

The background of the document is a photograph of Victoria Park, featuring a modern glass-fronted building, a paved walkway, and a landscaped area with a small stream or water feature. A semi-transparent green overlay covers the central portion of the image, where the title and company information are located.

CWC

crookes walker
consulting

Victoria Park

Environmental Standard Statement

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Revision Record

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1.0 Introduction

Crookes Walker Consulting (CWC) have been instructed to advise on the planning application for Victoria Park.

This creation of this Environmental Standard Statement is required by Manchester City Council as a means of clarifying how the compliance with the Councils Core Strategy (Policy EN4 & EN6) is to be achieved; it also expands on the project teams' approach to achieve low energy / low carbon dwellings.

Crookes Walker Consulting (CWC) are working collaboratively with a team of design consultants and industry professionals, including Britannia Group (Client), Ollier Smurthwaite Architects and Bell Munro (structural engineers) to develop sustainable design solutions for the new residential scheme referred to as Victoria Park.

This report identifies several technological solutions which will help reduce operational energy consumption of the building; the energy benefits of such technologies have been assessed using 'Standard assessment Procedure' (SAP) calculation software.

The final specific design solutions will be determined at a later date (following further community engagement, design details (e.g. thermal bridging) and in-depth calculated assessment of the benefits of each solution.

1.1 Existing Site Location & Features

The site is located on the corner of Laindon Road and Daisy Bank Road in Victoria Park.

The existing site address is
Victoria Park Probation
Centre Laindon Road,
Manchester, M14 5YJ.



Figure 1 Site Location

1.2 Existing Building and Features

The existing site Victoria Park Probation Centre is due to be demolished.



Figure 2 Existing Site

1.3 Proposed Site

The proposed new design of a mix of dwelling types comprises of 72 units including apartments block onto Daisy Bank Road with houses on Laindon Road.

Table 1. Accommodation schedule (see Appendix 1 for full details)

Block and Housing Type	Dwelling Size Count
Block 1 apartments	1 bed -23 no 2 bed -14 no
Block 2 houses	3 bed – 2 no 4 bed- 2 no
Block 3 houses	3 bed – 2 no 4 bed- 4 no
Block 4 houses	4 bed- 3 no
Block 4 apartments	1 bed- 2no 2 bed- 2 no
Block 5 houses	3 bed – 2 no 4 bed – 2 no
Block 6 houses	3 bed – 2 no 4 bed – 2 no
Block 7 houses	3 bed – 2 no 4 bed – 2 no
Block 8 houses	3 bed – 5 no
Detached house	6 bed- 1 no
Total	72

Refer to architectural document for up-to-date and accurate architectural information.



Figure 3 Proposed Site

2.0 Sustainable Design Approach

The following outlines the project teams' approach to achieving sustainable design solutions.

2.1 Energy Hierarchy

The design team have adopted an approach in which the need for energy use is reduced in the first instance and then energy efficient measures are explored and then the use of low / zero carbon technologies are considered.

This approach is summarised within the below diagram and the following sections of this report, elaborate on each element of this hierarchical approach.

