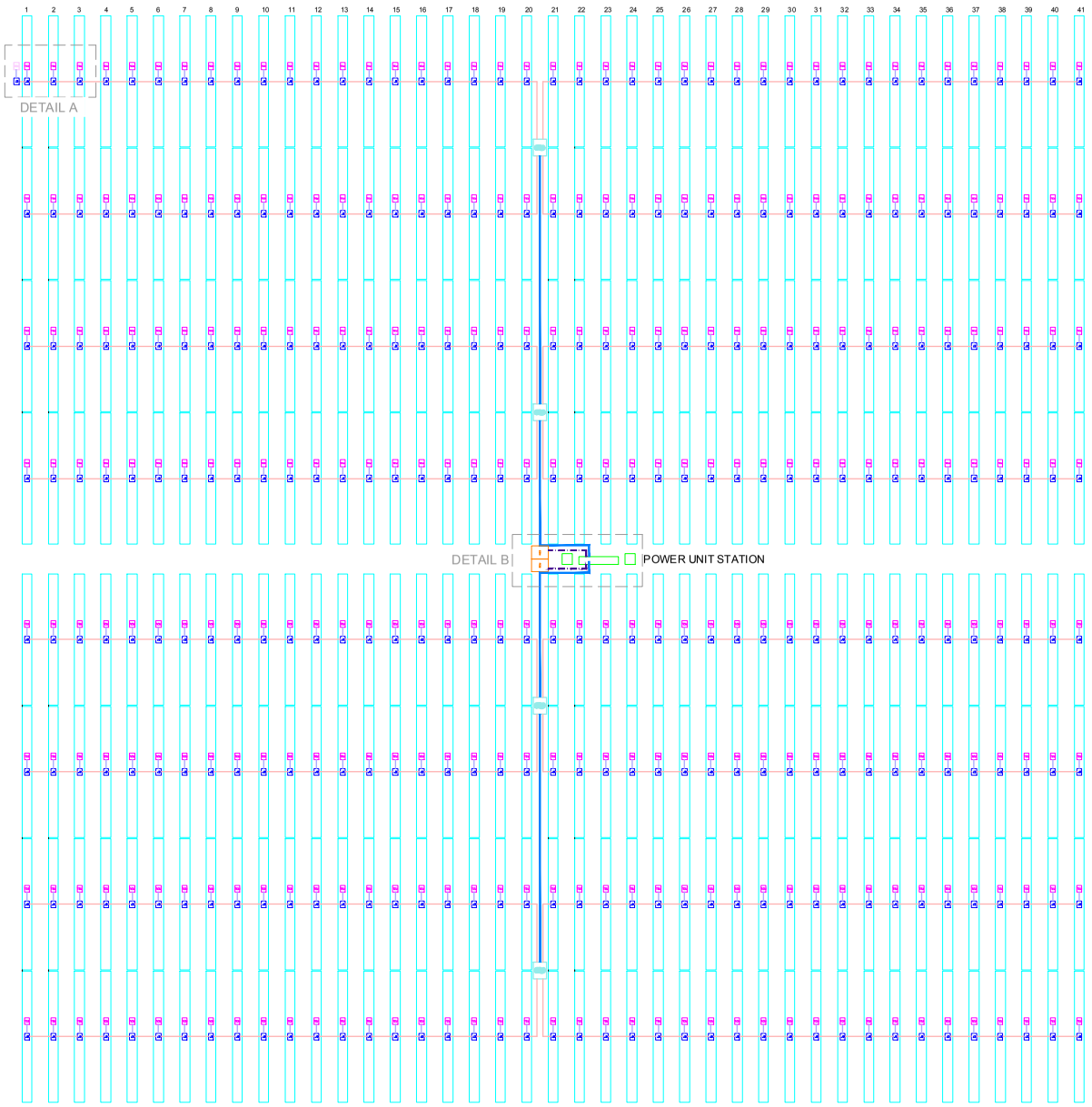
T JOIN CONNECTOR

DETAIL B - POWER UNIT STATION



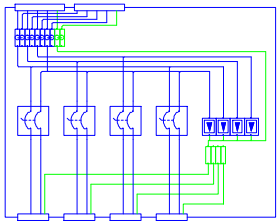
Measures in mm

DATE					SCALE		
05-08-2016				Solar Steel by Conyam Steel Services		**TRACSMART 3.0**	Drawing Nº: 001
Format/Size	Drawn	Checked	Approved			COMMUNICATION AND POWER SUPPLY DIAGRAM 6MWp POWER UNIT STATION	Replaces:
A3	Abel J. Fernández	Ivan Arianes	Ivan Arianes		-	SUNTRACK SINGLE LINE TCU TRACKER CONTROLLER RS485 COMMUNICATION	Project Nº:

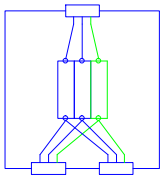


LEGEND	
Items	**Description**
	POWER UNIT STATION
	TRACKER STRUCTURE
	PRIMARY LINE, POWER SUPPLY DISTRIBUTION TO PANEL BOARD 3F+N+PE 25m2 SECTION AREA
	SECONDARY LINE, POWER SUPPLY DISTRIBUTION TO TCU F+N+PE 6m2 SECTION AREA
	TCU POWER SUPPLY, F+N+PE 1.5m2 SECTION AREA
	MODBUS-TCP COMMUNICAITION UTP CAT 6
	DISTRIBUTION PANEL BOARD
	JUNCTION BOX
	NCU
	TCU
	RSU

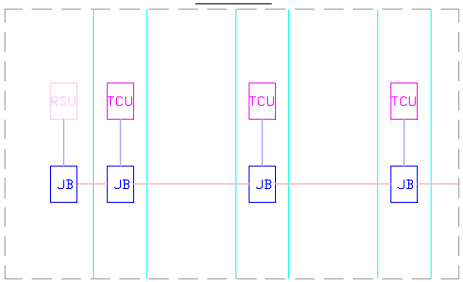
DISTRIBUTION PANEL BOARD



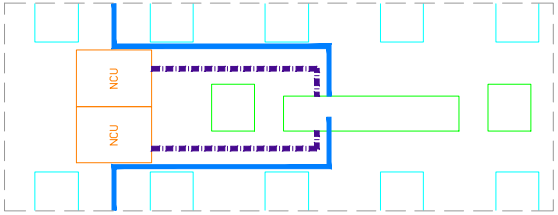
JUNCTION BOX



DETAIL A

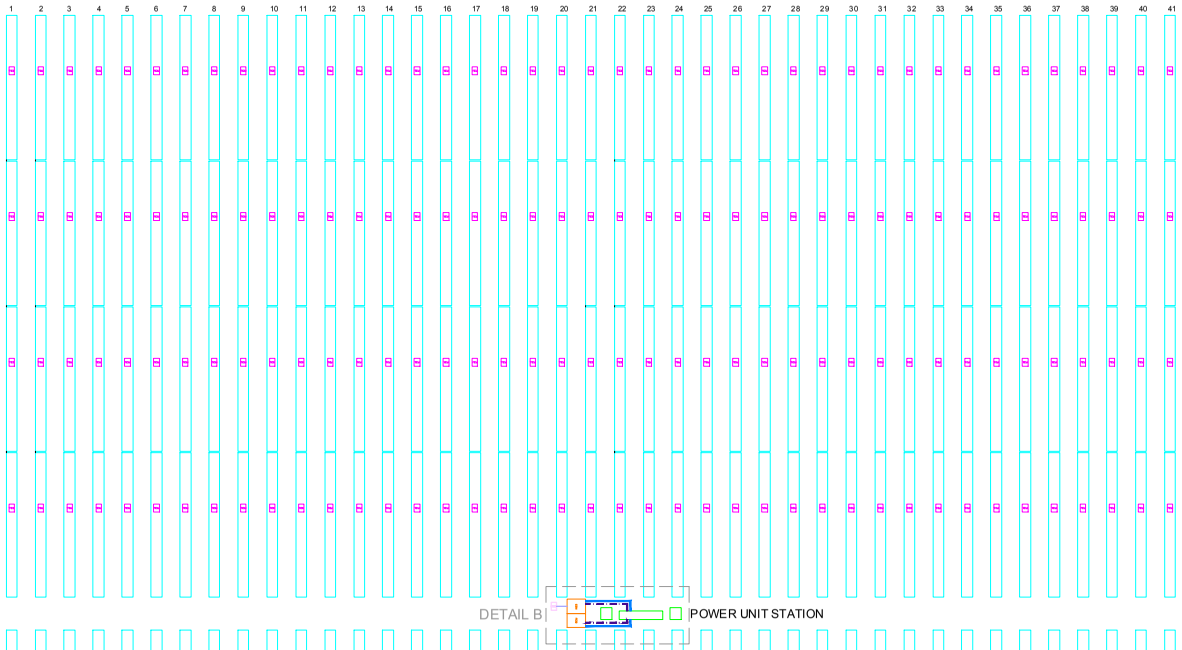


DETAIL B - POWER UNIT STATION



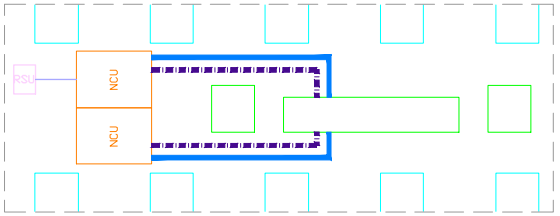
Measures in mm

DATE					SCALE		Drawing Nº: 002
05-08-2016				Solar Steel by Convert Steel Solutions		**TRACSMART 3.0**	Replaces:
Format/Size	Drawn	Checked	Approved		-	COMMUNICATION AND POWER SUPPLY DIAGRAM 6MWp POWER UNIT STATION	Project Nº:
A3	Abel J. Fernández	Ivan Arianes	Ivan Arianes			SUNTRACK SINGLE LINE TCU TRACKER CONTROLLER ZIGBEE COMMUNICATION	



