Sustainability and Energy Statement

Centre Heights

Swiss Cottage

May 2015

CENTRE HEIGHTS - SWISS COTTAGE

SUSTAINABILITY AND ENERGY STATEMENT

Issue No. 1 - May 2015

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Issue History:

Issue No.	Date	Description	
1	14/05/2015	Planning	

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1.0 Executive Summary

This energy statement relates to a FULL planning submission.

This report refers to the proposed new built penthouse level above the existing Centre Heights building, containing 5 dwelling houses and a new mews block to the rear of the site in place of the existing mult-story car park, which contains eleven dwellings.

The energy strategy is based on very high insulation levels, a communal vrv heat pump and photovoltaic panels to provide on-site generation of renewable electricity for the residential units.

The development shall to comply with a 110 litres/person/day of water requirement.

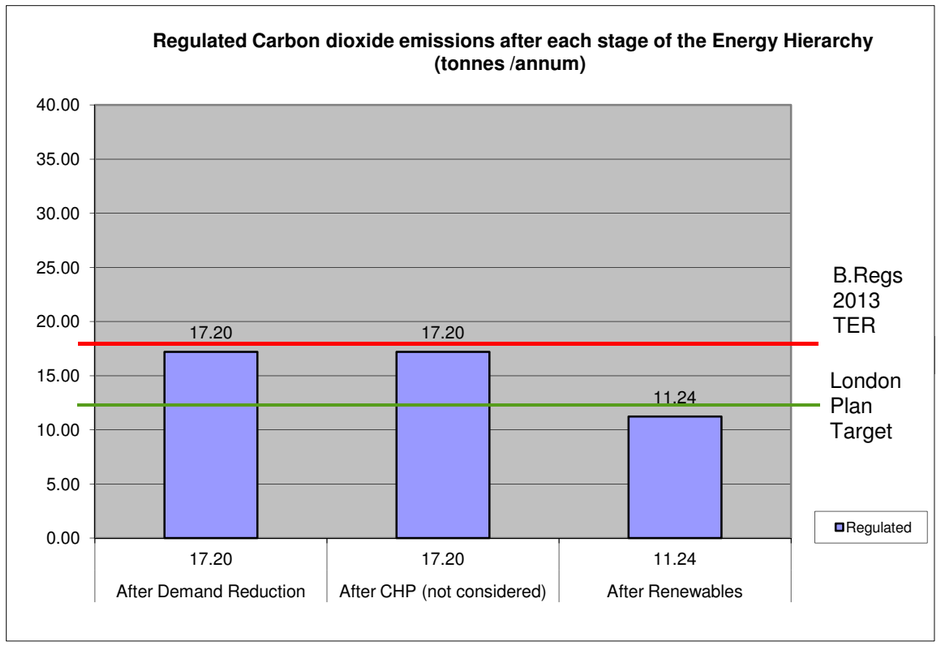


Table1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for a typical end penthouse apartment

	Carbon dioxide emissions (Kg CO^2 / m / annum)	
	Regulated	**Unregulated**
Gas Baseline 2013	17.60	7.57
London Plan Target (35%)	11.44	7.57
After Demand Reduction	17.20	7.57
After CHP (not considered)	17.20	7.57
After Renewables	11.24	7.57

The resulting percentage reductions in regulated carbon dioxide emissions are given in the table below

Table 2: Regulated Carbon dioxide savings from each stage of the Energy Hierarchy

	Regulated Carbon dioxide savings	
	Kg CO^2 / m / annum	**%**
Savings from demand reduction	0.40	2.3%
Savings from CHP	0.00	0.0%
Savings from renewable energy	5.96	34.7%
Total Cumulative Savings	6.36	36.1%

Lastly; the percentage reductions in total (unregulated + regulated) carbon dioxide emissions are given in the table below.

Table 3: Total Carbon dioxide savings for percentage renewables

	Total Carbon dioxide savings Regulated + unregulated
Baseline Carbon Emmissions	25.17
Savings from renewable energy	5.96
%ge Renewable	23.68%

2.0 Energy Hierarchy

2.1 Demand Reduction

The "regulated" CO2 Emissions were calculated using recognised SAP software, Stroma fSAP 2012.

