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Oriel

PVSOL report

	Name	Date
Prepared by	Laura de la Iglesia	21/03/2025
Checked	Alec Davies	21/03/2025
Approved	Alec Davies	21/03/2025

NTS @ A4	Project Stage: RIBA 4
SCALE & FORMAT	PROJECT STAGE
S4 - Suitable for review & authorisation	
SUITABILITY CODE	

ORL	ADX	XX	XX	TRP	E	000002	C02
PROJECT	ORIGINATOR	FUNCTIONAL BREAKDOWN	SPACIAL BREAKDOWN	FORM	DISCIPLINE	NUMBER	REVISION

No comments

C02	21/03/2025	S4 - Suitable for review & authorisation / Steel mesh and inverted roof panels updated from 625W to 645W
C01	28/01/2025	S4 - Suitable for review & authorisation
P02	26.11.2024	Steel mesh and inverted roof panels updated from 615W to 625W
P01	07.10.2024	First Issue

REV	Date	Revision Title
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ALL REVISIONS



Adexsi UK
The Business Centre, Cardiff House, Cardiff Road, Vale of Glamorgan.CF63 2AW

Project Name: Oriel Moorfields Eye Hospital

21/03/2025

Documentation

Customer Details

Company	
Customer Number	
Contact person	
Address	
Phone	
Fax	
E-Mail	

Project Data

Project Name	Oriel Moorfields Eye Hospital
Offer no.	
Project Designer	
Address	Supplies Dept, 4 St Pancras Way, London NW1 0PE, United Kingdom



Project Overview



Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System

Climate Data	London, GBR (1996 - 2015)
Values source	Meteonorm 8.1(i)
PV Generator Output	164.85 kWp
PV Generator Surface	697.2 m ²
Number of PV Modules	298
Number of Inverters	5

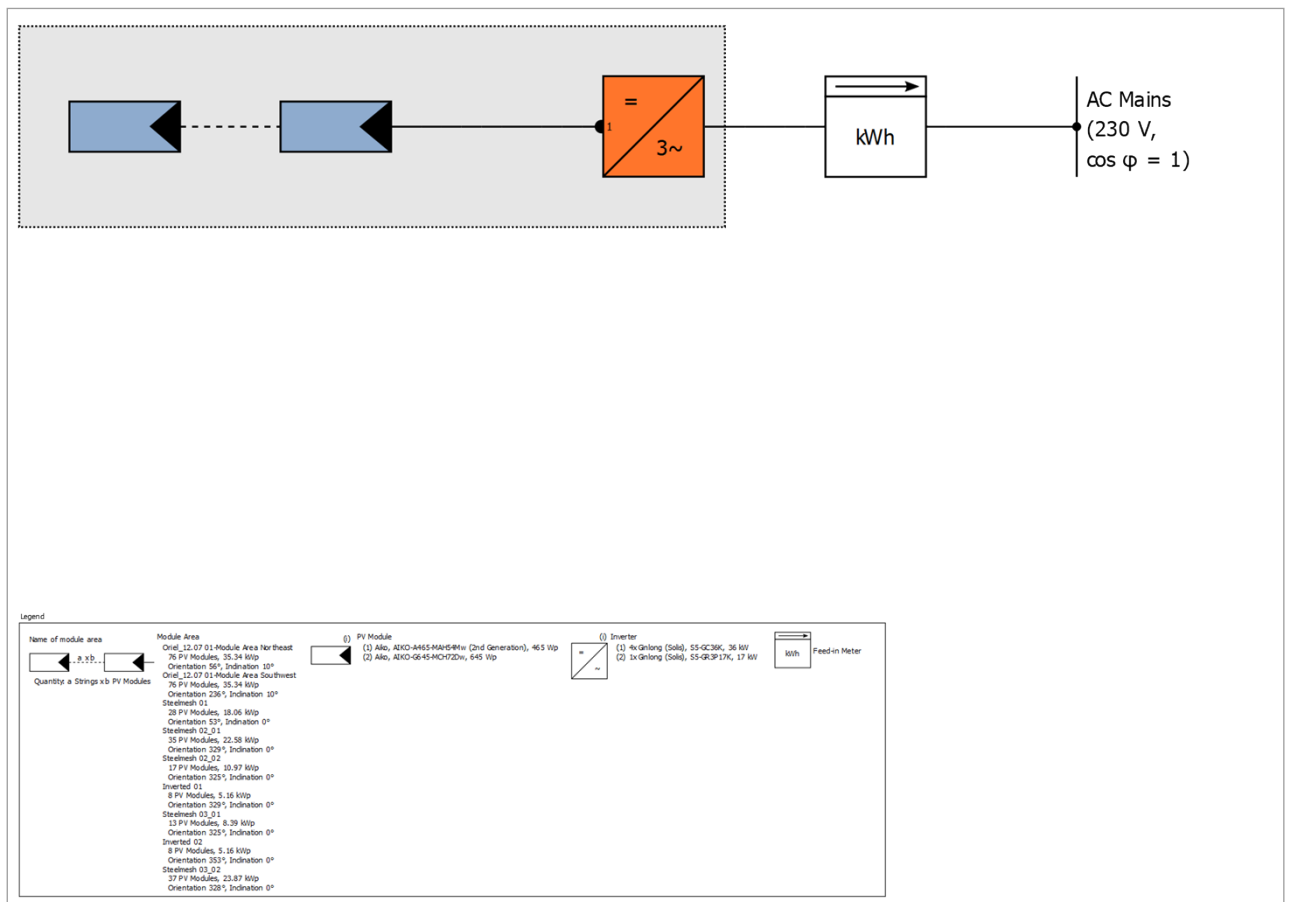


Figure: Schematic diagram

Production Forecast

Production Forecast

PV Generator Output	164.85 kWp
Spec. Annual Yield	916.36 kWh/kWp
Performance Ratio (PR)	93.93 %
Yield Reduction due to Shading	2.2 %
Grid Export	151,129 kWh/Year
Grid Export in the first year (incl. module degradation)	150,234 kWh/Year
Standby Consumption (Inverter)	67 kWh/Year
CO ₂ Emissions avoided	70,999 kg / year

The results have been calculated with a mathematical model calculation from Valentin Software GmbH (PV*SOL algorithms). The actual yields from the solar power system may differ as a result of weather variations, the efficiency of the modules and inverter, and other factors.

Set-up of the System

Overview

System Data

Type of System	3D, Grid-connected PV System
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Climate Data

Location	London, GBR (1996 - 2015)
Values source	Meteonorm 8.1(i)
Data resolution	1 h
Simulation models used:	
- Diffuse Irradiation onto Horizontal Plane	Hofmann
- Irradiance onto tilted surface	Hay & Davies

Module Areas

1. Module Area - Oriel_12.07 01-Module Area Northeast

PV Generator, 1. Module Area - Oriel_12.07 01-Module Area Northeast

Name	Oriel_12.07 01-Module Area Northeast
PV Modules	76 x AIKO-A465-MAH54Mw (2nd Generation) (v2)
Manufacturer	Aiko
Inclination	10 °
Orientation	Northeast 56 °
Installation Type	Mounted - Roof
PV Generator Surface	151.4 m²



Figure: 1. Module Area - Oriel_12.07 01-Module Area Northeast

Degradation of Module, 1. Module Area - Oriel_12.07 01-Module Area Northeast

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

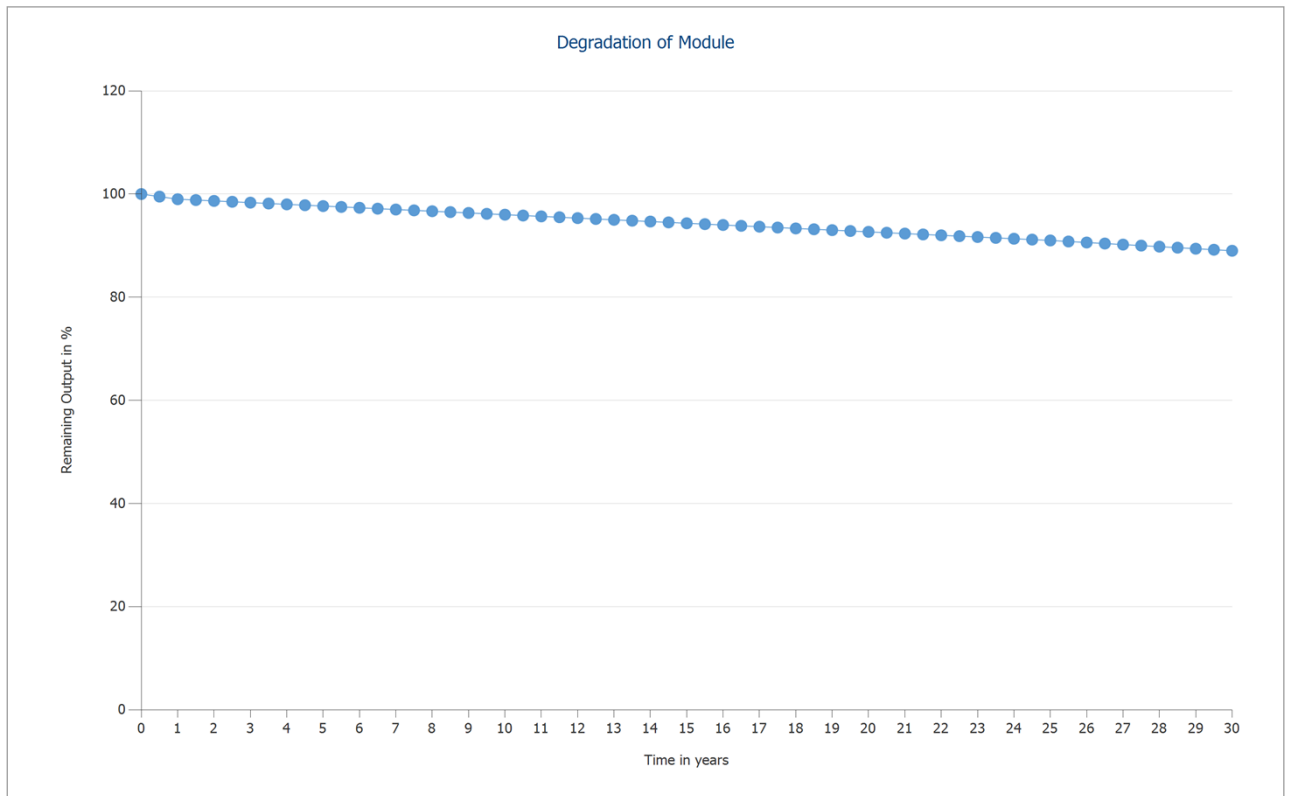


Figure: Degradation of Module, 1. Module Area - Oriel_12.07 01-Module Area Northeast

2. Module Area - Oriel_12.07 01-Module Area Southwest

PV Generator, 2. Module Area - Oriel_12.07 01-Module Area Southwest

Name	Oriel_12.07 01-Module Area Southwest
PV Modules	76 x AIKO-A465-MAH54Mw (2nd Generation) (v2)
Manufacturer	Aiko
Inclination	10 °
Orientation	Southwest 236 °
Installation Type	Mounted - Roof
PV Generator Surface	151.4 m²

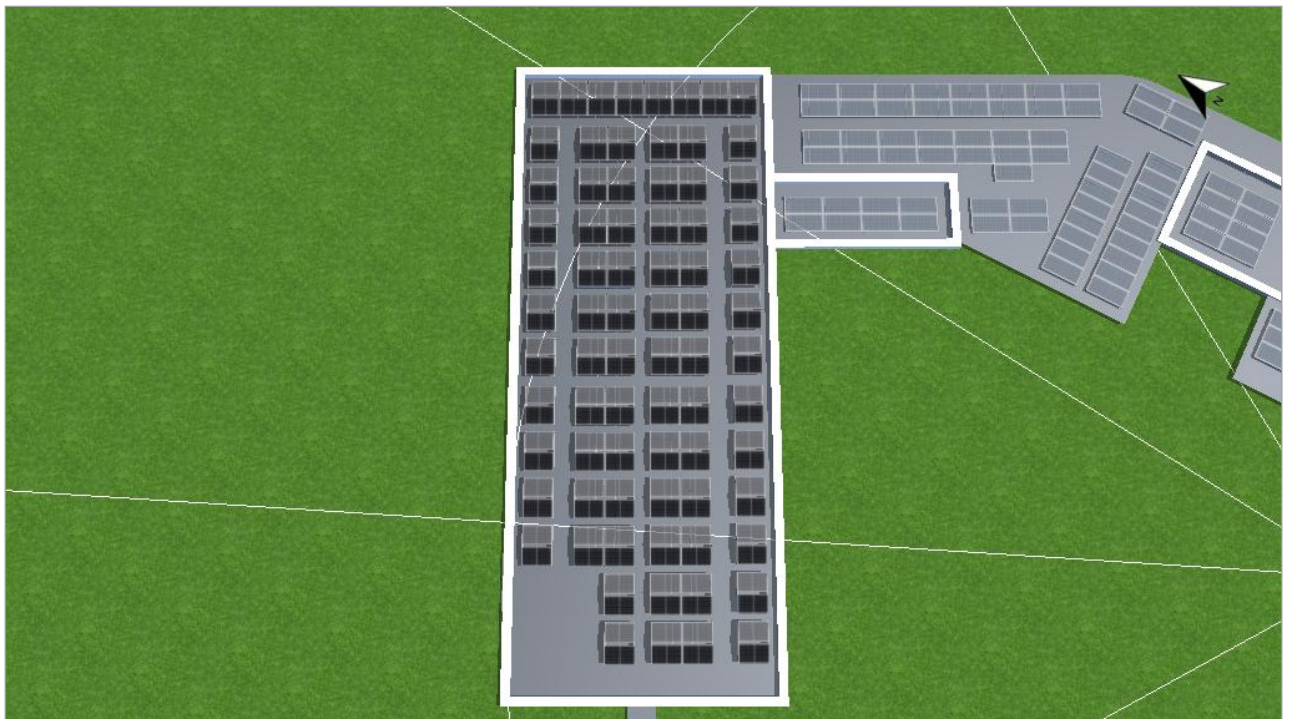


Figure: 2. Module Area - Oriel_12.07 01-Module Area Southwest

Degradation of Module, 2. Module Area - Oriel_12.07 01-Module Area Southwest

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

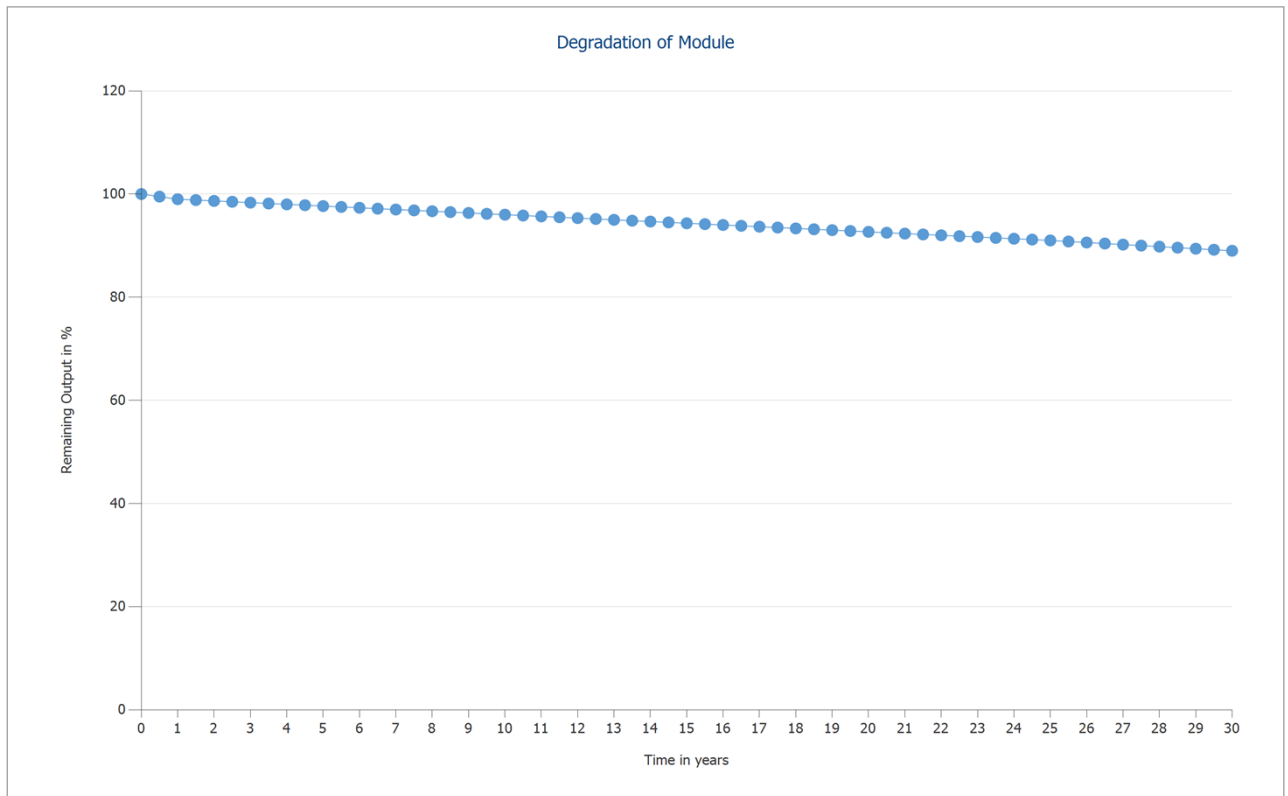


Figure: Degradation of Module, 2. Module Area - Oriel_12.07 01-Module Area Southwest

3. Module Area - Steelmesh 01

PV Generator, 3. Module Area - Steelmesh 01

Name	Steelmesh 01
PV Modules	28 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northeast 53 °
Installation Type	Mounted - Roof
PV Generator Surface	75.6 m²