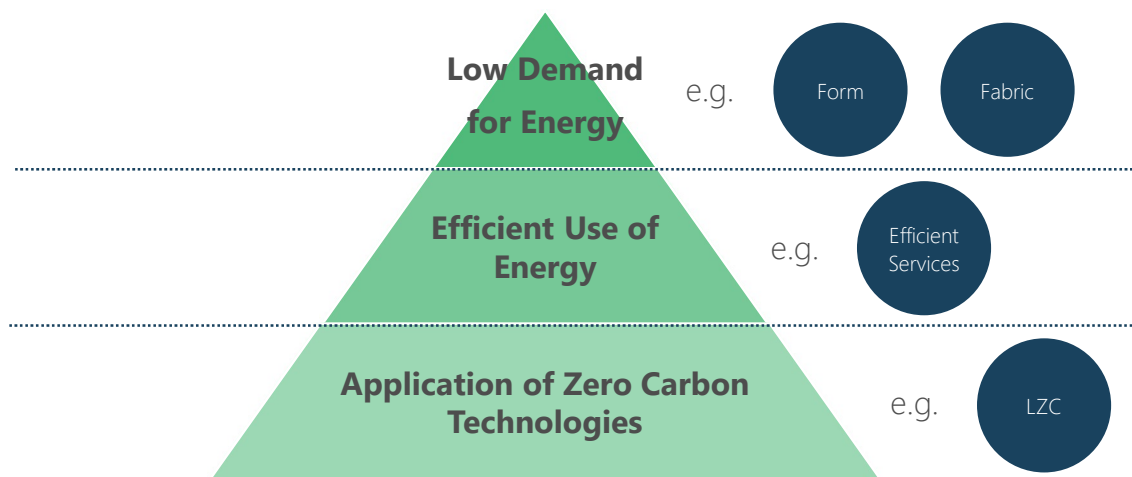


Figure 4 Energy Hierarchy Diagram

The architectural team are actively seeking to improve fabric values beyond those mention within this report, however, the feasibility of enhancing fabric is subject to further design analysis (e.g. cost, risk, buildability etc).

3.0 Statutory Requirements & Compliance Strategy

This Environmental Standards Statement seeks to demonstrate that the design intent for the scheme is aligned with Manchester City Council's aspirations in delivering sustainable developments. The environmental and energy strategy for the scheme has been developed using the following regulations and planning policies:

3.1 Part L Building Regulation Requirements

The Building Regulations Approved Document Part L (Conservation of Fuel and Power) 2021 is applicable for this scheme and outlines the requirements for achieving operational carbon targets associated with fuel usage.

The residential elements of the scheme have been reviewed against the requirements of Building Regulations Part L Volume 1 utilising SAP assessment software.

The SAP assessment has identified several solutions for achieving compliance, however, as noted above, the final solutions are subject to design development.

The scheme will be designed to achieve compliance with Approved Document L Volume 1 2021 and shall achieve the betterment over Part L 2010 as described below.

3.2 Manchester City Council Core Strategy

The Manchester City Council, Manchester Core Strategy 2012 to 2027 document and planning policies have been utilised for assessment as follows. The following policies are extracted from the Manchester Core Strategy Document:

The wording below contained within Section 3.2 has been taken from the Councils Core Policy guidance as is applicable to Victoria Park.

Policy EN 4

Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

- All development must follow the principle of the Energy Hierarchy, being designed:
 - to reduce the need for energy through design features that provide passive heating, natural lighting, and cooling
 - to reduce the need for energy through energy efficient features such as improved insulation and glazingto meet residual energy requirements through the use of low or zero carbon energy generating technologies
- Wherever possible new development and retrofit projects, including energy generation plant, must be located, and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies.
- Where possible new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings.
- Where appropriate new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing / potential decentralised energy schemes.
- The use of building materials with low embodied carbon in new development and refurbishment schemes.

Policy EN 6

Target Framework for CO₂ reductions from low or zero carbon energy supplies

Applications for residential development of 10 or more units and all other development over 1,000 sq. m will be expected as a minimum to meet the target shown in Tables 12.1 (domestic) or 12.2 (non- domestic) unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement.

Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development.

Developments smaller than the above threshold but involving the erection of a building or substantial improvement to an existing building will also be expected to meet the minimum target, where viable, but will not be expected to submit an energy statement.

The target framework relates to three broad development locations and their potential for low and zero carbon, decentralised energy. The areas are defined as follows:

- Target 1 Network development areas: Locations where the proximity of new and existing buildings, the mix of uses and density of development provide the right conditions to support district heating (and cooling).
- Target 2 Electricity intense areas: Locations where the predominant building type has an all-electric fit-out such as retail units and leisure complexes.
- Target 3 Micro-generation areas: Locations where lower densities and a fragmented mix of uses tend to mean that only building scale solutions are practical.