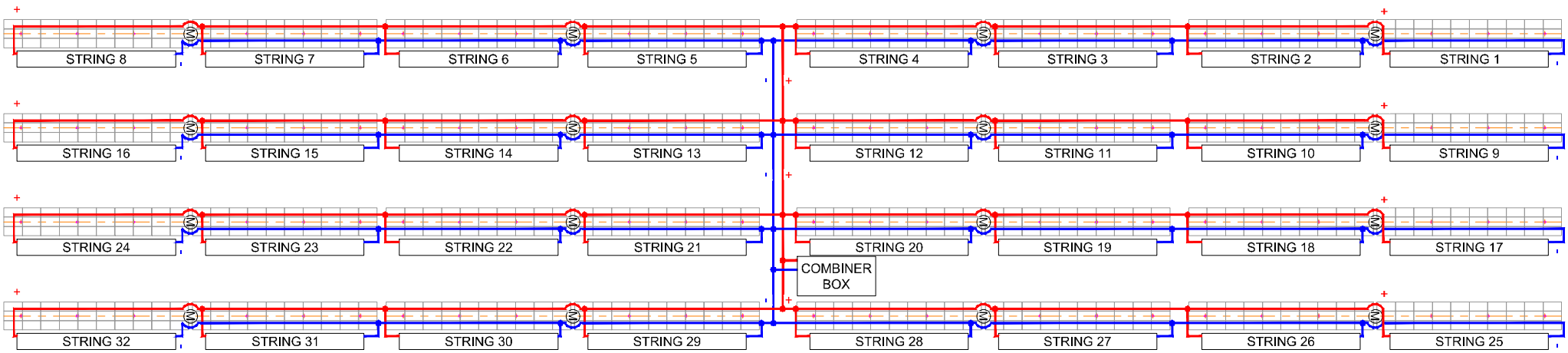
LEGEND	
Items	**Description**
	POWER UNIT STATION
	TRACKER STRUCTURE
	NCU POWER SUPPLY F+N+PE 6m2 SECTION AREA
	MODBUS-TCP COMMUNICAITION UTP CAT 6
	NCU
	TCU
	RSU

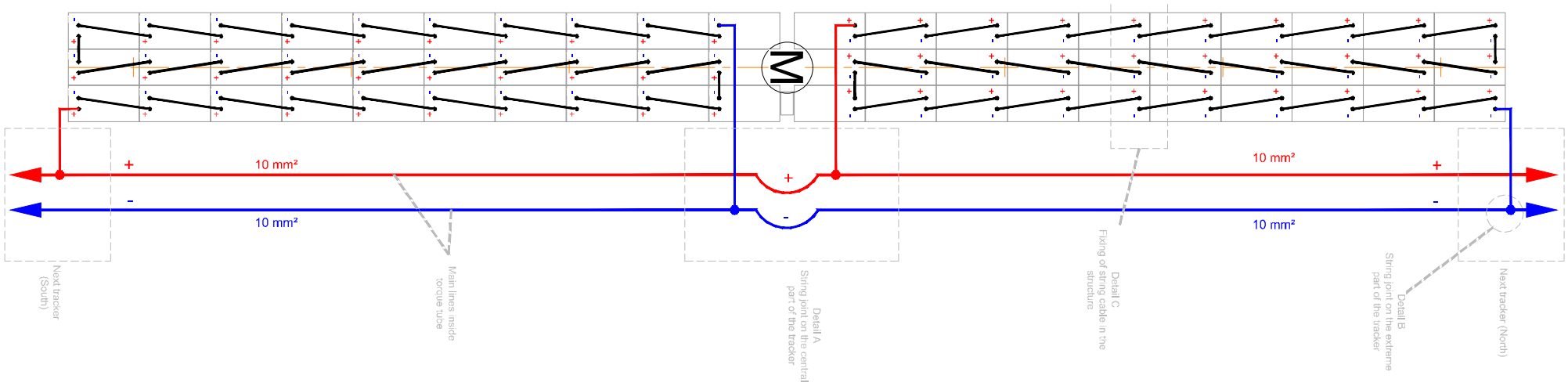
DETAIL B - POWER UNIT STATION



Measures in mm

DATE					SCALE		
05-08-2016				Solar Steel by Gonvarri Steel Solutions		**TRACSMART 3.0**	Drawing Nº: 003
Format/Size	Drawn	Checked	Approved			COMMUNICATION AND POWER SUPPLY DIAGRAM 6MWp POWER UNIT STATION	Replaces:
A3	Abel J. Fernández	Ivan Arianes	Ivan Arianes		-	SUNTRACK SINGLE LINE SELFPOWERED TRACKER CONTROLLER	Project Nº:

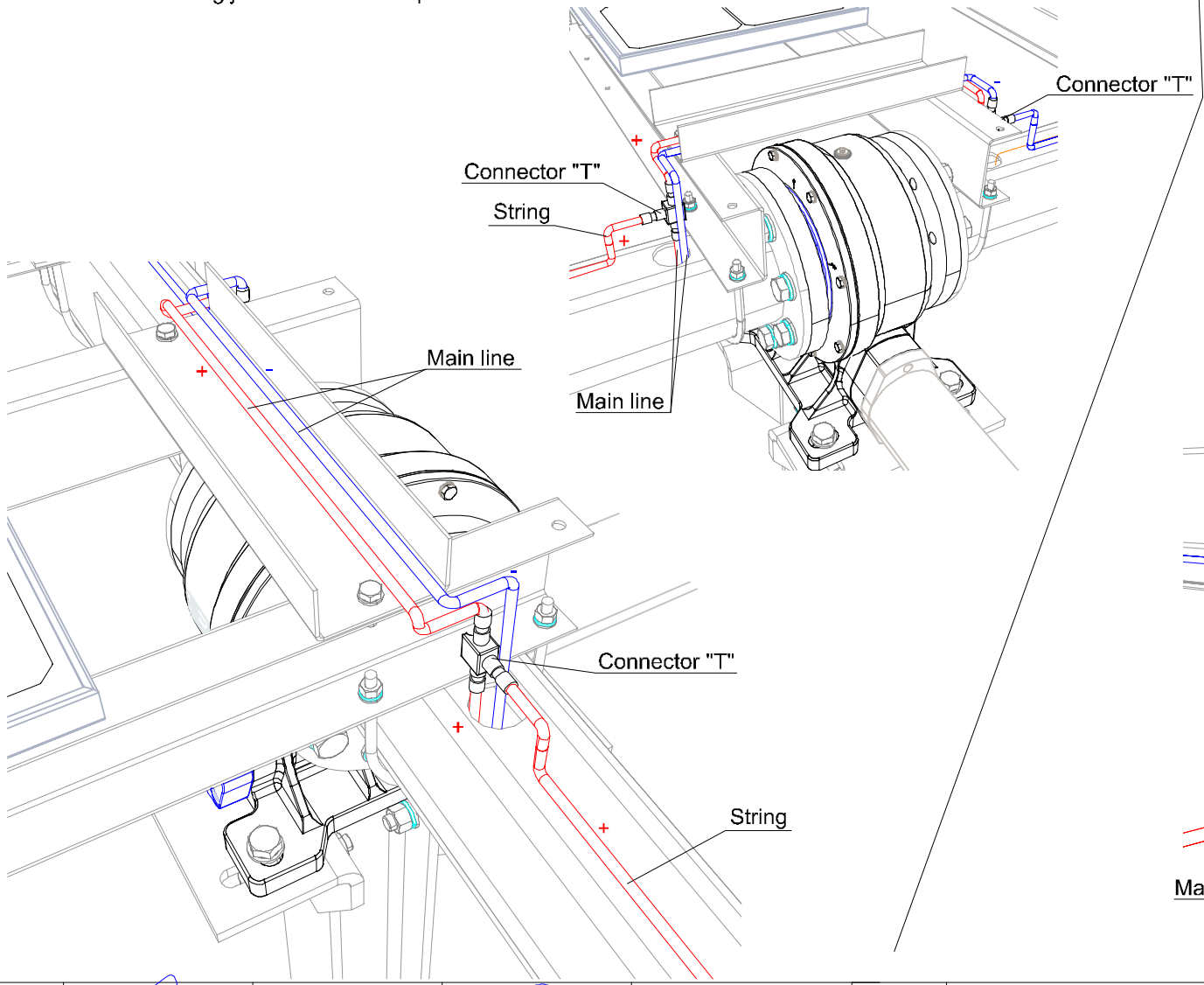


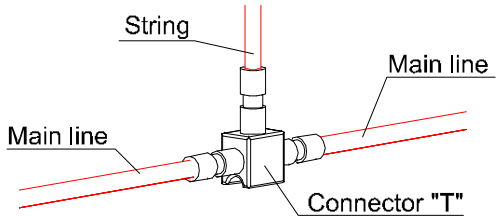


DATE				Solar Steel by Gonvarri Steel Services	SCALE	TRACSMART
04-11-2016						STRING WIRING
Format/Size	Drawn	Checked	Approved			Drawing Nº: H16E006-PE-001
A3	Jose Luis Castillo	Abel J. Fernández	Iván Arianes		-	Replaces:
Measures in mm						Project Nº: 2016-EST-006

