Introduction

This statement is provided to explain the design, access and planning considerations for the proposed solar PV system at Moulton Way Fire Station.

Design

The proposed solar system will be installed on the flat roof of the fire station. The solar array will have a total rated output of 1.88kWp and will consist of eight individual Yingli PV modules with a power rating of 235W per module. The dimensions of each PV modules are 165cm long by 99cm wide by 5cm deep. A specification sheet for the Yingli 235W can be found in Appendix I of this statement.

The modules will be fixed on the roof using a fully ballasted mounting system using Console mounting frames. Console frames are designed specifically for flat roofs and as they are ballasted they avoid having to penetrate the existing roof covering. Details of the Console mounting system can be found in Appendix II of this statement.

Each Console is designed to carry one solar PV module in landscape orientation at an angle of 25 degrees. The solar array of eight modules will be positioned on the roof so that the modules are all orientated due south in two rows of four modules. This ensures that the energy generation of the system is maximised. The distance between each row will be 1.5m. At its highest point each Console unit will stand a max of 63cm from the existing roof.

The closest the array will be to the edge of the building is 3.6m.

A scaled plan of the roof showing the proposed location of the solar array is included with the application.
Appearance

Polycrystalline solar PV modules have a mottled blue appearance – see image below. The fire station building is approximately 6m high and as the PV array will be positioned at least 3.6m away from the edge of the roof and will only be 63cm in height it is unlikely to be visible for someone standing at ground level.

Images showing a similar installation using the Console mounting system are shown below.

Access

The solar PV will be positioned on the roof and therefore will have no effect on vehicle movements or parking. The roof is unused currently and is not accessible by the public.
Planning Policy Framework

Planning policies relevant to this proposal are as follows:

National Planning Policy Statements

The most relevant Planning Policy Statements are PPS22: Renewable Energy, PPS1: Delivering Sustainable Development and PPS1 Supplemental: Planning and Climate Change. All three statements encourage urgent action to promote the growth of renewable energy.

PPS22: Renewable Energy

PPS22 sets out the Government’s planning policy on renewable energy. The key objectives are the promotion and development of renewable energy and improvements to energy efficiency in order to mitigate climate change.

PPS 22 further comments that

“Small-scale projects can provide a limited but valuable contribution to overall outputs of renewable energy and to meeting energy needs both locally and nationally. Planning authorities should not therefore reject planning applications simply because the level of output is small”.

The document also adds:

“Small scale renewable energy schemes utilising technologies such as solar panels, biomass heating, small scale wind turbines, photovoltaic cells and combined heat and power schemes can be incorporated both into new developments and some existing buildings. Local planning authorities should specifically encourage such schemes through positively expressed policies in local development documents”.

PPS1: Delivering Sustainable Development

PPS 1 set out the governments objectives for achieving sustainable this is identified as the core principle underpinning planning. One of the key aspects of this is the prudent use of resources. PPS 1 supplement sets out how planning should contribute to reducing CO2 emissions. Proposed development is expected to take account of site characteristics to minimise energy consumption and support opportunities for renewable energy.

East Midlands Regional Plan (March 2009)

The UK government is committed to ensuring that low carbon energy generation, including renewable technologies, make an increasing contribution to UK energy supplies. To achieve this it has set a target of 10% of UK electricity from renewable sources by 2010 and 20% by 2020.
At present, in the East Midlands, renewable energy makes a minor contribution to the region's energy need (approximately 2%) and lags behind other English regions. The East Midlands Regional Plan indicates that a 20% renewable energy targets mix by 2020 for the region can only be achieved by adopting energy efficiency improvements and challenging micro-generation targets (to include solar PV). The report contains indicative targets for various renewable energy technologies to achieve this 20% target by 2020. This will require an installed solar PV capacity of ~1,162MW (current capacity is negligible).

The regional plan also states that:

“Although the regional targets are ambitious, they are considered to be achievable and should be treated as a minimum. To achieve the targets however there needs to be a complete change in attitude in current planning practice. Local planning authorities need to accept that far more energy generation schemes using innovative renewable technologies need to be accepted if renewable targets are to be achieved”

National and regional plans are therefore very clear on the need for projects such as the one proposed for Moulton Way to be encouraged by local planning authorities.

**Northampton Borough Council Local Plan**

Northampton Borough Council has several policies that are relevant to this application; Policy E20 and Policy E39.

