

6th January 2022

Planning Department
Moree Plains Shire Council
Level 2, Max Centre
30 Heber Street
Moree NSW 2400

Our Ref: 21-367
Your Ref: DA2021/53

Attention: Murray Amos

By email: murray.amos@mpsc.nsw.gov.au

Dear Murray,

Addendum: Erection of a 4.95MW Solar Farm, 2910 Gwydir Highway Moree NSW 2400

This addendum provides additional information to the Moree Plains Shire Council to clarify matters outlined in the request for additional information received on the 17th of December 2021. This document should be assessed in conjunction with the Statement of Environmental Effects (SEE) prepared by SMK Consultants (September 2021) in support of the proposed construction of the Wathagar Solar Farm.

This letter aims to address the following items, raised by Moree Plains Shire Council:

1) Owner's Consent

A signed owner's consent has been uploaded to the Planning Portal and is included in Appendix 1 for Council's convenience.

2) Architectural Plans

Council has requested the following plans:

- Elevations of PV Panels maximum height of solar panels at full tilt – shown in the site plans in Appendix 2. The elevations are shown on the right-hand side of the plans and are labelled 'Front View'.
- Elevations of inverter stations and battery storage – included in the design plans in Appendices 3 (Battery) and 4 (Inverter).

- Offset from boundaries and Gwydir Highway – Included in Appendix 2.
- Stormwater management plan – Included as Appendix 5.

3) On-going operation

Council requested information regarding staffing requirements for the operation and maintenance of the solar farm. This information has been provided on Page 62 of the Statement of Environmental Effect as follows:

*“Once operational the site will be **unmanned**, however, one to two personnel will be necessary to carry out maintenance every quarter or as required.”*

4) Flood Planning – Clause 5.21 of Moree Plains LEP

The objectives of Clause 5.12 of the Moree Plains LEP are as follows:

- (a) to minimise the flood risk to life and property associated with the use of land,*
- (b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,*
- (c) to avoid adverse or cumulative impacts on flood behaviour and the environment,*
- (d) to enable the safe occupation and efficient evacuation of people in the event of a flood.*

Further, Clause 5.12 (2) states:

- Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development—*
- (a) is compatible with the flood function and behaviour on the land, and*
 - (b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and*
 - (c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and*
 - (d) incorporates appropriate measures to manage risk to life in the event of a flood, and*
 - (e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.*

The proposed development would be located within an existing levee. The Gwydir Floodplain Management Plan (FMP), gazetted in 2016, is applicable at the proposed site location. The levee is located within an area of Zone C in the FMP, as shown in Figure 1. According to rules outlined in the FMP, floodworks are not exempt from requiring a floodwork approval within this Zone. A floodwork Approval (90FW833508) was issued in 2016 by Water NSW for the existing levee at Wathagar.

The proposal is wholly contained within the existing levee, therefore the development would not result in additional impacts to the movement of floodwaters across the landscape. The proposal is therefore considered compatible with flood function and behaviour in the locality and will not impact flood behaviour. Given that the proposal involves minimal traffic, the construction and operation of the solar farm will not have any impact on potential evacuation procedures and evacuation route capacities. There would be no adverse impacts to the environment as a result of the proposal as the proposal does not involve vegetation clearance. No project-specific flood mitigation measures are required in association with the proposal.

The proposal is therefore considered to be in alignment with the objective of Clause 5.12 of the Moree Plains LEP.



Figure 1: Gwydir Valley Floodplain Management Plan 2016 - Management Zones, showing the proposal within Management Zone C

5) Visual Impacts

Glare and Glint

Glare is defined as a continuous source of excessive brightness relative to ambient lighting. Glint is defined as a momentary flash of bright light. Solar photovoltaic (PV) panels are constructed of dark, light-absorbing material and covered with anti-reflective coating. In order to maximise the efficiency, the panels are designed to limit reflection and to absorb around 98% of the light received. The glare generated from solar panels is significantly lower than many other surfaces, including water, however, the glass panels and metal frames have the potential to generate glare and glint. An assessment of the potential glare and glint generated by the proposed solar farm is necessary to ensure visual receptors such as road users, air traffic control towers and pilots are not impacted by the development of solar farms.

The amount of light reflected by a PV panel depends on the amount of light hitting the surface, the time of year, amount of cloud cover, the surface reflectivity, and whether the array is fixed or tracking.

When the sun is at a right angle to a fixed PV array, the angle of incidence (AOI) is the lowest but increases as the angle of rays from the sun increase relative to the fixed panel angle.

The percentage of sunlight reflected by PV solar panels is similar to that of water and less than most other materials, as illustrated in Figure 2 and Figure 3. The low reflectivity design of the solar PV panels maximises the absorption of solar energy and therefore minimises the extent of solar energy reflected.

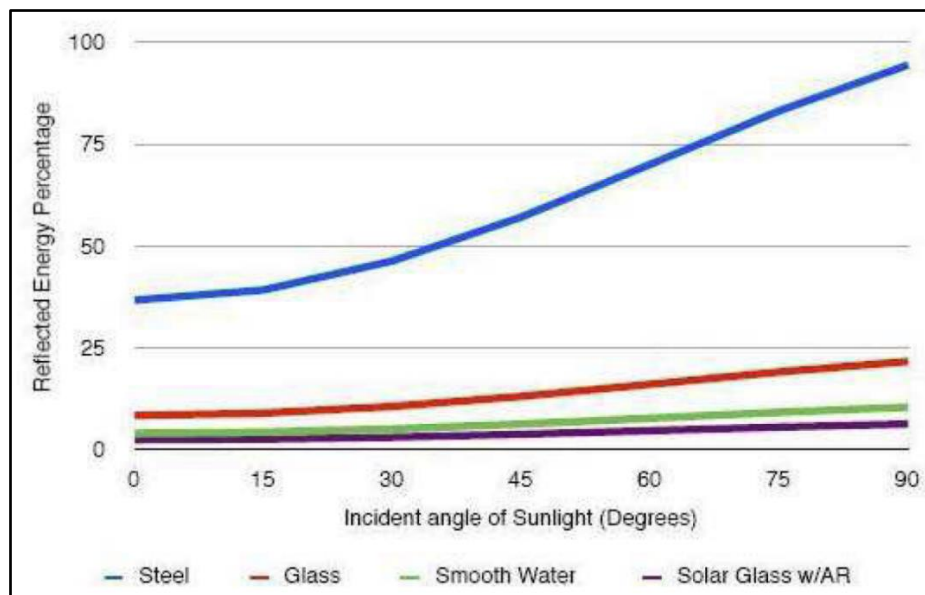


Figure 1: Typical Material Reflectivity with Sunlight Angle¹

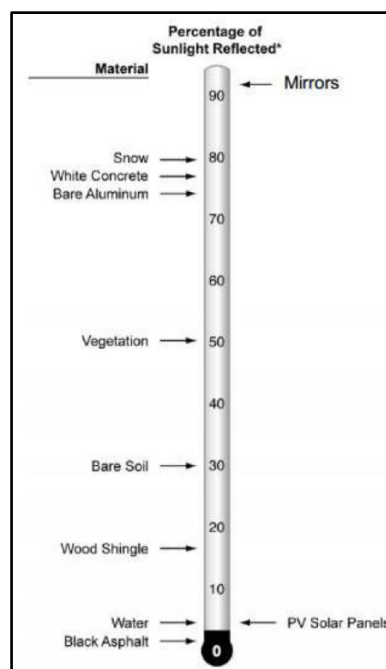


Figure 2: Comparative Reflection of PV Solar Panels²

Potential Impacts

Glare and glint are a potential hazard/nuisance generated by solar panels. Ho³ defines glint as a momentary flash of light, and glare as a more continuous source of excessive brightness relative to ambient lighting.

¹ Spaven Consulting, 2012. *Proposed Solar Energy Facility, Manston, Kent: Manston Airport 'Glint and Glare' Study*

² Sandia National Laboratories (Clifford K. Ho), n.d. *Overview Presentation of the Solar Glare Analysis Tool (SGHAT)* [ONLINE] Available at: http://share.sandia.gov/phlux/static/reference/glnt-glare/SGHAT_Ho.pdf

³ Ho, C.K., 2013, *Solar Glare Hazard Analysis Tool (SGHAT)*. Sandia National Laboratories, Albuquerque, NM.

Glint is produced as a direct reflection of the sun in the surface of a PV solar panel. Glare is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint⁴. The difference between glint and glare is depicted in Figure 3.