Detail A

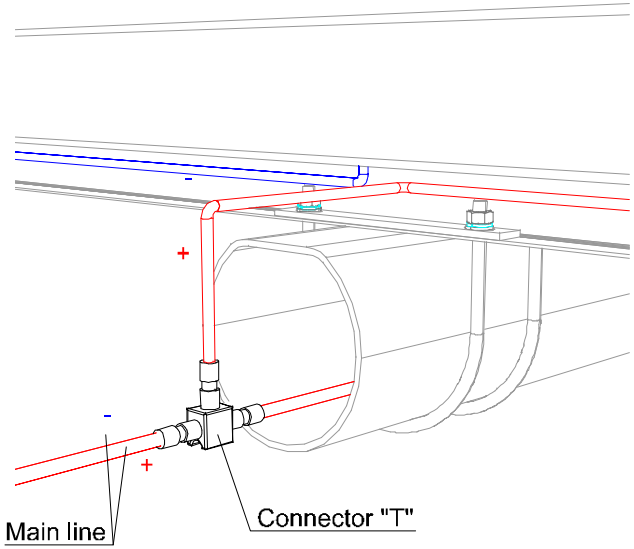
String joint on the central part of the tracker





Detail B

String joint on the extreme part of the tracker



Measures in mm

DATE				SCALE	TRACSMART	Drawing Nº: H16E006-PE-002
04-11-2016						Replaces:
Format/Size	Drawn	Checked	Approved	-	STRING WIRING	Project Nº: 2016-EST-006
A4	Jose Luis Castillo	Abel J. Fernández	Iván Arianes			

Solar Steel
By Gonvarri
Steel Services

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Surprise, AZ 85379 USA
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Fax.: +1 623 476 5849

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Fax: +90 312 815 47 27
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Fax: 34 98 550 53 60
www.hiasa.es

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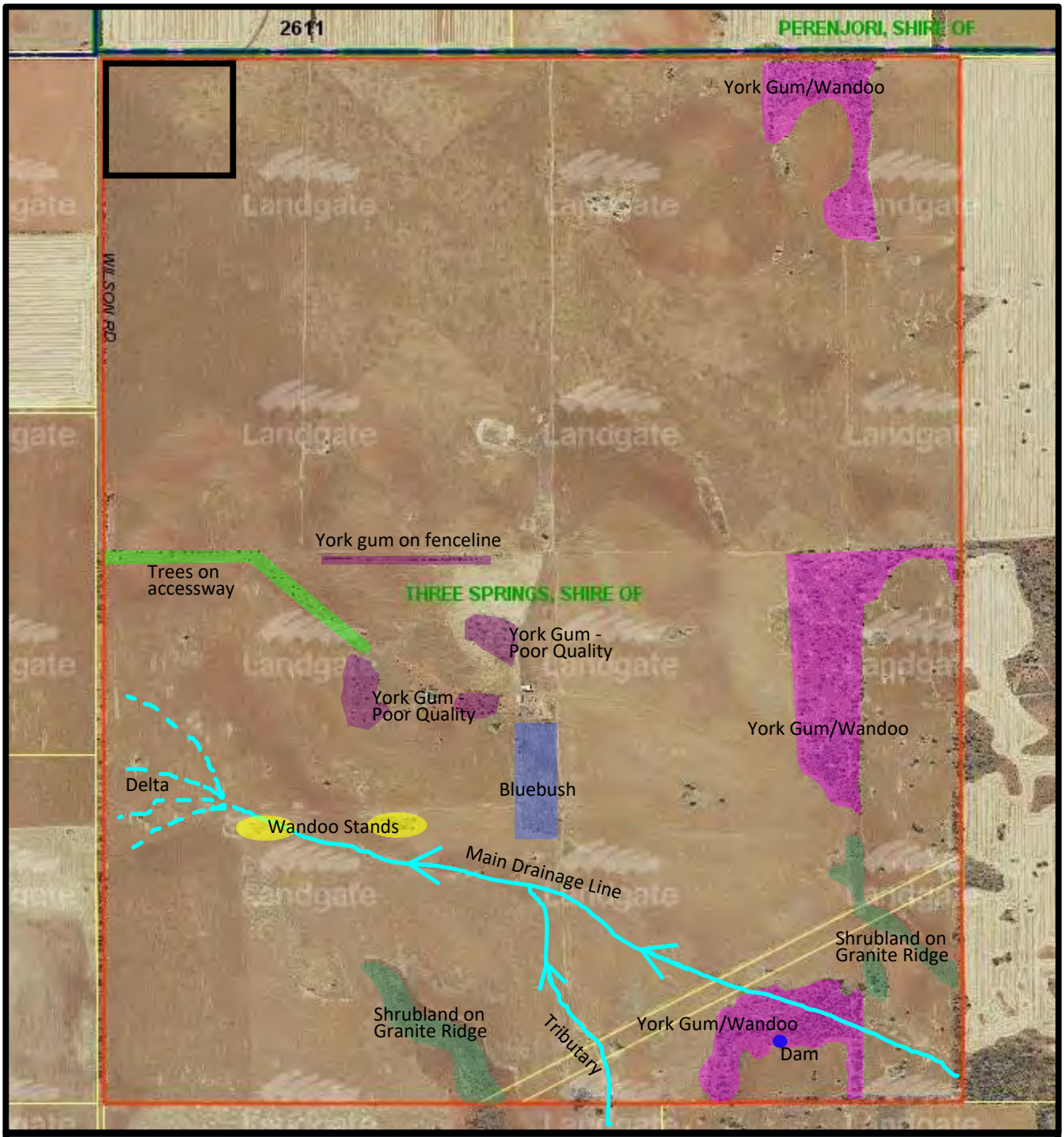
info@gsolarsteel.com