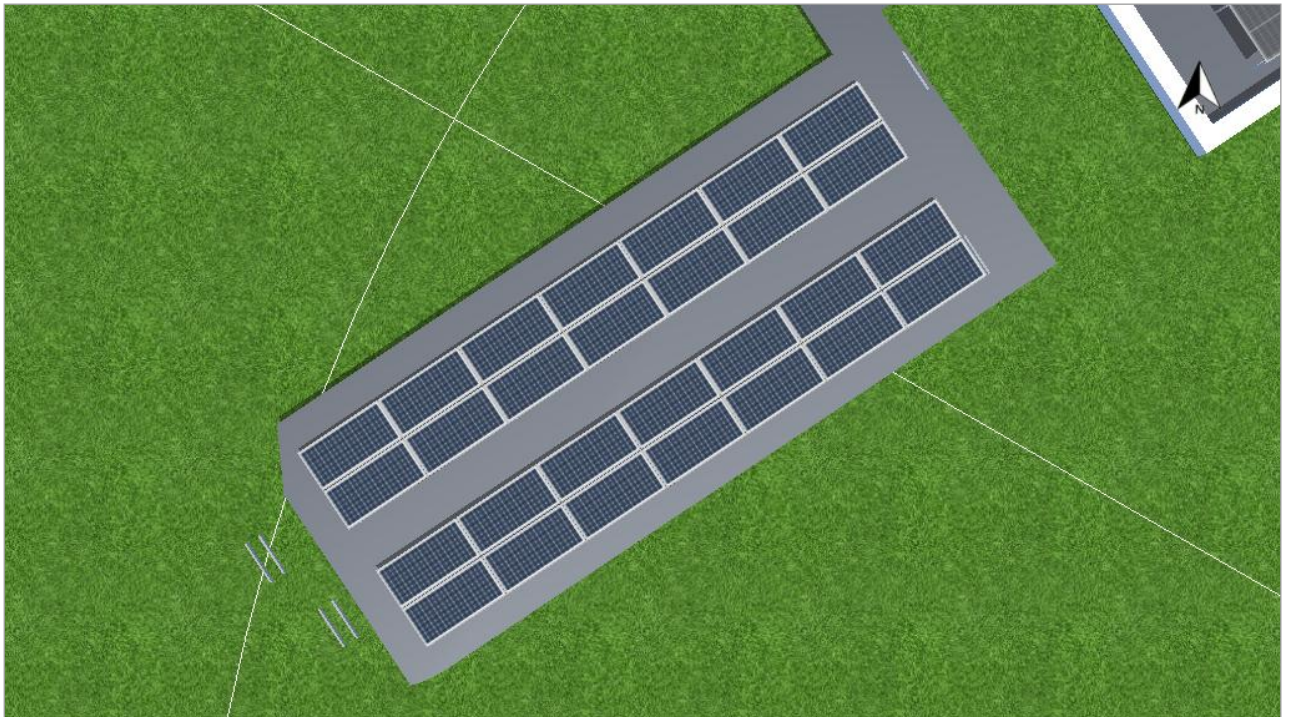


Figure: 3. Module Area - Steelmesh 01

Degradation of Module, 3. Module Area - Steelmesh 01

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

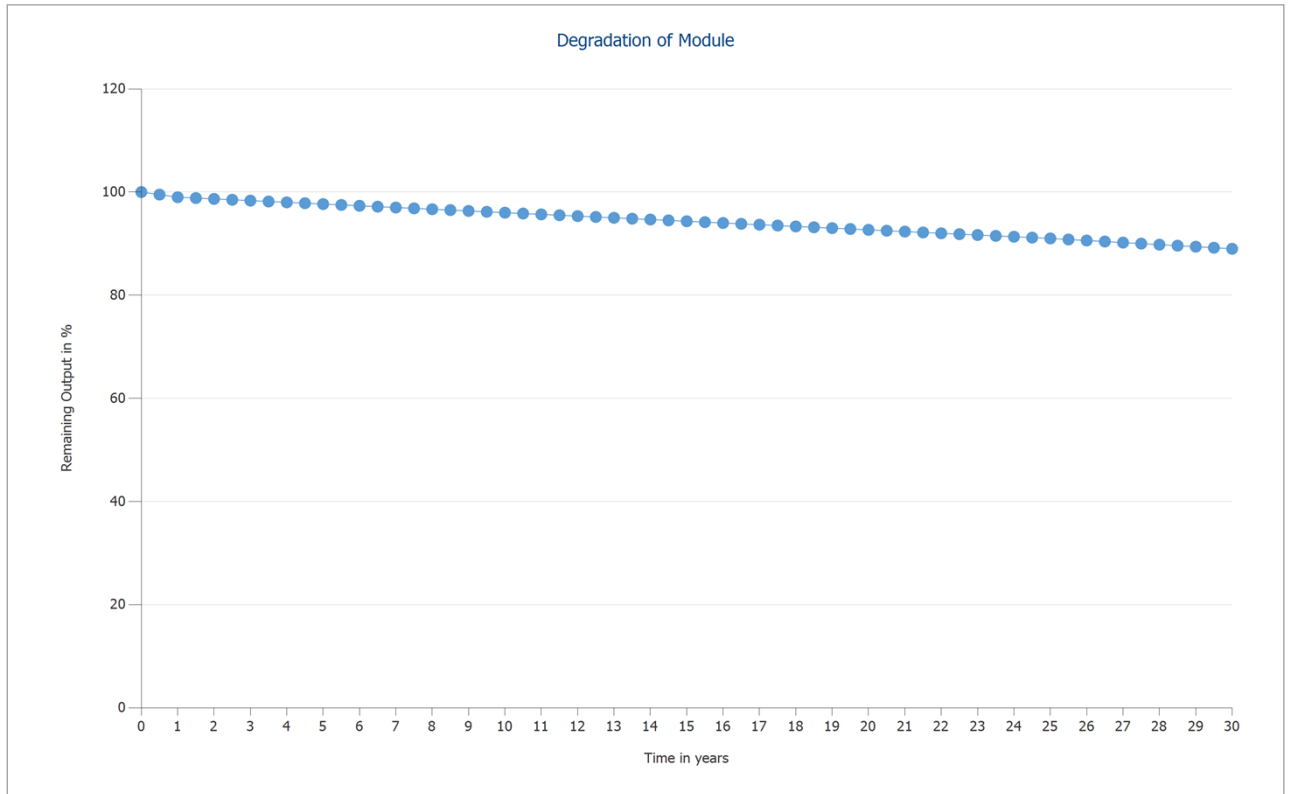


Figure: Degradation of Module, 3. Module Area - Steelmesh 01

4. Module Area - Steelmesh 02_01

PV Generator, 4. Module Area - Steelmesh 02_01

Name	Steelmesh 02_01
PV Modules	35 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northwest 329 °
Installation Type	Mounted - Roof
PV Generator Surface	94.5 m²



Figure: 4. Module Area - Steelmesh 02_01

Degradation of Module, 4. Module Area - Steelmesh 02_01

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

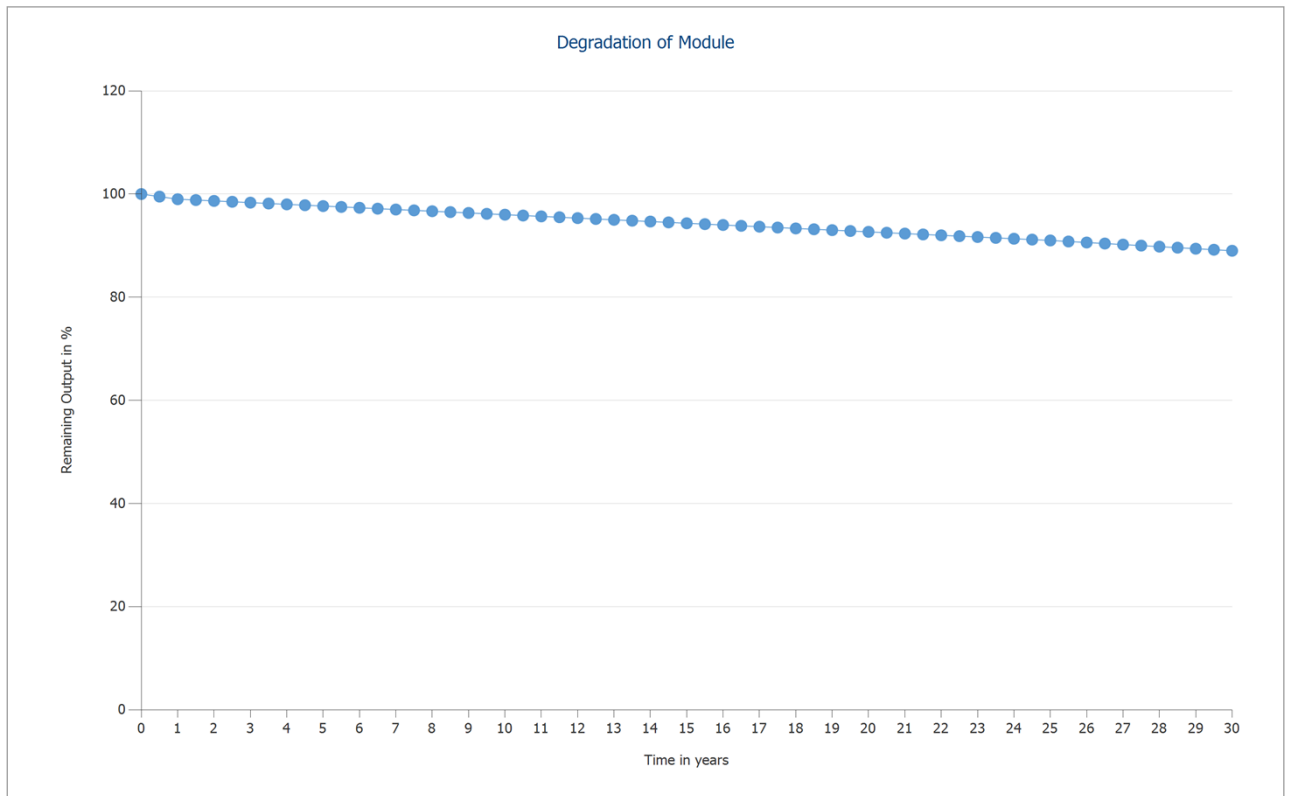


Figure: Degradation of Module, 4. Module Area - Steelmesh 02_01

5. Module Area - Steelmesh 02_02

PV Generator, 5. Module Area - Steelmesh 02_02

Name	Steelmesh 02_02
PV Modules	17 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northwest 325 °
Installation Type	Mounted - Roof
PV Generator Surface	45.9 m²

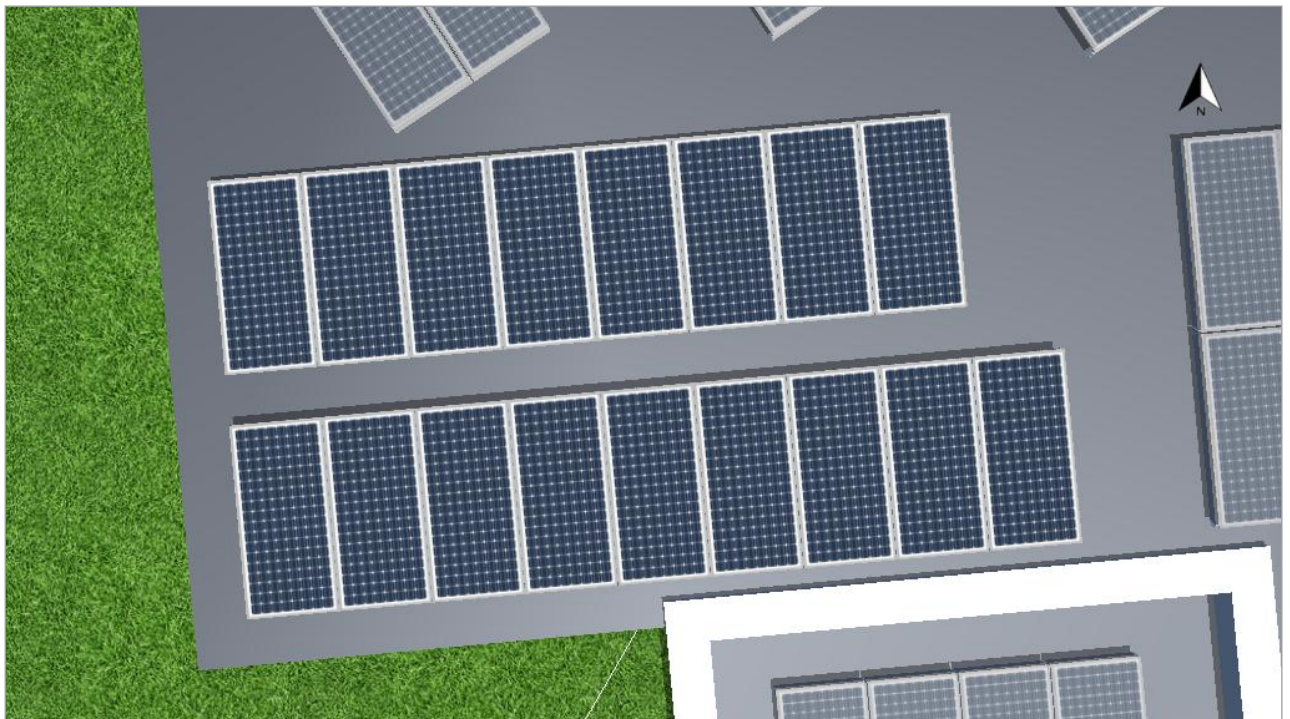


Figure: 5. Module Area - Steelmesh 02_02

Degradation of Module, 5. Module Area - Steelmesh 02_02

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

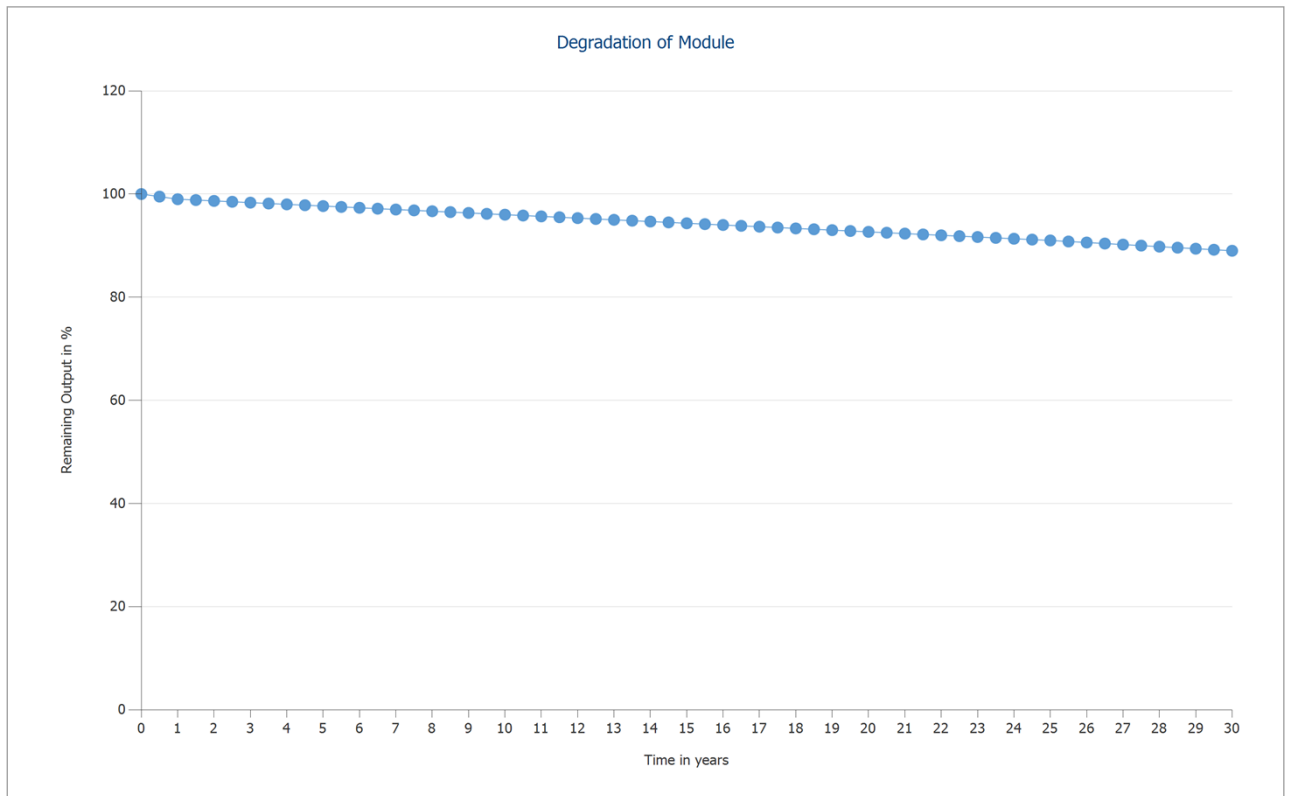


Figure: Degradation of Module, 5. Module Area - Steelmesh 02_02

6. Module Area - Inverted 01

PV Generator, 6. Module Area - Inverted 01

Name	Inverted 01
PV Modules	8 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northwest 329 °
Installation Type	Mounted - Roof
PV Generator Surface	21.6 m²