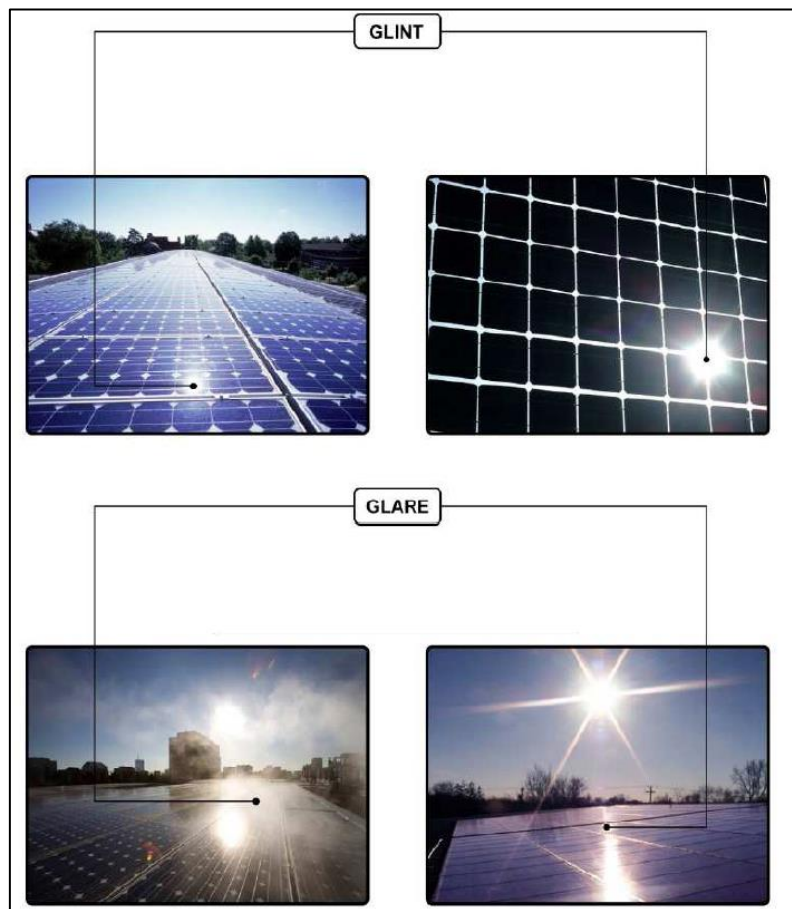


Figure 3: Visual Comparison of Glint and Glare⁵

Glare Hazard Analysis

Given the small nature of the development and based on the results of previous assessments for PV solar power projects and studies carried out in the USA and Europe, the potential for sun glint and glare would not be expected to have a significant impact.

SMK Consultants find it unlikely that sun glint or glare reflection from components of the project will have any significant impact on people residing in or travelling through the landscape. The potential for reflectivity of sunlight from the PV panels is less than a number of commonly established materials in the surrounding rural landscape including bodies of water, steel and standard window glass.

In relation to Council's raising possible concern surrounding potential glare/glint impact to drivers, as explained above the angle of incidence to the sun creates the glint and glare.

The diagram included as Figure 4 below shows the angle of the sun above the horizon for both the summer and winter solstice.

⁴ Power Engineers, 2010, *Panoche Valley Solar Farm Project Glint and Glare Study*, SolarGen Energy, May 21 2010

⁵ Power Engineers, 2010, *Panoche Valley Solar Farm Project Glint and Glare Study*, SolarGen Energy, May 21 2010

The angle of the sun above the horizon will determine the angle of incidence and reflectance, both being equal. The centre of the diagram is the location of the solar panels, and the outer circle is the direction from the sun to the reflective surface of the panel. The inner circles represent the angular height of the sun above the horizon during the day from sunrise to sunset.

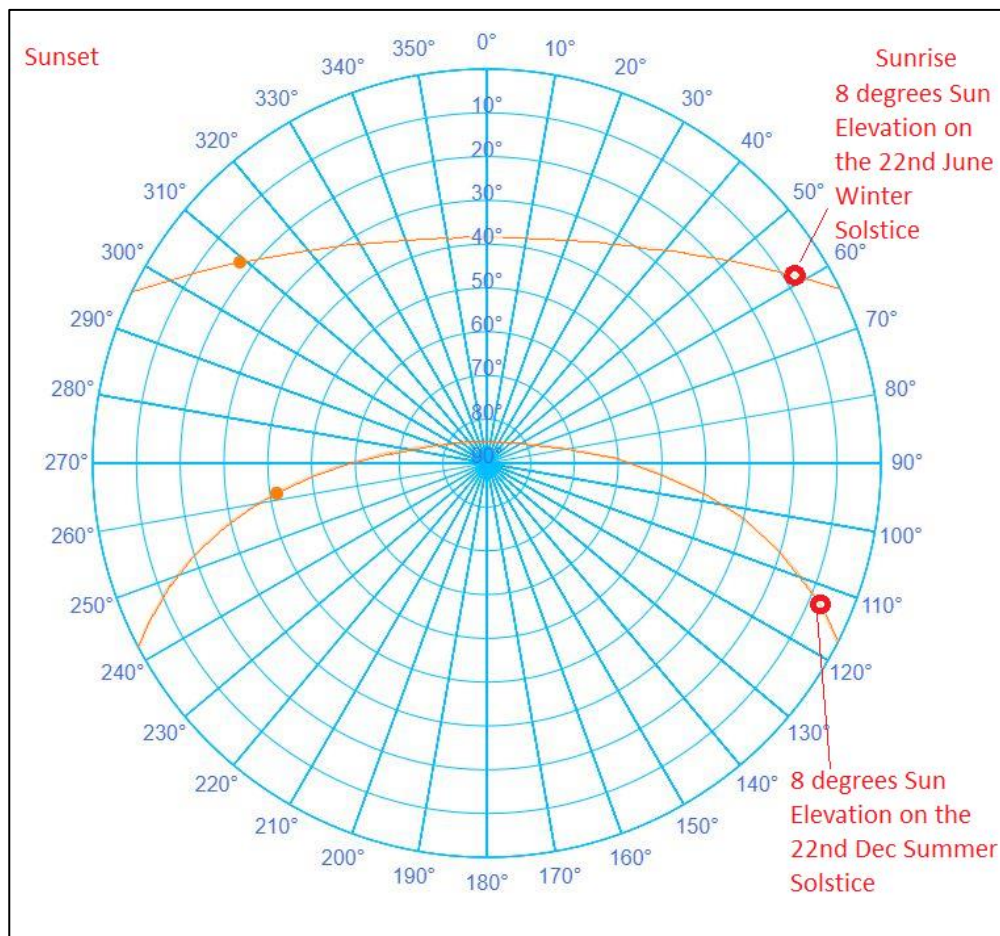


Figure 4: Angle of the sun above the horizon for both the summer and winter solstice.

During the summer solstice the sun is south of the solar panels and any glare or glint would be directed to the north away from the Gwydir Highway, causing no effect to passing traffic.

During the summer solstice the direction the glint and glare would be at a maximum around sunrise. The solar panels are fixed at alternating 8 degrees to the west and 8 degrees to the east. Because the panel is angled towards the west by 8 degrees this early morning glint at say 10 deg would be angled downwards at 6 degrees, the glint would hit the adjacent panel and have no effect on passing traffic. At this elevation the glint would be angled in a north westerly direction away from the road which is to the south of the panels.

Examining the winter solstice, the direction of glint and glare will be in a southerly direction. The minimum angle to create glint is about 5 degrees of sun elevation where the winter sunrise is slightly angled across the solar panels.

The maximum height above road level for a car driver is 1.2m and a truck driver 3m, as shown in Table 1.