The calculations take into account a number of "energy demand reduction" measures, which are summarised in the table opposite.

Generally, insulation levels approaching Passivhaus standards have been adopted. There glazing also has a u-value far better than the minimum required by the current building regs.

2.2 Efficient Infrastructure

2.2.1 District Heating (not available)

Having established the CO2 emissions after applying demand reduction measures, the next step was to investigate the use of efficient heating and cooling networks. The London heat map (see below) indicates there are no existing, district heating mains nearby and the nearest proposed heating mains will be at least 800m away.

2.2.2 Sitewide Heating (proposed)

The nature of this type of tower block (1960 concrete upgraded to effective curtain wall) has meant that installing gas boilers with flues in every apartment would be a very difficult task and potentially unsightly.

As as result, a sitewide heating scheme has been proposed. There will be centralised VRV heat pumps providing space heating with a centralised VRV boiler supplying heat for the domestic water load.

2.2.3 CHP (not proposed)

CHP needs at least 100 dwellings (ideally 500 or more) to be economically viable.

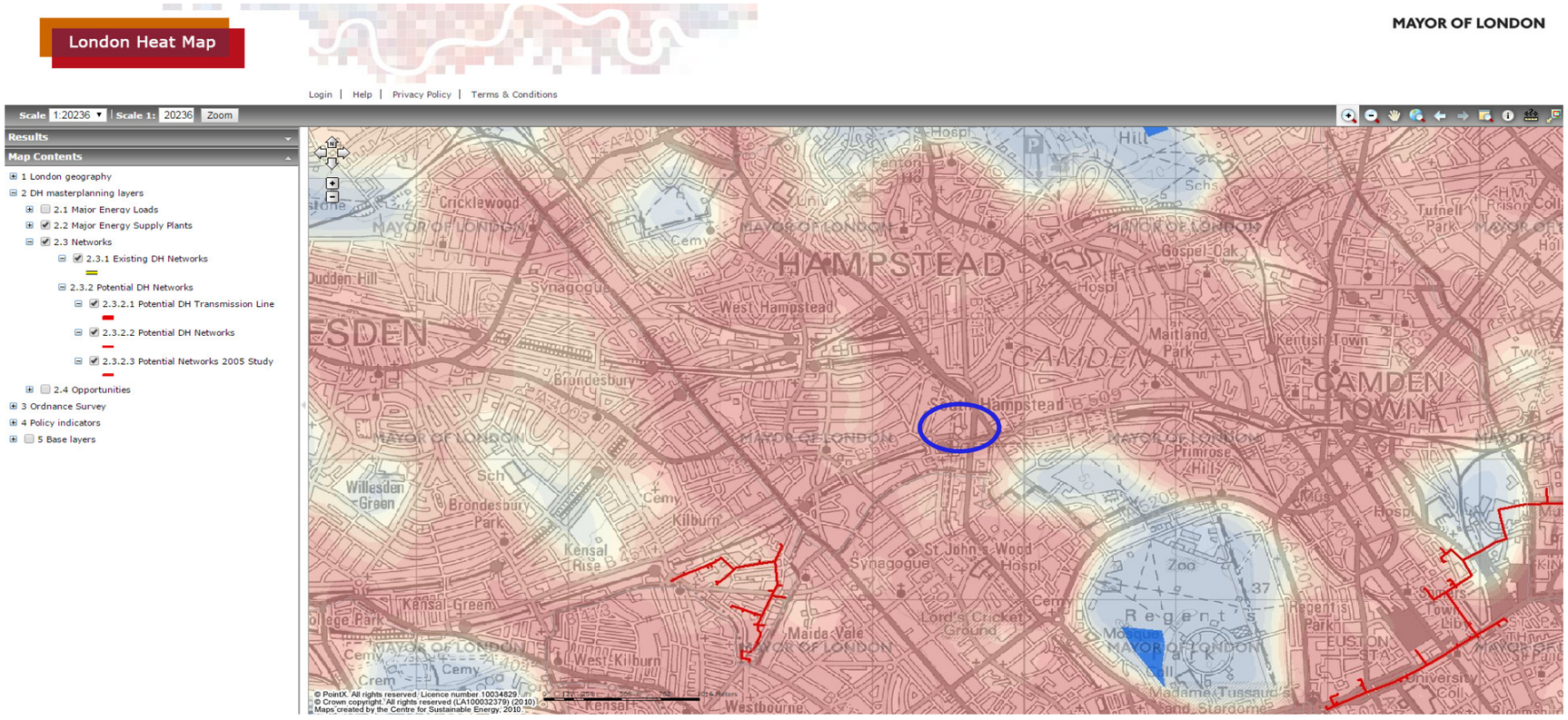
2.3 On-site Renewables (proposed)