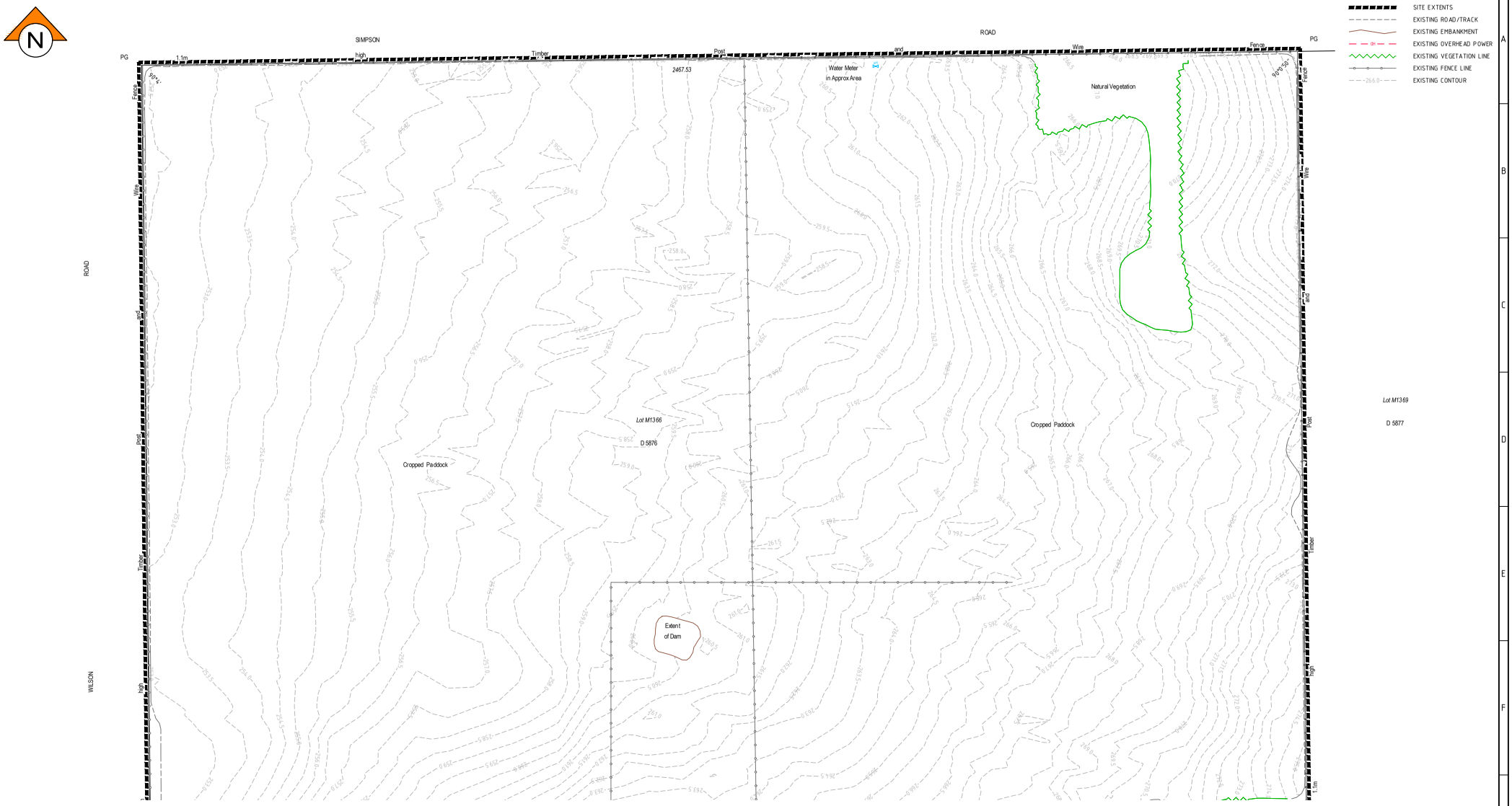
www.gonvarristeelservices.com
www.gsolarsteel.com

ANNEXURE J - DEVELOPMENT PLANS AND DRAWINGS



pgv ENVIRONMENTAL		Earthed Australia Pty Ltd SpringSolar Project	FIGURE 1
Drawn: Paul Van der Moezel	Date: 7 April 2017	**ENVIRONMENTAL CONSIDERATIONS**	
Job: 10284	Revision A		

Aerial sourced from Landgate



WARNING
BEWARE OF UNDERGROUND SERVICES.
The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.
DIAL 1100 BEFORE YOU DIG

REV	DATE	DRAWN	CHECKED	APPROVED	
B	22.05.17	BL	BG	DH	ISSUED FOR DA
A	10.05.17	MS	BG	DH	ISSUED FOR CLIENT REVIEW

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JDSi CONSULTING ENGINEERS
Workzone, Level 6, 1 Nash Street, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

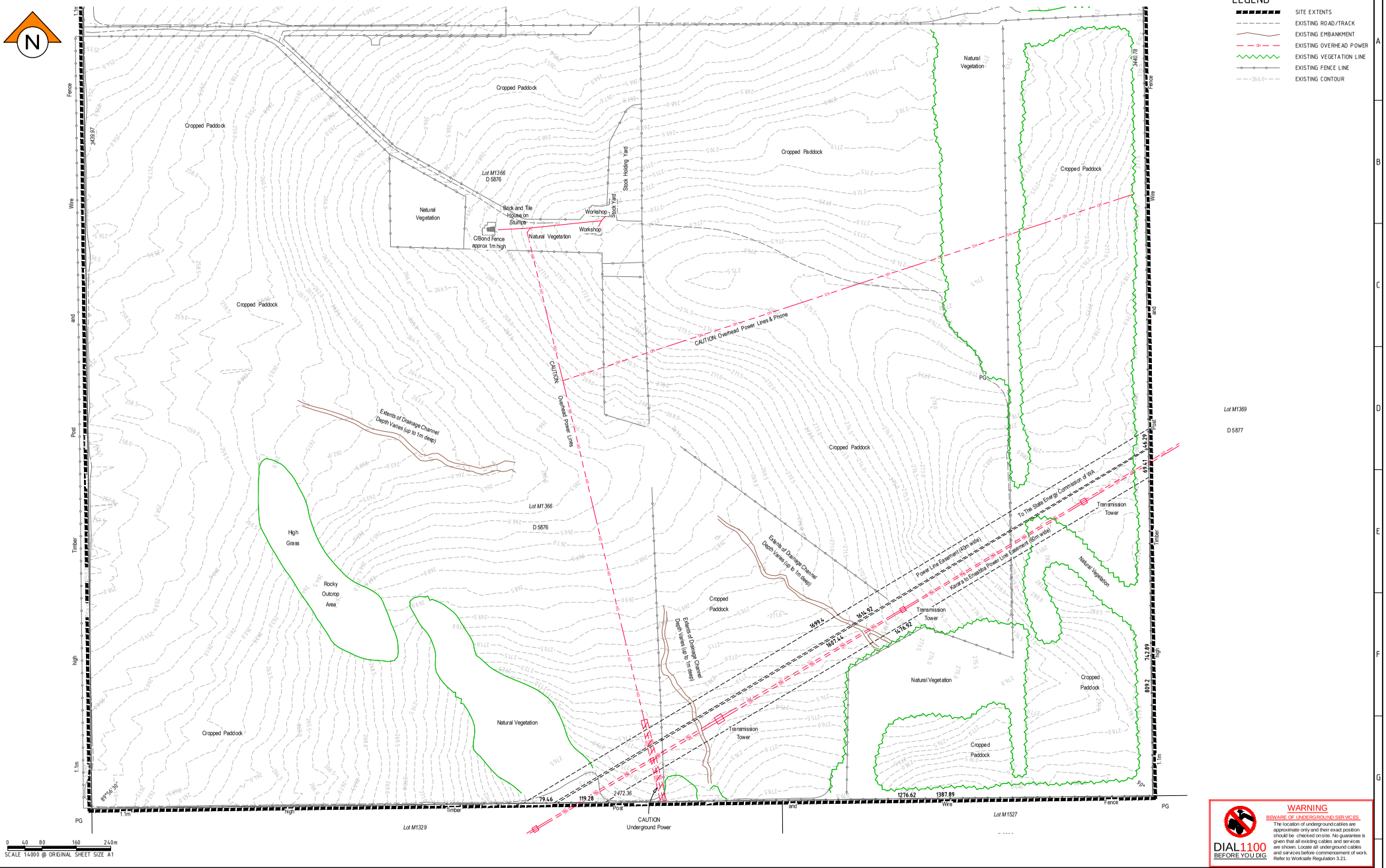
CLIENT: EARTHED/POWERMINDER

PROJECT: THREE SPRINGS SOLAR PLANT

DRAWING TITLE: EXISTING SITE FEATURES SHEET 1 OF 2

DRAWN: M. SMITHERS	WAPC No.
DESIGNED: -	SCALE @ A1: 1:4 000
PROJECT MANAGER: D. HELLMUTH	DATUM: AHD / CO-ORDS: PCG94
JDSi PROJECT No.: JDS171294	DRAWING No.: C050 / REVISION: B

Plotted By: blieslie Plot Date: 22/05/17 - 11:13 Cad File: I:\JDS171294\02 CIVIL\Drawings\JDS171294_C050-C051.dwg



WARNING
BEWARE OF UNDERGROUND SERVICES.
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DIAL 1100 BEFORE YOU DIG

REV	DATE	DRAWN	CHECKED	APPROVED	
B	22.05.17	BL	BG	DH	ISSUED FOR DA
A	10.05.17	MS	BG	DH	ISSUED FOR CLIENT REVIEW

Plotted By: blesli Plot Date: 22/05/17 - 11:13 Cad File: I:\JDS171294\02 CIVIL\Drawings\JDS171294_C050-C051.dwg

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Certified Quality System to ISO 9001

JDSi CONSULTING ENGINEERS
Workzone, Level 6, 1 Nash Street, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT: EARTHED/POWERMINDER

PROJECT: THREE SPRINGS SOLAR PLANT

DRAWING TITLE: EXISTING SITE FEATURES SHEET 2 OF 2

DRAWN: M. SMITHERS	WAPC No.
DESIGNED: -	SCALE @ A1: 1:4 000
PROJECT MANAGER: D. HELLMUTH	DATUM: AHD / CO-ORDS: PCG94
JDSI PROJECT No.: JDS171294	DRAWING No.: C051 / REVISION: B

MAIN PROPERTIES

Solar Module MFG	Rizen
Solar Module Model	RSM120-8-600BMDG
Total N° of modules	626,688
Total N° of strings	19,584
Module per string	32
Mounting system MFG	Soltec
Mounting system Type	SF7 Bifacial Ground Mount Horizontal Single-Axis
Solar Inverter MFG	SunGrow
Total N° of inverters	(56 units) 6.8MW MV Power Station 6800HV-MV
Total DC system size	376,012.8 kWp

