

Environmental Roofing Services Ltd
199 Chaddock Lane
Worsley
M28 1DW

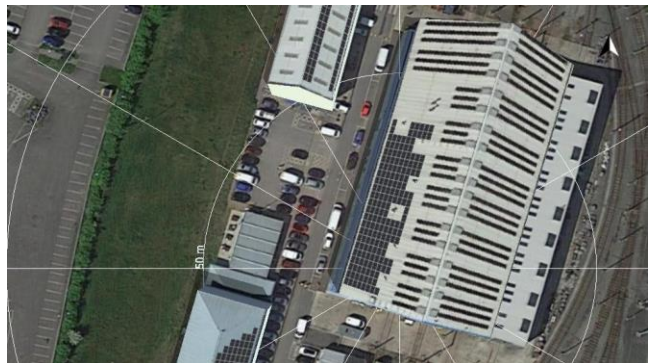
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Project Name: WEL4562 - Metrolink - M8 ORX
Offer no.: WEL4562 - Metrolink - M8 ORX

16/06/2021

Your PV system from Environmental Roofing Services Ltd

Address of Installation



Project Overview

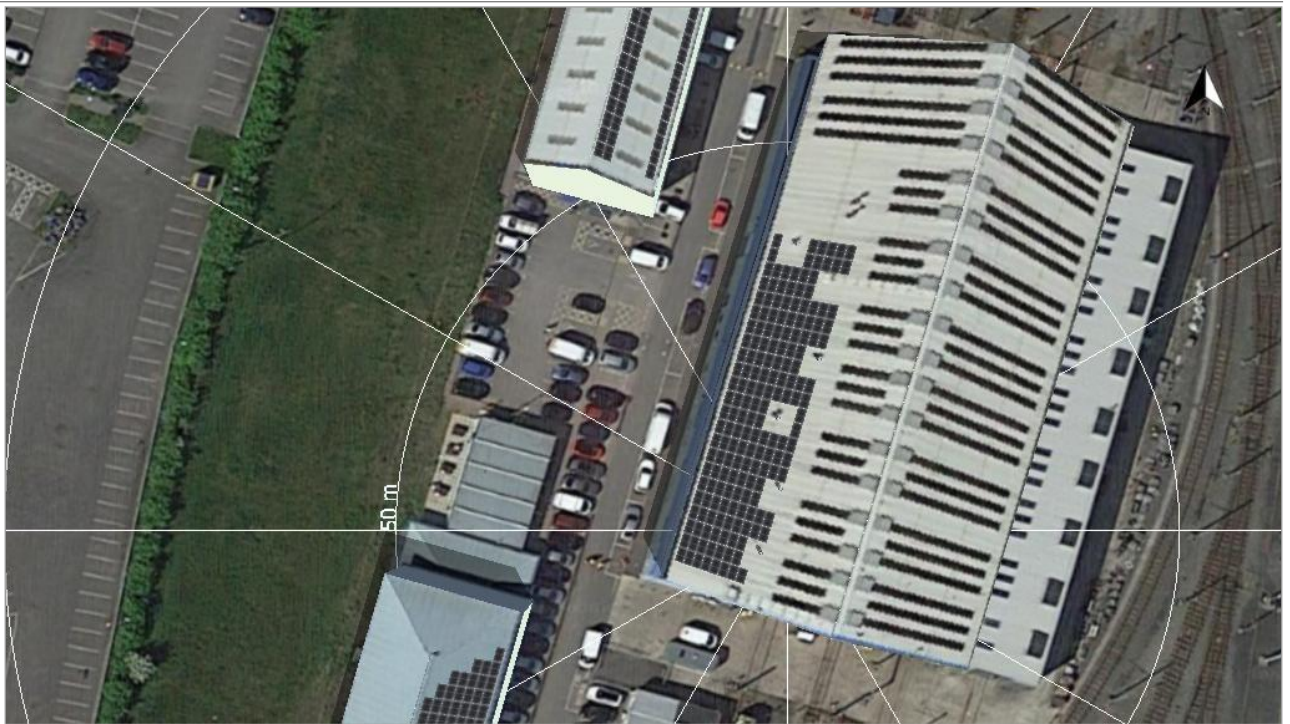


Figure: Overview Image, 3D Design

PV System

3D, Grid-connected PV System

Climate Data	Manchester-Ringway, GBR (2000 - 2009)
PV Generator Output	129.6 kWp
PV Generator Surface	622.9 m ²
Number of PV Modules	324
Number of Inverters	3