Table 1: Driver eye height (in metres) and vehicle type

vehicle type	suggested eye height	range of values	
		min	max
cars	1,08	1,00	1,20
trucks	2,33	1,80	3,00
buses	1,80	1,75	2,50
bicycles	1,50	1,00	2,20
pedestrians	1,55	0,90	2,00
equestrians	1,50	1,50	2,70

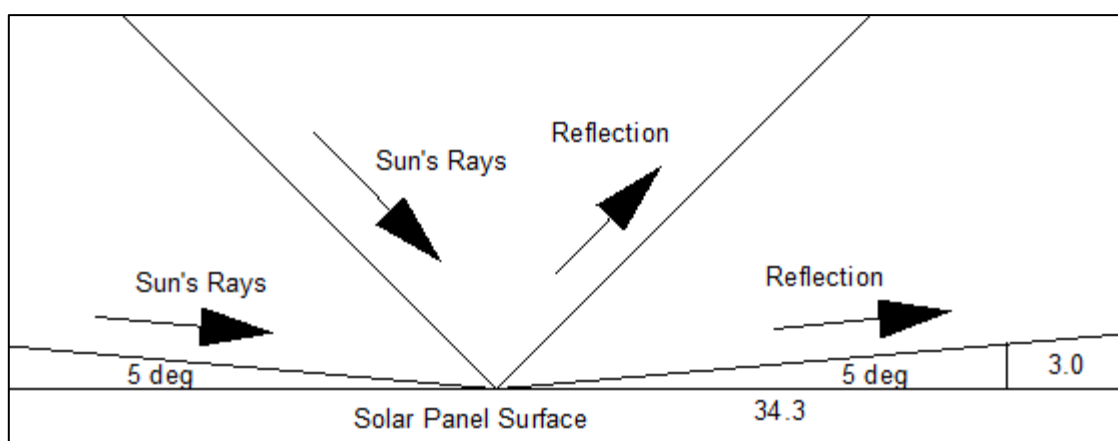


Figure 5: Reflection of sun's rays from solar panels at minimum angle of 5 degrees

Reflection from the solar panel surface at the minimum angle of 5 degrees will be above the eye level of a truck driver at a distance from the edge of solar array of 34.3m. The Gwydir Highway is about 85m away, therefore no effect on passing traffic will occur.

At all other times of the day the reflected light will be more vertical and the 34.3m distance would be less, therefore no effect on traffic.

Visual Impact – Rural Character

Council has requested that mitigation measures be identified to reduce visual impact on rural landscaping in accordance with the objectives of the RU1 zone.

As shown in Figures 6 and 7 below, the eye of a car driver is slightly above the levee bank height at the eastern end of the solar array which allows half of the panels to be visible for motorists travelling in cars. To a truck driver most of the panels are visible. At the western end of the solar array a car cannot see the solar panels, but a truck can see most of the panels.

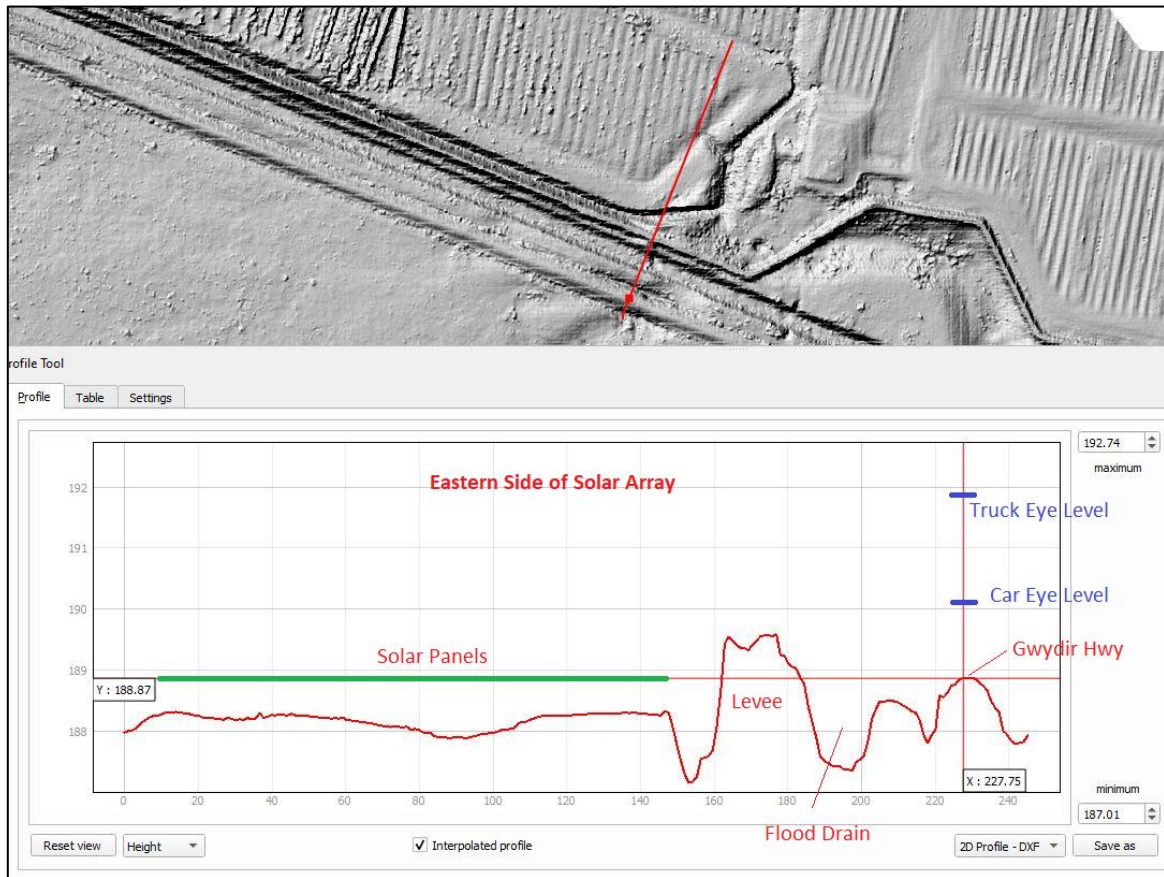


Figure 6: Lidar Data showing elevations along the eastern side of the proposal solar farm

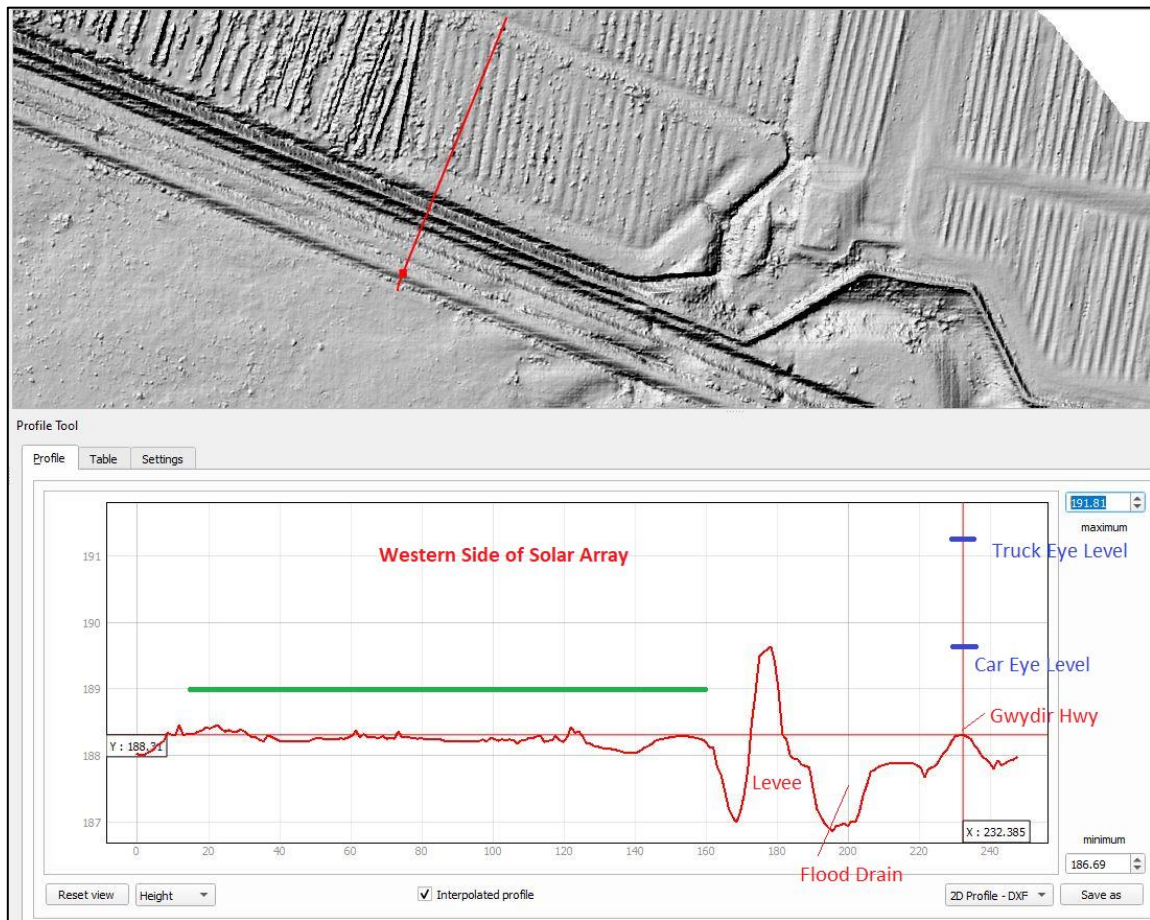


Figure 7: Lidar Data showing elevations along the western side of the proposal solar farm



Figure 8: Illustration of proposed development relative to existing infrastructure on the subject lot

As illustrated in Figure 8 above, the proposed solar panels would have minimal impact on the visual aspect of the site. The panels are partly hidden to all car traffic on the Gwydir Highway and the side profile to trucks is minimal compared to the existing buildings associated with the cotton gin on the site. The cotton gin building and seed shed are significant when compared to the minor visual profile of the panels. The profile of the panels is below the horizon and their profile are of a similar colour to the remainder of the gin yard. We believe the solar panel array's visual aspect is minor and should be acceptable. No additional mitigation measures are therefore considered to be required, as the existing levee, which can be considered an existing mitigation measure, would obscure all (for motorists in cars) or the majority (for truck drivers) of the proposed development from public view.