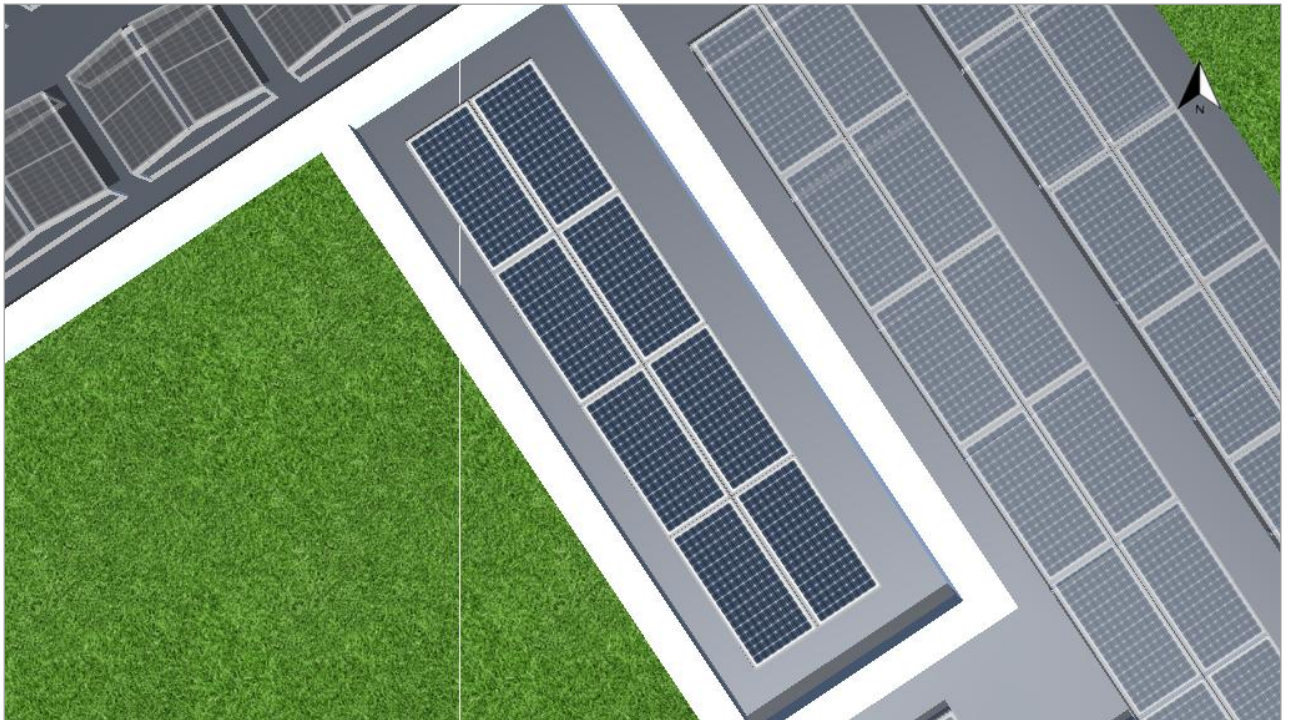


Figure: 6. Module Area - Inverted 01

Degradation of Module, 6. Module Area - Inverted 01

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

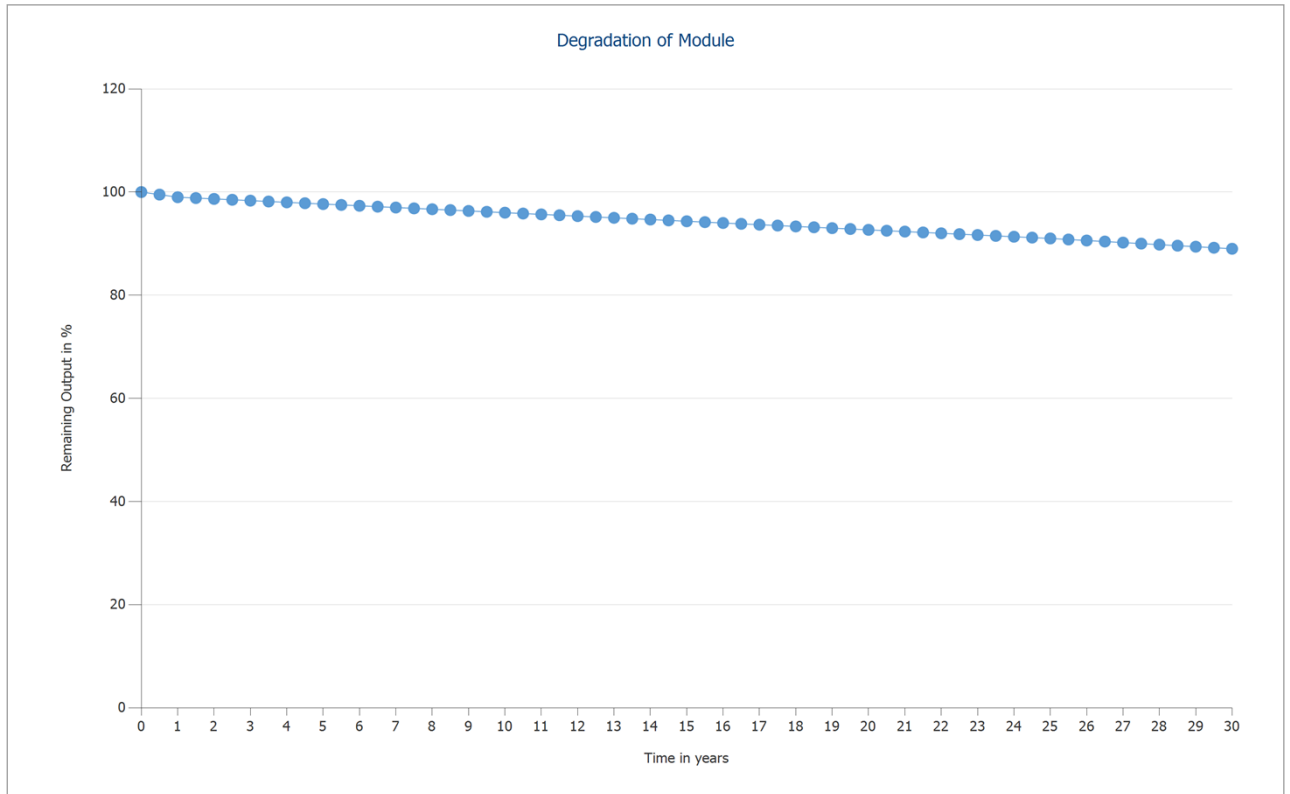


Figure: Degradation of Module, 6. Module Area - Inverted 01

7. Module Area - Steelmesh 03_01

PV Generator, 7. Module Area - Steelmesh 03_01

Name	Steelmesh 03_01
PV Modules	13 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northwest 325 °
Installation Type	Mounted - Roof
PV Generator Surface	35.1 m²

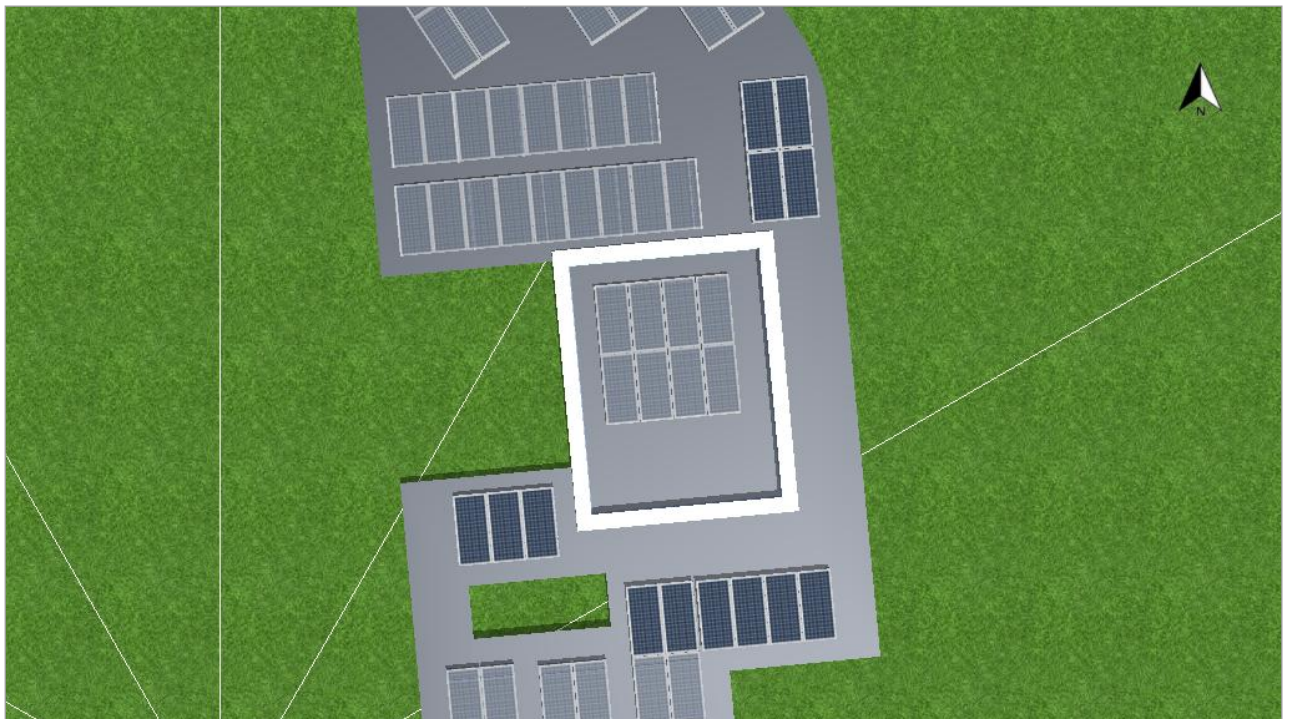


Figure: 7. Module Area - Steelmesh 03_01

Degradation of Module, 7. Module Area - Steelmesh 03_01

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

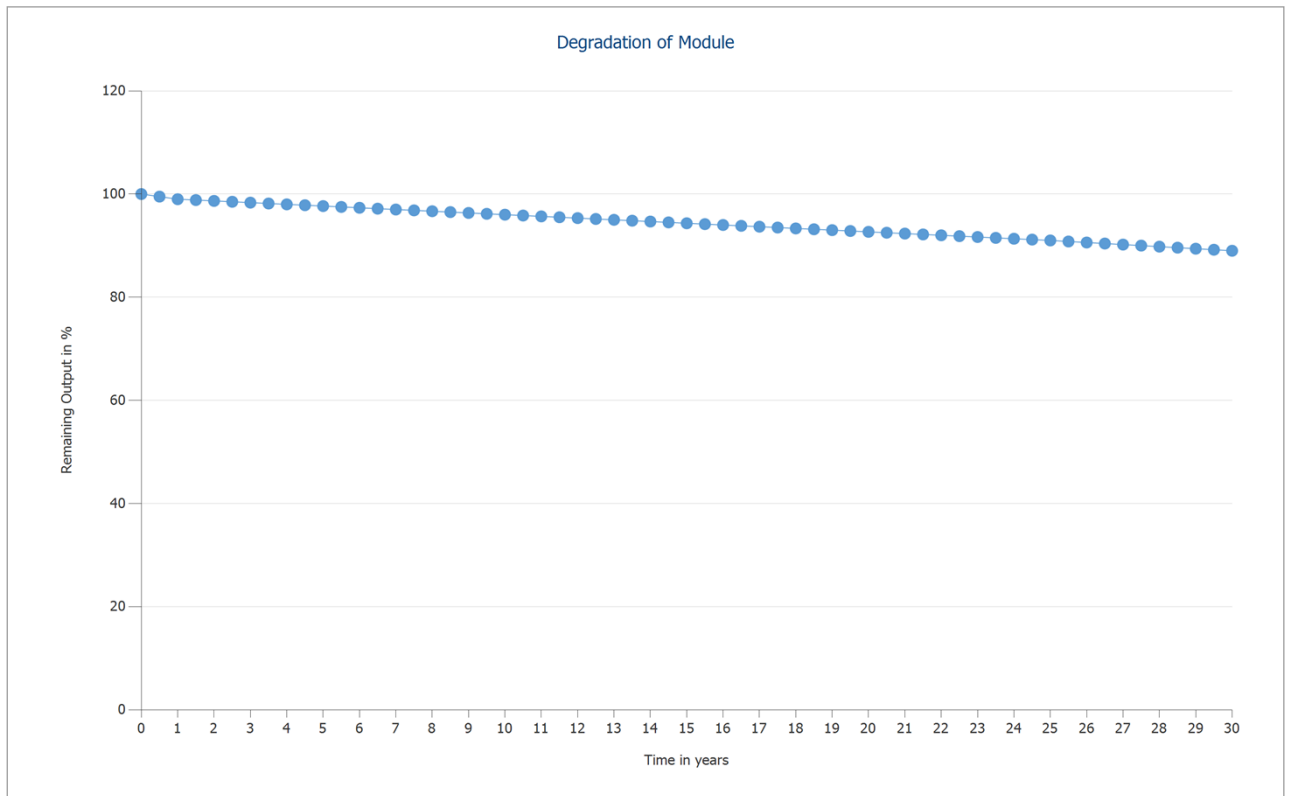


Figure: Degradation of Module, 7. Module Area - Steelmesh 03_01

8. Module Area - Inverted 02

PV Generator, 8. Module Area - Inverted 02

Name	Inverted 02
PV Modules	8 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	North 353 °
Installation Type	Mounted - Roof
PV Generator Surface	21.6 m²



Figure: 8. Module Area - Inverted 02

Degradation of Module, 8. Module Area - Inverted 02

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

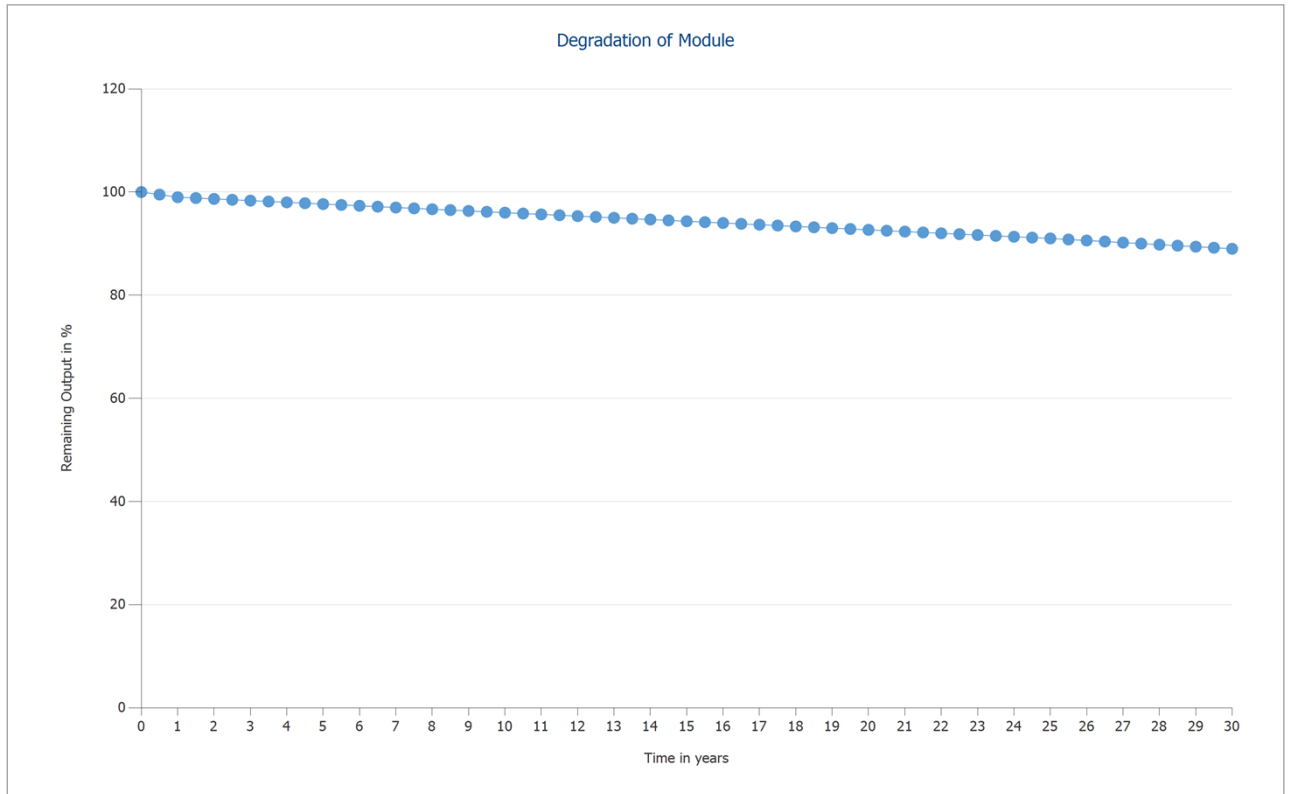


Figure: Degradation of Module, 8. Module Area - Inverted 02

9. Module Area - Steelmesh 03_02

PV Generator, 9. Module Area - Steelmesh 03_02

Name	Steelmesh 03_02
PV Modules	37 x AIKO-G645-MCH72Dw (v2)
Manufacturer	Aiko
Inclination	0 °
Orientation	Northwest 328 °
Installation Type	Mounted - Roof
PV Generator Surface	99.9 m²

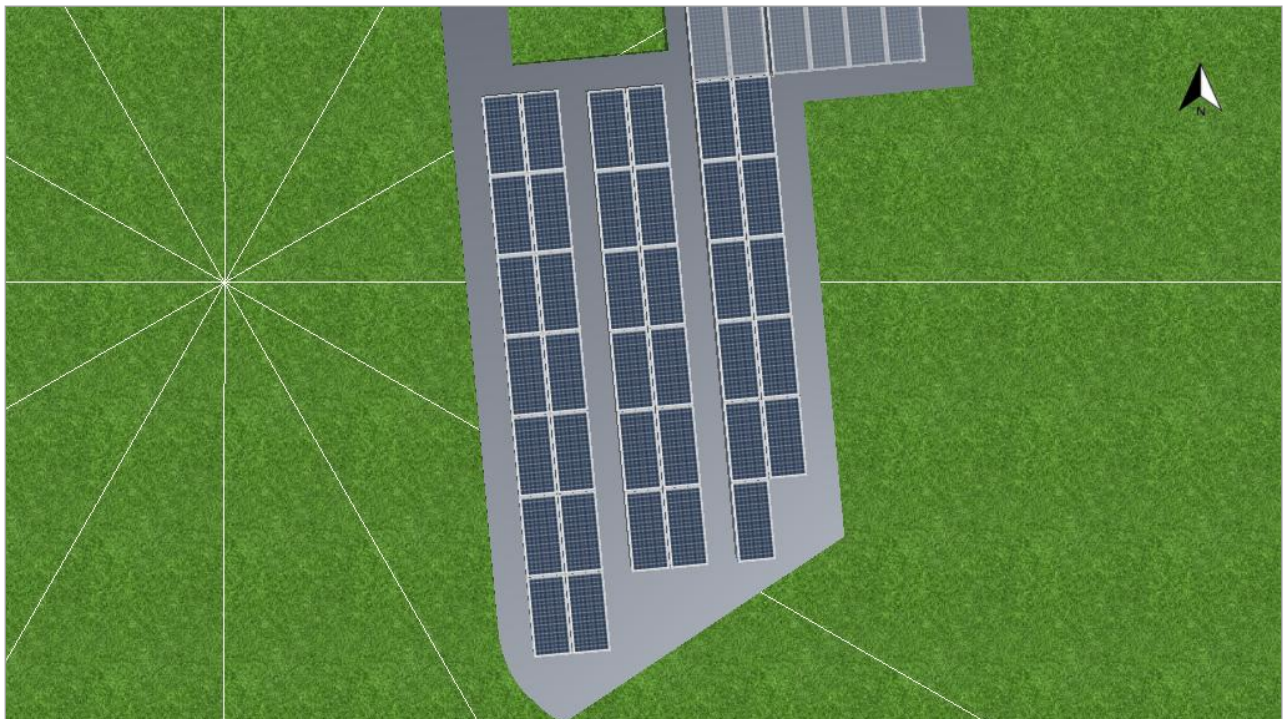


Figure: 9. Module Area - Steelmesh 03_02

Degradation of Module, 9. Module Area - Steelmesh 03_02

Characteristic curve	Linear (straight line)
Remaining power (power output) after 1 year	99 %
Remaining power (power output) after 25 years	91 %
Remaining power (power output) after 30 years	89 %