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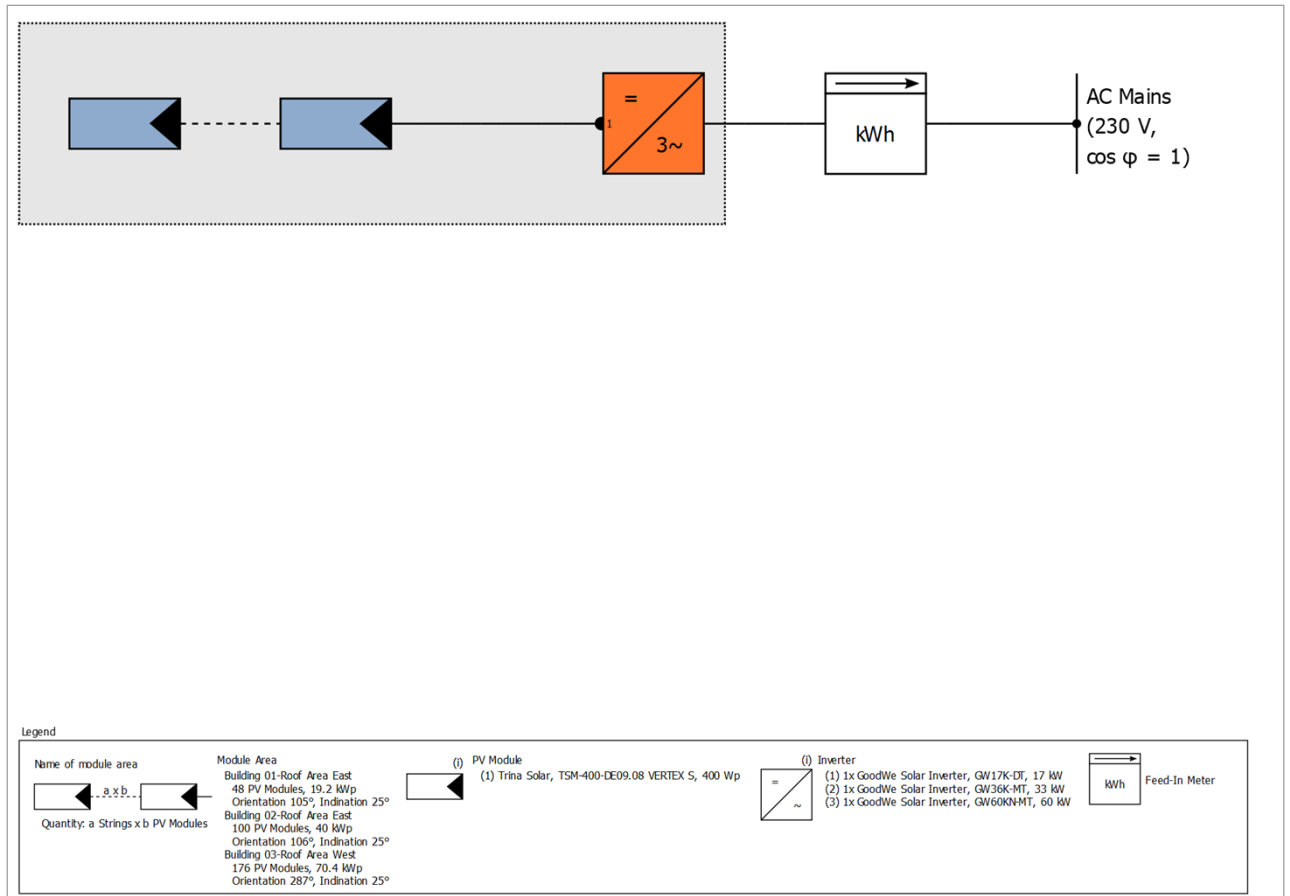


Figure: Schematic diagram

The yield

The yield

PV Generator Energy (AC grid)	101,485 kWh
Grid Feed-in	101,485 kWh
Down-regulation at Feed-in Point	0 kWh
Own Power Consumption	0.0 %
Solar Fraction	0.0 %
Spec. Annual Yield	782.58 kWh/kWp
Performance Ratio (PR)	92.0 %
Yield Reduction due to Shading	1.6 %/Year
CO ₂ Emissions avoided	47,668 kg / year

Financial Analysis

Your Gain

Total investment costs	194,400.00 £
Return on Assets	0.00 %
Amortization Period	More than 20 Years
Electricity Production Costs	0.1 £/kWh
Energy Balance/Feed-in Concept	Full Feed-in

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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, Gri

Start of Operation

Climate Data

Location

Manch

GBR (2

Resolution of the data Simulation models used:

- Diffuse Irradiation onto Horizontal Plane
- Irradiance onto tilted surface

Module Areas

1. Module Area - Building 01-Roof Area East

PV Generator, 1. Module Area - Building 01-Roof Area East

Name

Building
East

PV Modules

48 x TSM-4
VERTEX S

Manufacturer

Inclination

Orientation

Installation Type

PV Generator Surface

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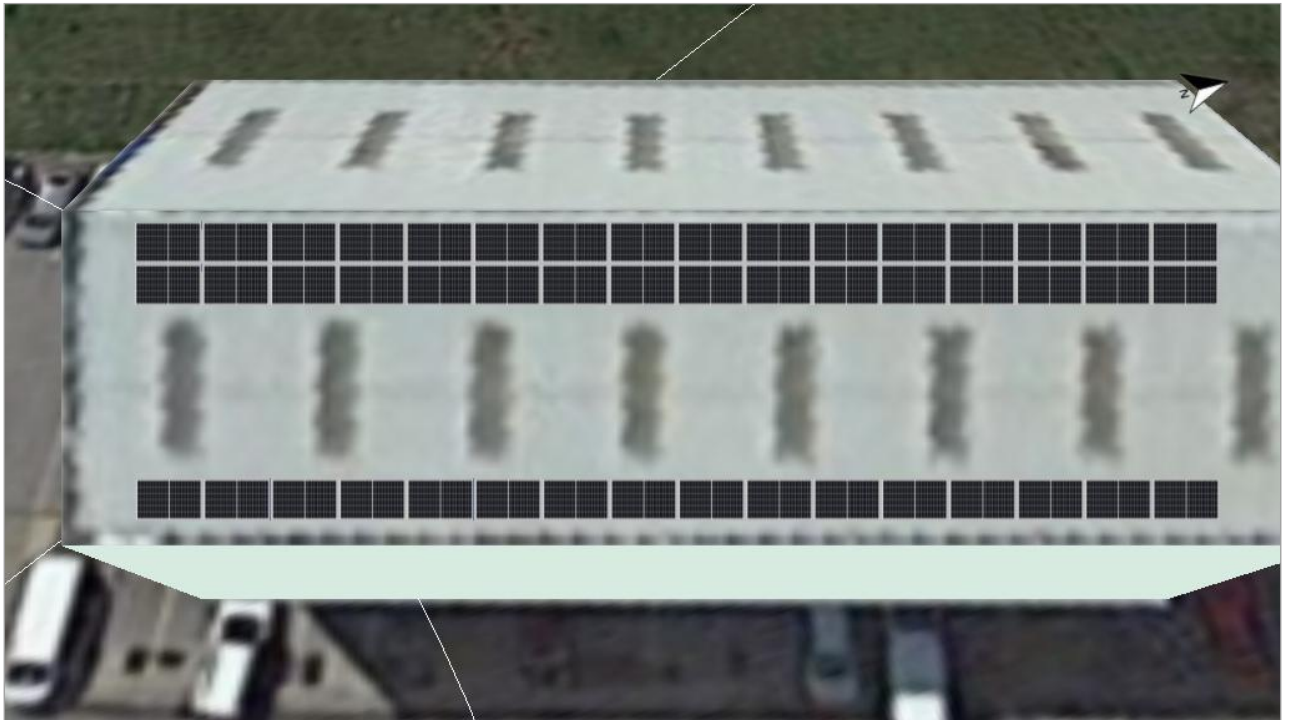