Legend

- Panel marco
- Tracker axis
- 5MW block
- DC cable from CB to Inverter
- 33 kV AC line
- Road
- Solar park fence
- Inverter pad
- Camera

ORIENTATION

N

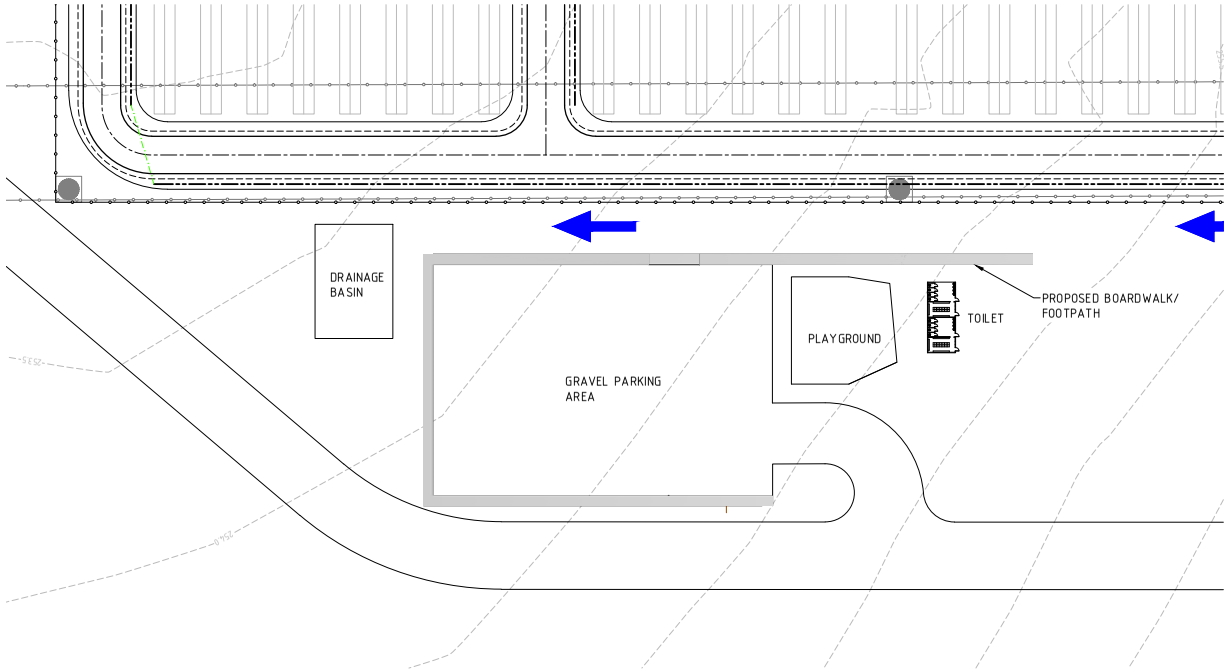
Rev.	Description	Drawn	Date	Checked
A	Initial Issue	GD	07/03/2021	GD

GENERAL VIEW
WHEATBELT SOLAR PLANT 1

Client: Pilot Energy

GREEN FUEL DEVELOPMENTS

Scale	1:5000
Datum	Assumed
Drawn	Glenn Gardiner
Surveyed	Glenn Gardiner
Date	25/06/2021
Job No.	GFD-021
Drawing	GFD-021-001
Plan No.	GFD 021-001
Sheet 1 of 10	
Rev.	A
SHEET SIZE	A1



TOURIST AREA
SCALE 1:500

0 5 10 20 30m
SCALE 1:500 @ ORIGINAL SHEET SIZE A1

REV	DATE	DRAWN	CHECKED	APPROVED	
B	22.05.17	BL	BG	DH	ISSUED FOR DA
A	10.05.17	MS	BG	DH	ISSUED FOR CLIENT REVIEW

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JDSi
CONSULTING ENGINEERS
Workzone, Level 6, 1 Nash Street, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