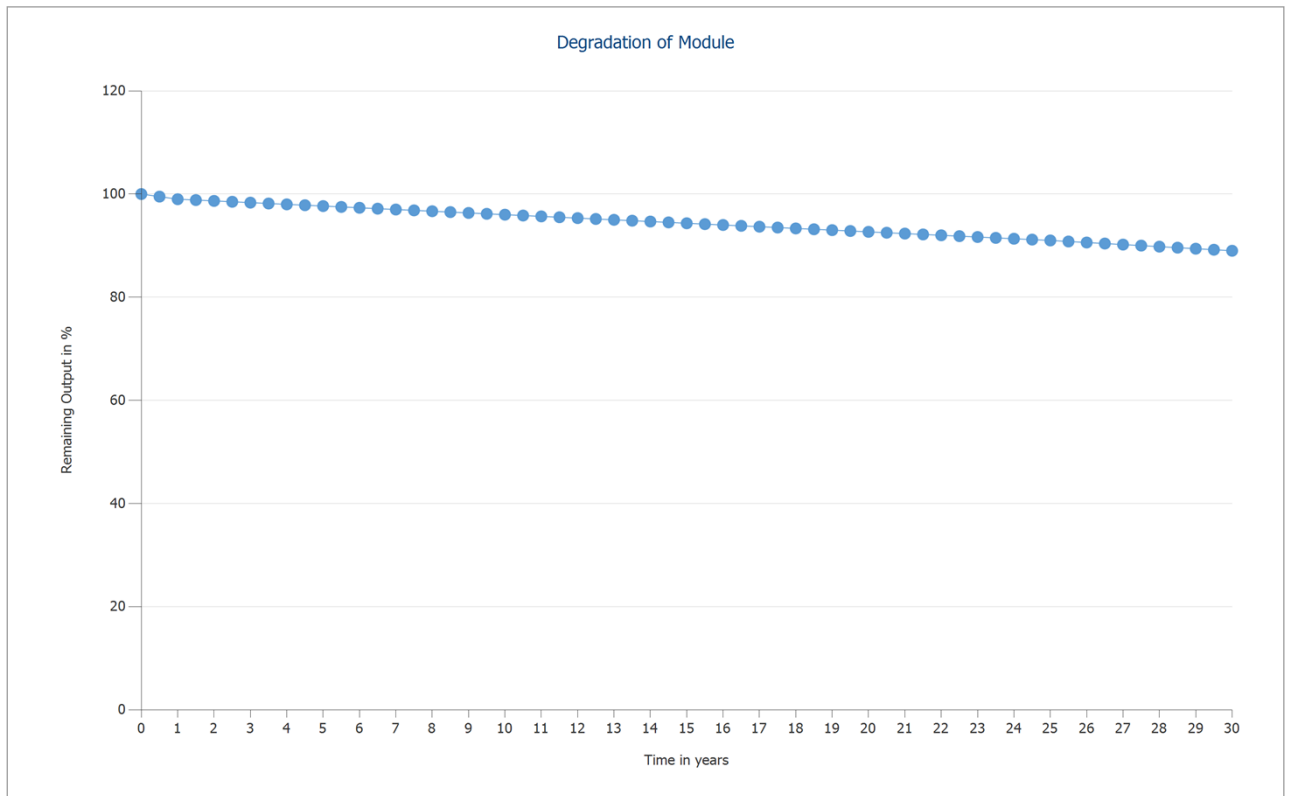


Figure: Degradation of Module, 9. Module Area - Steelmesh 03_02

Horizon Line, 3D Design

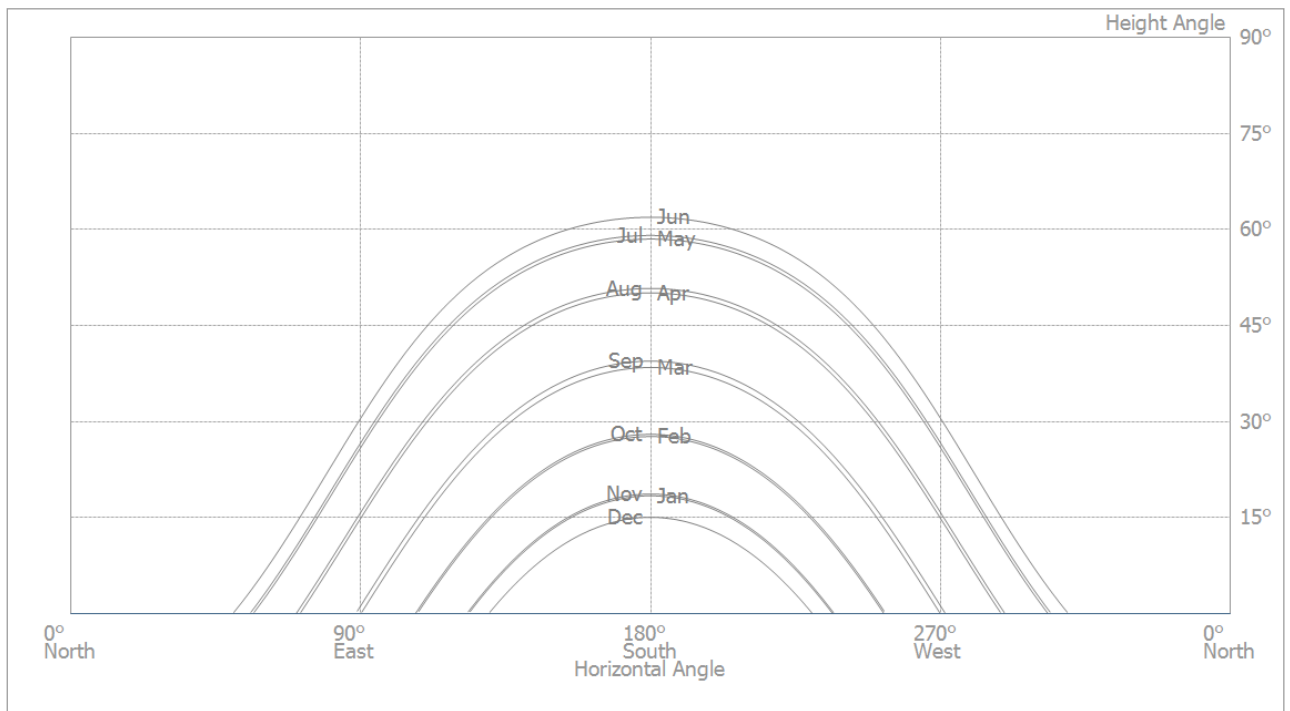


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Areas	Oriel_12.07 01-Module Area Northeast + Oriel_12.07 01-Module Area Southwest
Inverter 1	
Model	S5-GC36K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	98.2 %
Configuration	MPP 1: 1 x 18
	MPP 2: 1 x 10
	MPP 3: 2 x 12
	MPP 4: 2 x 12
Inverter 2	
Model	S5-GC36K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	98.2 %
Configuration	MPP 1: 1 x 18
	MPP 2: 1 x 10
	MPP 3: 2 x 12
	MPP 4: 2 x 12

Configuration 2

Module Area	Steelmesh 01
Inverter 1	
Model	S5-GR3P17K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	106.2 %
Configuration	MPP 1: 1 x 14
	MPP 2: 1 x 14

Configuration 3

Module Areas	Steelmesh 02_01 + Steelmesh 02_02 + Inverted 01
Inverter 1	
Model	S5-GC36K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	107.5 %
Configuration	MPP 1:
	1 x 16
	MPP 2:
	1 x 15
	MPP 3:
	1 x 17
	MPP 4:
	1 x 4 + 1 x 8

Configuration 4

Module Areas	Steelmesh 03_01 + Inverted 02 + Steelmesh 03_02
Inverter 1	
Model	S5-GC36K (v2)
Manufacturer	Ginlong (Solis)
Quantity	1
Sizing Factor	103.9 %
Configuration	MPP 1:
	1 x 4 + 1 x 8 + 1 x 3
	MPP 2:
	1 x 11 + 1 x 2 + 1 x 4
	MPP 3:
	1 x 12
	MPP 4:
	1 x 14

AC Mains

AC Mains

Number of Phases	3
Mains voltage between phase and neutral	230 V
Displacement Power Factor (cos phi)	+/- 1

Simulation Results

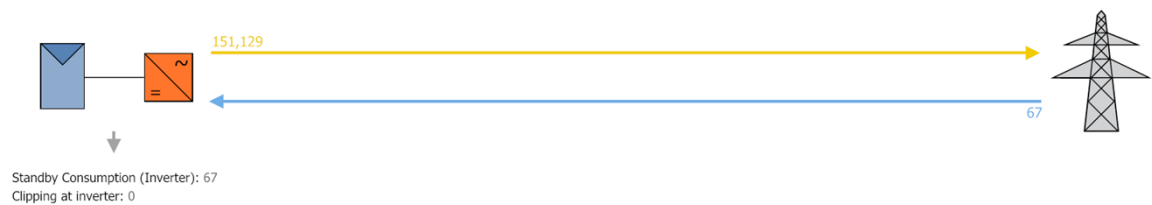
Results Total System

PV System

PV Generator Output	164.85 kWp
Spec. Annual Yield	916.36 kWh/kWp
Performance Ratio (PR)	93.93 %
Yield Reduction due to Shading	2.2 %
Grid Export	151,129 kWh/Year
Grid Export in the first year (incl. module degradation)	150,234 kWh/Year
Standby Consumption (Inverter)	67 kWh/Year
CO ₂ Emissions avoided	70,999 kg / year

Energy Flow Graph

Project: Oriel Moorfields Eye Hospital



All values in kWh
Small deviations in the totals can occur due to rounding
created with PV*SOL

Figure: Energy flow

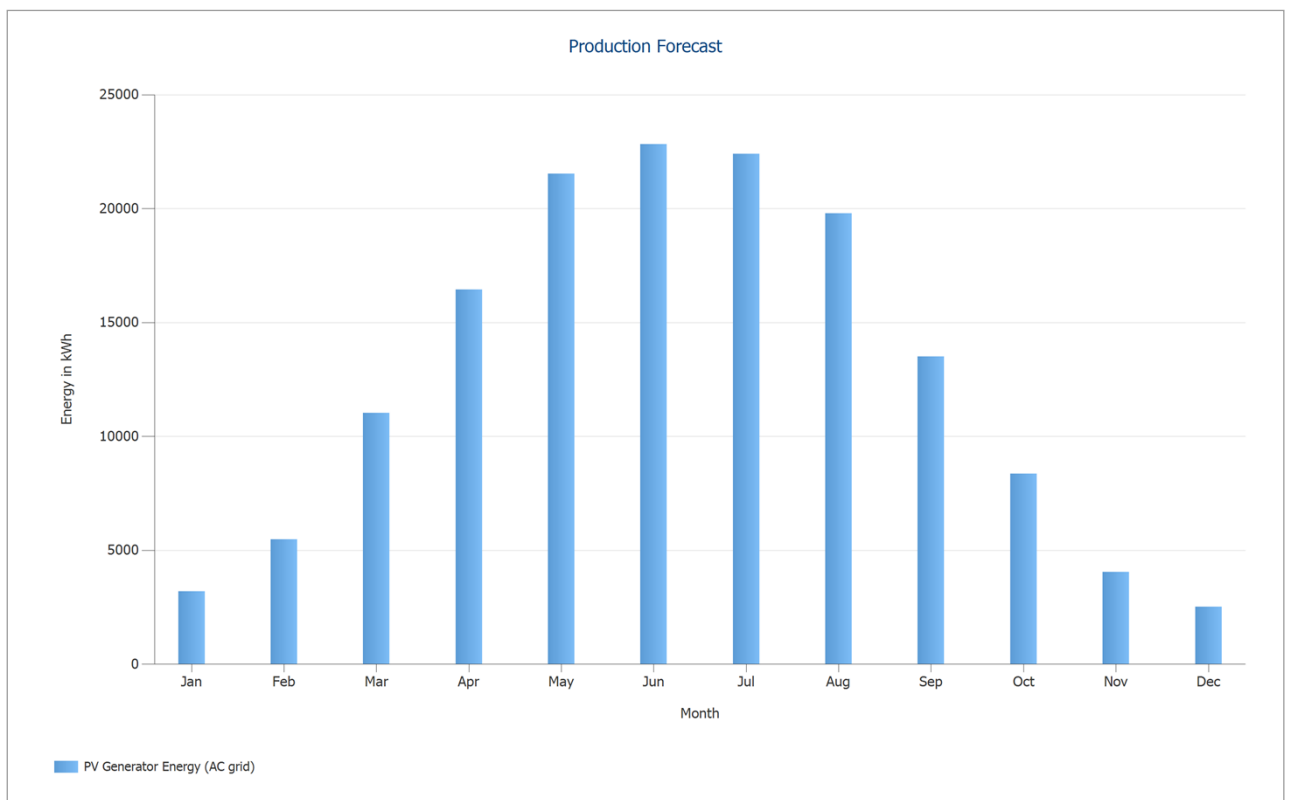


Figure: Production Forecast

PV System Energy Balance

PV System Energy Balance

Global radiation - horizontal	993.71 kWh/m²	
Deviation from standard spectrum	-9.94 kWh/m ²	-1.00 %
Ground Reflection (Albedo)	0.65 kWh/m ²	0.07 %
Orientation and inclination of the module surface	-4.60 kWh/m ²	-0.47 %
Module-independent shading	-4.37 kWh/m ²	-0.45 %
Reflection on the Module Surface	0.00 kWh/m ²	0.00 %
Irradiance on the rear side of the module	0.00 kWh/m ²	0.00 %
Global Radiation at the Module	975.45 kWh/m²	
	975.45 kWh/m ²	
	x 697.224 m ²	
	= 680,105.19 kWh	
Global PV Radiation	680,105.19 kWh	
Bifaciality (54.4 % of back irradiance)	0.00 kWh	0.00 %
Soiling	0.00 kWh	0.00 %
STC Conversion (Rated Efficiency of Module 23.65 %)	-519,271.86 kWh	-76.35 %
Rated PV Energy	160,833.33 kWh	
Module-specific Partial Shading	-2,040.55 kWh	-1.27 %
Low-light performance	763.51 kWh	0.48 %
Deviation from the nominal module temperature	-1,087.59 kWh	-0.68 %
Diodes	-28.23 kWh	-0.02 %
Mismatch (Manufacturer Information)	-3,168.81 kWh	-2.00 %
Mismatch (Configuration/Shading)	-678.60 kWh	-0.44 %
PV Energy (DC) without inverter clipping	154,593.07 kWh	
Failing to reach the DC start output	-5.97 kWh	0.00 %
Clipping on account of the MPP Voltage Range	-2.04 kWh	0.00 %
Clipping on account of the max. DC Current	0.00 kWh	0.00 %
Clipping on account of the max. DC Power	0.00 kWh	0.00 %
Clipping on account of the max. AC Power/cos phi	0.00 kWh	0.00 %
MPP Matching	-226.79 kWh	-0.15 %
PV energy (DC)	154,358.27 kWh	
Energy at the Inverter Input	154,358.27 kWh	
Input voltage deviates from rated voltage	-172.23 kWh	-0.11 %
DC/AC Conversion	-3,056.87 kWh	-1.98 %
Standby Consumption (Inverter)	-66.75 kWh	-0.04 %
Total Cable Losses	0.00 kWh	0.00 %
PV energy (AC) minus standby use	151,062.42 kWh	
PV Generator Energy (AC grid)	151,129.16 kWh	

Energy balance Sankey-Diagram

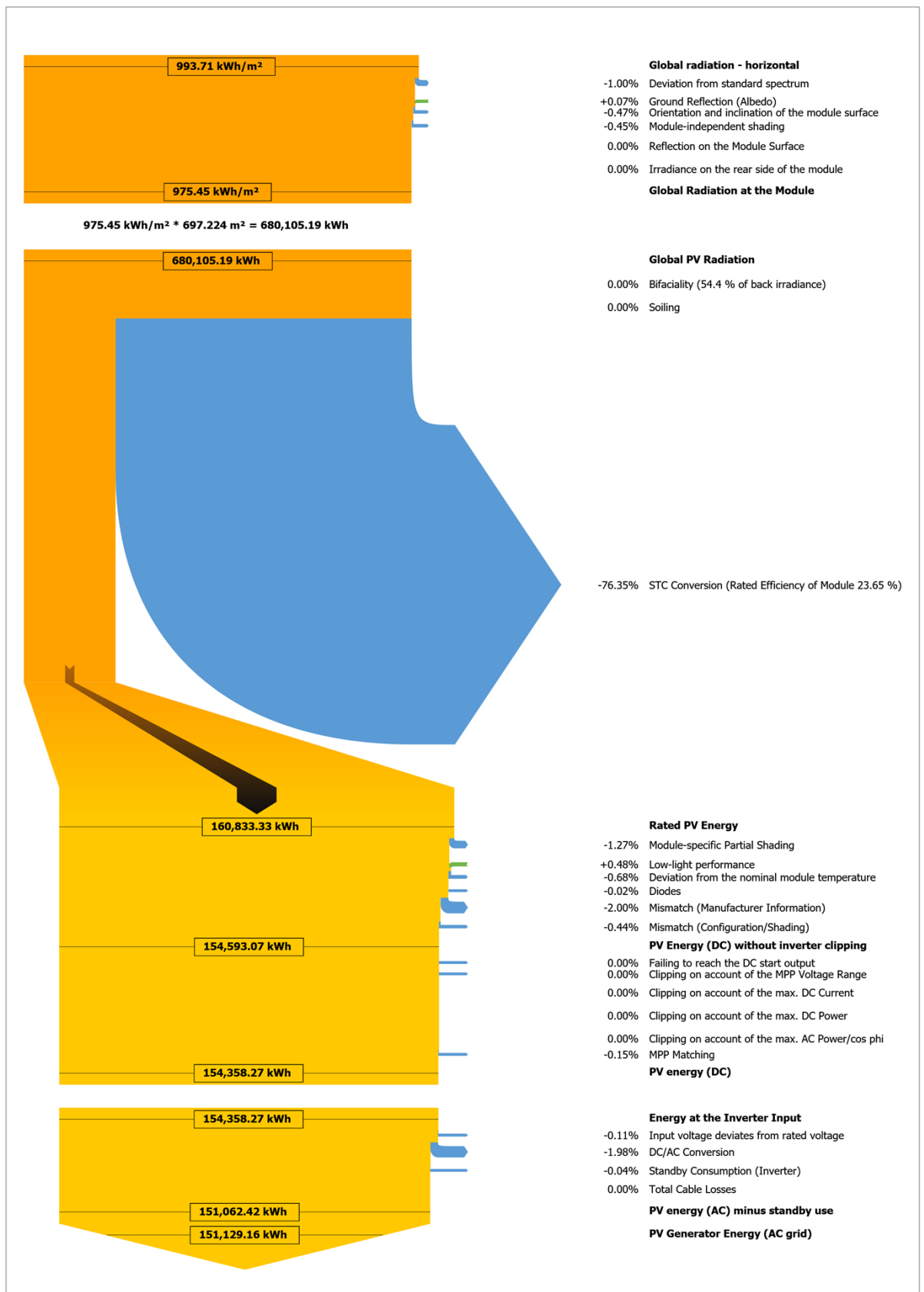


Figure: Energy balance Sankey-Diagram

Data Sheets

PV Module Data Sheet

PV Module: AIKO-A465-MAH54Mw (2nd Generation) (v2)

Manufacturer	Aiko
Available	Yes

Electrical Data

Cell Type	Si monocrystalline
Half-cell module	Yes
Cell Count	108
Number of Bypass Diodes	3
Loss voltage per bypass diode	1 V
Integrated power optimizer	No
Only Transformer Inverters suitable	No

I/V Characteristics at STC

MPP Voltage	34.68 V
MPP Current	13.41 A
Open Circuit Voltage	41.12 V
Short-Circuit Current	14.29 A
Increase open circuit voltage before stabilisation	0 %
Nominal output	465 W
Fill Factor	79.14 %
Efficiency	23.34 %

I/V Part Load Characteristics

Values source	Manufacturer/user-created
Irradiance	200 W/m ²
Voltage in MPP at Part Load	33.481 V
Current in MPP at Part Load	2.798 A
Open Circuit Voltage (Part Load)	38.579 V
Short Circuit Current at Part Load	2.902 A

Additional Parameters

Temperature Coefficient of Voc	-97 mV/K
Temperature Coefficient of Isc	8.13 mA/K
Temperature Coefficient of Pmpp	-0.26 %/K
Incident Angle Modifier (IAM)	100 %
Maximum System Voltage	1500 V

Mechanical Data

Width	1134 mm
Height	1757 mm
Depth	30 mm
Frame Width	26 mm
Weight	21.5 kg

PV Module: AIKO-G645-MCH72Dw (v2)

Manufacturer	Aiko
Available	Yes

Electrical Data

Cell Type	Si monocrystalline
Half-cell module	Yes
Cell Count	144
Number of Bypass Diodes	3
Loss voltage per bypass diode	1 V
Integrated power optimizer	No
Only Transformer Inverters suitable	No

