1 Introduction

The purpose of this document is to look at the feasibility for the installation of Photovoltaic Panels (PV Panels) at the Frieght Lane, Western Site. An initial design proposal has been created, so that the advantages and disadvantages of the installation can be considered on a project specific basis.

A study of the solar radiation incident at the location has been undertaken to provide an estimated energy output of the proposed installation of 8.79MWh/year.

2 Initial PV Proposal

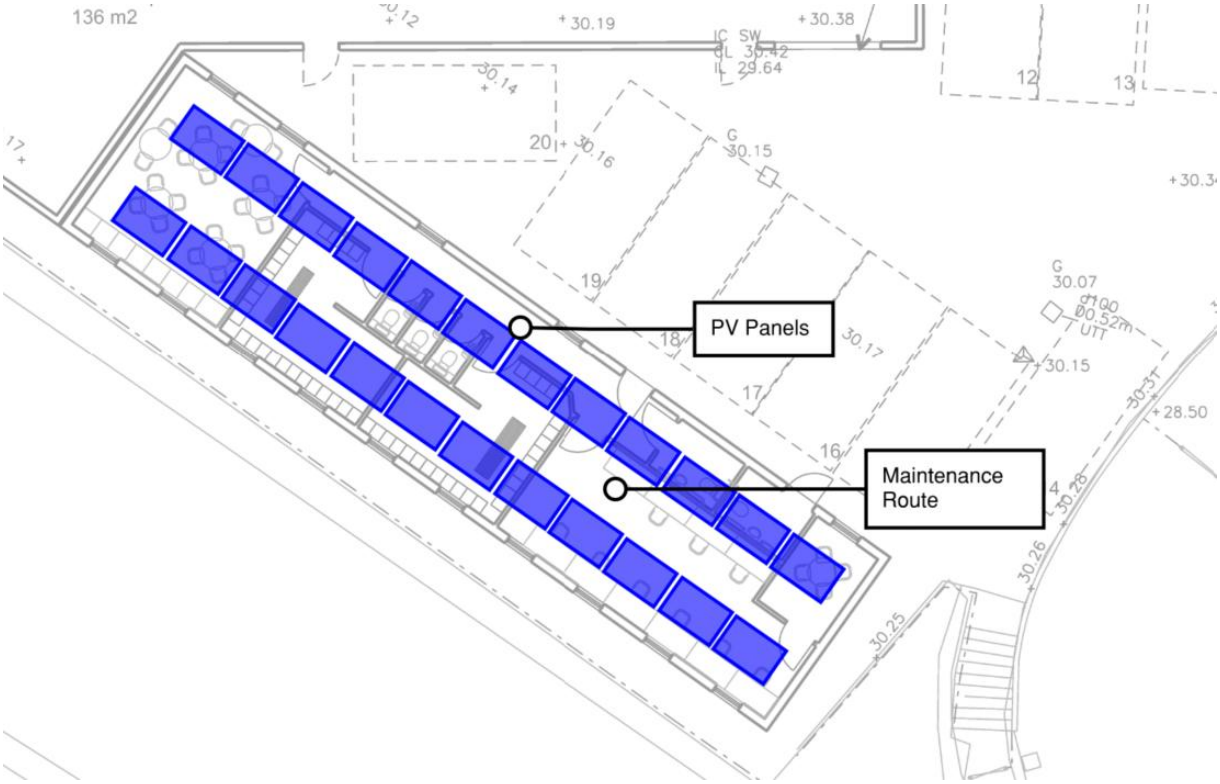

Figure 1 – PV Panel Roof Arrangement

An indicative PV panel layout is shown on the roof of the western site office building on the sketch above, which would be an allowance of 24 No. panels.

A perimeter zone allowance of 1m has been assumed at the roof edges and between two panel rows to provide access for maintenance and to prevent wind-load causing damage to the installation. To avoid overshadowing by adjacent panels, an allowance of 0.5m has been assumed between panel clusters.

3 Installation Particulars

In order to maximise the efficiency of the installation, we have made assumptions as to the angle the PV panels are going to be installed (tilt angle) and which orientation are going to be facing (Azimuth angle).

For optimal solar radiation exposure the PV panels should be facing south, (Azimuth angle of 180°). Due to the orientation of the building, this is considered impractical as the drawbacks of the space inefficiency would outweigh the benefit of an optimal Azimuth angle. Therefore, an orientation of approximately 150° Azimuth angle (panels facing South-East) has been assumed for this study.

4 Estimated Annual Output

At this stage, we have made assumptions in regard to the technical performance of the photovoltaic modules. High level panel details are provided in Table 1 below.

Dimensions (mm, L / W / H)	1720 / 1134 / 35
Weight (kg)	20.5
Peak power Output (W)	410
Module efficiency (%)	21

Table 1 – PV Panel Basic Characteristic Assumptions (Based on Yingli Solar, Panda 3.0 Pro)

With this information, we can estimate the output of the installation. Note that the case study is to maximize solar radiation collection and possible height restrictions have not been considered. Using a 15° tilt angle, the installation will be approximately 550mm high. Should this pose a building height / planning issue, a lesser degree of panel tilt may be considered at the cost of array output.

Our calculations have identified 14% installation losses and have been adjusted to account for overshadowing of the array by surrounding building.

The Annual energy output of the installation is estimated to be **8.79 MWh/year**.

5 Estimated Payback Period

We have conducted a high-level study to determine the estimated payback period for the proposed installation. With the output of the installation estimated at 8.79 MWh/year it is possible to estimate energy cost saving.

According to the Energy Price Guarantee policy paper from the Department for Business, Energy & Industrial Strategy, the cost of electricity per kWh for London is approximately of £0.34. With this price, the PV installation could save the building £2,988.49 a year subject to inflation and energy price changes.

Using the data provided by the Department for Business, Energy Security and Net Zero, the approximate PV Installation cost is £2,099.76 per kW. The installation will have a peak installation power of 9.84kW, this will result in an estimated initial cost of £20,661.62. This yields a simple payback period estimation of **8 years**.

6 Conclusions

According to the Conversion Factors from the Department for Business, Energy & Industrial Strategy, 1kWh of electricity is equivalent to 0.20707 kg/CO_2.

This means that the installation could result in an annual CO_2 reduction of approximately 1,820.12 kg/CO_2.

SP would recommend feeding the power generated from the PV installation directly into the buildings main LV power distribution system. As the electrical infrastructure has been designed with a single tenant occupancy in mind, any PV installation fed into the main LV panelboard shall benefit both the incoming tenant and landlord. Given the electrical demands of the office building are likely to be less than those generated from the PV, there may be opportunity to export/sell back to the grid.