Further, the glare and glint will not impact passing traffic as all reflected glare or glint is above the height of all vehicles traversing the highway.

The above information has been provided to clarify matters raised by the Moree Plains Shire Council. Please do not hesitate to contact our office should you require any further information.

Kind regards,

Marie Duffy

Marie Duffy
Environment and Resource Consultant
SMK CONSULTANTS
39 Frome Street | PO BOX 774
MOREE NSW 2400

SMK
CONSULTANTS

T: (02) 6752 1021 | F: (02) 6752 5070
E: marie@smk.com.au | Web: www.smk.com.au

Appendix 1: Owners Consent

SMK

CONSULTANTS

surveying – irrigation – environmental – planning

ABN 63 061 919 003

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Moree NSW 2400
Ph 02 6752 1021
Fax 02 6752 5070
admin@smk.com.au

www.smk.com.au

The Planning Department
Moree Plains Shire Council
Level 2, Max Centre
30 Heber Street
Moree NSW 2400

Letter of Authority

To whom it may concern,


We, the undersigned, authorise SMK Consultants Pty Ltd and/or Kinelli Pty Ltd to lodge a Development Application, and/or a Construction Certificate, and/or a Statement of Environmental Effects and any other documentation or applications on our behalf in respect of the development set out in Schedule 1 on the land set out in Schedule 2.

Schedule 1: Development

Establishment and Operation of a 4.95MW Solar Farm at 2910 Gwydir Highway, Wathagar

Schedule 2: Land affected

Lot Number	Plan Description
2	773266

Name (print)	John Stevenson, CEO
Position	CEO/Director/Secretary, Namoi Cotton Ltd
Signature	 11 October 2021 Date ___/___/___
Name (print)	
Position	CEO/Director/Secretary, Namoi Cotton Ltd
Signature	Date ___/___/___

Name (print)

David Statham

Position

Applicant and Company Director, Sundown Pastoral Co Pty Ltd

Signature



Date

12 / 10 / 2021

Name (print)

Danielle Statham

Position

Applicant and Company Director, Sundown Pastoral Co Pty Ltd

Signature



Date

12 / 10 / 2021

Appendix 2: Architectural Plans

Sundown Pastoral Pty Ltd.

**Wathagar Solar Farm
2910 Gwydir Hwy, Wathagar,
NSW 2400**

Property Plan

Legend

- Proposed Development Offsets
- Solar Panels Footprint
- Inverters
- Fence
- Batteries
- Substation
- Other Structures
- Access Track
- Lot Boundaries
- Gwydir Highway
- Google Satellite

Lot 2
DP 773266

Silos Sheds Cotton Gin Storage Shed

37.8m

77.9m

39.5m

78.8m



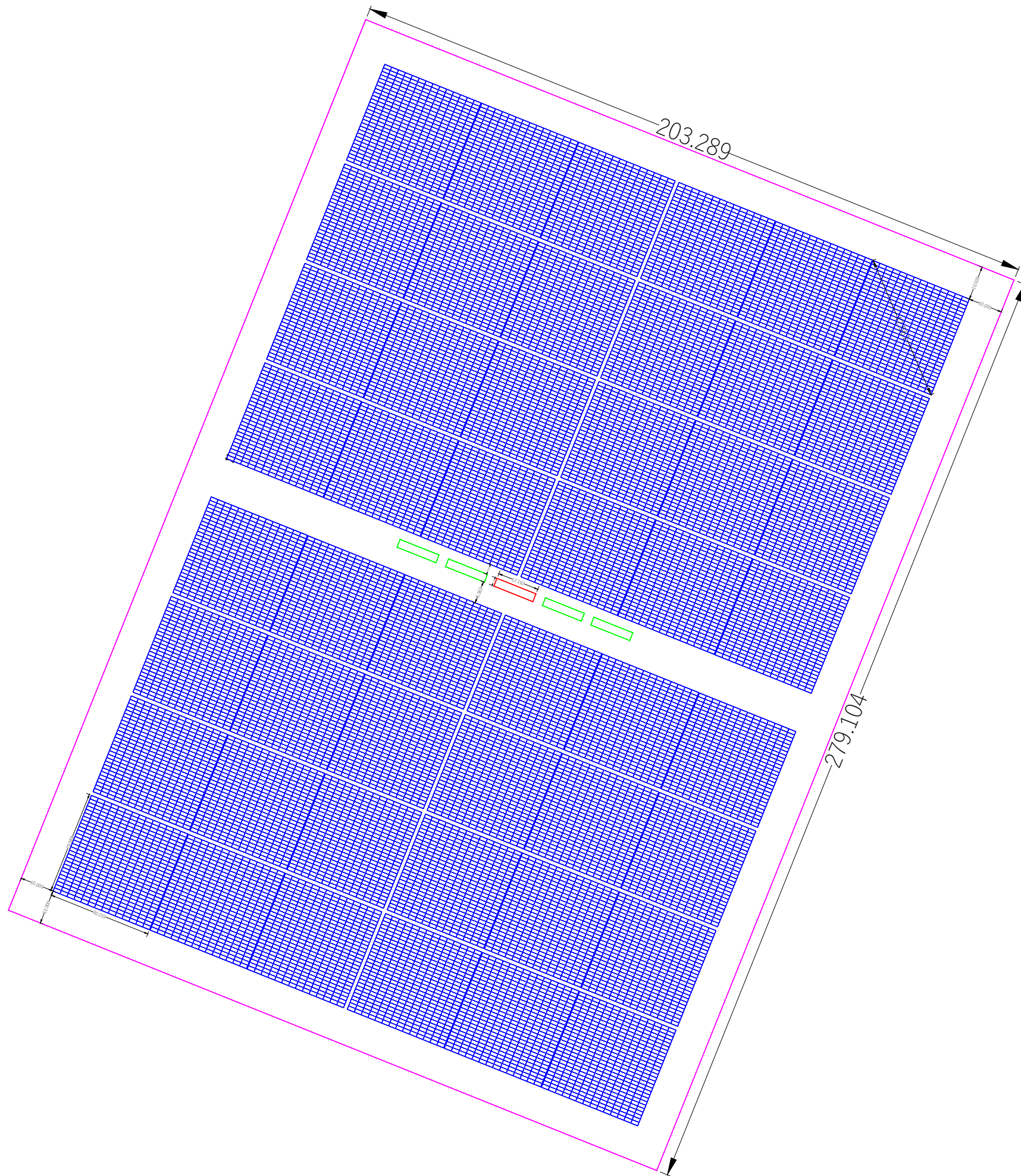
0 100 200 300 400 m

Scale: 1:5,000 (A3)

Surveyed By: -
Prepared By: Tarrant Moss
Date: 30/09/2021

SMK
CONSULTANTS
surveying - irrigation - environmental

Disclaimer:
The information in this map has been provided in good faith. While all effort has been made to ensure the accuracy and completeness of the information the data providers take no responsibility for any errors or omissions that may occur or losses or damage that may result from the use of this information.