I/V Characteristics at STC

MPP Voltage	45.21 V
MPP Current	14.27 A
Open Circuit Voltage	54.4 V
Short-Circuit Current	15.02 A
Increase open circuit voltage before stabilisation	0 %
Nominal output	645 W
Fill Factor	78.96 %
Efficiency	23.88 %

I/V Part Load Characteristics

Values source	Manufacturer/user-created
Irradiance	200 W/m ²
Voltage in MPP at Part Load	44.974 V
Current in MPP at Part Load	2.877 A
Open Circuit Voltage (Part Load)	51.448 V
Short Circuit Current at Part Load	3.004 A

Additional Parameters

Temperature Coefficient of Voc	-220 mV/K
Temperature Coefficient of Isc	5 mA/K
Temperature Coefficient of Pmpp	-0.26 %/K
Incident Angle Modifier (IAM)	100 %
Bifacial factor	70 %
Maximum System Voltage	1500 V

Mechanical Data

Width	1134 mm
Height	2382 mm
Depth	30 mm
Frame Width	30 mm
Weight	33.5 kg

Inverter Data Sheet

Inverter: S5-GC36K (v2)

Manufacturer	Ginlong (Solis)
Available	Yes
Electrical data - DC	
DC nominal output	36 kW
Max. DC Power	70.4 kW
Nom. DC Voltage	600 V
Max. Input Voltage	1100 V
Max. Input Current	128 A
Max. short circuit current	160 A
Number of DC Inlets	8
Electrical data - AC	
AC Power Rating	36 kW
Max. AC Power	39.6 kVA
Nom. AC Voltage	230 V
Number of Phases	3
With Transformer	No
Electrical data - other	
Change in Efficiency when Input Voltage deviates from Rated Voltage	0.15 %/100V
Min. Feed-in Power	35 W
Standby Consumption	10 W
Night Consumption	1 W
MPP Tracker	
Output Range < 20% of Power Rating	99.6 %
Output Range > 20% of Power Rating	99.9 %
Count of MPP Trackers	4
MPP Tracker 1-4	
Max. Input Current	32 A
Max. short circuit current	40 A
Max. Input Power	17.6 kW
Min. MPP Voltage	200 V
Max. MPP Voltage	1000 V

Inverter: S5-GR3P17K (v2)

Manufacturer	Ginlong (Solis)
Available	Yes

Electrical data - DC

DC nominal output	17 kW
Max. DC Power	30 kW
Nom. DC Voltage	600 V
Max. Input Voltage	1100 V
Max. Input Current	64 A
Max. short circuit current	80 A
Number of DC Inlets	4

Electrical data - AC

AC Power Rating	17 kW
Max. AC Power	18.7 kVA
Nom. AC Voltage	230 V
Number of Phases	3
With Transformer	No

Electrical data - other

Change in Efficiency when Input Voltage deviates from Rated Voltage	0.2 %/100V
Min. Feed-in Power	2 W
Standby Consumption	10 W
Night Consumption	1 W

MPP Tracker

Output Range < 20% of Power Rating	99.6 %
Output Range > 20% of Power Rating	99.9 %
Count of MPP Trackers	2

MPP Tracker 1-2

Max. Input Current	32 A
Max. short circuit current	40 A
Max. Input Power	15 kW
Min. MPP Voltage	160 V
Max. MPP Voltage	1000 V