A number of renewable energy sources were looked at; Solar (PV and thermal), Wind, Biomass and Heat Pumps.

Our proposed strategy is to use Photovoltaic Panels on the roofs of dwellings with the heating and domestic hot water provided by a centralised VRV heat pump.

Table 4: Energy Efficiency Measures - "Be Lean"

Element or System	Reference value	Demand Reduction Proposal	Comment
Wall U-Values	0.35	0.15	~~Requires 120 mm P.U. insulation~~
Floor U-Values	0.25	0.15	~~Requires 100 mm P.U. insulation~~
Roof U-Values	0.16	0.1	~~Requires 200 mm P.U. insulation~~
Opaque Door	2	1.4	~~Requires extra 10 mm P.U. insulation~~
Thermal Bridging	0.11	0.15	
Windows	All East or West Facing		
U- Values (W/m2K) Frame Factor Solar Energy Trans. Light Trans.	1.8 0.7 0.51 0.67	1.4 0.89 0.65 0.72	Low-e, double-glazed units with soft coating
Ventilation system	Natural Ventilation with Intermittent extract fans	Continuous mechanical extract (CMEV)	
Extract Fans	2 Fans per apt, 5 per house	1 Per Apt, 1 Per House	
Hot Water Cylinder	150l Cylinders with 35mm factory foam	centralised dhw storage	
Primary Losses	Primary pipework not insulated, cylinder temp controlled by thermostat	Sitewide heating circuits highly insulated	
Low-e light fittings	75% of fixed outlets	100% of fixed outlets	
Heating Fuel	Electricity	No change	
Heating System		Daikin VRV heat pumps with VRV boilers	
Heating Controls	Programmer + room thermostat + TRVs + boiler interlock	Zonal time and temperature control	
Hot Water System	Stored water, heated by boiler, separate timers for HTG and DHW	Independent time control	



http://www.londonheatmap.org.uk

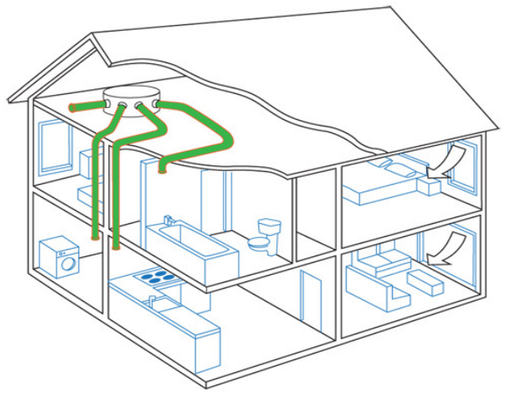
3.0 Detailed Proposal

The detailed energy calculations (see appendix 1) suggest a PV installation sized at 0.1 - 0.75kWp per apartment. When area averaged accross the nerw part of the development the total number of 250Wp panels required is approximately 16.