Domestic CO₂ emissions reduction targets (Table 12.1)

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity intense buildings	+15% increase on Part L 2010
Target 3: Micro generation area	+15%increase on Part L 2010

Where the CO₂ emissions reduction required under any future revision to Part L of the building regulations becomes greater than the '% Minimum requirement', the reduction required under building regulations would apply.

Where the Council identifies an 'allowable solution', for example within an energy proposals plan, that would produce higher carbon reductions at no extra cost than that of achieving the '% Minimum requirement' (or required under building regulations if greater) the higher percentage reduction will be required. The cost comparison is based on the cost of incorporating the 'allowable solution' at design stage.

The **energy statement** will be required to be submitted at the outset of any proposed development (outline application or before). Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street trees and waterways to contribute to compliance with CO₂ mitigation,

subject to the energy statement incorporating evidence such as modelling to demonstrate compliance.

Guidance on what the energy statement should contain and how to decide which target applies to a development proposal is given in Appendix A of the policy.

3.3 Achieving for Achieving Compliance with Statutory Requirements

This report demonstrates how compliance is achieved with the statutory requirements as noted within section 3.1 and 3.2 above.

Utilising the approved SAP 10.2 software, representative samples of apartments and houses have been assessed, typically on an area-weighted block average of the sample.

The predicted energy and CO₂ emissions for the residential accommodation has been calculated for a variety of solutions as can be seen within Appendix 2.

The solutions which were deemed as a 'Pass' under the SAP 10.2 software indicate that the 'dwelling emission rate' achieved around a 50% betterment over the minimum requirements for Part L 2021. **Therefore all solutions identified far exceed the minimum council betterment of a 15% over Part L 2010.**

At this stage we have not defined the exact arrangement of solutions, as we do not wish to limit solutions at this early project stage. For example the project team have a desire to improve thermal bridging details at a later stage, but this cannot be determined at this stage.

Solutions for achieving compliance and exceedance Part L 2021 are likely to include some of the following:

- a. High-end fabric solutions - E.g. triple glazing
- b. Air tight building – potentially less than 3 m³/h/m²@50Pa
- c. Solar photovoltaics
- d. Air to water heat pumps
- e. Mechanical Ventilation with Heat Recovery
- f. Efficient lighting

See Appendix 2 for the full SAP assessment results.

4.0 Energy Conservation – Low demand for Energy

This section provides an overview of the current strategy for designing Victoria Park in a manner that will reduce the energy demand of the building by passive design measures. The fabric performance has been optimised using SAP and guidance found within Approved Document 'O' for the avoidance of overheating.

4.1 Sustainable Building Fabric Designs

The building "fabric" (e.g. façade, roof, windows etc) have been designed in a manner that significantly exceeds the minimum requirements which are defined within Approved Document Part L Volume 1.

The below Table 1 demonstrate this by showing the minimum fabric values and compares against the proposed values.

Note: the final fabric values will change slightly from the below as final product details are selected and arrangement agreed.

Table 2: Comparison of Minimum Fabric Values and Enhanced Proposed Fabric Values to achieve a low energy building.

NEW BUILDING		
	Minimum Fabric Values (For Building Regulation Part AD L LV1 (2021) - Energy Conservation for Dwellings)	Proposed Fabric Values
External Wall	0.26 W/m ² K	0.15 W/m ² K
Glazing	1.60 W/m ² K	1.20 W/m ² K, Enhanced U value for 0.8 W/m ² K
Door	1.60 W/m ² K	1.2 W/m ² K
Roof	0.16W/m ² K	0.10 W/m ² K

Ground/ Exposed Floor	0.18 W/m ² K	0.10 W/m ² K
Thermal Bridging	Y=0.04	Y=0.04
Air permeability	8.0m ³ /(h·m ²) @ 50Pa 1.57m ³ /(h·m ²) @ 4Pa	3.0 m ³ /hr/m ² @ 50 Pa

4.2 Avoidance of Overheating

There has been mandatory requirement to undertake the assessment to demonstrate compliance with the new Building Regulations Part O 2021 Edition to tackle overheating in new residential type buildings.