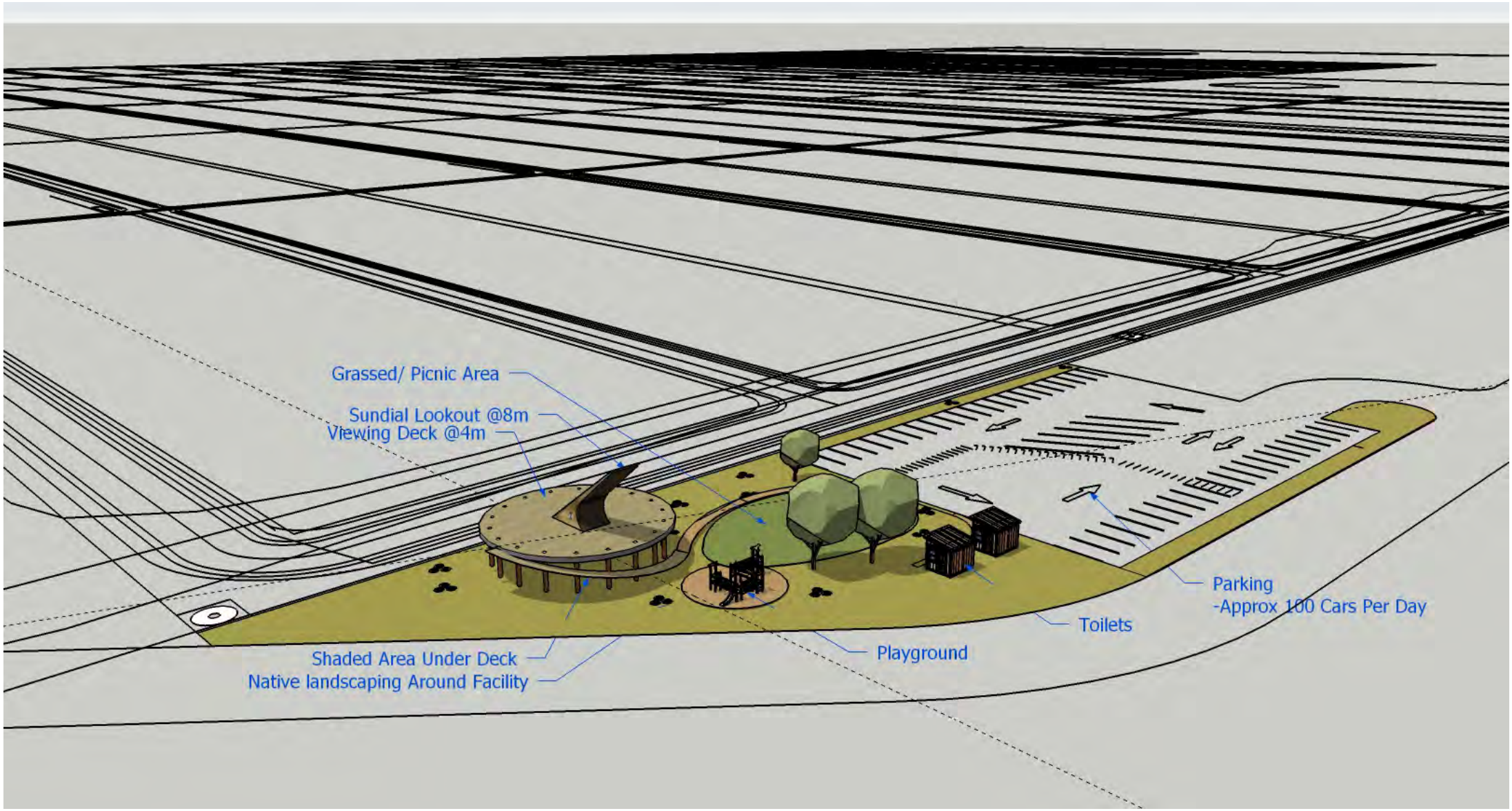
CLIENT: EARTHED/POWERMINDER

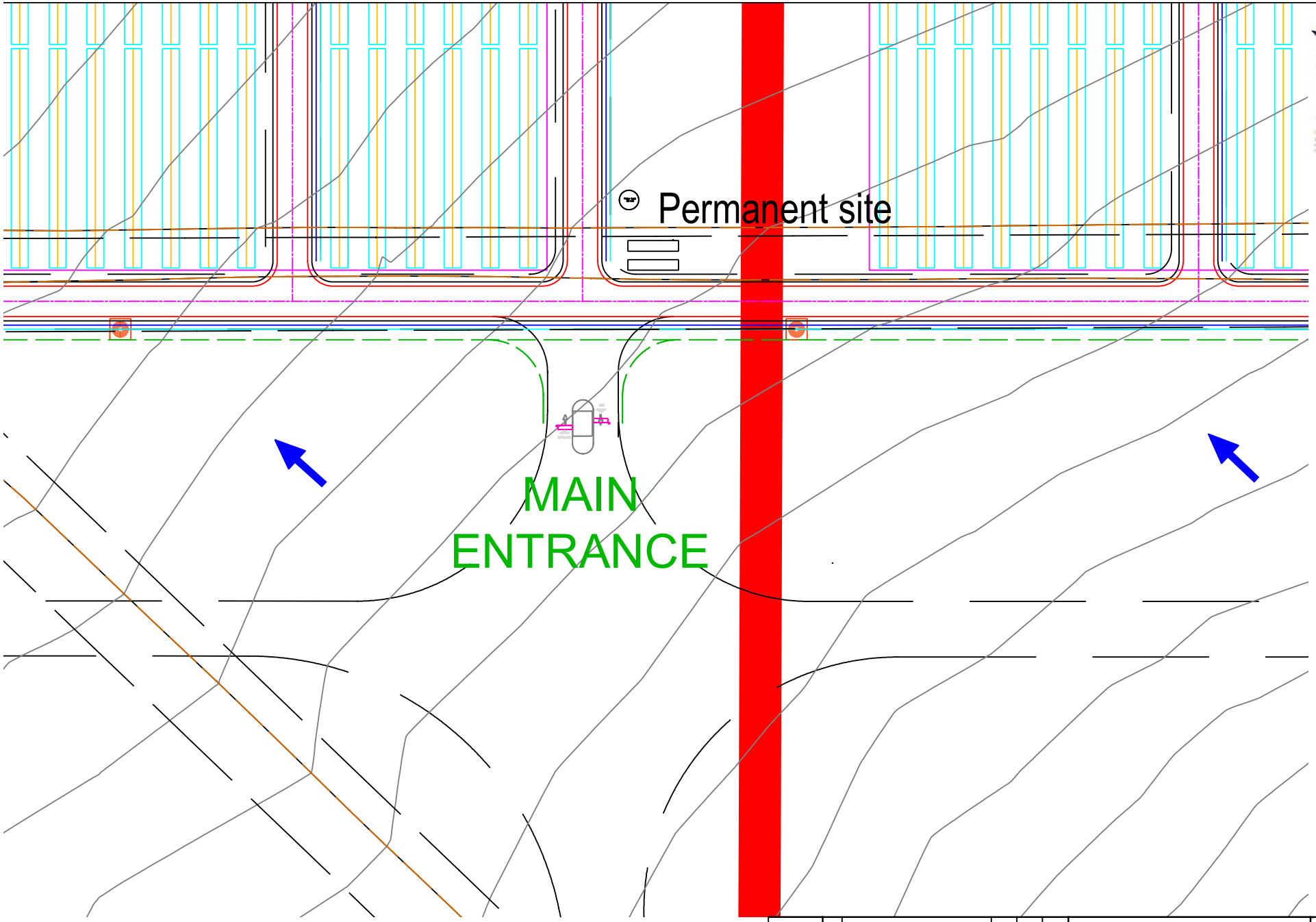
PROJECT: THREE SPRINGS SOLAR PLANT

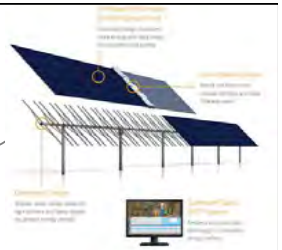
DRAWING TITLE: SITE LAYOUTS SHEET 1 OF 3

DRAWN	M. SMITHERS
DESIGNED	-
PROJECT MANAGER	D. HELLMUTH
JDSi PROJECT No.	JDS171294
WAPC No.	
SCALE @ A1	1:500
DATUM	AHD
CO-ORDS	PCG94
DRAWING No.	C054
REVISION	B

Plotted By: bleslie Plot Date: 22/05/17 - 13:26 Cad File: I:\JDS171294\02 CIVIL\Drawings\JDS171294_C054-C056.dwg


Grassed/ Picnic Area
Sundial Lookout @8m
Viewing Deck @4m
Parking
-Approx 100 Cars Per Day
Toilets
Playground
Shaded Area Under Deck
Native landscaping Around Facility





MAIN PROPERTIES

Solar Module MFG	SunPower
Solar Module Model	SPR-P19-400-GLS
Total N° of modules	417.000
Total N° of strings	16.680
Module per string	25
Mounting system MFG	SunPower
Mounting system Type	Ground Mount Horizontal Single-Axis
Solar Inverster MFG	SMA
Total N° of inverters	(30 units) 5MW MV Power Station 5000SC-EV
Total DC system size	166.800 kWp

Legend

- Panel marco
- Tracker axis
- 5MW block
- DC cable from CB to Inverter
- 33 kV AC line
- Road
- Solar park fence
- Inverter pad
- Camera