Figure: 1. Module Area - Building 01-Roof Area East

2. Module Area - Building 02-Roof Area East

PV Generator, 2. Module Area - Building 02-Roof Area East

Name	Building 02-Roof Area East
PV Modules	100 x TSM-400-DE09.08 VERTEX S (v1)
Manufacturer	Trina Solar
Inclination	25 °
Orientation	East 106 °
Installation Type	Roof parallel
PV Generator Surface	192.2 m ²

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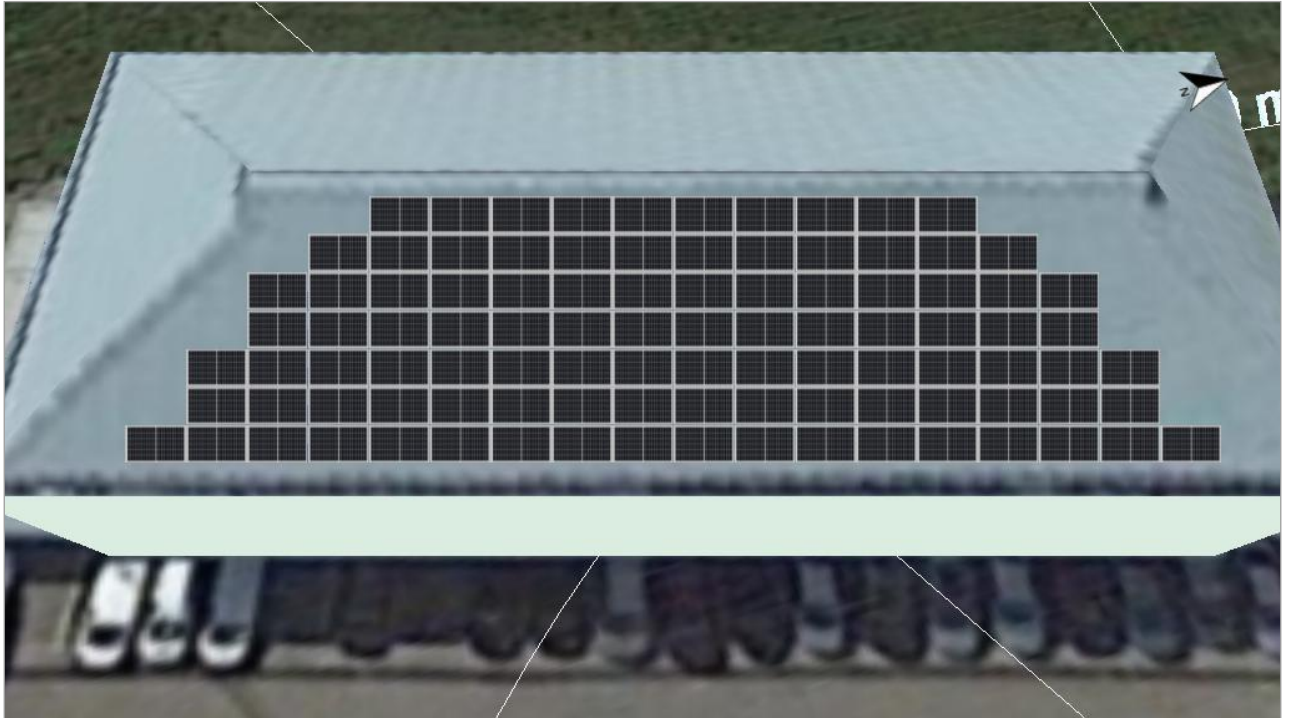


Figure: 2. Module Area - Building 02-Roof Area East

3. Module Area - Building 03-Roof Area West

PV Generator, 3. Module Area - Building 03-Roof Area West

Name	Building 03-Roof Area West
PV Modules	176 x TSM-400-DE09.08 VERTEX S (v1)
Manufacturer	Trina Solar
Inclination	25 °
Orientation	West 287 °
Installation Type	Roof parallel
PV Generator Surface	338.3 m ²