Plans and parts list

Circuit Diagram

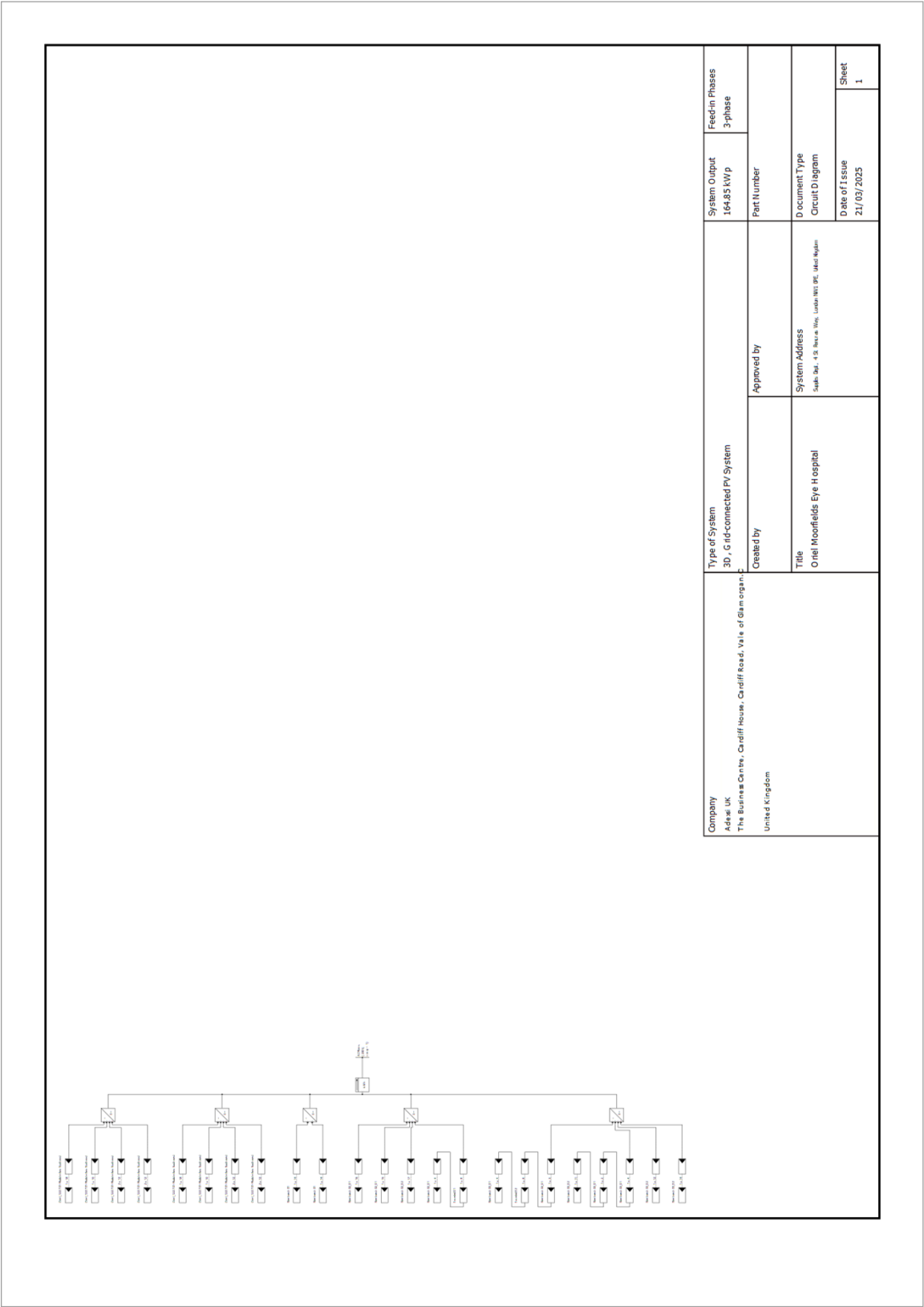


Figure: Circuit Diagram

Overview plan

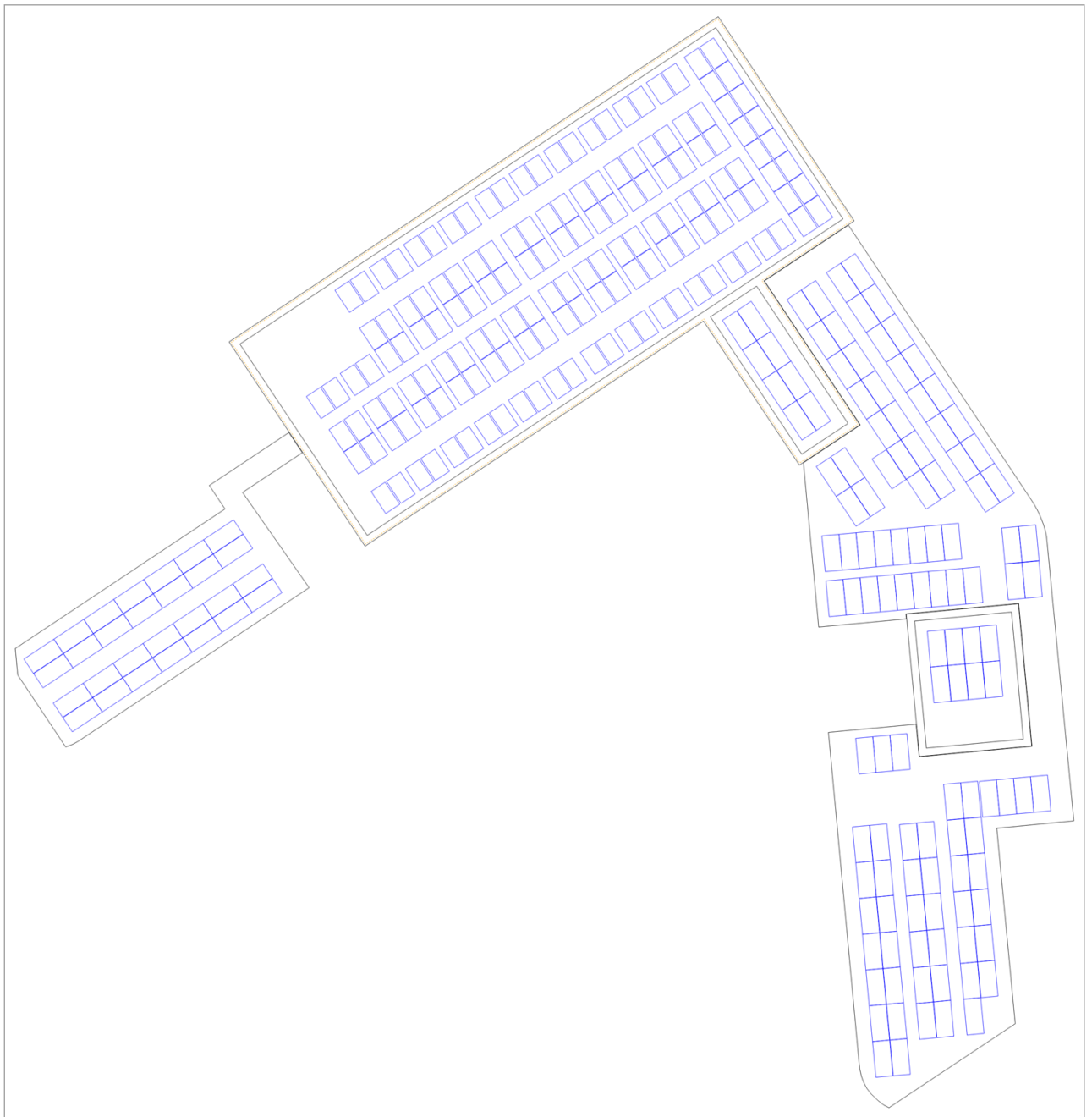


Figure: Overview plan

Dimensioning Plan

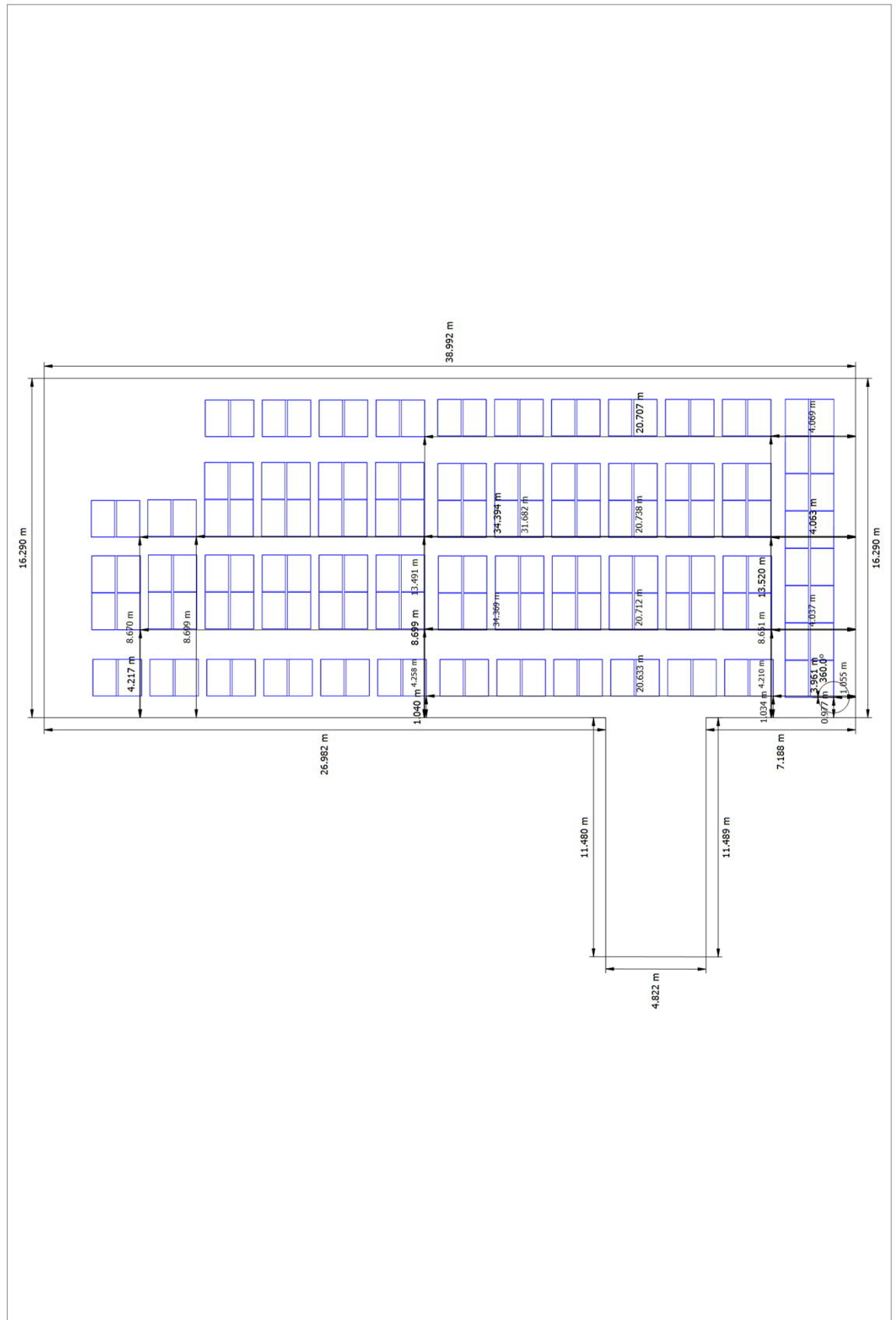


Figure: Oriel_12.07 01 - Area 1-Northeast

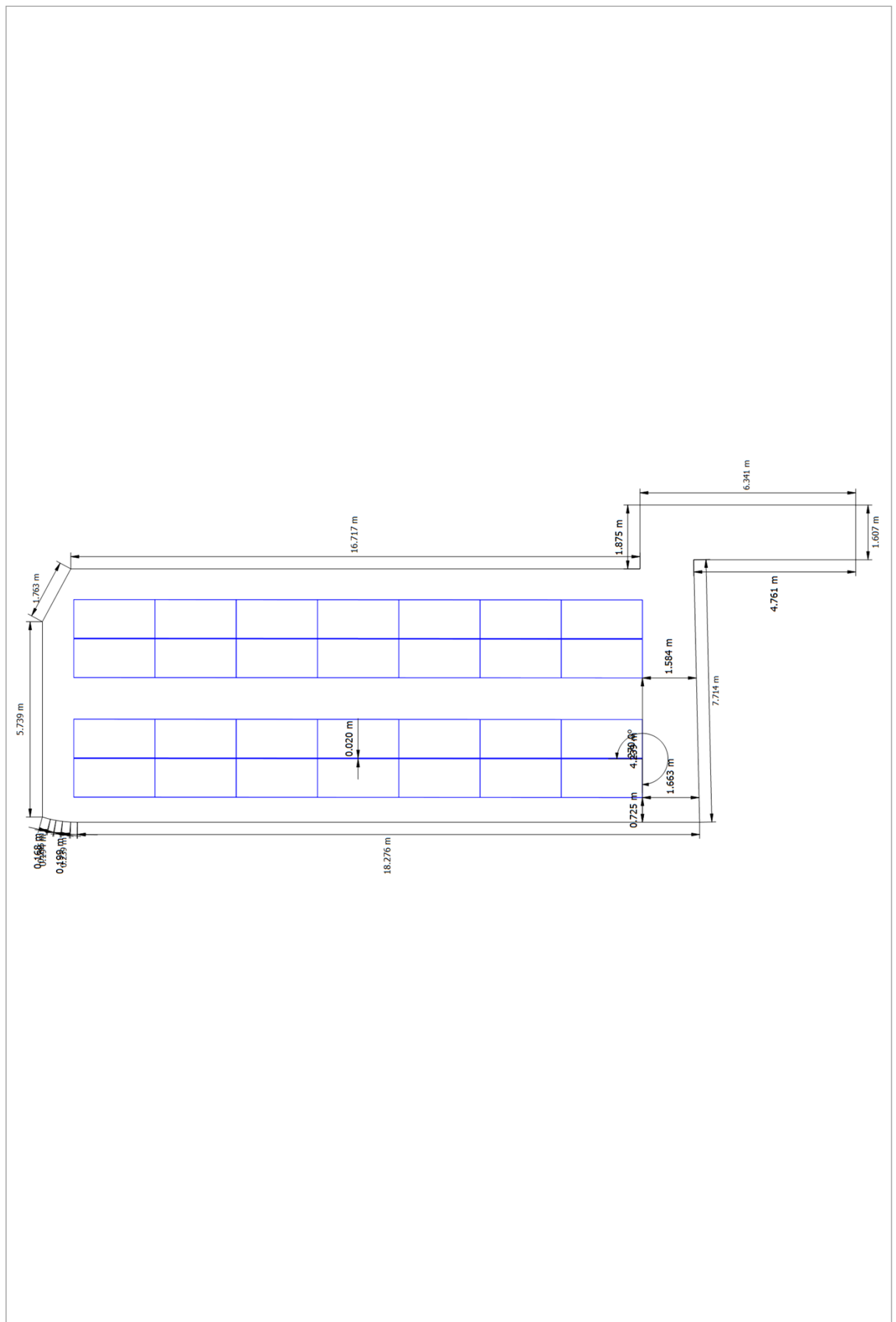


Figure: Oriel_12.07 01 - Area 3-Northeast

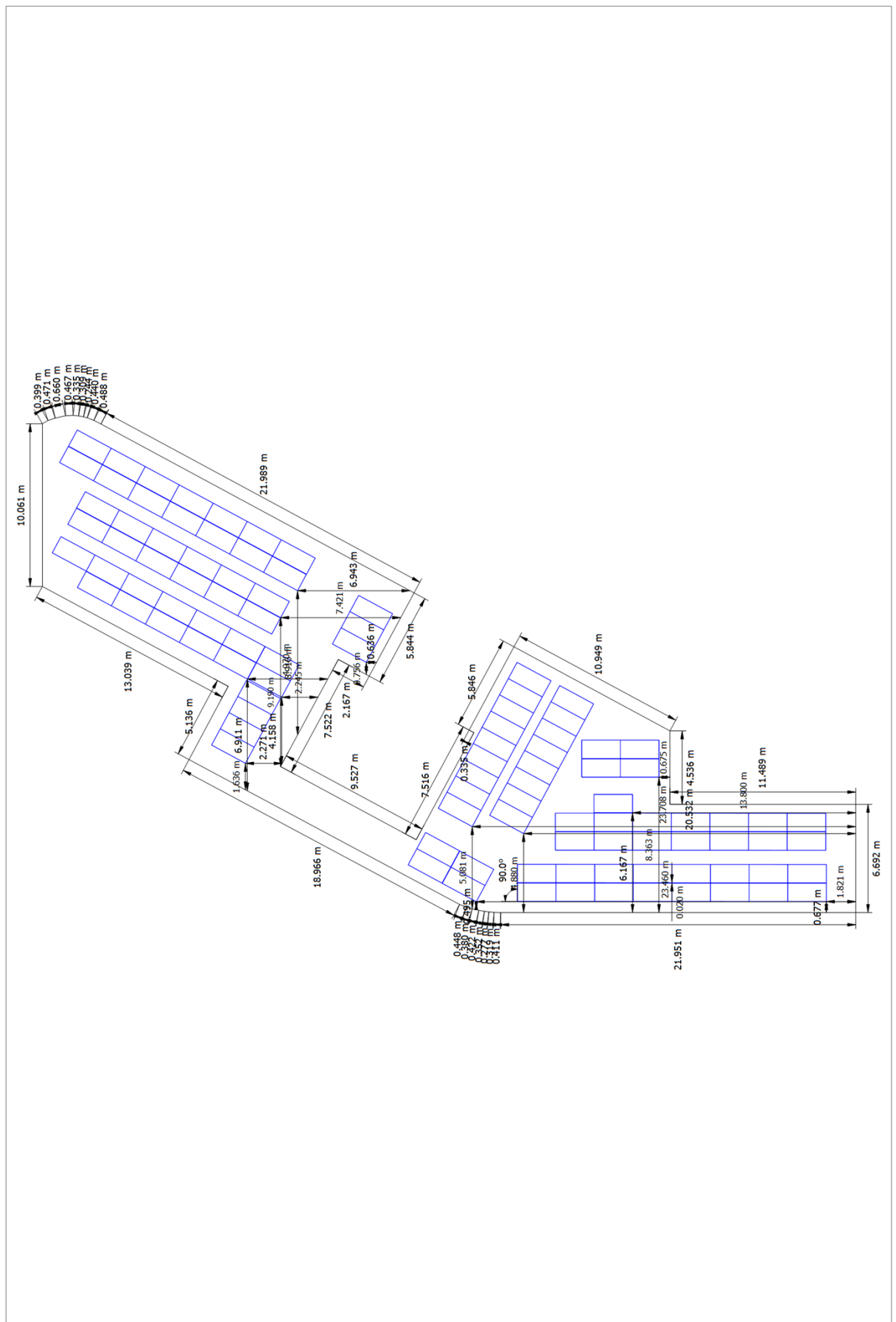


Figure: Oriel_12.07 01 - Area 4-Northwest

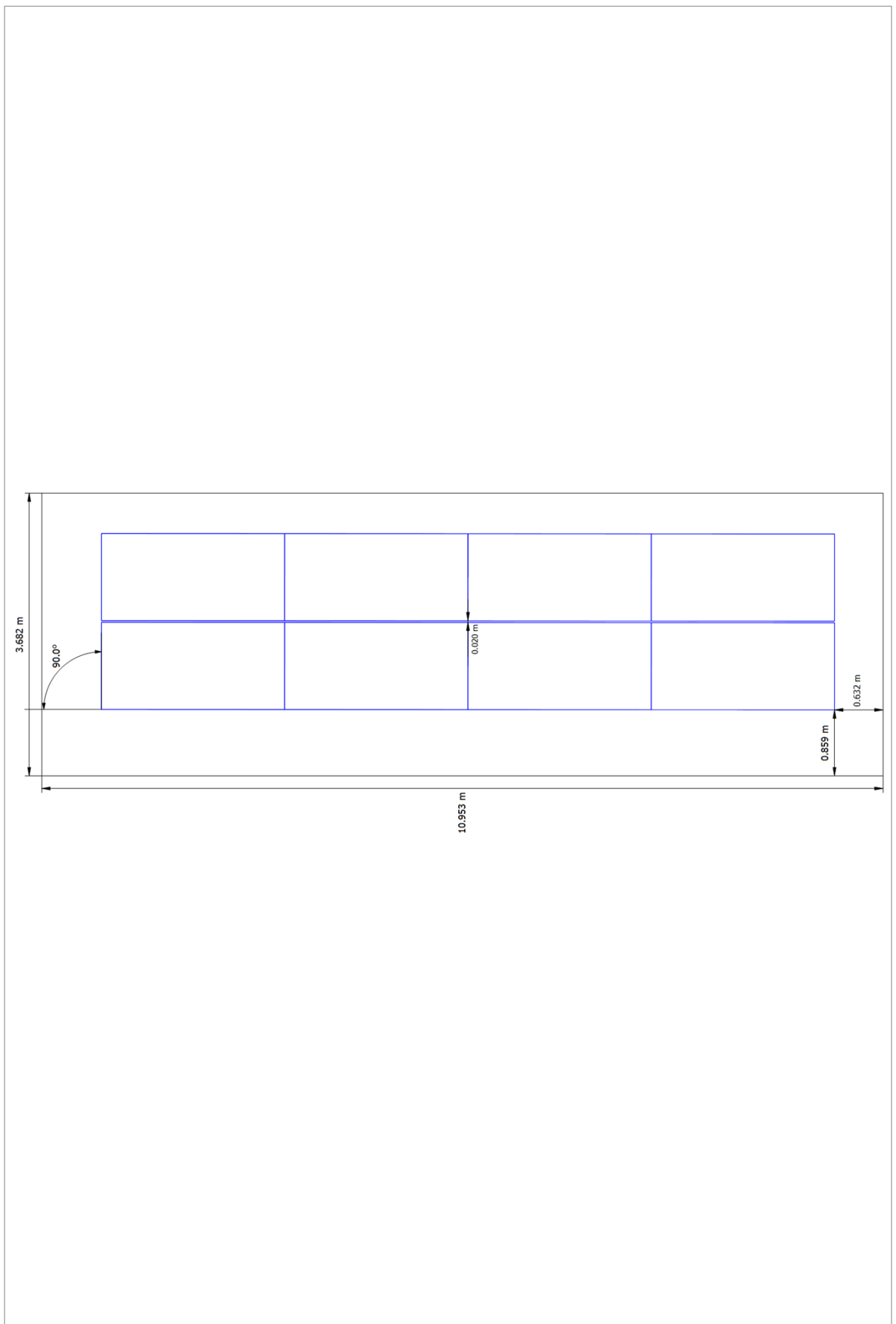


Figure: Oriel_12.07 01 - Area 6-Northwest

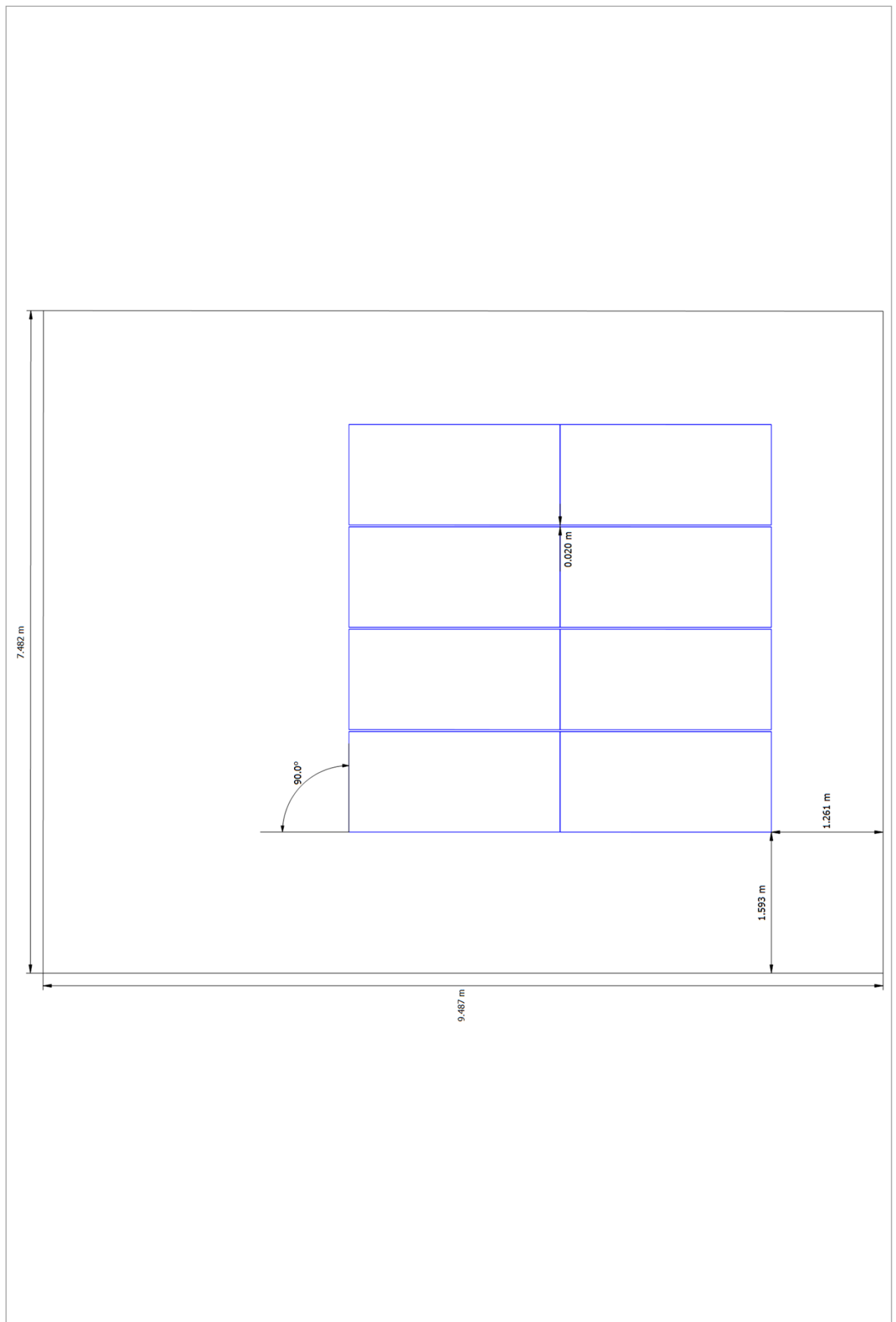


Figure: Oriel_12.07 01 - Area 2-North

String Plan

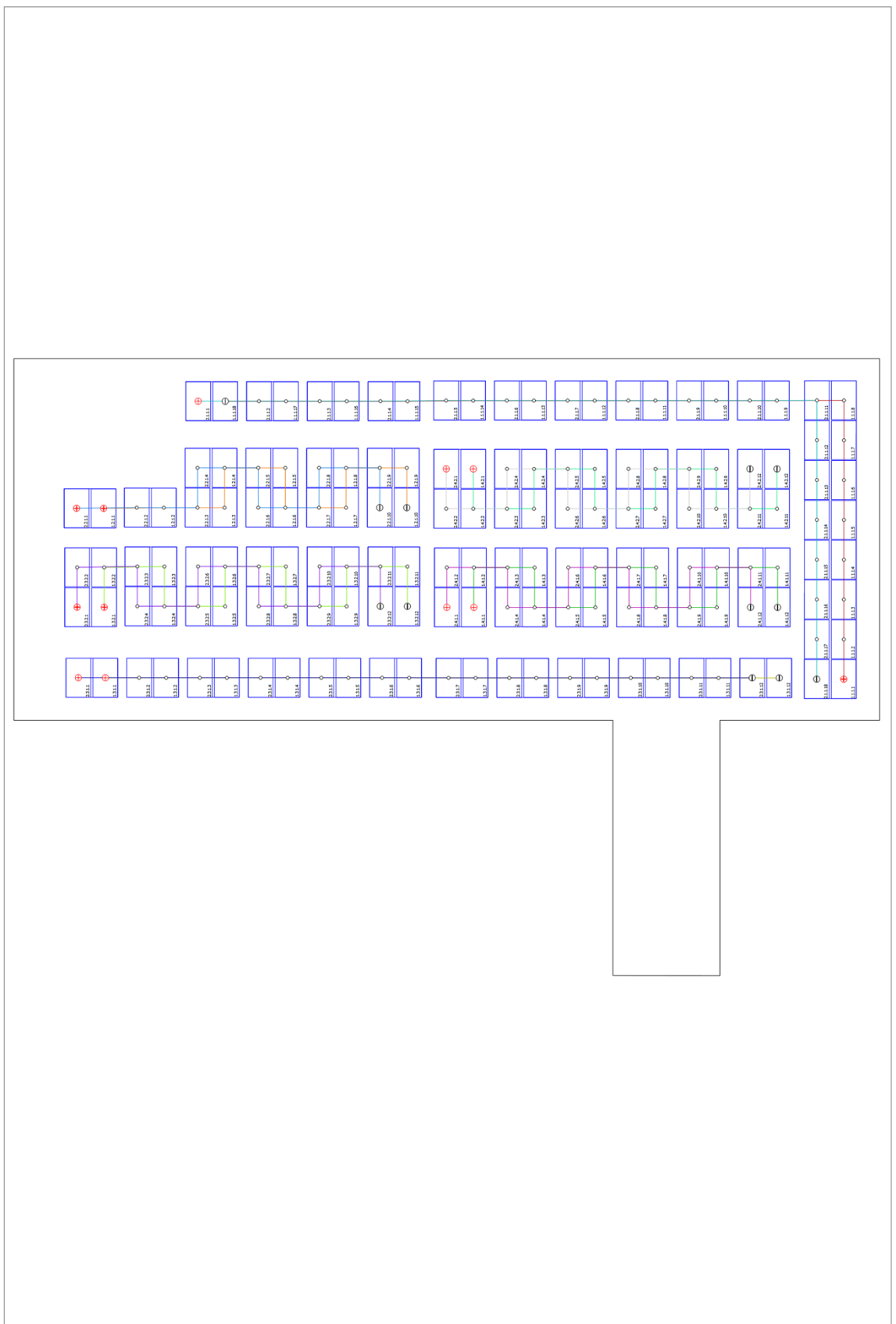