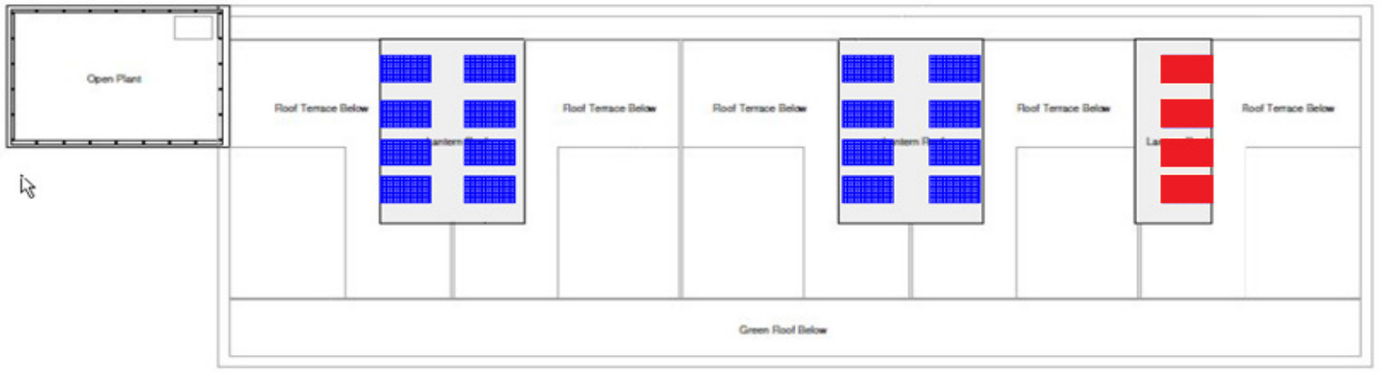
The panels are to be installed on the lantern roofs above the penthouseses detailed feasibility study is given on the following page.

The ventilation strategy relies upon a continuous mechanical ventilation strategy.

The mews flats have be modelled with waste water heat recovery to reduce the number of PV on the penthouse roof



Continuous Mechanical Extract System



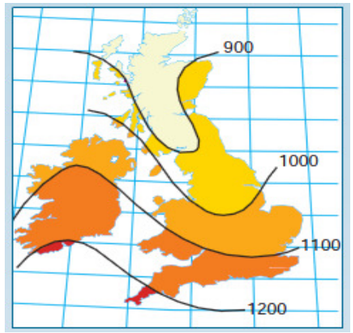
1/134 Roof Plan
1 : 100

Proposed PV location showing
16 panels with potential for more

Detailed proposal: Photovoltaics

1. SITE ANALYSIS

Incoming annual radiation	1,100 kWh/m2
Tilt	30 deg
Direction (S=0, W=90, E=-90)	-45 deg
Correction Factor	96%
Shading	None
Shading Correction Factor	1.00
Inverter loss Correction Factor	95%
Dist'n loss Correction Factor	98%
Balance Of System C.F.	94%
Total Combined Correction Factor	84.0%
Corrected annual radiation	**924 kWh/m2**



Annual radiation kWh/m2
For South-facing @30 deg tilt

Tilt	Annual output as percentage of maximum for stated orientation (with respect to due south) and tilt / %												
	−90° West	−75°	−60°	−45° SW	−30°	−15°	0° South	15°	30°	45° SE	60°	75°	90° East
Vertical	56	60	64	67	69	71	71	71	71	69	65	62	58
80°	63	68	72	75	77	79	80	80	79	77	74	69	65
70°	69	74	78	82	85	86	87	87	86	84	80	76	70
60°	74	79	84	87	90	91	93	93	92	89	86	81	76
50°	78	84	88	92	95	96	97	97	96	93	89	85	80
40°	82	86	90	95	97	99	100	99	98	96	92	88	84
30°	86	89	93	96	97	99	100	100	98	96	94	90	86
20°	87	90	93	96	97	98	98	98	97	96	94	91	88
10°	89	91	92	94	97	95	96	95	95	94	93	91	90
Horizontal	90	90	90	90	90	90	90	90	90	90	90	90	90

Correction for tilt and direction

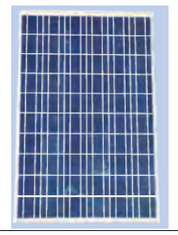
	%ge of sky blocked by obstacles	Correction Factor
None	<20%	1.00
Modest	20-60%	0.80
Significant	60-80%	0.65
Heavy	80-100%	0.50

Correction for sky obstructions

2. PANEL SELECTION

Chosen Panel	HIT 250
Manufacturer	Sanyo
Dims	1610 x 861 x 35
Output at 1000 W/m2 radiation	250 W
Annual corrected output	231 kWh
Annual output per m2	167 kWh/m2
Installed Cost per m2	£350