The assessment has been carried out by the Architect using the prescribed "simplified method".

The architectural team have designed the façade / glazing / windows in such a way that achieved compliance with Part O.

This careful design mitigates the need for mechanical cooling.

5.0 Energy Efficient Operation

Even with an enhanced fabric design, the need for energy use is unavoidable, however, several design solutions have been selected to help improve the energy efficient operation of the building, which can also reduce fuel consumption and save on energy bills.

An overview of the potential sustainable design solutions are described below.

5.1 Electric Panel Radiators with App (mobile Phone) Control Functionality

Space heating to all units are likely to be achieved via direct electric panel radiators. As these do not rely on the storage or distribution of hot water there is no wasted heat and as such, they provide a very energy efficient design solution in comparison to wet system (i.e. boiler system). There is also less embodied carbon associated this solution, as there is far less material involved with the installation works compared to typical alternatives (e.g. central boiler system).

It is proposed the panel heaters are capable of Wi-Fi connectivity, to allow residents/tenants remote control of each panel heater via an Android or iPhone App. App control can allow for the following control features for the residents/tenants:

- Viewing of current temperature readings
- Setting of desired temperature
- Day and night temperature settings
- On/off control of each panel heater
- Daily and weekly time scheduling

The panel heater is to be capable of being controlled without the use of an App, through manual adjustment of the thermostat at the panel heater.

Panel heaters shall include smart adaptive functions to recognise the time the space takes to heat up and also recognise when a window is open in order to switch off automatically to prevent wasting energy.



Figure 5 App Controllable Radiator (Example shown is Adax Neo)

5.2 Mechanical Ventilation with Heat Recovery

Mechanical ventilation with heat recovery' (MVHR) unit could be introduced to houses and apartments. This has the potential of several benefits from a sustainability perspective as follows.

In the majority of domestic bathrooms and kitchens, a local dedicated fan is provided which exhausts warm air to the outside; this is essentially "dumping" useful room heat to outside and is thus wasted energy.

With the MVHR unit, circa 85% of the heat extracted from bathrooms and kitchens can be captured (during colder months) and used to heat the incoming supply air. As such this is a very energy efficient solution relative to alternative solutions. This strategy is the same strategy for dwellings complying with the widely recognised Passivhaus standard.

The MVHR unit can be provided with an intelligent integral control system which enables the heat recovery device to be bypassed during the warmer months.

The MVHR unit flow rates can be increased during the summer months to also provide "free cooling".

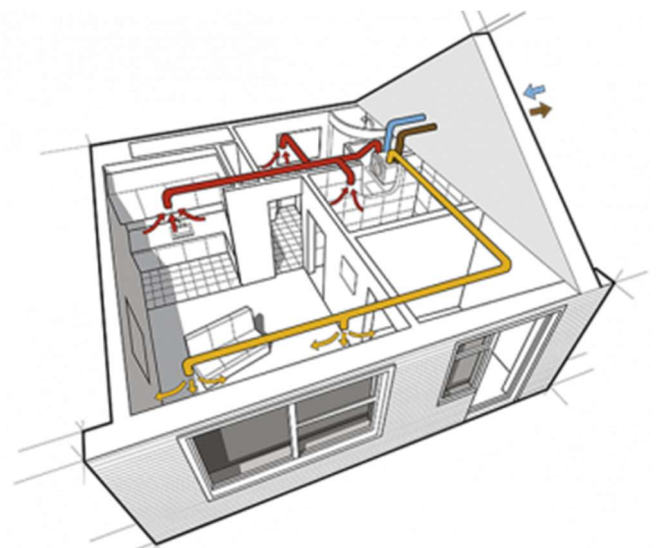


Figure 6 Example of MVHR System (Image Courtesy of Xpelair)

5.3 Intelligent Lighting

Low energy LED luminaires are proposed throughout the scheme for landlord areas and apartments.

All landlord areas, with the exception of plantrooms, will make use of lighting presence detectors and / or daylight dimming controls to keep lighting energy use to a minimum.