Policy E20 states that “Planning permission for new development will be granted subject to:

- The design of any building or extension adequately reflecting the character of its surroundings in terms of layout, siting, form, scale and use of appropriate materials
- Development being designed located and used in a manner which ensures adequate standards of privacy, daylight and sunlight

Policy E39 states that “Planning permission for development involving renewable energy installations (including solar PV) will be granted where:

- The design and appearance of the installation will not cause undue detriment to the amenity of the locality
- Any noise and disturbance created by the proposal are considered acceptable in relation to surrounding land uses
- The proposal does not adversely affect important views or skylines or the character of the surrounding area”

It is our opinion that the proposed development will satisfy all these criteria:

Through appropriate siting and design any visual impact of the system has been minimised. The scale of the system we have specified is small for this type of project covering an area of just 14m². At its highest point the PV modules will be no more that 63cm above the flat roof. The system should not be visible from the ground and at locations in the vicinity higher than street level the visual intrusion will be minimal (especially compared with the
overall scale of the building and roof). The building is not in a conservation area or listed and the development should not adversely affect significant views or the character of the surrounding area.

In terms of potential nuisance issues around solar glare, PV modules are light converters and therefore have extremely low reflection properties and therefore solar glare should not be an issue.

PV has no moving parts and is therefore silent in operation and creates no emissions.

**Conclusion**

Current government guidance as well as national, regional and local plans are clear about the need for more renewable energy generation to meet climate change targets. The proposed solar PV installation at Moulton Way fire station clearly accords with these planning objectives and therefore should be permitted.
Appendix I – PV Module Specification

YL 235 P-29b-1 / 1650x990 SERIES

ABOUT YINGLI SOLAR

Yingli Solar is a vertically integrated manufacturer of solar photovoltaic modules. Under one roof we manufacture our ingots, wafers, cells and modules. This ensures that we can tightly control our material and production quality, offering our customers leading product durability and sustainable performance backed by our 25 year limited power warranty*.

PERFORMANCE

➢ High efficiency, polycrystalline solar cells with high transmission and textured glass delivering a module series efficiency of up to 14.4%, minimising installation costs and maximising the kWh output of your system per unit area.

➢ Power tolerance of +/-3% minimising PV system mismatch losses.

QUALITY & RELIABILITY

➢ Robust, corrosion resistant aluminium frame independently tested to withstand wind loads of 2.4kPa ensuring a stable mechanical life for your modules.

➢ Take confidence in our modules with a 5 year limited product warranty and a 25 year limited power warranty*.

➢ Modules protected by box during transportation and with 2D modules in a box on-site waste is minimised.

➢ Modules independently tested to ensure conformance with certification and regulatory standards.

➢ Manufacturing facility certified to ISO 9001 Quality Management System standards.

WARRANTIES

5-year limited product warranty*  
Limited power warranty*: 5 years at 90% of the initial rated power output, 25 years at 80% of the initial rated power output

QUALIFICATIONS AND CERTIFICATES

IEC 62158 Edition 2, IEC 61730 Class A, CE, ISO 9001

*In compliance with our Warranty Terms and Conditions.
YL 235 P-29b-1 / 1650x990 SERIES

ELECTRICAL PARAMETERS

| Electrical parameters at STC (1000 W/m², 25°C, AM 1.5G according to CN60904-3) |
|---------------------------------|--------|--------|--------|--------|--------|
| Module type                     | 1115P-29b-1 | 1115P-29i | 1125P-29b-1 | 1125P-29i | 1125P-29b-1 | 1125P-29i |
| Power output (W)                | 210.0  | 219.0  | 220.0  | 225.0  | 230.0  | 235.0  |
| Power output tolerance (%)      | +/- 3  | +/- 3  | +/- 3  | +/- 3  | +/- 3  | +/- 3  |
| Module Efficiency (%)           | 12.6   | 12.2   | 12.5   | 13.8   | 14.1   | 14.4   |
| Voltage at Max. P, V_{mp} (V)   | 28.5   | 29.0   | 29.5   | 29.5   | 29.5   | 29.5   |
| Current at Max. P, I_{mp} (A)   | 7.37   | 7.41   | 7.50   | 7.63   | 7.80   | 7.97   |
| Open circuit voltage V_{oc} (V) | 36.0   | 36.0   | 36.5   | 36.5   | 37.0   | 37.0   |
| Short circuit current I_{sc} (A) | 9.05   | 9.15   | 9.28   | 9.40   | 8.54   |
| Max. system Voltage (V)         | 1,000-1,050 |