Project: Wathagar Gin
Title: Site Layout

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 1 of 5

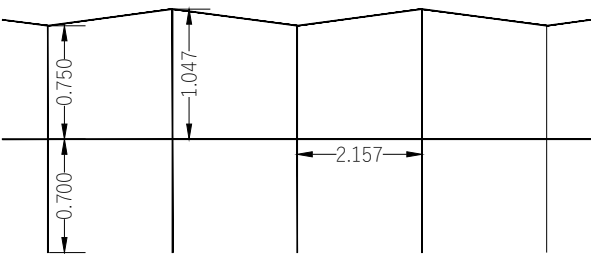
PROJECT DATA

FENCED AREA	5.674ha
DC TRUNK & BUS CABLE	185mm2
STRING LENGTH	28 modules
NO. OF BLOCKS	48
NO. OF PV MODULES	18816
PV MODULE	JAM72S20-MR 460W
TOTAL DC RATING	8.655 MWp
INVERTER	Sungrow SG4950
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	4.95 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

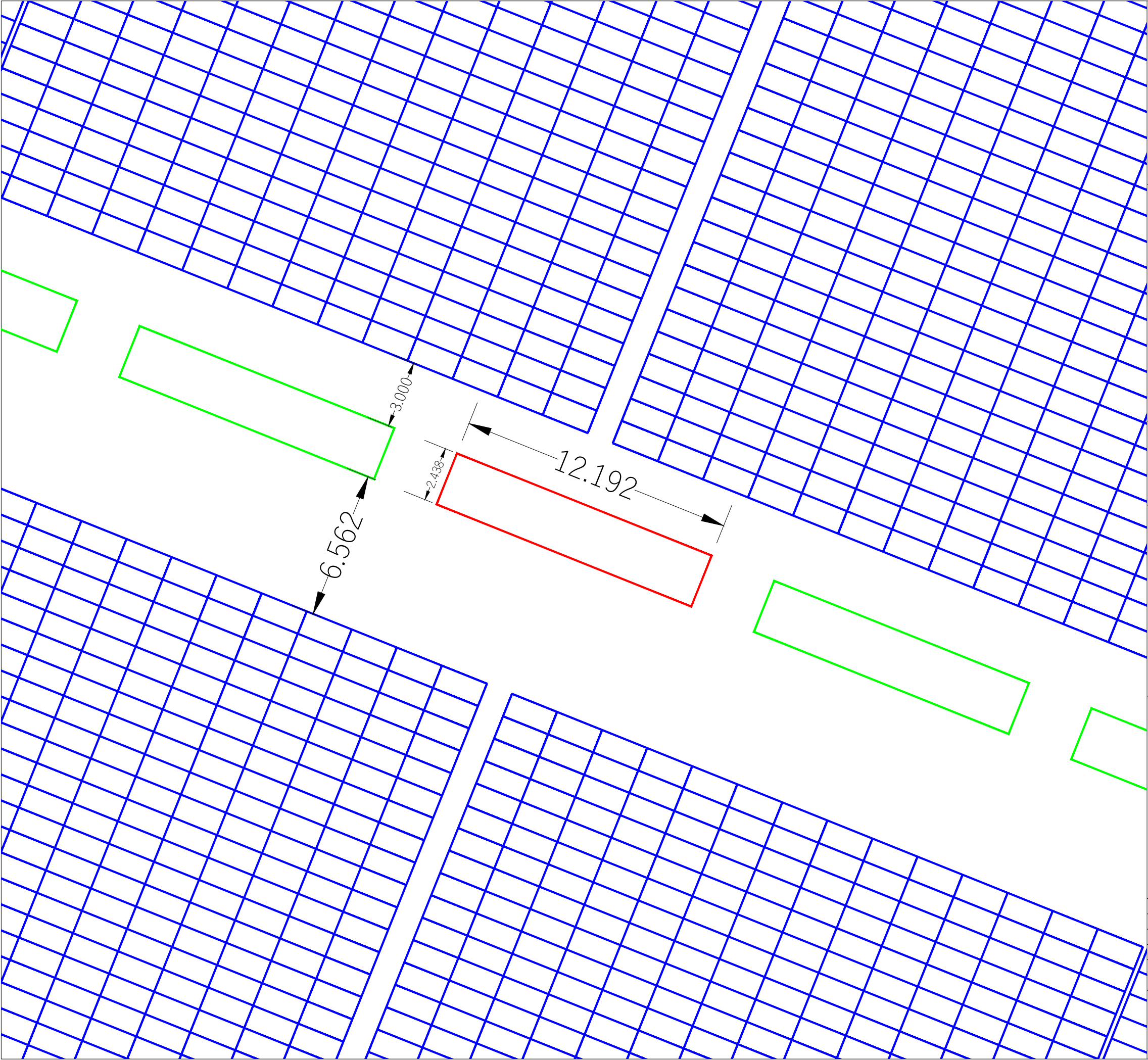
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21
B	First Solar Modules	RLM		17/11/21
C	JA Solar PV Modules	RLM		24/11/21
D	JAM72S20 Portrait	RLM		4/01/22



Project: Wathagar Gin
Title: Inverter View

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 2 of 5

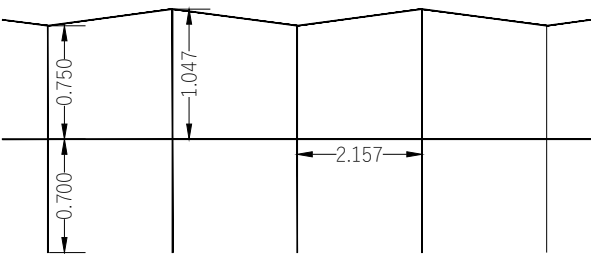
PROJECT DATA

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DC TRUNK & BUS CABLE	185mm2
STRING LENGTH	28 modules
NO. OF BLOCKS	48
NO. OF PV MODULES	18816
PV MODULE	JAM72S20-MR 460W
TOTAL DC RATING	8.655 MWp
INVERTER	Sungrow SG4950
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	4.95 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

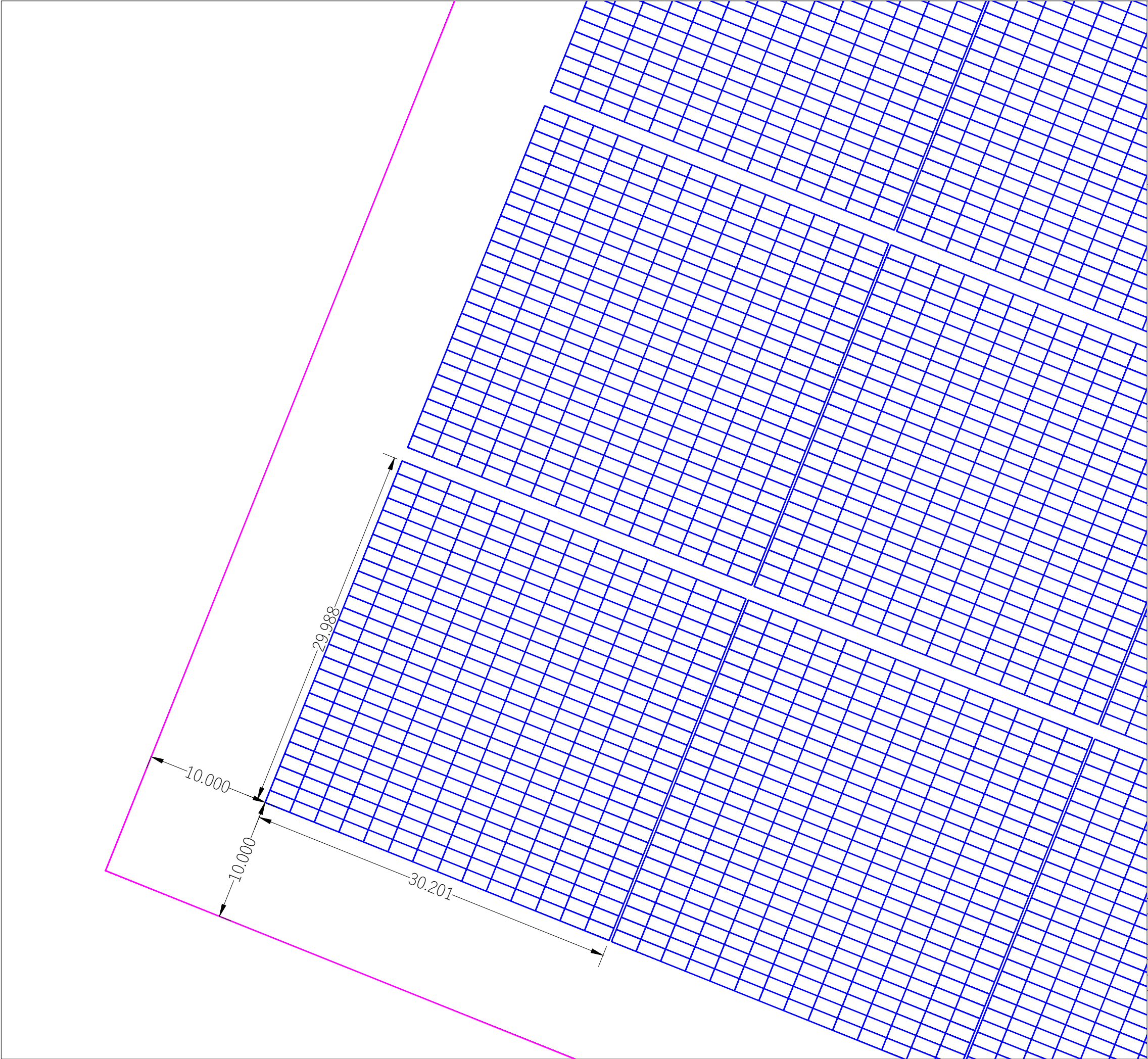
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21
B	First Solar Modules	RLM		17/11/21
C	JA Solar PV Modules	RLM		24/11/21
D	JAM72S20 Portrait	RLM		4/01/22