5.4 Low Flow Appliances

During subsequent design stages consideration will be given to the selection of sanitaryware such as WC's, baths, showers, sinks etc provided such that water consumption shall be less than the required minimum.

It is not within CWC's remit to specify sanitaryware / white goods and the project is not currently at a stage where the selection of the below listed equipment has been concluded, however, CWC proposed the below targets to achieve a reduction in water usage.

By utilising the calculation tools within Approved Document G, this demonstrates that we are able to achieve a **reduced water consumption from 125 l/p/d to 100 l/p/d**.

Table 3: Example Method to Significantly Reduce Water Consumption

Appliance	Part G maximum flow rate which equates to 125l/p/d	Example target flow rates which equate to 100l/p/d	% Difference
Shower	10 l/min	6 l/min	40%
WHB tap	6 l/min	4.5 l/min	25%
Kitchen Tap	8 l/min	5 l/min	37.5%
Bath	185 litres	140 litres	32%
WC flush	4.5 litres	4 litres	12.5%
Dishwasher	1.25 l/place setting	0.85 l/place setting	47%
Washing Machine	8.17 l/kg dry load	5.7l/kg dry load	43%

5.5 Metering Strategy

CWC propose all dwellings utility meters are located within the apartment/house and in a location that is easily accessible to the tenants (e.g. within the utility store, on the wall). This will enable tenants to monitor their ongoing energy / water usage and consider how to better manage their consumption.

In a similar manner, all landlord supplies shall be meters and made easily accessible.

6.0 Implementation of Renewable Technologies

Once energy demand has been reduced to a minimum by implementing measures described within this report, additional renewables are proposed to offset the site energy consumption.

The below summarises available solutions considered for Victoria Park. Again the final combination of energy conservation solutions shall be determined at a later date.

6.1 Hot Water Heat Pump

Hot water heat pumps to individual apartments and houses may be utilised. The primary heat pump solution considered is a combined hot water, heat recovery and Mechanical Ventilation system with storage cylinder. Edel or Kers Unit below



Figure 7 Example Hot water Heat Pump

Alternative heat pump solution to the above would be an independent system (i.e. one which does not have an MEV) and in this situation the indoor hot water cylinder would be ducted to the façade with both intake and exhaust ducting.

6.2 Solar Photovoltaics (PV)

The electricity demand could be offset with solar photovoltaics (PV), providing an effective solution which can be utilised throughout the year, albeit more beneficial during the summer months.



Figure 8 Example of Rooftop Solar PV

6.3 Discounted Renewables and LZC Technologies

The following summarises other renewable and low carbon technologies which have been considered and discounted.

Low and Zero Carbon Technology Appraisal	
Central Air Source Heat Pump (ASHP)	Central system not possible due to lack of location to locate an external condenser unit, which would be excessively noisy and prohibit the use of openable windows to several apartments.
Ground Source Heat Pump (GSHP)	Not adequate space for external spaces available for boreholes / "slinky" pipework. Costs also excessive relative to alternative solutions.
Solar Thermal	There is no centralised hot water storage proposed as hot water pipework would need to be either distributed within external walkways, which is inefficient due to significant heat loss from pipework, or through apartments, which results in access and maintenance issues.
Combined Heat & Power (CHP)	There is no LTHW heating system within the proposed design. If one was to be provided, there would not be an adequate constant base heating load to provide suitable payback for this technology.
Biomass	Site location, logistics and storage preclude this technology
Wind Turbines	The strobing effect and noise issues associated with this technology are not acceptable in this location