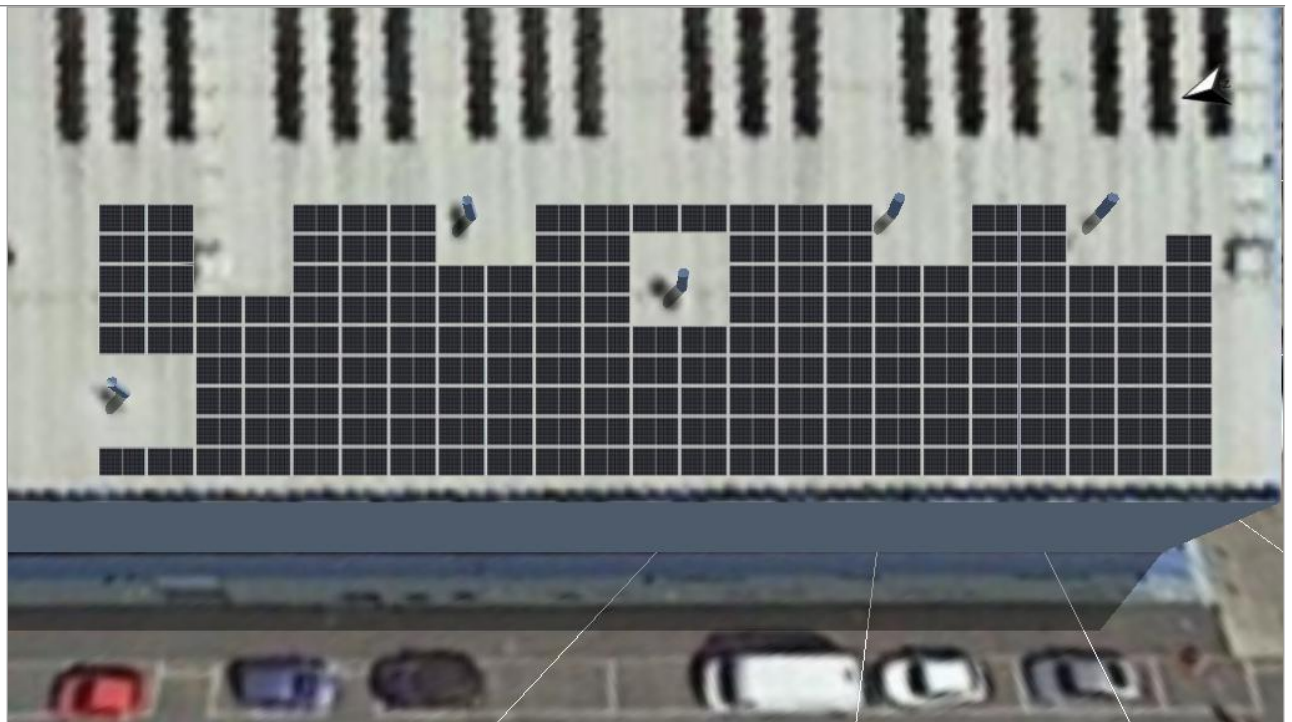


Figure: 3. Module Area - Building 03-Roof Area West

Horizon Line, 3D Design

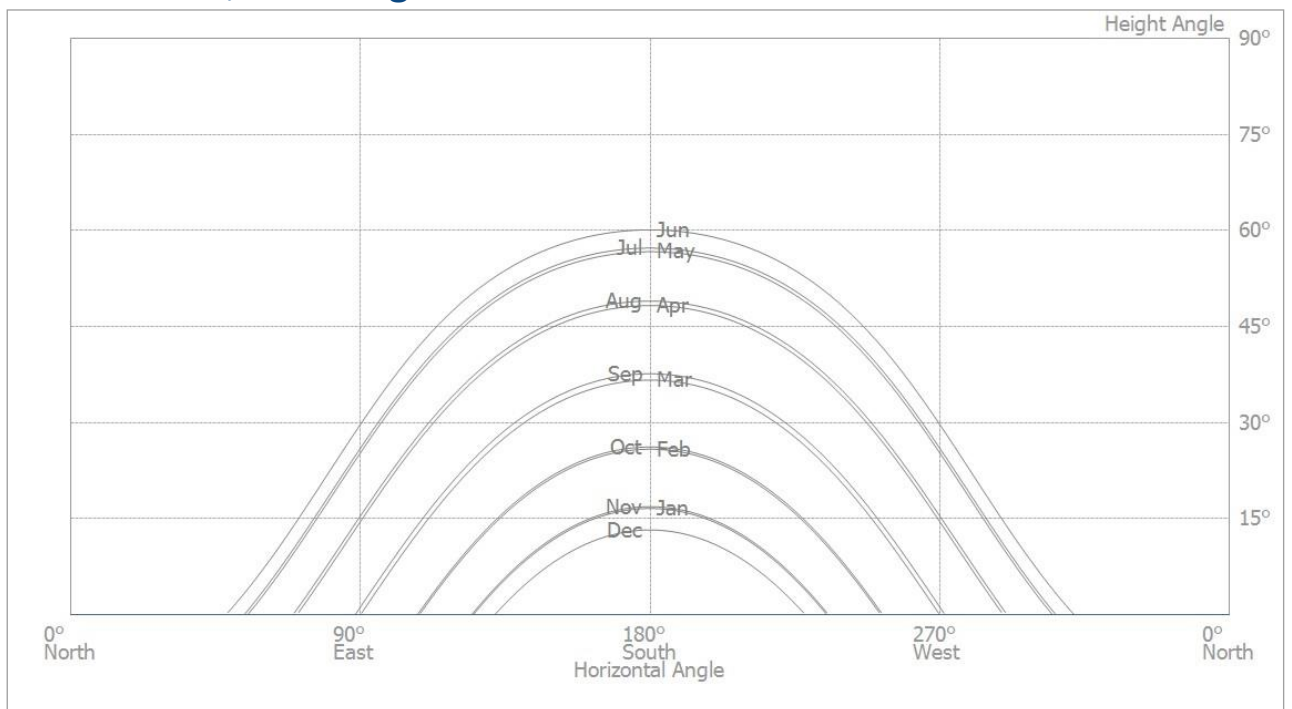


Figure: Horizon (3D Design)

Inverter configuration

Configuration 1

Module Area

Building 01-Roof Area East

Inverter 1

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Model	GW17K-DT (v3)
Manufacturer	GoodWe Solar Inverter
Quantity	1
Sizing Factor	112.9 %
Configuration	MPP 1+2: 3 x 16

Configuration 2

Module Area	Building 02-Roof Area East
Inverter 1	
Model	GW36K-MT (v3)
Manufacturer	GoodWe Solar Inverter
Quantity	1
Sizing Factor	121.2 %
Configuration	MPP 1: 2 x 17
	MPP 2: 2 x 17
	MPP 3: 2 x 16

Configuration 3

Module Area	Building 03-Roof Area West
Inverter 1	
Model	GW60KN-MT (v4)
Manufacturer	GoodWe Solar Inverter
Quantity	1
Sizing Factor	117.3 %
Configuration	MPP 1: 2 x 22
	MPP 2: 2 x 22
	MPP 3: 2 x 22
	MPP 4: 2 x 22

AC Mains

AC Mains

Number of Phases	3
Mains Voltage (1-phase)	230 V
Displacement Power Factor (cos phi)	+/- 1

Simulation Results

Results Total System

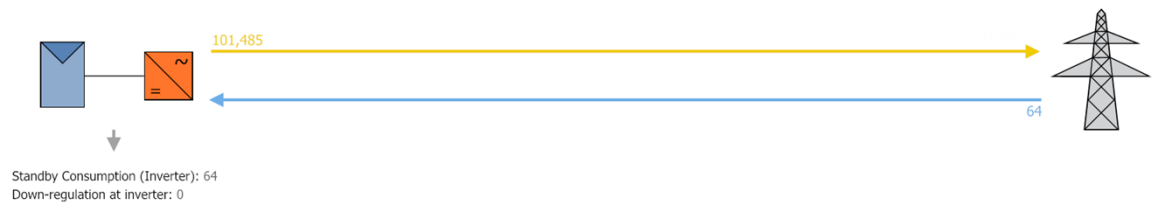
PV System

PV Generator Output	129.6 kWp
Spec. Annual Yield	782.58 kWh/kWp
Performance Ratio (PR)	92.0 %
Yield Reduction due to Shading	1.6 %/Year

Grid Feed-in	101,485 kWh/Year
Grid Feed-in in the first year (incl. module degradation)	101,485 kWh/Year
Standby Consumption (Inverter)	64 kWh/Year
CO ₂ Emissions avoided	47,668 kg / year

