Metropolitan Police Service
Croydon Custody Centre Decarbonisation Works
Design & Access Statement

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hamilton ARCHITECTS

Quality Information

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Croydon Custody Centre Decarbonisation Works Design & Access Statement		MPS	Hamilton Architects		Peter Carr

Revision History

Revision	Revision Date	Details	Authorised	Name	Position
1	12.02.24	Plant platform design amend-ed	PC	Peter Carr	Senior Asso-ciate

Contents

1. Background

1.1 Introduction

The building for Croydon Custody Centre – Berin Underwood House was constructed in the early 2010's and the fabric is original with double glazed metal framed curtain walling and windows, terracotta and composite panel wall cladding and barrel-vaulted standing seam metal roofs.

There is a car park to the side of the building. There is also a small service yard to the rear of the building.

1.2 Details of Met Zero Carbon & Policies / Legislation

The Mayor of London has introduced a new policy to make London Net Zero Carbon (NZC) by 2030 (from the legal requirement of 2050). In the 2018 GLA Environment Strategy, the MPS is shown to emit 80% of all GLA family members' carbon (noting that TFL exclude trains and buses from this calculation). The major MPS emitters are fleet (40%), property (60%).

As a result of the policy, all carbon related lifecycle works (such as boiler and window replacements, fabric improvement etc.) would need to accelerate from a 30 year plan to delivery within the next seven years. MPS has identified sites where lifecycle works are due, and where there are opportunities for additional interventions that will enable NZC to be achieved in the estate.

Existing aerial view of site showing roof and car park and service yard beside building.

2. Proposals

2.1 Decarbonisation Works

2.1.1 Carbon savings.

The majority of the existing gas-fired boilers of Croydon Custody Centre have reached the end of their economic life and are now due replacement.

Options have been explored for replacing this plant. The possible proposals included like-for-like replacement of the existing gas-fired boiler plant and associated equipment, and also proposals for decarbonising the heating system by replacing the existing gas-fired heating plant with electric heat pumps.

Thermal modelling software and a review of gas meter records covering the past five years have been used to establish the anticipated heating demand of the building, which has demonstrated that the existing heating plant capacity of 900 kW could be reduced to 318kW. By using a green energy tariff for electricity with an effective carbon factor of zero due to the use of renewable energy sources, the carbon emissions associated with the heat pump heating system become zero, therefore decarbonising Croydon's heating system. This would mean a saving of approximately 93 tonnes of carbon dioxide per annum based on current carbon emissions.

2.1.2 Decarbonisation Options

When considering heating decarbonisation solutions for Croydon CC, at the outset, several options were reviewed:

1. Electric heat pumps
2. Direct electric heaters
3. Variable refrigerant flow (VRF / VRV) direct expansion systems
4. Biofuel boilers / CHP
5. Connection to District Energy Network

Of the above, the electric heat pump option was deemed the most favourable and so passed to further technical analysis. The other options did not progress to further review for the following reasons.

Direct electric heaters

- Effective coefficient of performance (COP) of 1 as 1 kW of electric energy becomes 1 kW of heat energy. This is significantly less than other heat pump options which have COPs of at least 2, even under the least favourable conditions. This low COP would result in higher running costs and larger electrical infrastructure requirements.

- Significant additional refit works required to replace existing radiators, trench heaters and heating coils throughout the whole building.
- Covered electric heaters can lead to heightened fire hazards.
- Significant electrical works to provide supplies to units throughout the building.

VRF systems

- Some in depth analysis, including thermal modelling of COPs, was carried out into this option before ruling it out.
- Due to the heating capacity required for the building, an extensive number of separate systems would be required due to limitations in the maximum capacity of VRF systems, especially when considering that it is desirable to operate on the refrigerant R32 to have less sensitivity to potential F-Gas phase down of the typical R410A.
- Whilst this VRF system itself offers reasonable COPs and the ability to both heat and cool the building, recovering heat in the case of a 3-pipe / 4-pipe system, significant works would be required to fit units throughout the building.
- VRF indoor units are not suitable for every space in the building requiring heating, such as WC's, showers, stores and the custody suite. When factoring in that these areas may be heated by electric panel heaters with a COP of 1, the SCOP for the overall system could be reduced to below 2.
- Refrigerant pipe length and height change limitations add complications to finding suitable external plant locations for outdoor units.
- Significant electrical works to provide supplies to units throughout the building.
- Future replacement of units may require significant works throughout the building.