Parameters of the thermal characteristics

- HIOT (Nominal Operating Cell Temperature) (°C): 46 +/- 2
- Temperature coefficient beta of I_{mp} (1/K): +0.0004
- Temperature coefficient delta of V_{mp} (1/K): -0.0037
- Temperature coefficient gamma of P_{max} (1/K): -0.0045

MECHANICAL PARAMETERS

| Dimensions (length [mm] / width [mm] / thickness [mm]) | 1,650 / 190 / 50 |
| Thickness with junction box (mm)                     | 50 |
| Weight (kg)                                          | 16.8 |
| Junction box manufacturer / protection degree / number of devices | Q1 / 1P65 / 3 |
| Junction box dimensions length / width / thickness (mm) | 150 / 150 / 20 |
| Positive cable & negative cable manufacturer / length (mm) / cable cross-section (mm²) | 6X / 1.000/1900 / 4.0 |
| Plug connector manufacturer / type / protection degree | MC4 / UV resistance and self-locking / IP67 |
| Front cover material / thickness (mm)                | Tempered Glass, 3.2mm |
| Cell type (quantity / technology)                    | 60 / polycrystalline / 5A x 16.6 |
| Encapsulant materials                                | Ethenes Vinyl Acetate (EVA) |
| Rear cover material / thickness (mm)                 | i.e. PET - PVDF / 0.287 |
| Frame material                                       | rolled stainless steel |

OPERATING CONDITIONS

- Operating temperature (°C): -40 to +85
- Max. wind load (Pa): 2.8K

PACKAGING

- Number of modules per box: 20
- Box size (length [mm] / width [mm] / depth [mm]): 1700/1640/1165
- Box gross weight in kg: 450
- Bars per pallet: 1

* The data does not relate to a single module and they are not part of the offer; they serve for comparison only to different module types.

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Subject to modifications and errors
commerce@yinglisolar.com
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www.yinglisolar.com
Appendix II – Console Mounting System Specification

Installation Guide

ConSole

The ConSole is the ideal solution for mounting solar panels on flat roofs. Most common solar panels in the 70 to 260 range can be mounted on the ConSole.

The ConSole is filled with ballast (gravels, flagstones, etc.), in order to provide greater resistance to wind loading. The amount of ballast is determined according to the height of the building, its location and the nature of the installation surface. Please refer to the table on page 3 for reference values with regard to the amount of ballast.

The ConSole is made of 100% recycled, chlorine-free high-density polyethylene (HDPE). The raw materials of the ConSole are fire resistant and comply with fire protection standards in accordance with DIN 4102 Class B2. The energy payback time for the ConSole is less than one year.

The ConSole weighs between 3-6 kg, is stackable (40 ConSoles per pallet) and has a continuous mounting border.

The non-slip ConSole Light is also optionally available. This ConSole has an EPDM film bonded onto its bottom side, which generates a higher friction coefficient. This ConSole is particularly suitable for slippery roofing materials.

Please check for any updated versions of the installation guide on www.ubbink.com

The Ubbink Solar Team.

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Ubbink Solar ConSole Installation Guide 2007
Installation Preparations

Scope of Supply
- 1 ConSole
- 2 Aluminium U-Profile
- 8 M6 x 20mm Stainless Steel Hexagonal Bolts
- 8 M6 Stainless Steel Self-Locking Nuts
- 8 18 mm Stainless Steel U-Washers

Make sure the installation surface is even, clean and not too smooth / slippery. In the case of slippery surfaces (e.g. PVC roofing membranes or similar), a non-slip mat should also be used.

Please check whether the installation surface (e.g. the roof) has been designed to sustain the required additional permanent ballast loading.

Position the ConSole with the flat side facing in a southward direction. Maintain a distance from the edge of the roof of at least one fifth of the building height "h", (e.g. at a building height 10 meter keep a distance of 2 meter). The distance between the parallel rows of ConSoles is illustrated in the diagram on the left.

Add the corresponding amount of ballast that is required (please refer to the table on page 3 for the reference value).

Required Tools
- Electric Screwdriver with a Hexagonal Bit for a 10 mm Bolt
- 7 mm Drill
- 10 mm Open-End or Ring Spanner

Installation

1. Self-Locking Nut
   U-Profile
   Washer
   M6 Bolt

   Mount solar panel onto the U-profile (please refer to the diagram above). Please make sure that the slotted hole is positioned on the higher side of the ConSole and that the small round holes are on the lower side. Please use the supplied mounting materials. Screw the bolts tight.