Figure: Oriel_12.07 01 - Area 1-Northeast

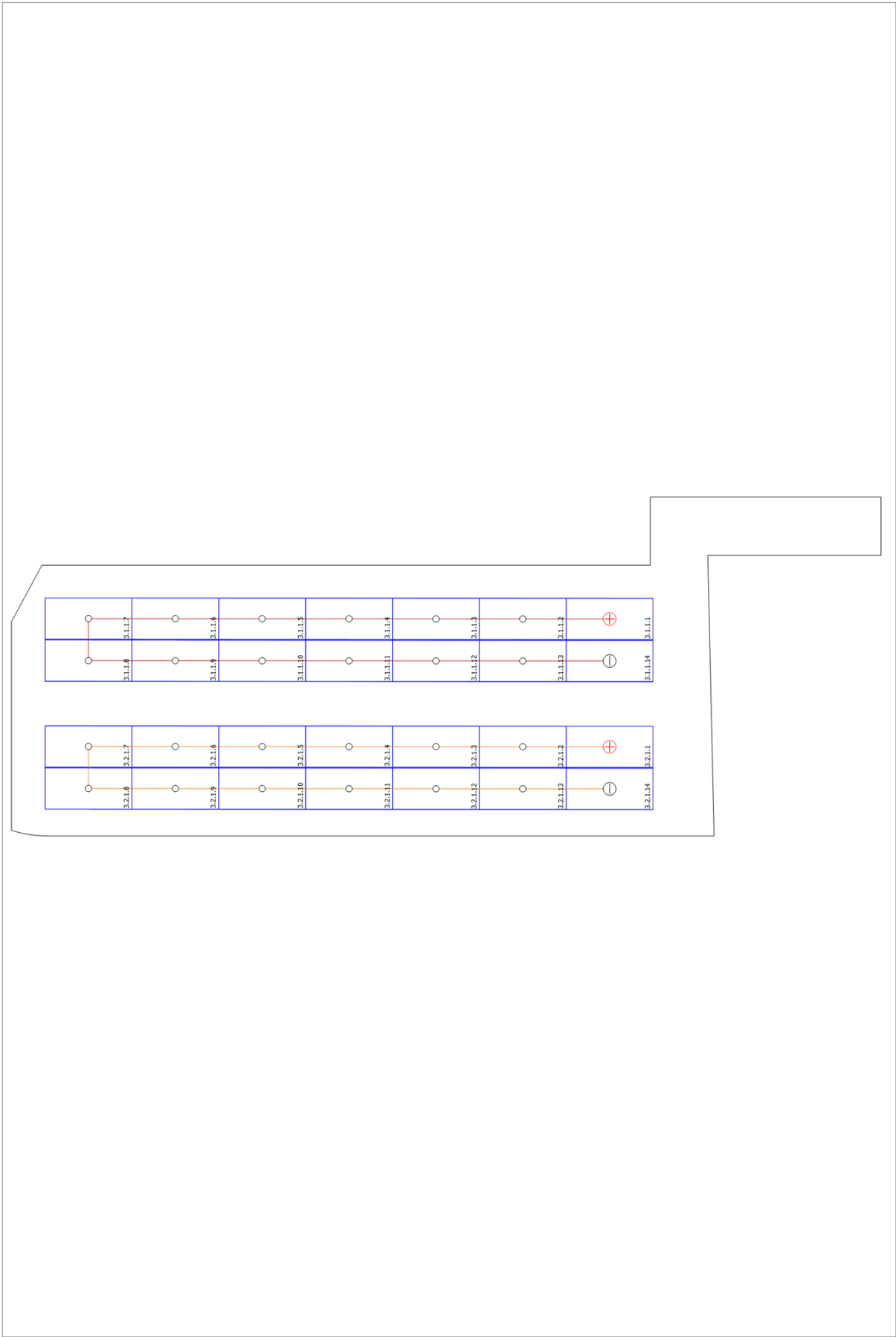


Figure: Oriel_12.07 01 - Area 3-Northeast

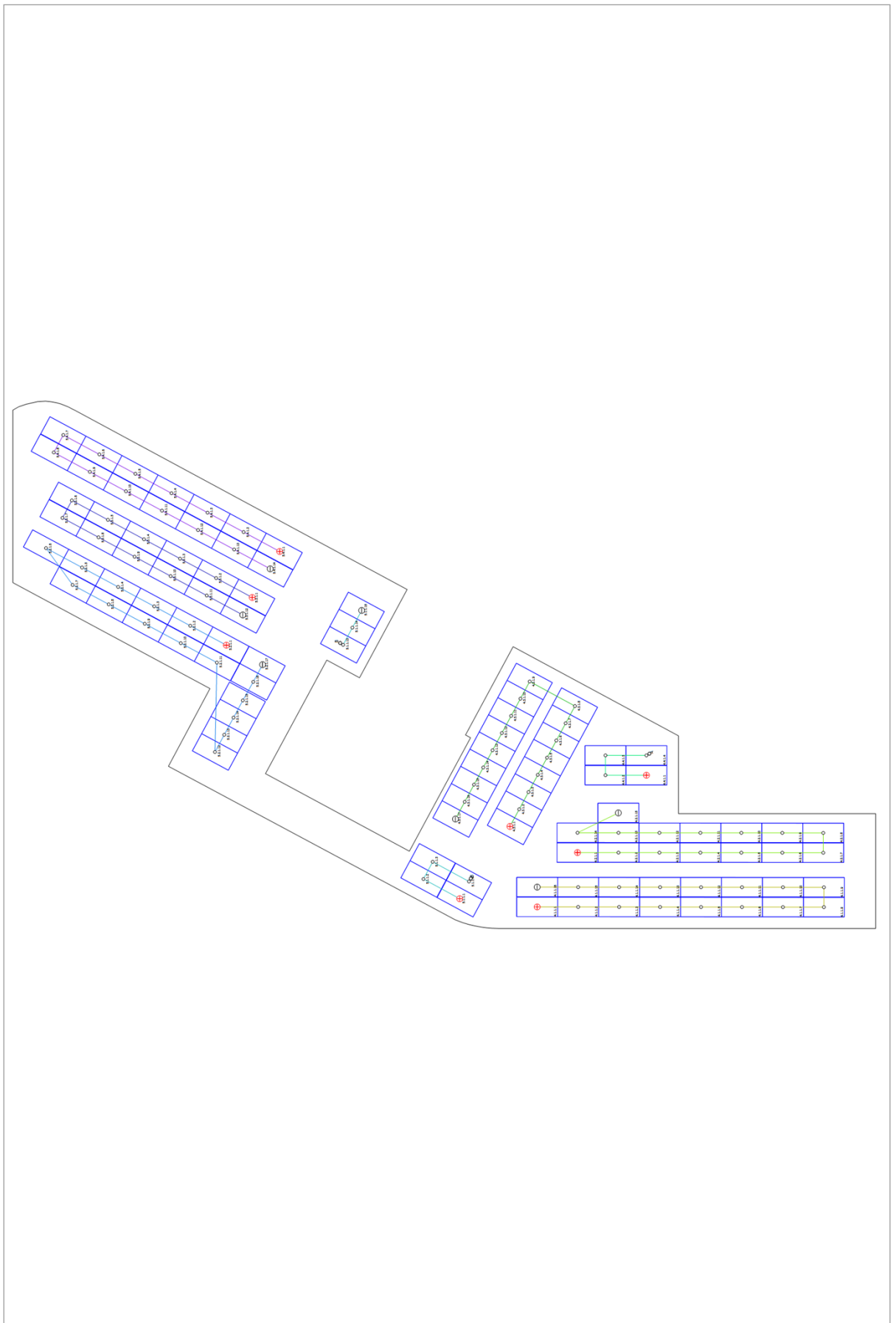


Figure: Oriel_12.07 01 - Area 4-Northwest

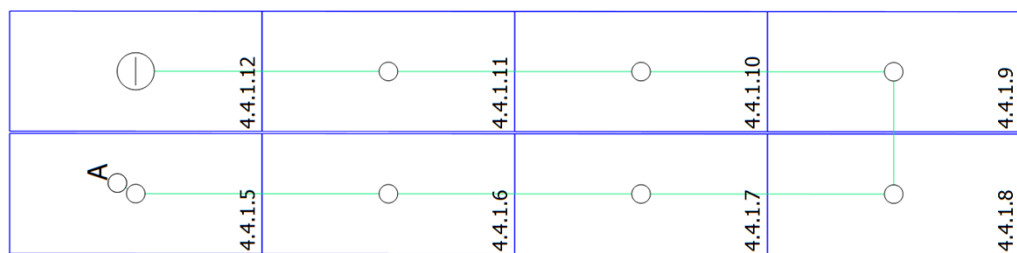


Figure: Oriel_12.07 01 - Area 6-Northwest

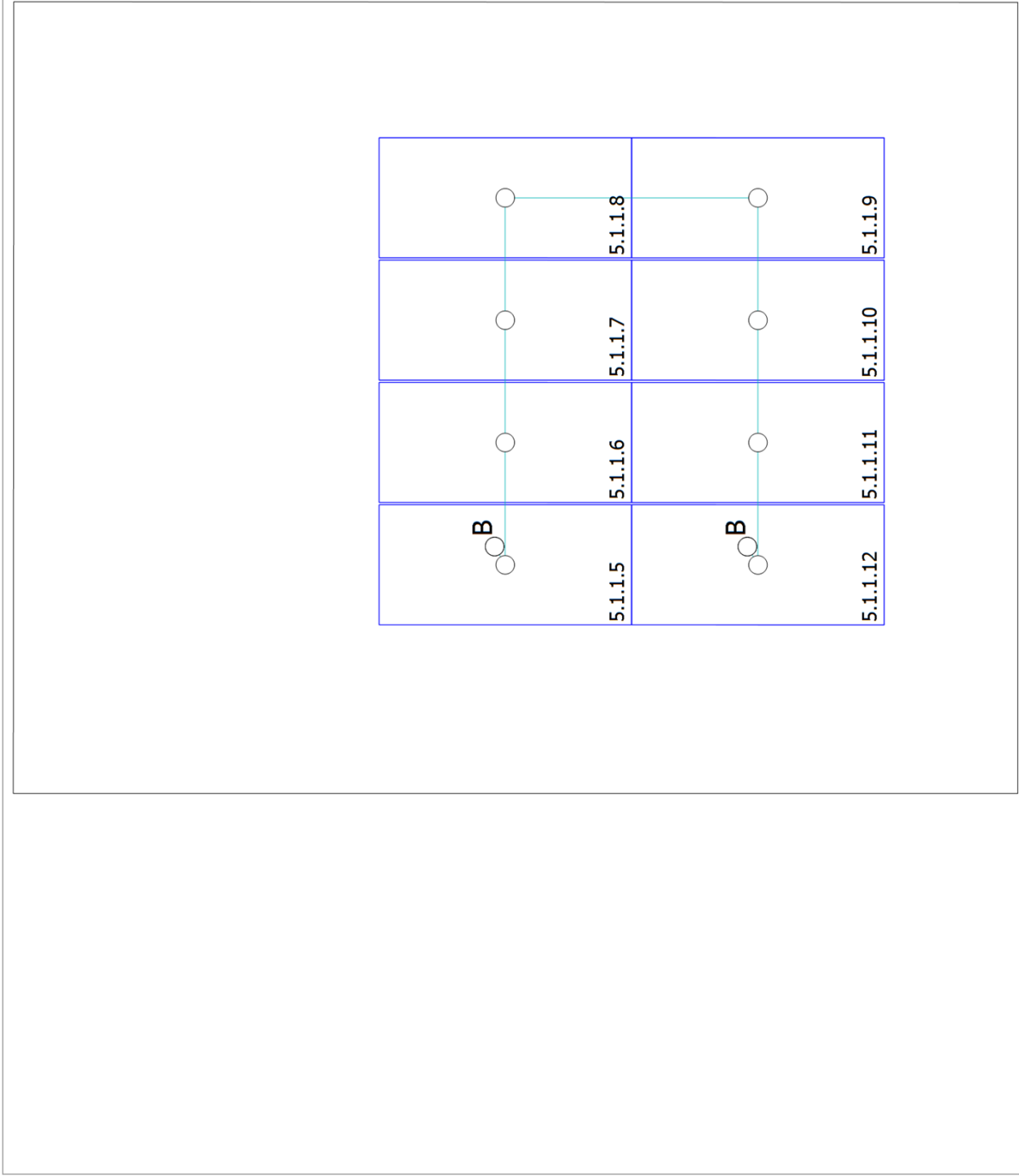


Figure: Oriel_12.07 01 - Area 2-North

Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Aiko	AIKO-A465- MAH54Mw (2nd Generation)	152	Piece
2	PV Module		Aiko	AIKO-G645- MCH72Dw	146	Piece
3	Inverter		Ginlong (Solis)	S5-GC36K	4	Piece
4	Inverter		Ginlong (Solis)	S5-GR3P17K	1	Piece
5	Components			Feed-in Meter	1	Piece