Biofuel boilers / biofuel combined heat and power

- These systems tend to have elevated nitrous oxide (NOx) emissions which exceed NOx emission guidance set out in the London Environment Strategy, London Plan Air Quality Positive and the Croydon Air Quality Plan for the Air Quality Management Area (AQMA). Biofuel boilers have higher NOx emissions than equivalent ultra-low and low NOx gas boilers.
- The efficiency of boiler plant tends to be lower than equivalent gas-fired boilers. This can be offset in part by using biofuel combined heat & power for suitable applications.
- Additional on site fuel storage would be required to store sufficient supplies of biofuel, which would be subject to various environmental and technical requirements.
- Fuel would need to be delivered to the site by delivery vehicles.

Given the above noted obstacles for alternative decarbonisation options, heat pumps have been recommended as the preferred decarbonisation method. Below are several advantages of this approach.

- Aligns well with ongoing plans to decarbonise the electricity grid. No carbon generation at the point of use.
- A reasonably good efficiency / coefficient of performance (COP) can be achieved.
- Ability to connect to existing chilled water system as a heat source, helping to improve the effective COP and recycle heat which would otherwise be rejected to atmosphere back into the building.
- Existing heat distribution system and heat emitters can be retained and reused.
- Centralised plant in a dedicated plant area permits maintenance of the system without requiring access into office areas.
- Centralised plant limits the extent of works areas and associated mechanical and electrical infrastructure.
- Fed with mains electricity, so no transport fuel deliveries required to site.
- Running cost is comparable and perhaps slightly less than equivalent gas-fired plant. This is subject to variances in electricity and gas unit costs and efficiency levels achieved by plant.
- Can use non-HFC refrigerants and therefore not subject to future F-Gas phasedown.

2.1.3 Air Source Heat Pumps

Options for air source, ground source and water source heat pumps were considered. There would be no suitable water system available that could be used for water source heat pumps. Given the significant additional expense of a ground source heat pump system due to the need for boreholes, and associated risks such as environmental planning and achieving the required thermal performance from boreholes, it was decided to rule ground source heat pumps out at this point. Air source heat pumps were the chosen solution.

It is planned that the air source heat pumps would be open to external air as this is necessary for their operation, with the existing boiler plant room used to house thermal stores and distribution plant including pumps etc

2.1.4 Power Supply Resilience

Due to the nature of the work in the Custody Centre it is necessary that it can continue to operate in the event of a cut to the buildings power supply. As the heat pumps require such a supply it was necessary to upgrade the power supply to the site

2.2 Proposed Works

2.2.1 Elevated Plant Platform

It is necessary to locate the new plant in the car park. Air source heat pumps require access to free air in order to operate properly. The use of the existing plant rooms would not have been practical to accommodate the new equipment.

The car park is used to accommodate operational vehicles as well as staff parking. Loss of parking spaces would have an adverse affect on the operational effectiveness of the police station. The only option to provide the necessary plant area, that would not disrupt the operation of the police station, was to place the equipment on a steel platform supported on columns above the car park ground level. The columns have been placed to allow the continued use of the parking spaces under the platform.

The platform accommodating the air source heat pumps will be partly enclosed with acoustic louvre screening and partly with curtain walling with aluminium spandrel panels. A Noise Report is included with this application demonstrates that the enclosure will provide sufficient screening to the air source heat pumps to maintain required noise levels to local receptors

2.2.2 Plant Platform Location

A number of locations and configurations for the elevated plant platform were considered. The three locations the platform could fit would have been: along northern boundary of the car park; to the middle of the car park; or along south eastern boundary of the car park.