ORIENTATION

N

Rev.	Description	Drawn	Date	Checked
A	Initial issue	DCM	04/05/2017	DCM

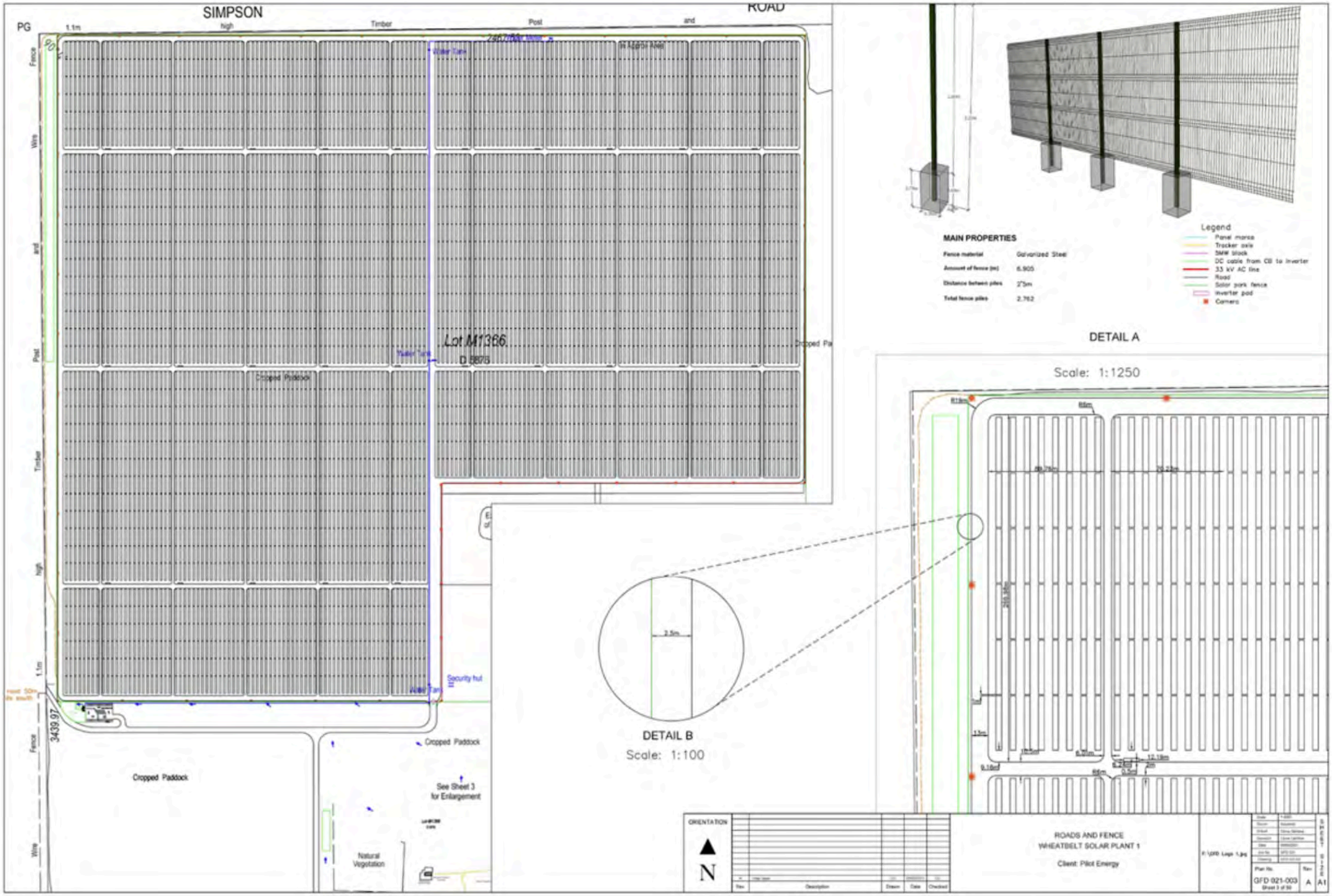
GENERAL VIEW AND DETAILS
THREE SPRINGS SOLAR PLANT

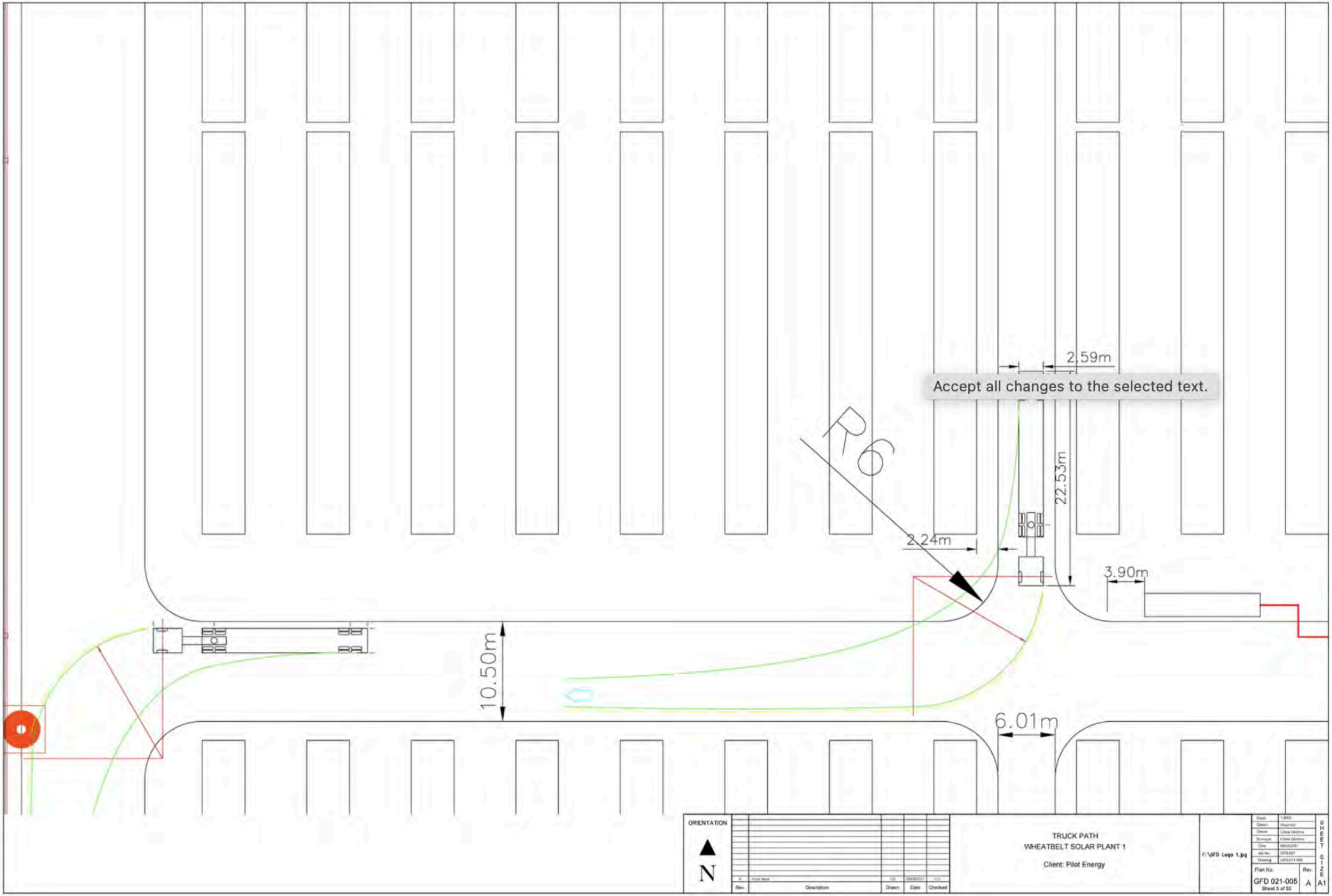
Client: Earthed

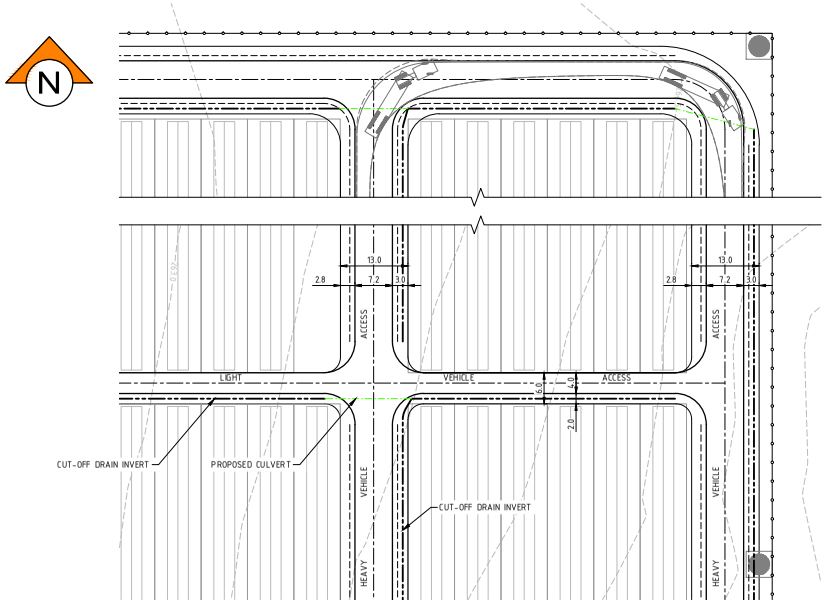
Tel. +34 954 951 008
Fax. +34 954 955 275
Email cel.solar@gmgrupo.es
www.gmgrupo.es

Scale	1:4000
Datum	Assumed
Drawn	Dario Casas
Surveyor	Dario Casas
Date	04/05/2017
Job No.	CEL182-EAR
Drawing	CEL182-002

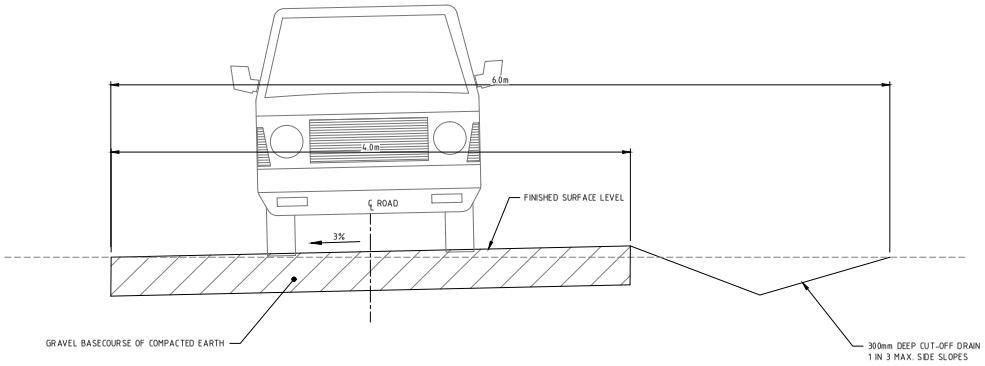
Plan No. CEL182-002 Sheet 1 of 6 | Rev. A | SHEET SIZE A1


SIMPSON
ROAD
Lot M1366
D 5875
Cropped Paddock
Cropped Paddock
Cropped Paddock
Natural Vegetation
See Sheet 3 for Enlargement
Security hut
Water Tank
3439.97
MAIN PROPERTIES
Fence material Galvanized Steel
Amount of fence (m) 6,905
Distance between piles 2.5m
Total fence piles 2,762
Legend
Panel morse
Tracker axis
Solar block
DC cable from CB to inverter
33 kV AC line
Road
Solar park fence
Inverter pad
Camera
DETAIL A
DETAIL B
Scale: 1:100
Scale: 1:1250
ORIENTATION
N
ROADS AND FENCE
WHEATBELT SOLAR PLANT 1
Client: Pilot Energy
GFD 021-003
A
A1

