Paradise Power Systems Ltd

Project Name: 9th September 2019Bellrock

Client: Bell rock hotel

Address: Church road, st marys, Tr21 0jr

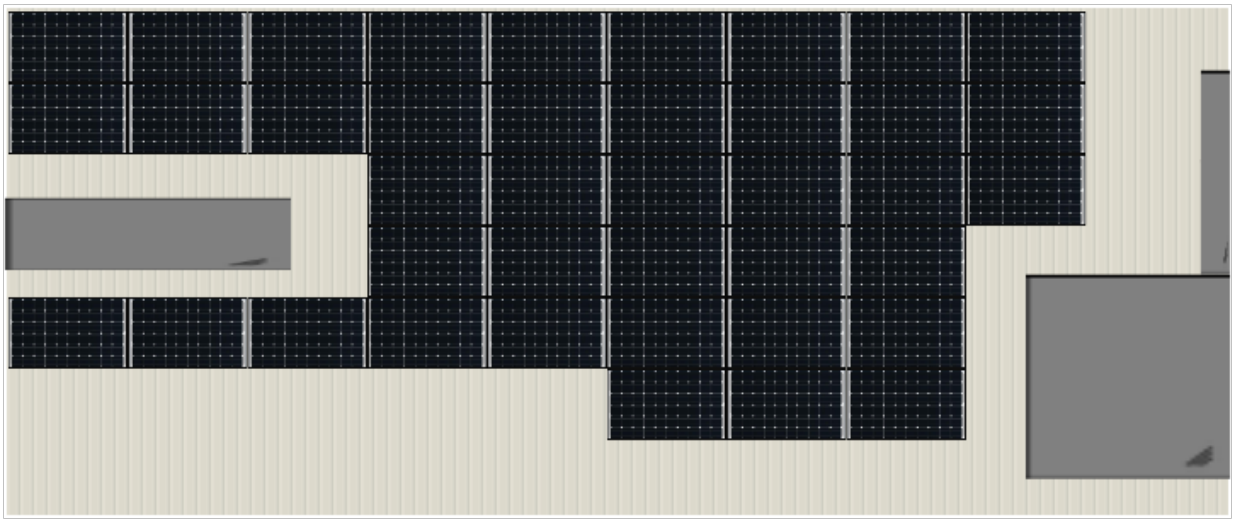
Date Created: 9th September 2019

Designer: Jason Hicks Jason Hicks

paradisepower

Roof Layout

Roof 1



Component list

Item	Quantity
Q Cells 345W Black Framed Split Cell Mono solar panel	40
SolarEdge 15,000 3 phase inverter	1
AEL TF.32-1 MID 3ph kWh Meter	1
Label sheet	1
Rail bolt for grasol rails	40
SolarEdge Wattnode Modbus Meter with 100A CT Clamp	1
SolarEdge Wifi Antenna for SETAPP inverters	1
KN 25A 4-pole AC isolator	2
SolarEdge Optimiser P370	40
Pair of MC4 connectors	4
50m reel of 4mm2 solar cable	1
Metasole flat channel (landscape)	104
Renusol end clamp (black)	48
Renusol mid clamp (black)	56

Inverter Compatibility

SolarEdge 15,000 3 phase

Panels		**Inverter**	
PV power:	**13800 W**	Rated AC output	**15000 W**

String 1: 20 Q Cells 345W Black Framed Split Cell Mono solar panels with P370 optimisers

Panels		**Optimiser**	
PV power:	**345 W**	Rated input power	**370 W**
Open circuit voltage at -10° C	**44 V**	Max DC voltage	**60 V**
V_{mpp} at 40° C:	**32 V**	V_{mpp} lower limit	**8.00 V**
V_{mpp} at -10° C:	**37 V**	V_{mpp} upper limit	**60 V**
I_{mpp} at 25° C:	**10.22 A**	Max DC input current	**11 A**

String			
Total string power	**6900 W**	Max string power	**11250 W**
String length	**20**	Permitted string lengths	**16/50**

- The current this panel can deliver is suitable for this optimiser.
- The power output of this panel is suitable for this optimiser
- The open circuit voltage of the panel should never be too high for this optimiser
- The maximum power point voltage of the panel is within the correct range for this optimiser
- The string power output is less than the maximum input for this inverter.
- This string contains 20 optimisers.