Project: Wathagar Gin
Title: South West Corner

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 3 of 5

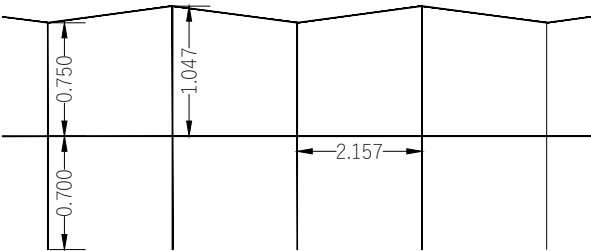
PROJECT DATA

FENCED AREA	5.674ha
DC TRUNK & BUS CABLE	185mm2
STRING LENGTH	28 modules
NO. OF BLOCKS	48
NO. OF PV MODULES	18816
PV MODULE	JAM72S20-MR 460W
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INVERTER	Sungrow SG4950
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	4.95 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

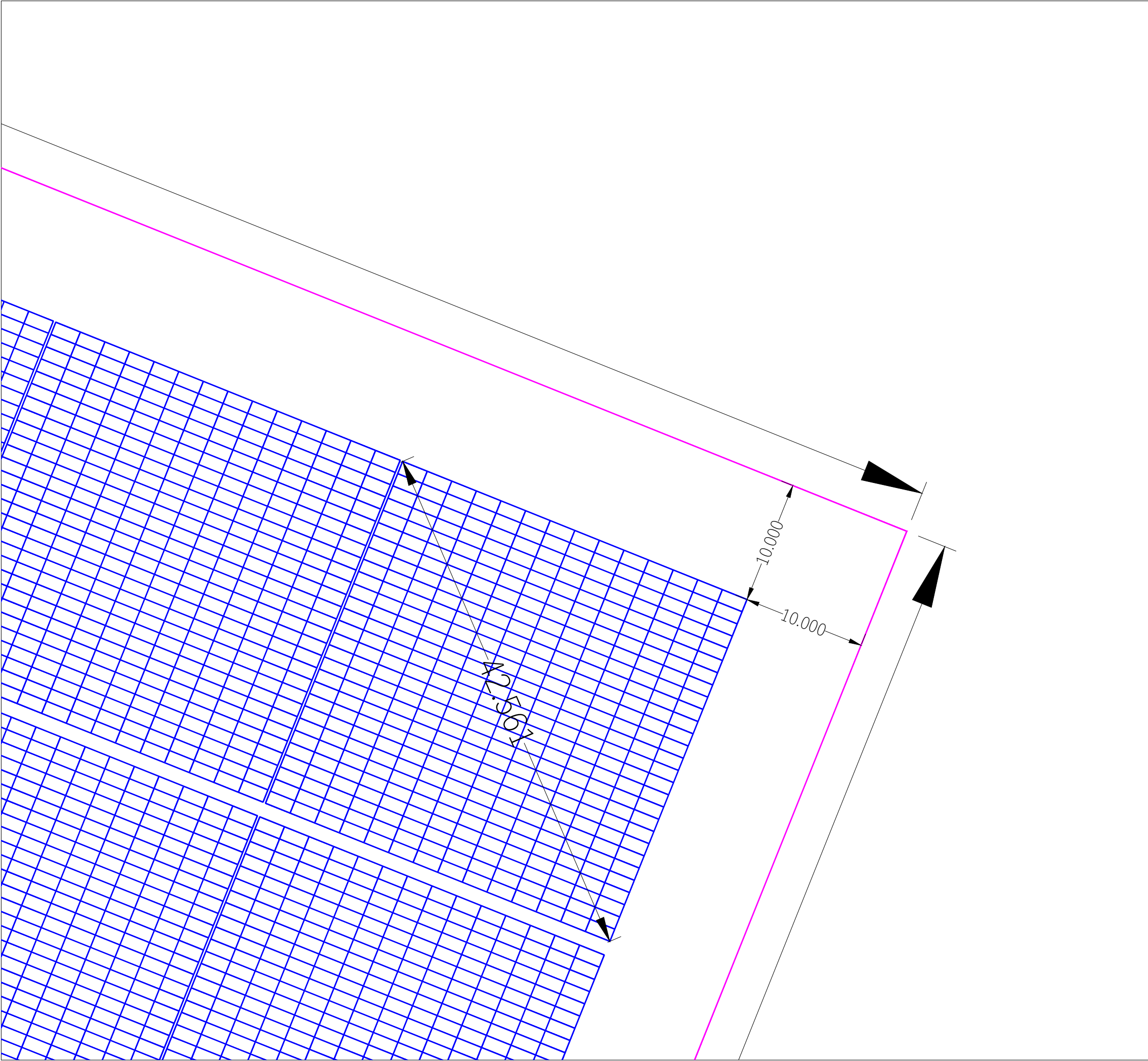
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21
B	First Solar Modules	RLM		17/11/21
C	JA Solar PV Modules	RLM		24/11/21
D	JAM72S20 Portrait	RLM		4/01/22



Project: Wathagar Gin
Title: North East Corner

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 4 of 5

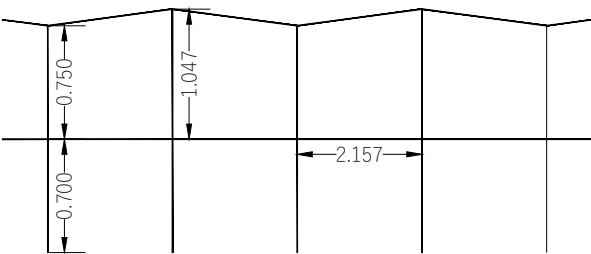
PROJECT DATA

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INVERTER	Sungrow SG4950
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	4.95 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