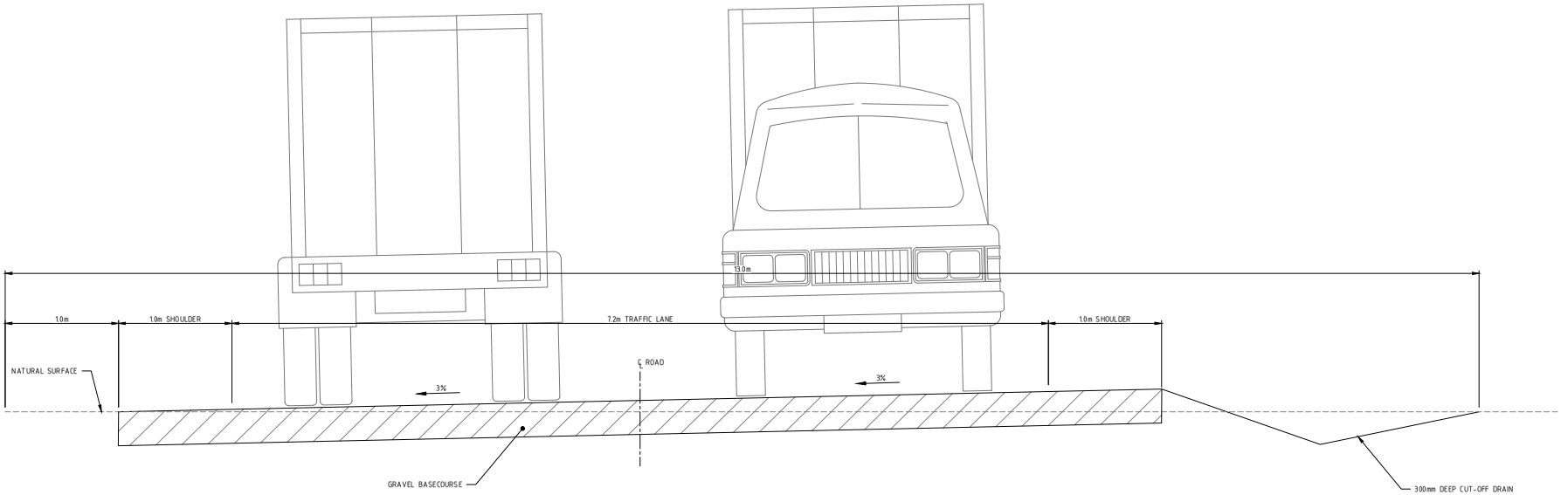

2.59m
Accept all changes to the selected text.
R6
22.53m
2.24m
3.90m
10.50m
6.01m
ORIENTATION
N
TRUCK PATH
WHEATBELT SOLAR PLANT 1
Client: Pilot Energy
F:\GFD Logo 1.jpg
Plan No:
GFD 021-005
Sheet 5 of 50
Rev.
A
SHEET SIZE
A1



TYPICAL INTERSECTION PLAN
SCALE 1:500



TYPICAL LIGHT VEHICLE ACCESS ROAD SECTION
SCALE 1:20



TYPICAL HEAVY VEHICLE ACCESS ROAD SECTION
SCALE 1:20

0 5 10 20 30m
SCALE 1:500 @ ORIGINAL SHEET SIZE A1

0 0.2 0.4 0.8 1.2m
SCALE 1:20 @ ORIGINAL SHEET SIZE A1

REV	DATE	DRAWN	CHECKED	APPROVED	
A	22.05.17	B.L	B.G	D.H	ISSUED FOR DA

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JDSi
CONSULTING ENGINEERS
Workzone, Level 6, 1 Nash Street, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT: EARTHED/POWERMINDER

PROJECT: THREE SPRINGS SOLAR PLANT

DRAWING TITLE: SITE LAYOUTS SHEET 3 OF 3

DRAWN: M. SMITHERS	WAPC No.
DESIGNED: -	SCALE @ A1: AS SHOWN
PROJECT MANAGER: D. HELLMUTH	DATUM: AHD / CO-ORDS: PC694
JDSi PROJECT No.: JDS171294	DRAWING No.: C056 / REVISION: A

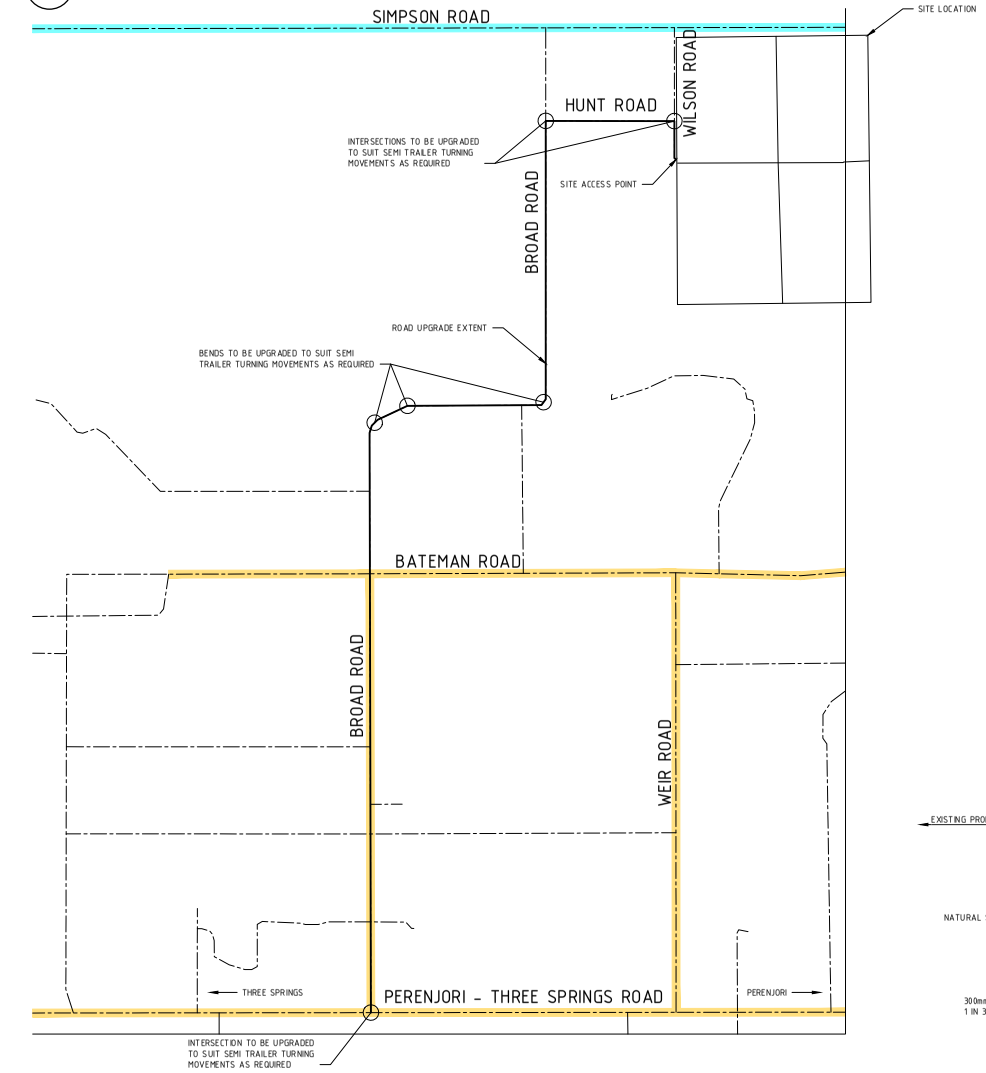
Plotted By: blieslie Plot Date: 22/05/17 - 11:28 Cad File: I:\JDS171294\02 CIVIL\Drawings\JDS171294_C054-C056.dwg

LEGEND

ROAD UPGRADE EXTENT AS PER TYPICAL SECTION BELOW

RAV NETWORK UP TO CATEGORY 5 VEHICLE - UNCONDITIONAL

RAV NETWORK UP TO CATEGORY 5 VEHICLE - CONDITIONAL



ROAD UPGRADE PLAN

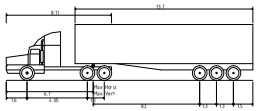
NTS

BROAD ROAD - STREET VIEW

NTS

HUNT ROAD - STREET VIEW

NTS



Prime mover and semi-trailer (19 m)

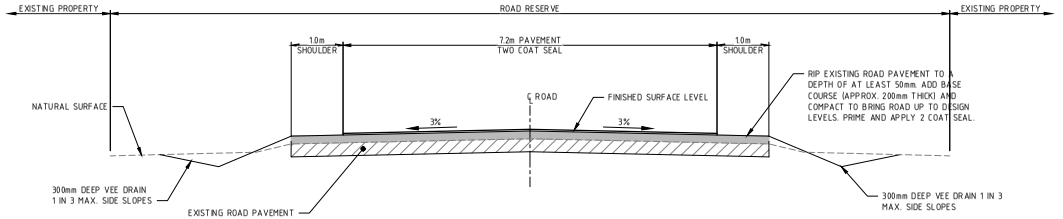
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.540m
Track Width	2.500m
Lock to Lock Time	6.00s
Curb to Curb Turning Radius	12.500m

SEMI-TRAILER PROFILE

NTS

WILSON ROAD - STREET VIEW

NTS



ROAD UPGRADE TYPICAL SECTION

NTS

0 0.05 0.1 0.2 0.3m

SCALE 1:5 @ ORIGINAL SHEET SIZE A1

REV	DATE	DRAWN	CHECKED	APPROVED	
A	22.05.17	B.L	BG	DH	ISSUED FOR DA

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CLIENT: EARTHED/POWERMINDER

PROJECT: THREE SPRINGS SOLAR PLANT

DRAWING TITLE: ROAD UPGRADE PLAN AND SECTIONS

DRAWN: M. SMITHERS		WAPC No.	
DESIGNED: -		SCALE @ A1: AS SHOWN	
PROJECT MANAGER: D. HELLMUTH		DATUM: AHD	CO-ORDS: PCG94
JDSi PROJECT No.: JDS171294	DRAWING No.: C057		REVISION: A