String 2: 20 Q Cells 345W Black Framed Split Cell Mono solar panels with P370 optimisers

Panels		**Optimiser**	
PV power:	**345 W**	Rated input power	**370 W**
Open circuit voltage at -10° C	**44 V**	Max DC voltage	**60 V**
V_{mpp} at 40° C:	**32 V**	V_{mpp} lower limit	**8.00 V**
V_{mpp} at -10° C:	**37 V**	V_{mpp} upper limit	**60 V**
I_{mpp} at 25° C:	**10.22 A**	Max DC input current	**11 A**

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- The maximum power point voltage of the panel is within the correct range for this optimiser
- The string power output is less than the maximum input for this inverter.
- This string contains 20 optimisers.

Electrical

SolarEdge 15,000 3 phase

AC isolator

A KN 25A 4-pole AC isolator has been specified for this inverter

- The rated isolator current (25A) is greater than the rated inverter current (23A)
- The isolator is suitable for use on a three phase inverter.

Input 1

DC isolator

- This inverter contains an integrated DC Isolator.

Cable

10m of 4mm2 solar cable has been specified

- Voltage drop at maximum power point at 40°C will be around **0.85 V (0.11** percent)

Input 2

DC isolator

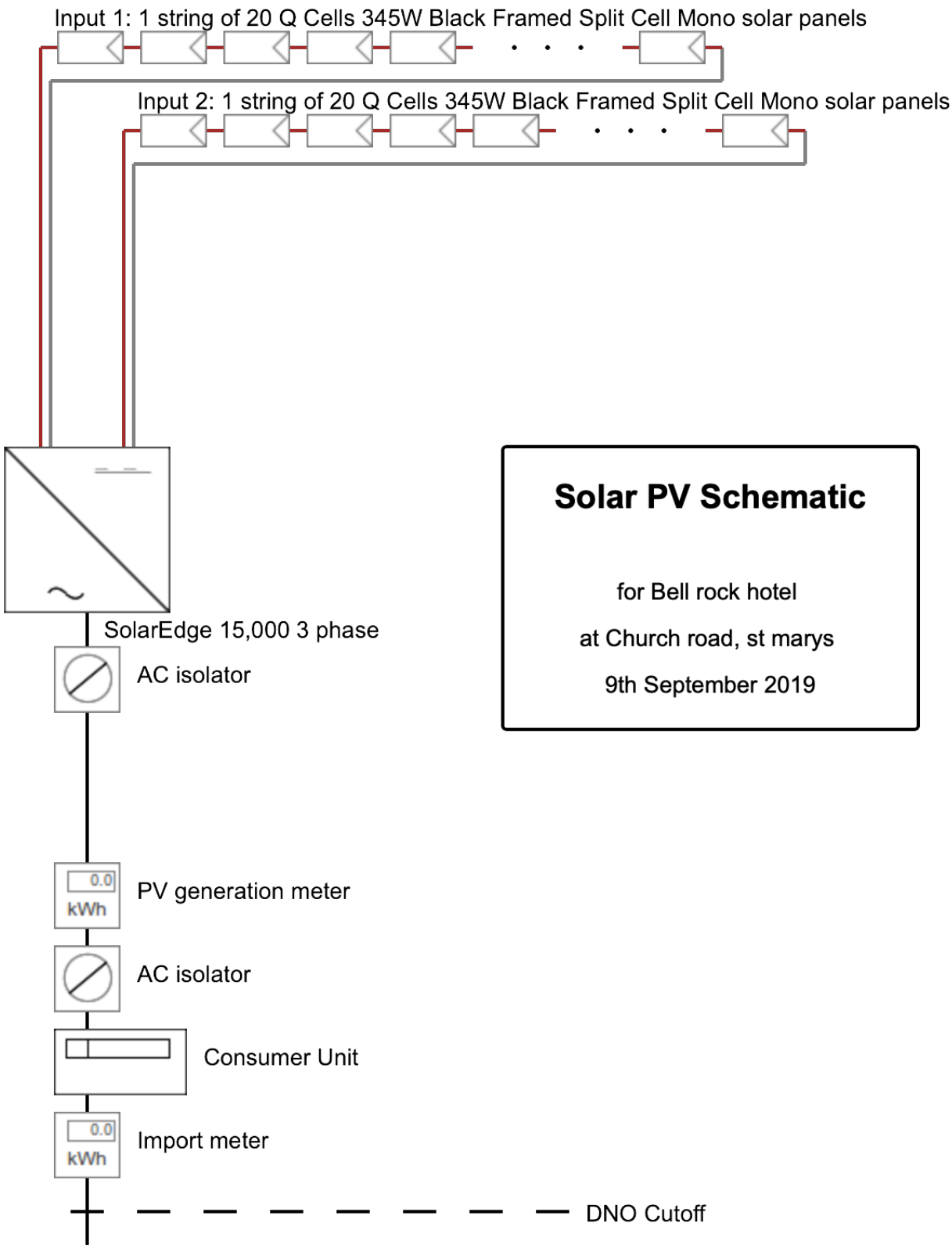
- This inverter contains an integrated DC Isolator.