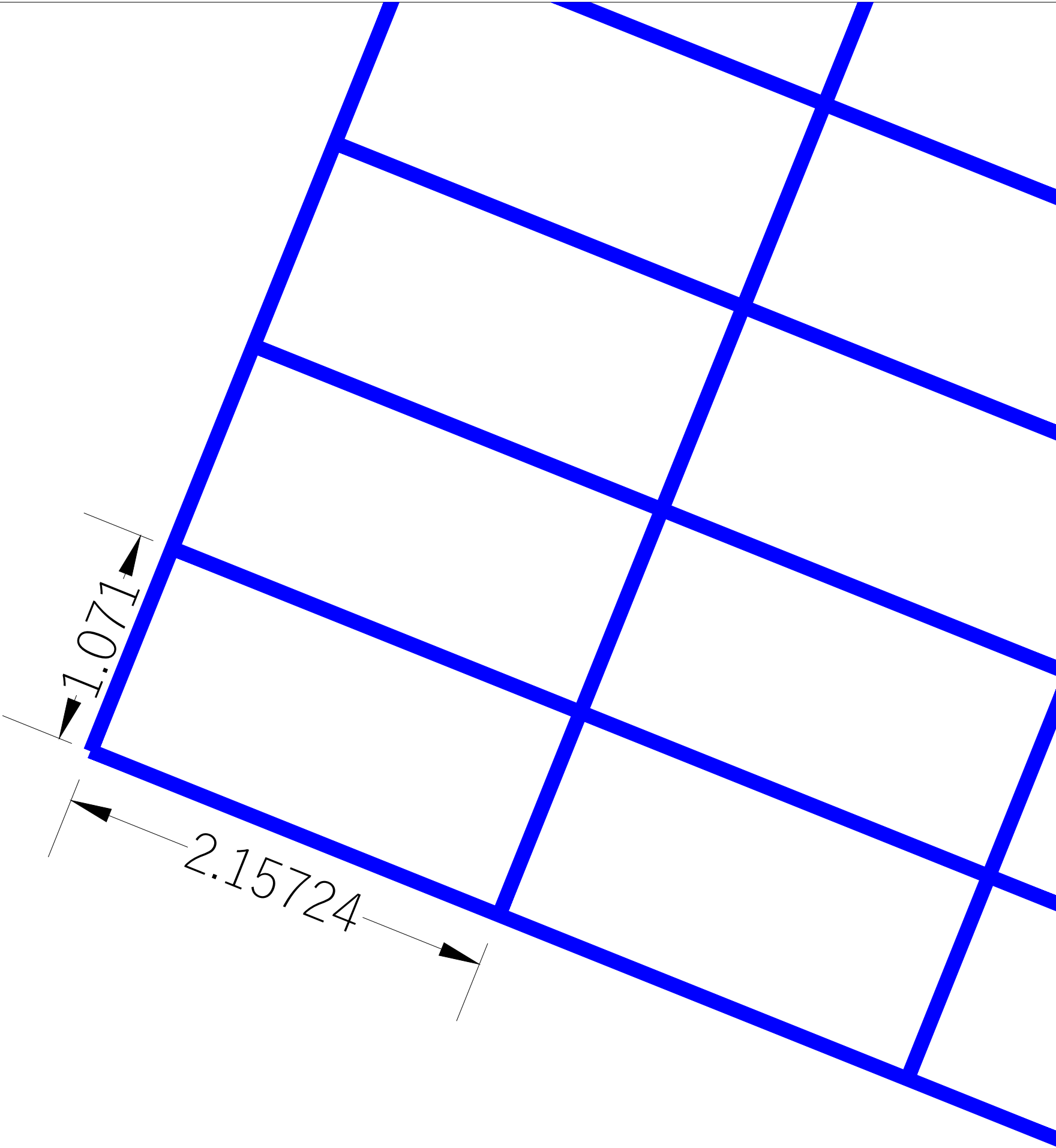
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21
B	First Solar Modules	RLM		17/11/21
C	JA Solar PV Modules	RLM		24/11/21
D	JAM72S20 Portrait	RLM		4/01/22



Project: Wathagar Gin
Title: Single Module View

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 5 of 5

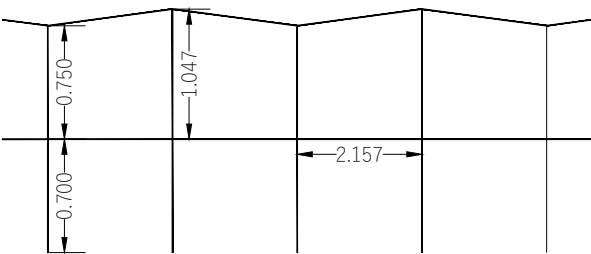
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SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	4.95 MVA


LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

FRONT VIEW



LEGEND

 BATTERY STORAGE	 LOT BOUNDARY
 INVERTER	 ROAD
 PV MODULES	 HV LINE O/H & U/G
 FENCE	 DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21
B	First Solar Modules	RLM		17/11/21
C	JA Solar PV Modules	RLM		24/11/21
D	JAM72S20 Portrait	RLM		4/01/22

Appendix 3: Image and Design of Battery

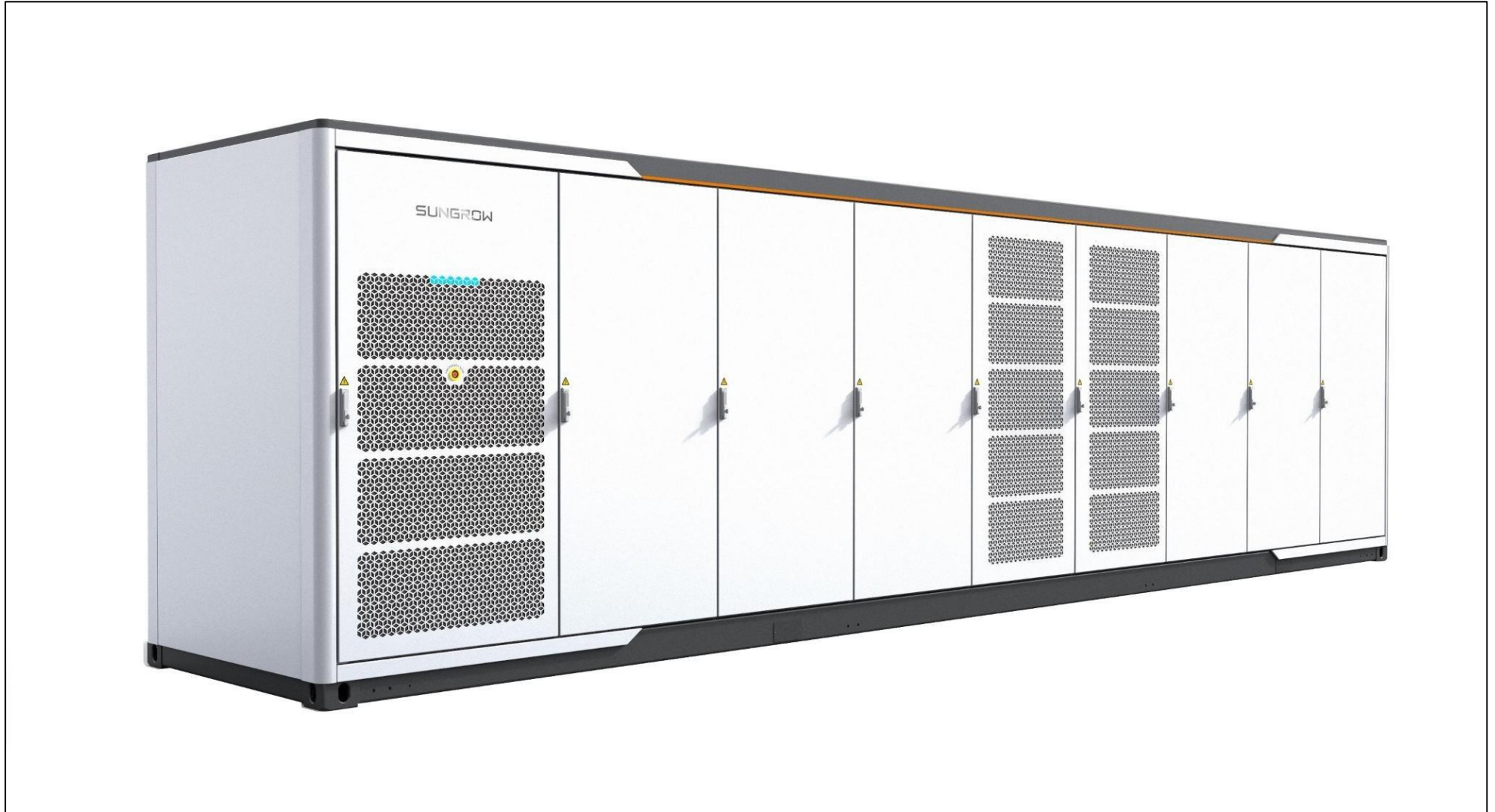
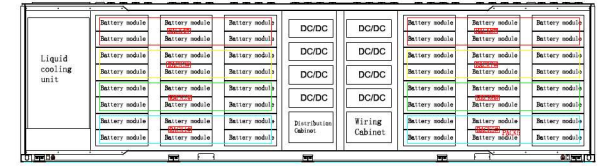
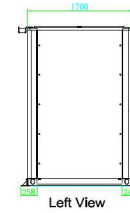
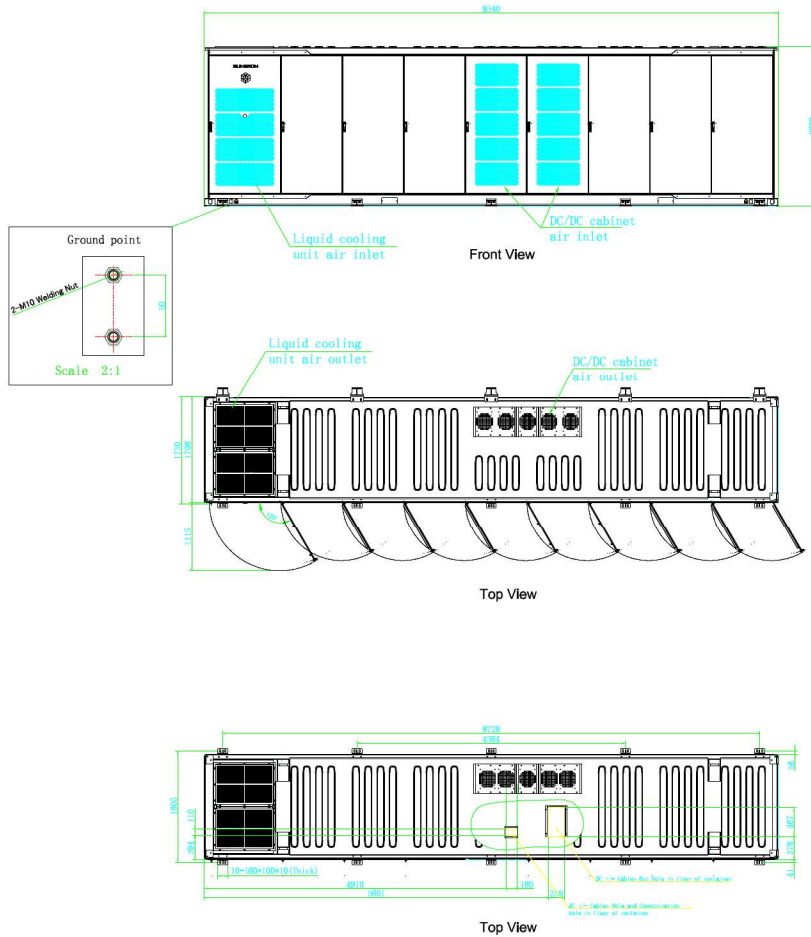
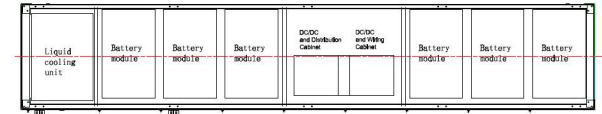