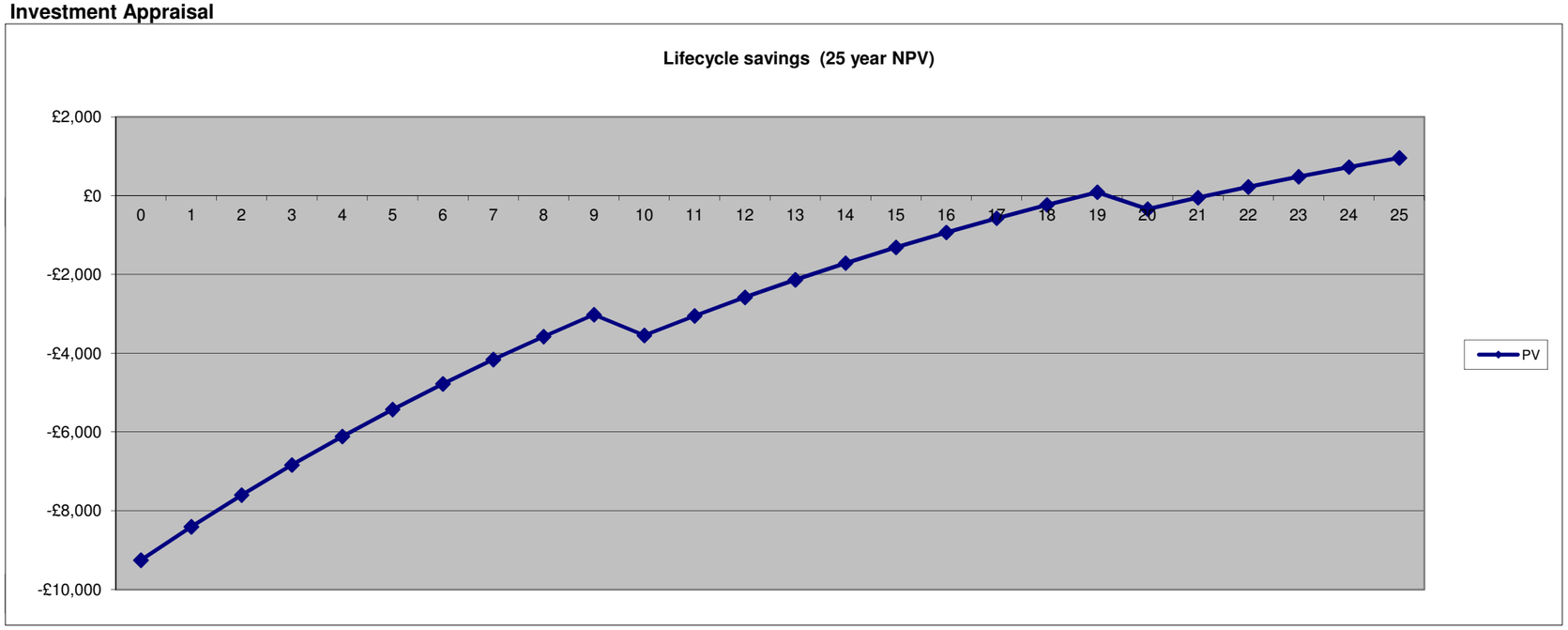
Manufacturer's information

MBPV240	HIT 250	STP 250		
MoserBaer	Sanyo	Suntech		
1661 x991 x 40	1610 x 861 x 35	1665 x991 x 50		
240 W	250 W	250 W		
135 kWh/m2	166.67	140.36		
£300	£350	£250		
				

3. TARGET CO2 REDUCTION

Target	**0 kg CO2**
CO2 saved per kWh	0.52
KWh to achieve target	5,000kWh
Peak Output Required	5.3 kWp
Panel Area Required	**29 m2**
Installed Cost	**£10,150**
Annual maintenance (@1.5%)	£152
Replace inverters (10 yearly)	£1,500
Output drop (per year)	1.5%
Feed-in Tariff	15.4 p/kWh
Duration	25 years
Year 1 FIT	£772
Output used on site	15%
Elec price from grid	14.5 p/kWh
Year 1 Elec Saving	£105
Output sold to Grid	86%
Elec price to grid	4.0 p/kWh
Year 1 Elec Sales	£171
SIMPLE PAYBACK	9.8 years
25 year NPV	£92,502
CO2 saved	0 kg CO2
%ge renewable	#DIV/0!