Cable

10m of 4mm2 solar cable has been specified

- Voltage drop at maximum power point at 40°C will be around **0.85 V (0.11** percent)

Schematic diagram



Annual Output Performance Estimate

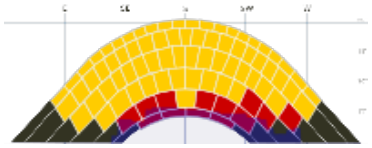
Site Details	
Client	Bell rock hotel
Address	Church road, st marys
	TR21 0JR
Postcode zone	Zone 4

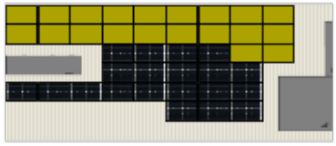
The sunpath diagram shows the arcs of the sky that the sun passes through at different times of the day and year as yellow blocks. The shaded area indicates the horizon as seen from the location of the solar array. Where objects on the horizon are within 10m of the array, an added semi-circle is drawn to represent the increased shading. Blocks of the sky that are shaded by objects on the horizon are coloured red, and a shading factor is calculated from the number of red blocks.

The performance of the solar array is calculated by multiplying the size of the array (kWp) by the shading factor (sf) and a site correction factor (kk), taken from tables which take account of the geographical location, orientation and inclination of the array.

Inverter 1: SolarEdge 15,000 3 phase

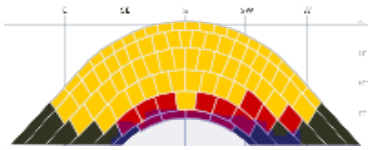
String 1 - shading group 1

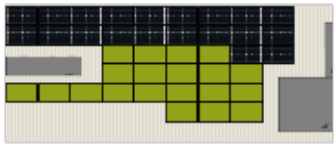




A: Installation data	
Installed capacity	6.900 kWp
Orientation	90°
Inclination	10°
B: Calculations	
kWh/kWp (kk)	902
Shade factor (sf)	0.87
Estimated output	5415 kWh

String 2 - shading group 1





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Installed capacity	6.900 kWp
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B: Calculations	
kWh/kWp (kk)	902
Shade factor (sf)	0.87
Estimated output	5415 kWh

Total output over all inverter inputs: 10830 kWh

The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure and is given as guidance only. It should not be considered a guarantee of performance.

The shade assessment has been undertaken using the standard MCS procedure. It is estimated that this method will yield results within 10% of the actual annual energy yield for most systems.

Structural calculations

Roof 1

Weight loading calculation

The total weight of the solar panels and mounting components is **802.24 kg**. Assuming this is spread evenly over the area that the solar panels cover (**71.69 m^2**), the loading imposed by the solar PV array is **11.2 kg/m^2**, or **0.11** kN/m^2.

The existing dead load on the roof from the roof covering is **12 kg /m^2**, or **0.12 kN/m**.

If we factor in an imposed load of 0.75 kN/m^2 instead of snow loading, then the percentage increase in loading due to the installation of the solar array becomes

100 x ((0.11 + 0.12 + 0.75) / (0.12 + 0.75) - 1) = **12.6%**

You should note that this method does not actually check the load capacity of the roof - it merely checks that you are not increasing the loading significantly. Calculating roof strength of trussed rafter roofs is a complicated task, and if you are unsure of the strength of the roof then it would be wise to take the advice of a structural engineer.

An increase of less than 15% in the load imposed on a roof is not considered to be a significant change (The Building Regulations 2000, Approved Document A).

Please note that this method does not calculate the strength of the roof, and if a roof was badly constructed, does not meet existing building regulations, or is in poor condition then it may still not be appropriate to install an array.