The chosen location provides the optimum solution for the following reasons:

- Although this location is more visible from the public road it was felt that this would be preferable to having ot nearer the residential properties to Union Road to the south east of the site where it could potentially cause more noise issues and would be more visually intrusive for these houses.There are existing trees which provide screening to the platform from Windmill Road.
- Placing the platform to the south east side of the site would have required removing trees in this area so that vehicular circulation around the car park was maintained
- There are no additional restrictions to Police Station parking facilities.
- The new plant lant is in close proximity to the existing plant room where connections will be made into the existing heating system

3. Planning Implications

3.1 Visual Appearance of Elevated Plant Platform

3.1.1 Design Approach for Platform

Generally, platforms accommodating air source heat pumps would be enclosed on four sides with acoustic louvre screening. This screening provides a more uniform appearance to the platform, concealing the variety of shapes and sizes of the new equipment. It also provides acoustic mitigation for the noise produced by the plant.

After discussions with planning an approach was developed to break up the treatment of the elevations so that the plant enclosure would not appear as one monolithic form. Treatments were explored to ameliorate the utilitarian exterior of the platform.

The use of art to improve the appearance of the platform was investigated. It was felt the use of artwork would draw attention to the platform to an even greater degree. The cost and timescale of procuring art, also, did not align with the project goals of the project.

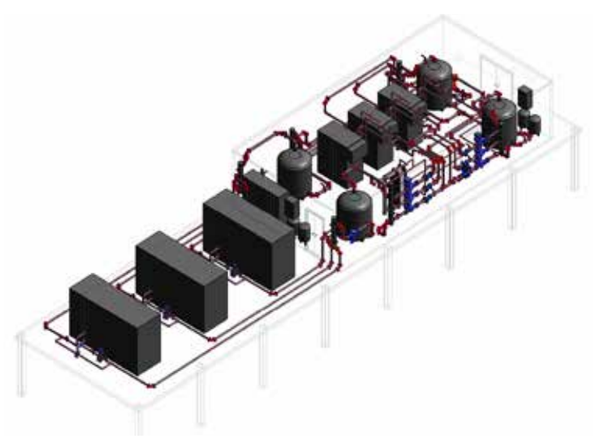
It was felt the better approach would be to design the new construction so that it complimented the existing building as much as possible. In this way, the intention would be that it would draw less attention to itself. It should look like it is part of the existing from.

It was also felt the use of planting would soften the impact of the construction. A green wall of climbing plants would cover part of the northwest elevation to help the platform blend more into the streetscape of Windmill Road.

3.1.2 Form and Scale of Platform

In this design part of the equipment is enclosed in a prepackaged enclosure which doesn't require ventilation to vertical walls. The screening still has to be tall enough to provide acoustic enclosure to the plant but it can be divided up into different materials and geometries. The design of these areas would then reflect the materials, colours and geometries of the existing building.

Proposed View 1 *showing elevation of plant platform from Windmill Road side.*



The part of the enclosure which does not require ventilation will consist of curtain walling framing and infill panels which match the geometry of the curtain walling to the existing building. The part of the enclosure where ventilation will be required will be enclosed in acoustic louvres which will match the large louvred panels to the existing building.

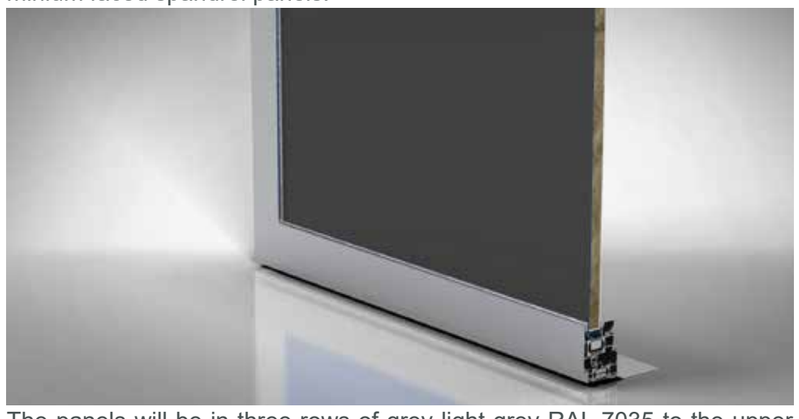
For the curtain walling section facing the road there will be a 'green wall' consisting of an native evergreen species appropriate to the local environment, that would grow upward from ground level via a stainless steel wire mesh. To the sections with louvres there will be a vertical emphasis. This will break up the mass of the platform and reflect the appearance of the existing building.