Energy Flow Graph

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

Figure: Energy Flow Graph

Plans and parts list

Circuit Diagram

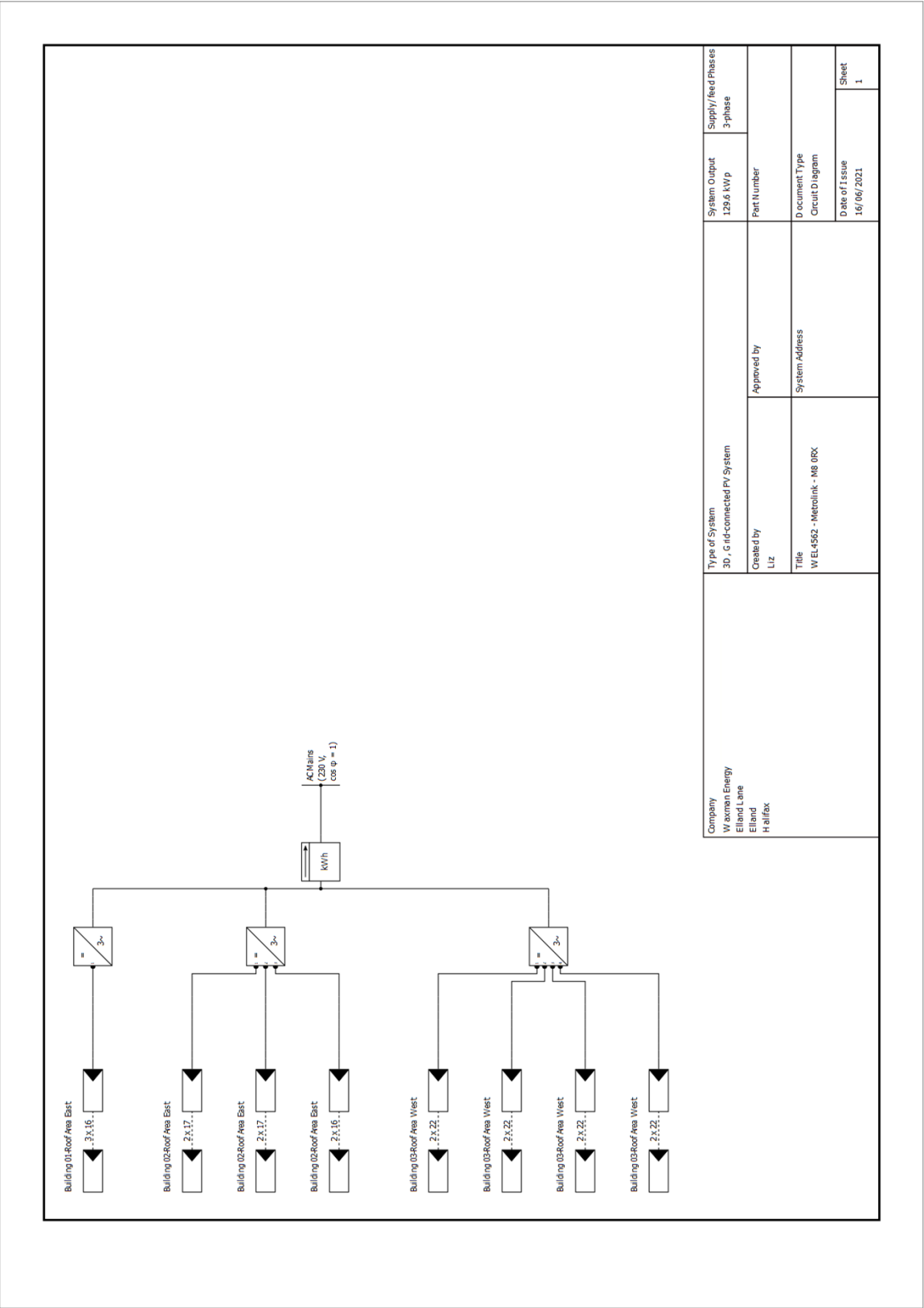
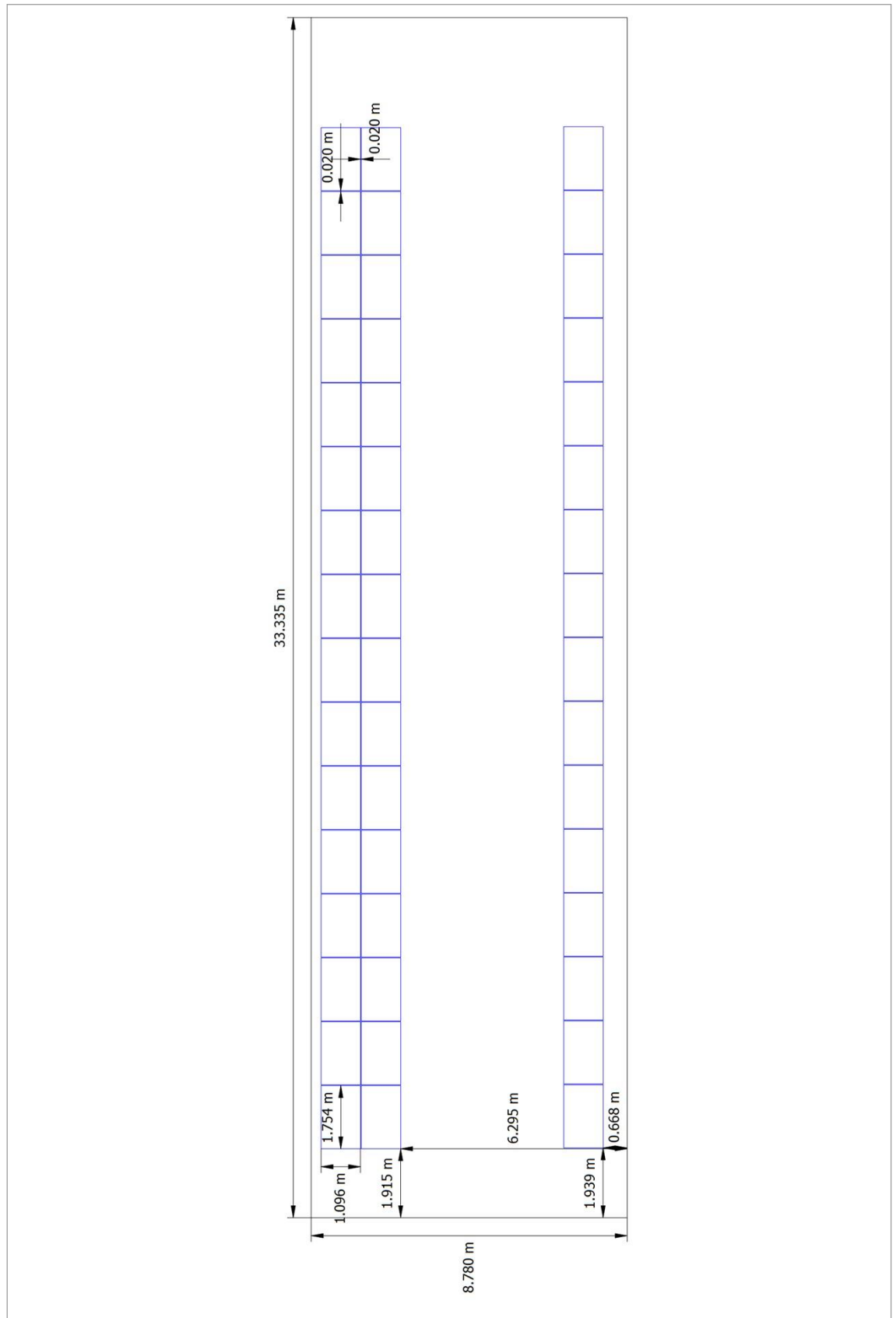