7.0 Appendix 1 Accommodation Schedule

PLOT	NO. BEDS	ROOM	AREA (SQM)
BLOCK 1 (APARTMENTS)			
PLOT 01	1C	RESIDENTIAL	43.6
PLOT 02	1A	RESIDENTIAL	37.1
PLOT 03	1A	RESIDENTIAL	37.1
PLOT 04	1A	RESIDENTIAL	37.1
PLOT 05	1C	RESIDENTIAL	43.6
PLOT 06	2C	RESIDENTIAL	71.5
PLOT 07	2A	RESIDENTIAL	61.6
PLOT 08	2A	RESIDENTIAL	61.6
PLOT 09	2C	RESIDENTIAL	71.5
PLOT 10	1C	RESIDENTIAL	43.6
PLOT 11	1A	RESIDENTIAL	37.1
PLOT 12	1A	RESIDENTIAL	37.1
PLOT 13	1A	RESIDENTIAL	37.1
PLOT 14	1C	RESIDENTIAL	43.6
PLOT 15	2C	RESIDENTIAL	71.5
PLOT 16	2A	RESIDENTIAL	61.6
PLOT 17	2A	RESIDENTIAL	61.6
PLOT 18	2C	RESIDENTIAL	71.5
PLOT 19	1C	RESIDENTIAL	43.6
PLOT 20	1A	RESIDENTIAL	37.1
PLOT 21	1A	RESIDENTIAL	37.1
PLOT 22	1A	RESIDENTIAL	37.1
PLOT 23	1C	RESIDENTIAL	43.6
PLOT 24	2C	RESIDENTIAL	71.5
PLOT 25	2A	RESIDENTIAL	61.6
PLOT 26	2A	RESIDENTIAL	61.6
PLOT 27	2C	RESIDENTIAL	71.5
PLOT 28	1C	RESIDENTIAL	43.6
PLOT 29	1A	RESIDENTIAL	37.1
PLOT 30	1A	RESIDENTIAL	37.1
PLOT 31	1A	RESIDENTIAL	37.1
PLOT 32	1C	RESIDENTIAL	43.6
PLOT 33	2C	RESIDENTIAL	71.5
PLOT 34	2C	RESIDENTIAL	71.5
PLOT 35	1D	RESIDENTIAL	40.5
PLOT 36	1D	RESIDENTIAL	40.5
PLOT 37	1D	RESIDENTIAL	40.5
CIRCULATION			234.6
PLANT			16.7
GIA			2157.7
BLOCK 2			
PLOT 38	4A	RESIDENTIAL	106.1
PLOT 39	3A	RESIDENTIAL	90.1
PLOT 40	3A	RESIDENTIAL	90.1
PLOT 41	4A	RESIDENTIAL	106.1

BLOCK 3			
PLOT 42	4A	RESIDENTIAL	106.1
PLOT 43	3A	RESIDENTIAL	90.1
PLOT 44	4A	RESIDENTIAL	106.1
PLOT 45	4A	RESIDENTIAL	106.1
PLOT 46	3A	RESIDENTIAL	90.1
PLOT 47	4A	RESIDENTIAL	106.1
BLOCK 4			
PLOT 48	4A	RESIDENTIAL	106.1
PLOT 49	1B	RESIDENTIAL	37.0
PLOT 50	2B	RESIDENTIAL	71.5
PLOT 51	4A	RESIDENTIAL	106.1
PLOT 52	1B	RESIDENTIAL	37.0
PLOT 53	2B	RESIDENTIAL	71.5
PLOT 54	4A	RESIDENTIAL	106.1
BLOCK 5			
PLOT 55	4A	RESIDENTIAL	106.1
PLOT 56	3A	RESIDENTIAL	90.1
PLOT 57	3A	RESIDENTIAL	90.1
PLOT 58	4A	RESIDENTIAL	106.1
BLOCK 6			
PLOT 59	4A	RESIDENTIAL	106.1
PLOT 60	3A	RESIDENTIAL	90.1
PLOT 61	3A	RESIDENTIAL	90.1
PLOT 62	4A	RESIDENTIAL	106.1
PLOT 63	6A	RESIDENTIAL	131.1
BLOCK 7			
PLOT 64	4A	RESIDENTIAL	106.1
PLOT 65	3A	RESIDENTIAL	90.1
PLOT 66	3A	RESIDENTIAL	90.1
PLOT 67	4A	RESIDENTIAL	106.1
BLOCK 8			
PLOT 68	3B	RESIDENTIAL	90.6
PLOT 69	3B	RESIDENTIAL	90.6
PLOT 70	3B	RESIDENTIAL	90.6
PLOT 71	3B	RESIDENTIAL	90.6
PLOT 72	3B	RESIDENTIAL	90.6
TOTAL 1 BED	25	TOTAL	988.95
TOTAL 2 BED	16	TOTAL	369.48
TOTAL 3 BED	15	TOTAL	1354
TOTAL 4 BED	15	TOTAL	1590.75
TOTAL 6 BED	1	TOTAL	131.1
	72		
		TOTAL GIA	5450.5