Screenshots, 3D Design Environment

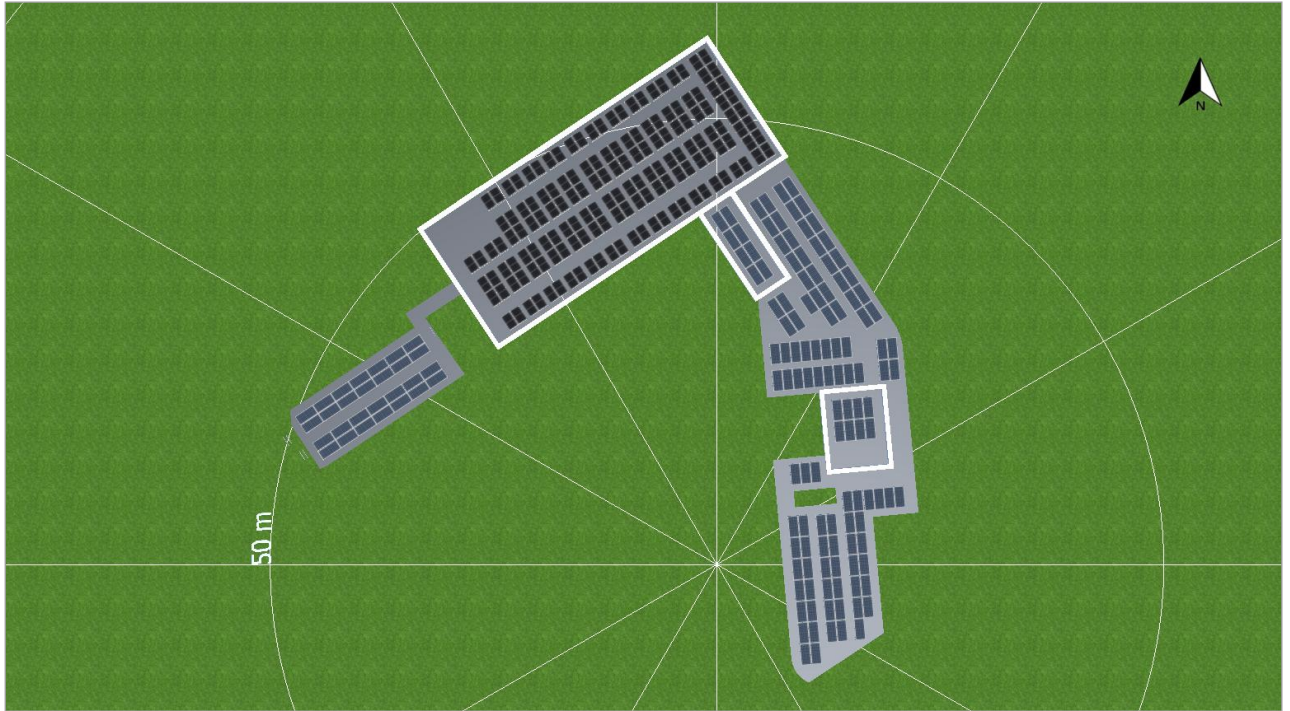


Figure: Shade Environment

Module Areas

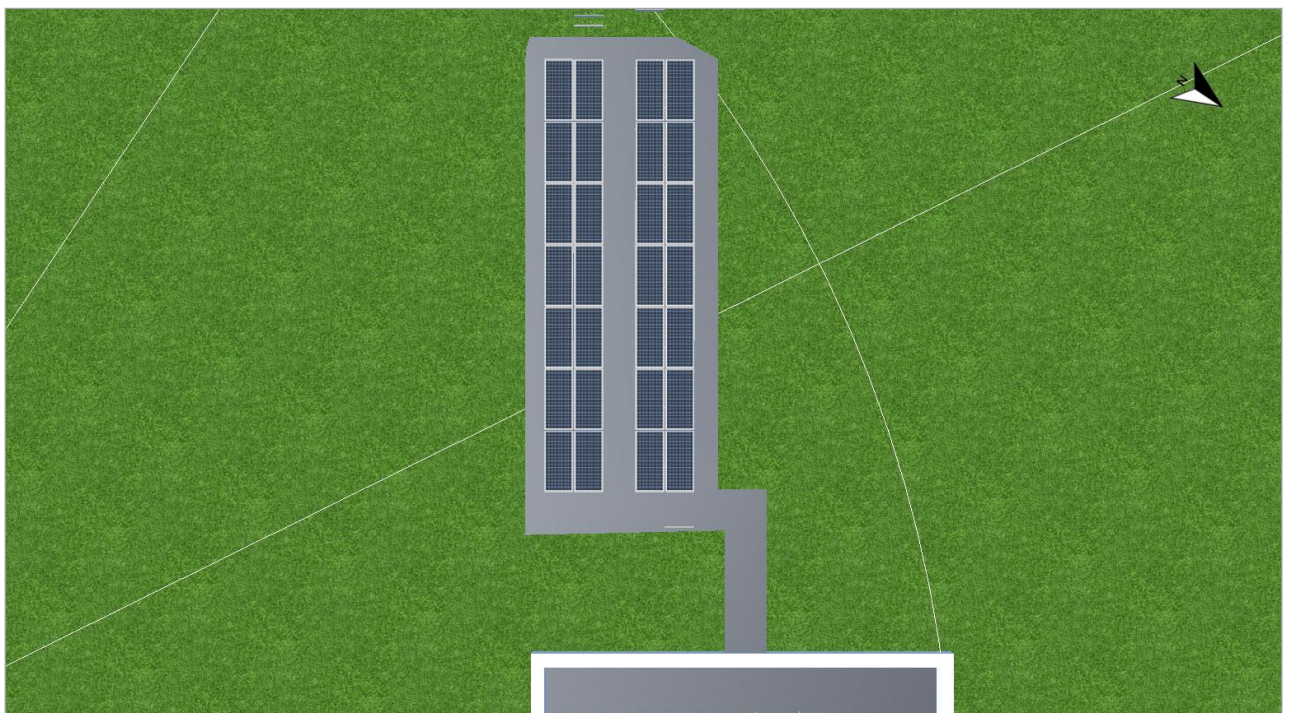


Figure: Steelmesh Area 01

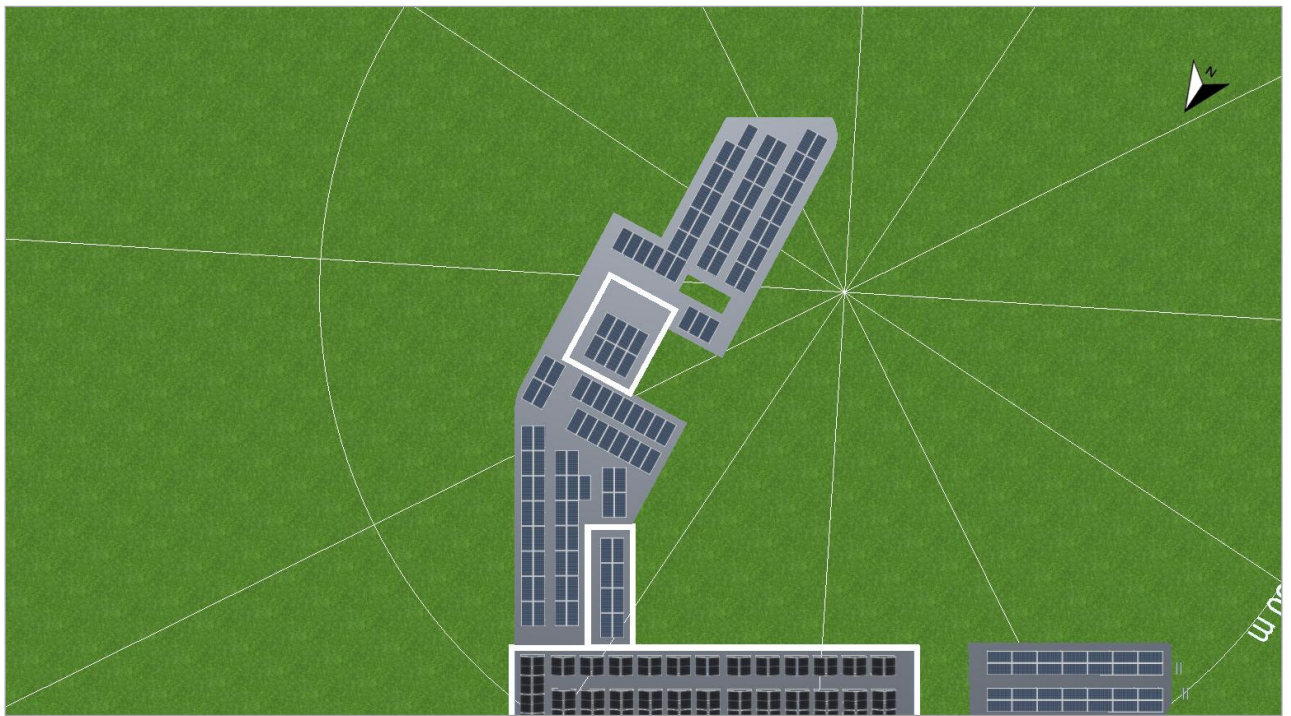


Figure: Steelwork Area 02 and 03

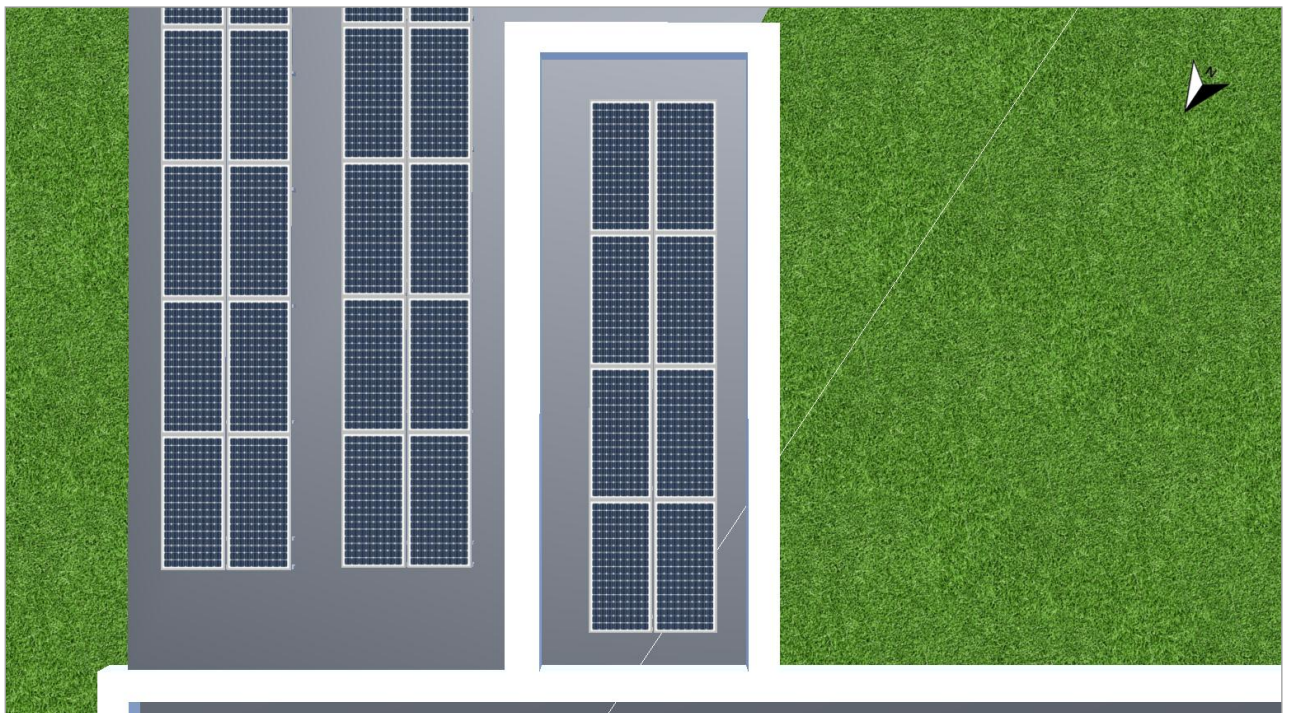


Figure: Inverted roof 01

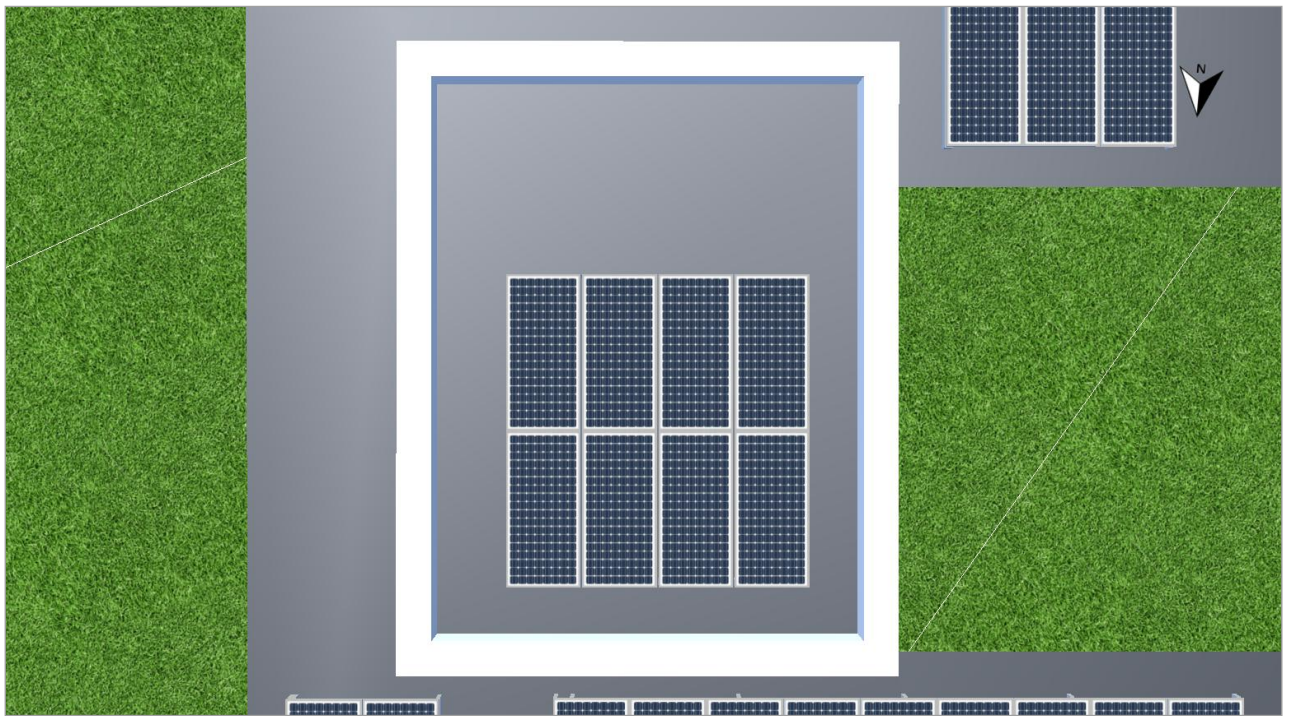


Figure: Inverted roof 02



Figure: Brown roof

Configuration



Figure: Inverter 01_02

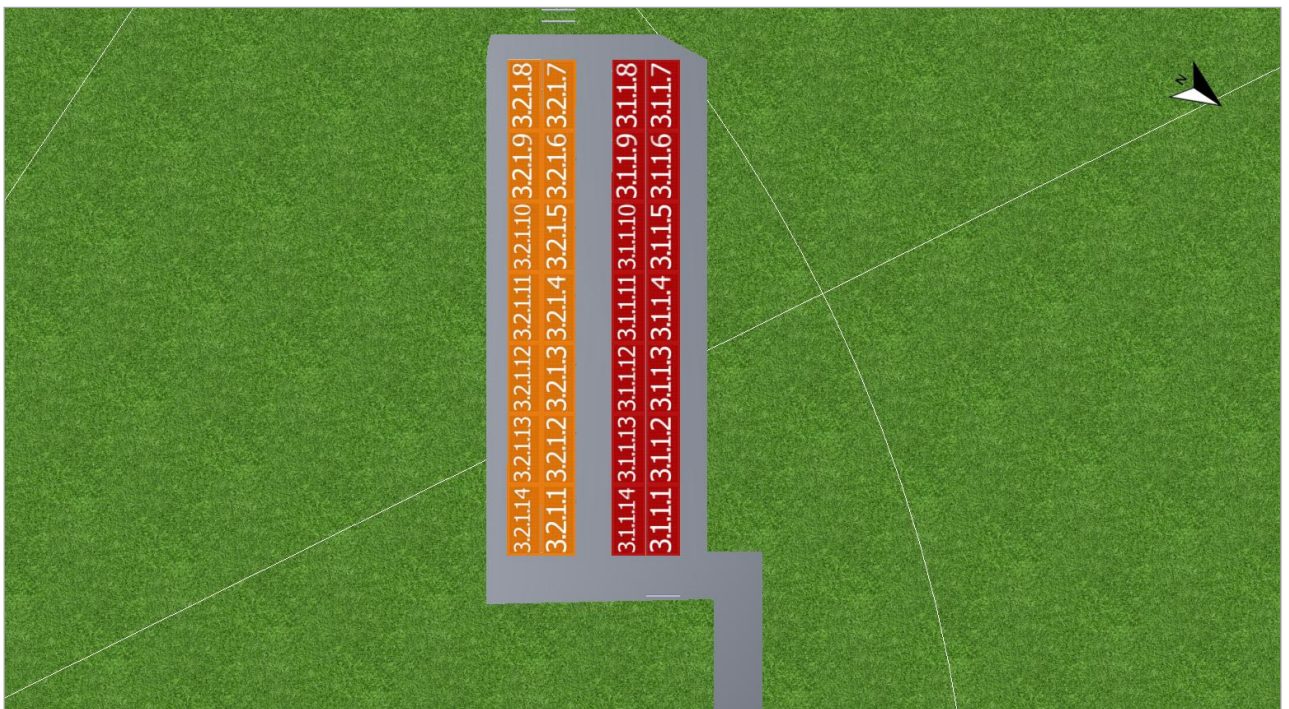


Figure: Inverter 02

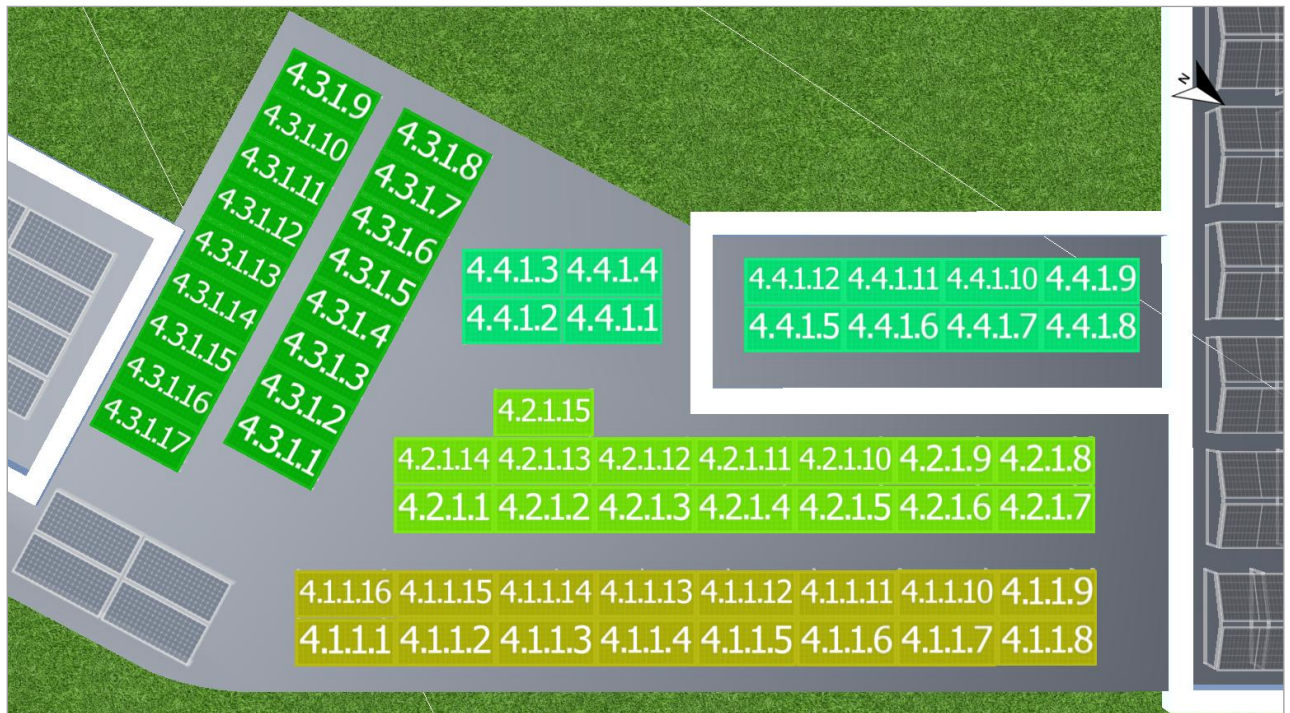


Figure: Inverter 04

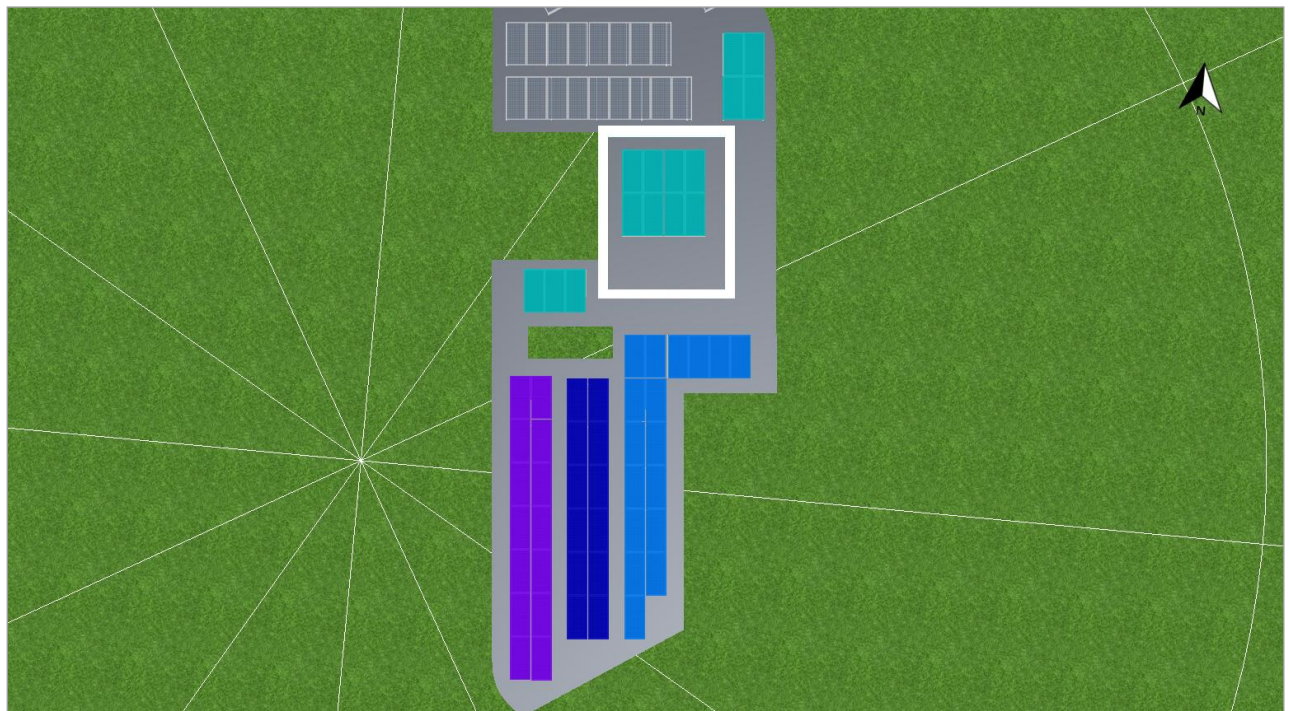


Figure: Inverter 05

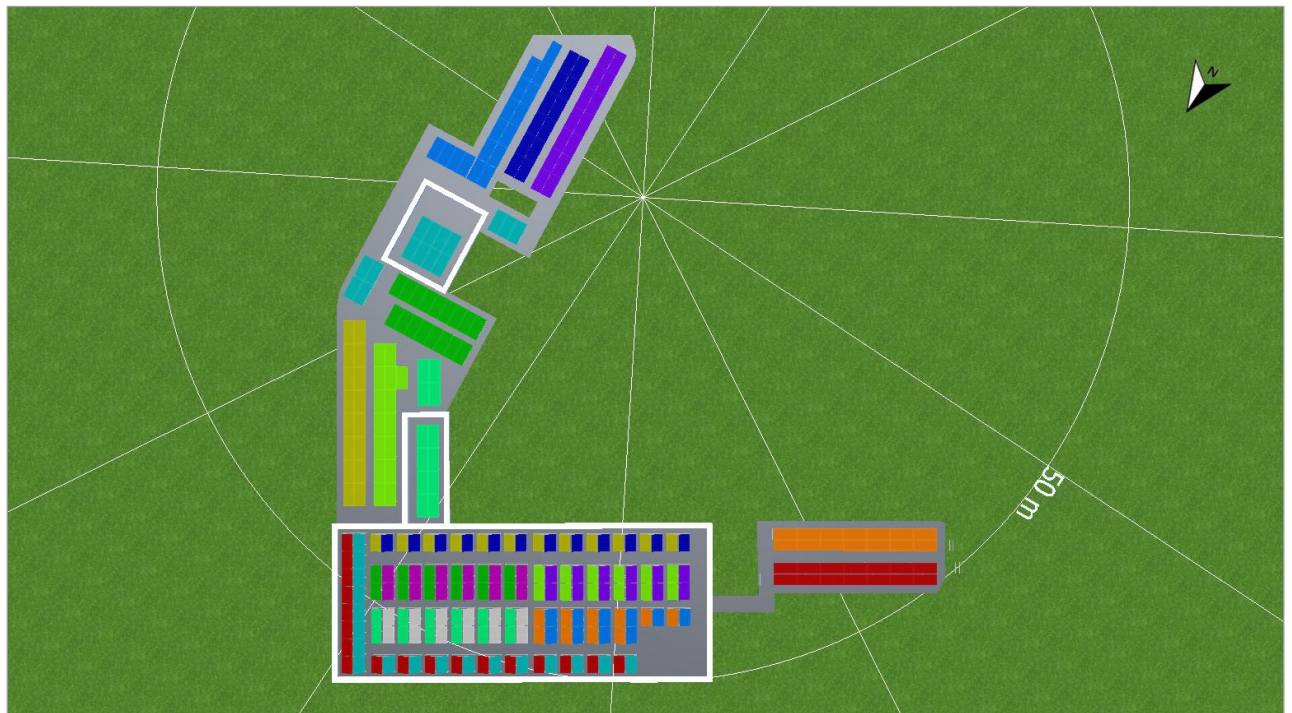


Figure: System configuration

Shading



Figure: Brown roof shading

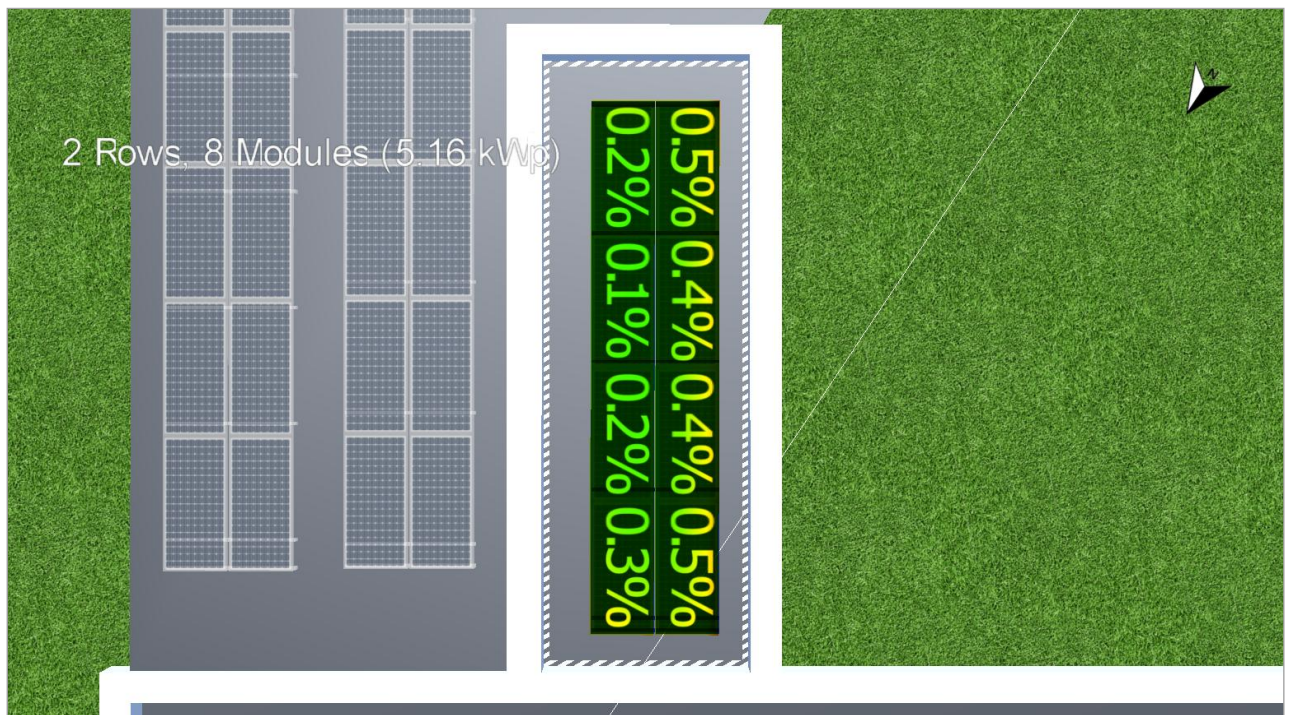


Figure: Inverted roof 01 shading