Figure 1: Image of Battery



Front view of removing roof



Top view of removing roof

Note:

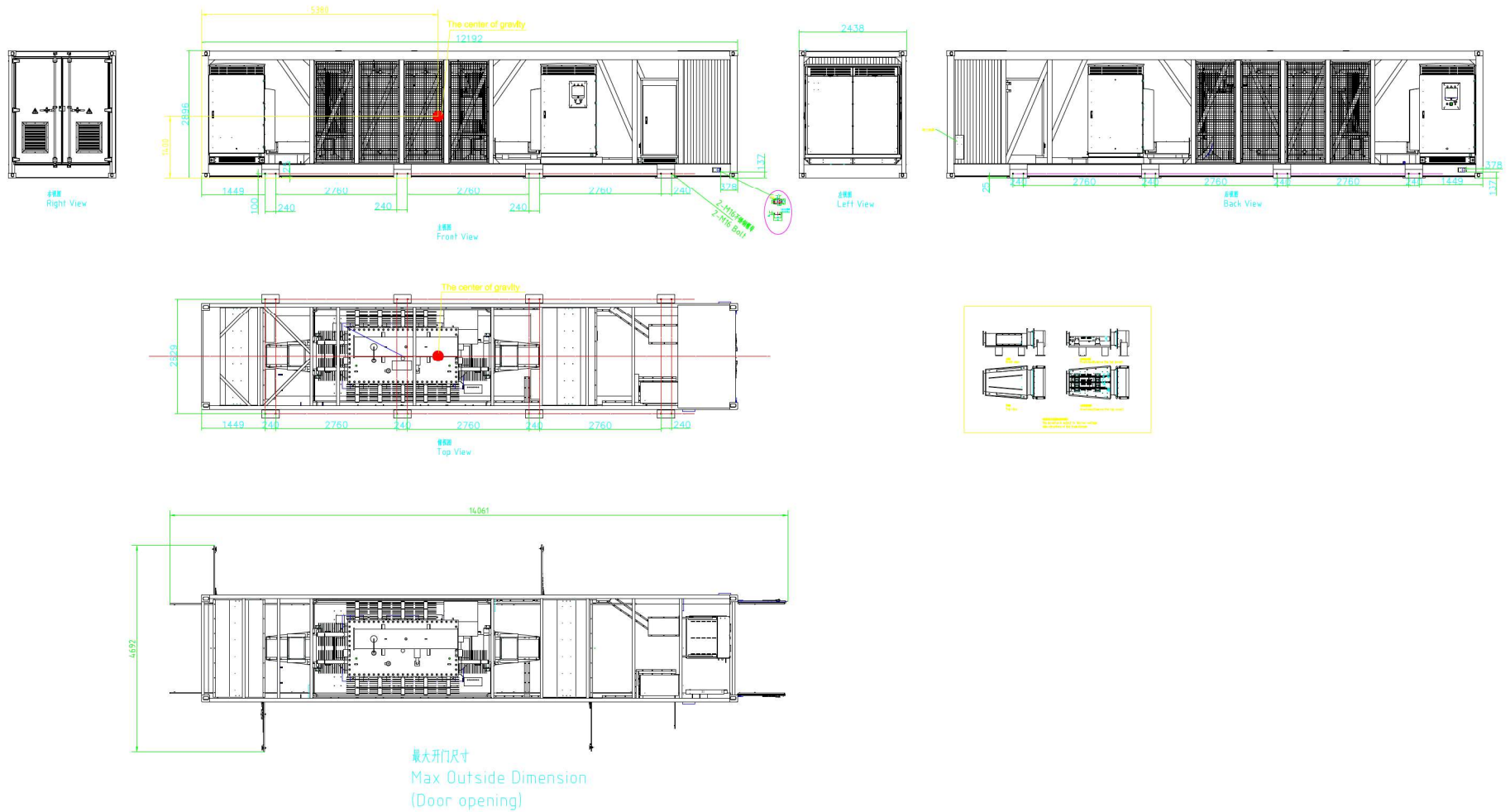
1. The layout drawing is for reference. There may be partial adjustments in the detailed design.
2. Weight About 26,400 ± 200 kg(including coolant).
3. Size: 9340mm×2600mm×1730mm (W×H×D)

Appendix 4: Image and Design of Inverter



Figure 2: Image of Inverter

密级：秘密
Confidential



1.具体信息，可按照客户技术协议添加
For information, specific items subject to customer requirements.

2.此图可能不是最终版本，仅供参考，最终图纸以交付的文件为准。
The drawing may not be the final version and it is used for reference only.
For the final drawing, refer to the documentation in the scope of delivery.

绘制/Drawn by	韦亮亮	日期/Date	2021-03-11	图纸名称/Drawing Name	产品型号/Product Model	绘图比例 Drawing Scale	1:1	SUNGROW
校核/Checked by	阮怀俊	日期/Date	2021-03-11	外形图及箱体尺寸 /Dimensions and Layouts	SG4950HV-MV	图纸编号/Drawing No.:	共14张 第2张 Page 2 of 14	
批准/Approved by	钱辰辰	日期/Date	2021-03-11			DWG_00210113_SG4950HV-MV_总图/总图/01442		

Appendix 5: Stormwater Management Plan

Stormwater Management Plan

The existing Wathagar Cotton Gin is under the control of EPA licence EPL 10832. Part of this licence is the requirement to treat stormwater for sediment control and monitor the quality of the water for contaminants. The EPL 10832 details the full scope of testing, record keeping and annual reporting of every stormwater discharge event.

The management of stormwater onsite currently exists and is ongoing. The primary components of the management plan are:

- a) The collection and drainage of all areas onsite, including the proposed solar array, to the northwest corner of the site via an existing internal drainage network. The flat grade of the drains act as a silt trap. The deposited silt is excavated occasionally and reused onsite.
- b) At the north-west corner of the site is a gated pipe to control the discharge of stormwater. This is a primary control to stop the release of contaminated water from the site. All testing occurs here.
- c) The siltation pond slows the velocity of the water and allows all small particles to be deposited and removed from the water. Most sediments are removed at this location with the water sometimes not escaping the pond. This stored water is used on site for dust control on all roads.
- d) Excess runoff from the siltation pond flows overland within land owned by the Proponent and is stored again temporarily at Site D. If the water level becomes high at D it is released into the irrigation channel adjacent via gated pipes and the water is sent to the Wathagar on-farm storage dam also owned by Sundown Pastoral Co. The water is later used for irrigation.
- e) The following plan shows these major components. The existing EPA licence controls all stormwater management on site. It is not considered necessary to duplicate or alter this plan.