Figure: Circuit Diagram

Dimensioning Plan



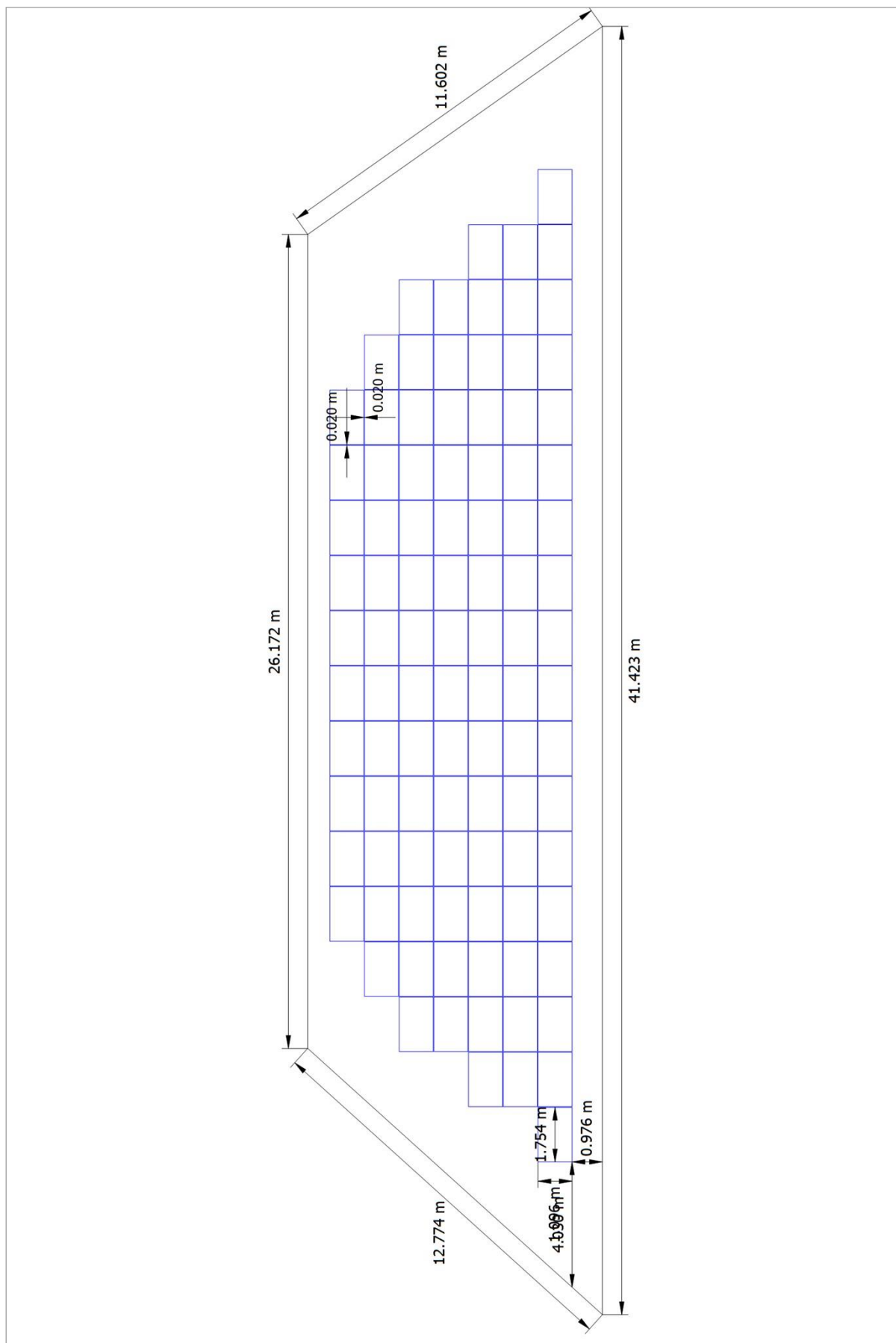
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Figure: Building 01-Roof Area East

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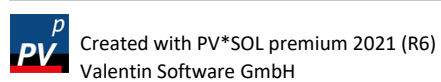


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Figure: Building 02-Roof Area East