Example of green wall support structure

3.1.3 Materials and Colours for Platform

The materials and colours to the new platform will refer to the existing building. The existing building consists primarily of glazed curtain walling and cladding panels in grey colours. Large areas of the walls are clad in terracotta tiles in a clay colour and a grey colour. There are also a large number of louvred panels in a blue colour.

The walls to the non ventilated section of the platform will be framed in polyester powder coated aluminium curtain walling section with ppc aluminium faced spandrel panels.



The panels will be in three rows of grey light grey RAL 7035 to the upper row; a mid grey RAL 7037 to the middle row and a dark grey RAL 7016 to the bottom row

The louvres to the ventilated section of the platform will be polyester powder coated aluminium. The colour will be a green colour RAL 6035. This green shade is intended to compliment the neighbouring green wall.

The support structure will be galvanised steel. The appearance of the plant platform is demonstrated in the below 3D visuals. Attached product brochures indicate materials and appearance of the louvres.

Example of green wall planting

3.2 Parking Implications

The primary purpose of placing the air source heat pumps on the elevated platform is to avoid the loss of parking spaces. The provision of the platform will not remove any parking spaces. Swept path anaylsis drawings are included with the application which show cars can enter and exit the parking spaces under the platform without restriction.

3.3 Floor Space Implications

No floor space will be created as a result of the construction of the plant platform.

Existing view from Windmill Road

Proposed View 2 *showing new plant platform from Windmill Road*

Proposed View 3 *showing aerial view of new plant platform*

Proposed View 4 *showing aerial view of plant platform from south east*

Appendix A: Product Brochures

Technical Data

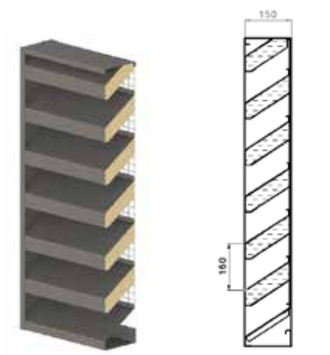
WAKEFIELDACOUSTICS
NOISE CONTROL TECHNOLOGY

Louvre Type WA-ACL-150SB

150mm deep single bank louvre

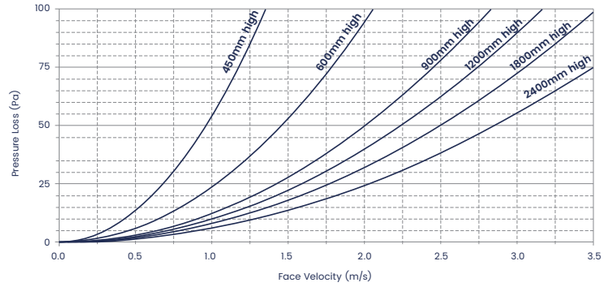
Specification: Single bank acoustic louvre 150mm deep, manufactured with horizontally mounted blades on a 150mm pitch, housed in an outer casing.

Louvre supplied with birdguard and polyester powder paint finish to a standard RAL / BS colour



Louvre			Sound Reduction (dB) at Octave Band Centre Frequency (Hz)							
Depth	Style	Product Code	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
150mm	Single Bank	WA-ACL-150SB	4	4	6	8	10	11	11	10

Pressure Loss Details



Pressure loss correction factors based upon installation conditions are given below:

Fresh air intake, ducted to rear	+0%
Exhaust air to atmosphere, ducted to rear	+10%
Non-ducted	+50%

Weight	Height	Free Area
56kg/m2 Approx	450	33%
	600	38%
	900	42%
	1200	44%
	1500	46%
	1800	46%
	2100	46%
	2400	47%

Options Available

- Birdguard (BG)
- Powder Coat finish (PC)
- Pre-coated steel (CS)
- Externally Flanged (F)
- Support Frame (SF)

Coding Example: WA-ACL-150-SB/BG/PC/F

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