8.0 Appendix 2 SAP Assessment Report

Energy Strategy Option	Space Heating Strategy	Domestic Hot Water Strategy	Vent System Type	PV Requirement	SAP Compliance Results		
				kWp / Apt	DFEE< TFEE	DPER< TPER	DER< TER
APARTMENT BLOCKS							
2482 Victoria Park (Energy Council undertook SAPs)							
Option 1	elec panel	elec immers	sys 4 MVHR	none	5%	-15%	40%
Option 2	elec panel	elec immers	sys 4 MVHR	yes 1kWp	5%	2%	51%
Option 3	elec panel	HW HP	sys 4 MVHR	none	25%	50%	76%
Option 4	elec panel	HW HP	KERS Vent	none	22%	29%	61%
HOUSES							
2482 Victoria Park (Energy Council undertook SAPs)							
House Type 3B							
Option 1	elec panel	elec immers	sys 4 MVHR	none	10%	-54%	23%
Option 2	elec panel	elec immers	sys 4 MVHR	yes 3.5kWp	10%	44%	80%
Option 3	elec panel	HW HP	sys 4 MVHR	none	10%	-11%	44%
Option 4	elec panel	HW HP	KERS Vent	yes 1.2kWp	13%	5%	51%
Option 5	elec panel	HW HP	sys 3 MEV	yes 1.2kWp	13%	15%	56%
Option 6	elec panel	HW HP	MVHR	none	18%	26%	63%
House Type 4B							
Option 1	elec panel	elec immers	sys 4 MVHR	none	9%	-51%	27%
Option 2	elec panel	elec immers	sys 4 MVHR	yes 4kWp	9%	29%	80%
Option 3	elec panel	HW HP	sys 4 MVHR	none	9%	-10%	42%
Option 4	elec panel	HW HP	KERS Vent	yes 1.2kWp	11%	5%	51%
Option 5	elec panel	HW HP	sys 3 MEV	yes 1.8kWp	9%	9%	52%
Option 6	elec panel	HW HP	MVHR	none	15%	22%	60%
House Type 6A							
Option 3	elec panel	HW HP	sys 3 MEV	yes 1.8kWp	9%	9%	52%
Option 4	elec panel	HW HP	KERS Vent	yes 2.4kWp	9%	3%	50%
Option 6	elec panel	HW HP	MVHR	none	12%	9%	53%

Option Key

Option 1 - Electric Heaters and Hot Water no PV and MVHR

Option 2 - Electric Heaters and Hot Water with PV and MVHR

Option 3 - Electric Heaters and Hot Water Heat Pump Dimplex Edel with PV and MVHR

Option 4 - Electric Heaters and Hot Water Heat Pump with PV & KERS

Option 6 - enhanced fabric

Technology Abbreviations Key

Dimples Edel HW HP - Hot Water Heat Pump only

MVHR - Mechanical Ventilation Heat Recovery

KERS Vent - indoor heat pump is a combined hot water, heat recovery and MEV system with storage cylinder. It converts waste heat energy from bathrooms and kitchens to low cost, renewable hot water.

DFEE/TFEE Dwelling Fabric Energy Efficiency / Target Fabric Energy Efficiency

DPER/TPER Dwelling Primary Energy Rate/Target Primary Energy Rate

DER/TER Dwelling Emission Rate/Target Emission Rat