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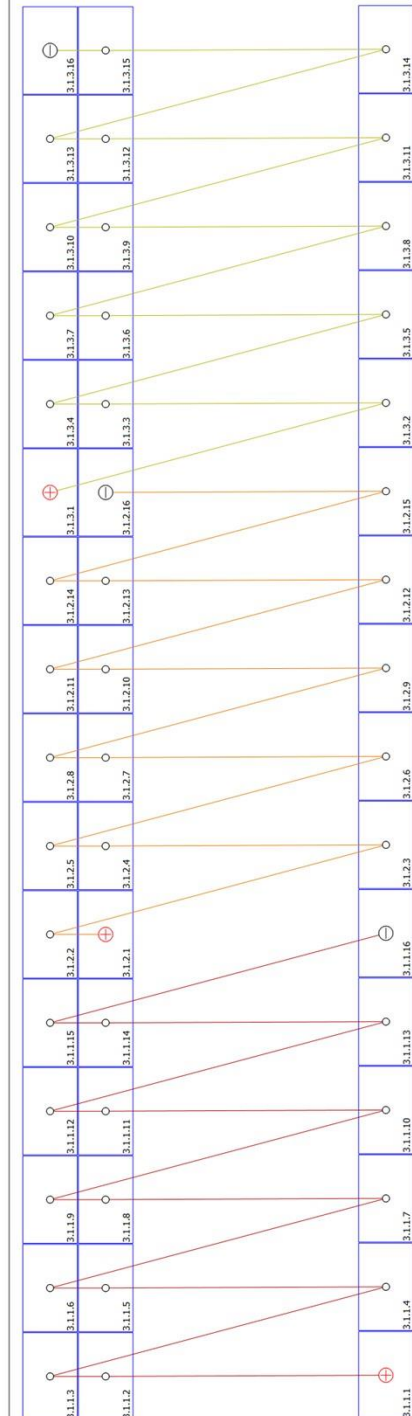


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Figure: Building 03-Roof Area West

String Plan



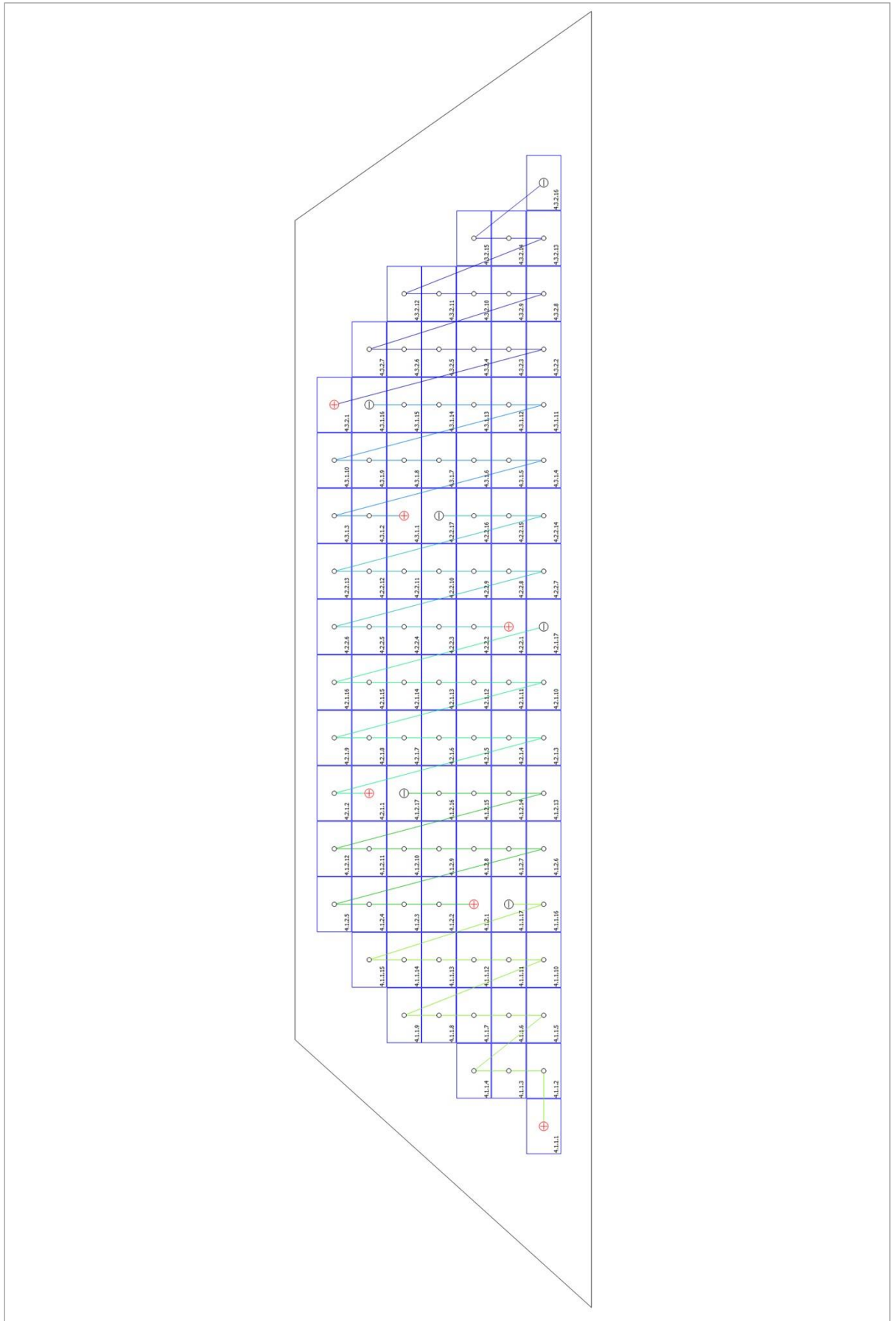
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Figure: Building 01-Roof Area East

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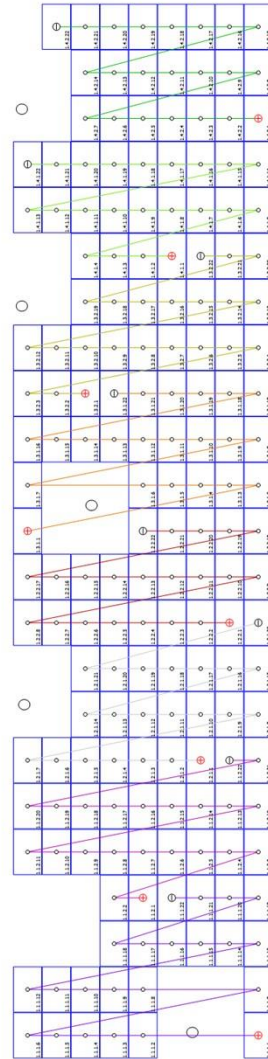
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Figure: Building 02-Roof Area East

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Figure: Building 03-Roof Area West