2. Connect the cables.

3. Position the solar panel symmetrically onto the ConSole. If positioned correctly, the U-profile strips should prevent the solar panel from sliding away.

4. Use the profiles as a jig to drill four (4) holes (7 mm) in the vertical edges of the ConSole.

5. Mount the profiles onto the ConSole with the supplied mounting materials (please refer to the diagram above). Please make sure that the u-washer is placed between the nut and the ConSole.

Ubbink Solar ConSole Installation Guide 2007
Finding the Right ConSole for Your Solar Panel

1. First measure the distance \( d \) for the mounting drill holes on the back of the solar panel.

2. Determine the required ConSole for the width of your solar panel using the table on the right. Any extension rails that may be required should be listed as a separate position on the order.

<table>
<thead>
<tr>
<th>Distance ( d ) (mm)</th>
<th>ConSole 2.1</th>
<th>ConSole 2.2</th>
<th>ConSole 2.3</th>
<th>ConSole 4.1</th>
<th>ConSole 4.2</th>
<th>ConSole 6.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>531 - 591 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>591 - 651 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>651 - 686 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>686 - 711 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>711 - 746 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>746 - 781 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>781 - 841 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>841 - 895 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>895 - 911 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>911 - 1015 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1015 - 1045 mm</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(● = only with extension rail)

If there are multiple possibilities, then select the ConSole, which fits the length of your solar panel best. The dimension \( A \) of the ConSole should correspond approximately to the length of the module.

Extended solar panels require larger amounts of ballast due to the larger contact surface that is exposed to the wind. Please always select the ConSole, where the surface area of the solar panel extends over the edges as little as possible (maximum 12 cm on either side).

\[ A \]

ConSole 2.1 133 73 44 10
ConSole 2.2 144 67 39 10
ConSole 2.3 125 86 48 9
ConSole 4.1 160 80 45 8.5
ConSole 4.2 128 105 55 8
ConSole 6.2 168 105 55 8

All dimensions are in cm

Determining the Amount of Ballast Required for ConSole

In order for the ConSole to withstand wind loads, it is necessary to fill the ConSole with ballast. Suitable ballast are gravel, stones, slabs or similar. Please refer to the table on the right for indicative ballast values. These values correspond to the inland wind conditions in Germany at reference wind speeds of 22.5 m/s. These have been calculated according to DIN1055-4 (2005-03) and Eurocode, and have been confirmed by long-standing experience for wind loads of up to 130 km/h. The outer rows of Consoles (on the edge of the module field) have to be ballasted with higher loads according to the table. The stated values ensure that the Consoles do not lift off or tip over. In order to make sure that they do not slide away, one should ensure that the friction coefficient between the roof surface and the ConSole is higher than 0.6. This value can easily be determined using a spring balance. The ConSole light with the non-slip base generates a higher friction coefficient, especially useful on slippery roofing material. To comply with the local circumstances and locally applicable norms we advise to consult an approved construction engineer. We inform you that in order to prevent accidents, it is necessary to work in accordance with the statutory industrial safety regulations. Please implement the corresponding safety measures. Consult our website for latest information.

Ballast (kg) in the Console according to DIN1055-4:2005-03 and a reference wind speed of 22.5 m/s. For German inland wind conditions: wind zone I, and the suburban terrain category III.

<table>
<thead>
<tr>
<th>Position in module field</th>
<th>Ballasting height up to 8 metres</th>
<th>12 metres</th>
<th>16 metres</th>
</tr>
</thead>
<tbody>
<tr>
<td>middle edge</td>
<td>middle edge</td>
<td>middle edge</td>
<td>middle edge</td>
</tr>
<tr>
<td>ConSole 2.1</td>
<td>50</td>
<td>78</td>
<td>59    91</td>
</tr>
<tr>
<td>ConSole 2.2</td>
<td>46</td>
<td>73</td>
<td>55    86</td>
</tr>
<tr>
<td>ConSole 2.3</td>
<td>51</td>
<td>82</td>
<td>60    95</td>
</tr>
<tr>
<td>ConSole 4.1</td>
<td>62</td>
<td>99</td>
<td>73    115</td>
</tr>
<tr>
<td>ConSole 4.2</td>
<td>58</td>
<td>94</td>
<td>68    110</td>
</tr>
<tr>
<td>ConSole 6.2</td>
<td>83</td>
<td>134</td>
<td>98    156</td>
</tr>
</tbody>
</table>

Please be aware that for higher reference wind speeds more ballast should be added.

For example for a reference wind speed of 26 m/s, an extra 50% of ballast should be added.

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