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Parts list

Parts list

#	Type	Item number	Manufacturer	Name	Quantity	Unit
1	PV Module		Trina Solar	TSM-400-DE09.08 VERTEX S	324	Piece
2	Inverter		GoodWe Solar Inverter	GW17K-DT	1	Piece
3	Inverter		GoodWe Solar Inverter	GW36K-MT	1	Piece
4	Inverter		GoodWe Solar Inverter	GW60KN-MT	1	Piece
5	Components			Feed-In Meter	1	Piece

Screenshots, 3D Design Configuration

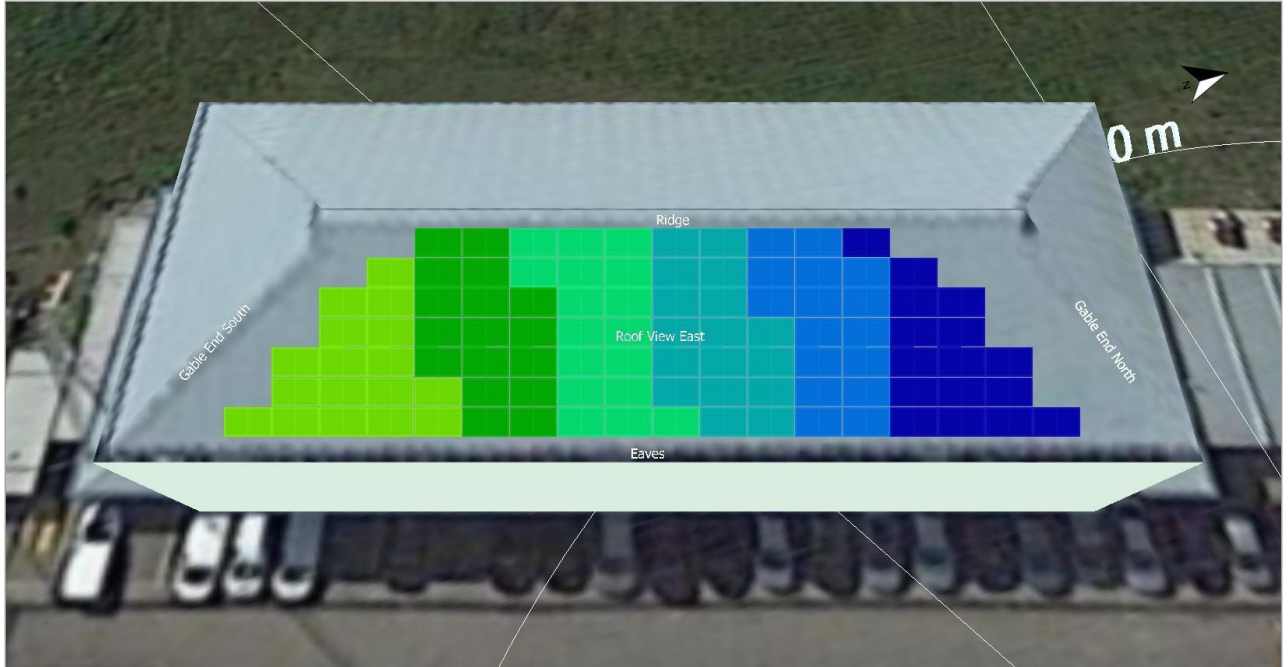


Figure: Screenshot01



Figure: Screenshot03

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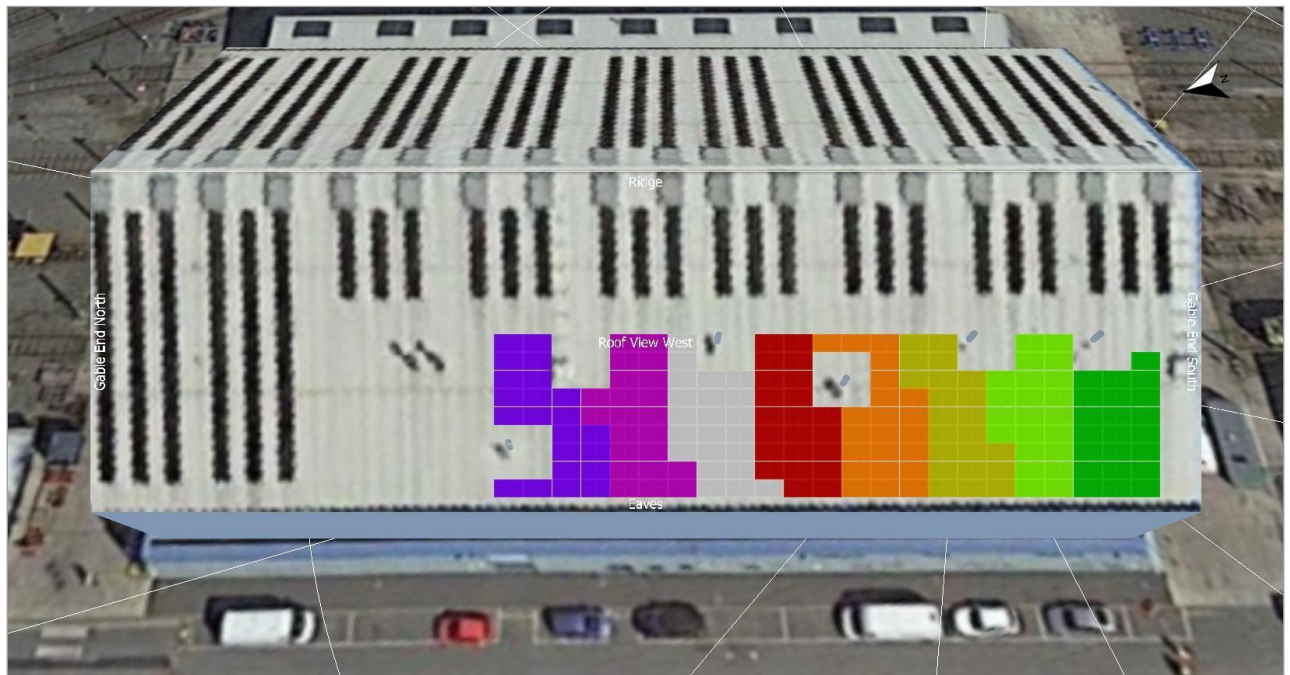


Figure: Screenshot04