Investment Appraisal



4. OTHER CONSIDERATIONS

4.1 Space - approximately 135m2 available on roof.
4.2 Maintenance - annual inspection and occasional repair , but otherwise, fairly minimal
4.3 Noise - not an issue.
4.4 Energy mix - would work well with heat pumps, should not affect future district heating, but would be a bad match for future private-wire electricity from, say, a community CHP system.

Appendix I

Energy Calculations

Regulations Compliance Report

Approved Document L1A, 2013 Edition, England assessed by Stroma FSAP 2012 program, Version: 1.0.1.21
Printed on 14 May 2015 at 17:04:07

Project Information:

Assessed By: () **Building Type:** Maisonette

Dwelling Details:

NEW DWELLING DESIGN STAGE Total Floor Area: 139.7m²
Site Reference : Centre Heights **Plot Reference:** Penthouse end south FEE HI
Address :

Client Details:

Name: na
Address :

This report covers items included within the SAP calculations.
It is not a complete report of regulations compliance.

1a TER and DER

Fuel for main heating system: Electricity (c)
Fuel factor: 1.47 (electricity (c))

Target Carbon Dioxide Emission Rate (TER)	25.7 kg/m²	
Dwelling Carbon Dioxide Emission Rate (DER)	11.24 kg/m²	OK

1b TFEE and DFEE

Target Fabric Energy Efficiency (TFEE)	62.5 kWh/m²	
Dwelling Fabric Energy Efficiency (DFEE)	62.1 kWh/m²	
		OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.15 (max. 0.30)	0.15 (max. 0.70)	OK
Floor	0.15 (max. 0.25)	0.15 (max. 0.70)	OK
Roof	0.10 (max. 0.20)	0.10 (max. 0.35)	OK
Openings	1.40 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated using user-specified y-value of 0.15

3 Air permeability

Air permeability at 50 pascals	3.00 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main Heating system:	Community heating schemes - Heat pump Community heat pump
Secondary heating system:	None

5 Cylinder insulation

Hot water Storage:	No cylinder

6 Controls

Space heating controls	Charging system linked to use of community heating, programmer and at least two room thermostats	OK
Hot water controls:	No cylinder	

Regulations Compliance Report

7 Low energy lights

Percentage of fixed lights with low-energy fittings	100.0%	
Minimum	75.0%	OK

8 Mechanical ventilation

Continuous extract system		
Specific fan power:	0.5	
Maximum	0.7	OK

9 Summertime temperature

Overheating risk (Thames valley):	Medium	OK

Based on:

Overshading:	Average or unknown
Windows facing: East	8.58m²,
Windows facing: South	3.3m²,
Windows facing: East	1.23m²,
Windows facing: South	1.23m²,
Windows facing: West	11.36m²,
Windows facing: East	12.9m²,
Windows facing: East	4.66m²,
Windows facing: South	8.38m²,
Windows facing: East	5.11m²,
Windows facing: South	15.12m²,
Windows facing: West	5.11m²,
Ventilation rate:	8.00
Blinds/curtains:	None
	Closed 100% of daylight hours

10 Key features

Air permeability	3.0 m³/m²h
Roofs U-value	0.1 W/m²K
Community heating, heat from electric heat pump	
Photovoltaic array	
Fixed cooling system	

DRAFT

Job no:	**3460**
Date:	**12/05/2015**
Assessor name:	**W O'Reilly**
Registration no:	
Development name:	**Centre Heights Penthouses and Mews**

PRINTING: before printing please make sure that in "Page Setup" you have selected the page to be as "Landscape" and that the Scale has been set up to 70% (maximum)

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

	House Type:	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7		Type 8		Type 9		Type 10	
	Description:	Penthouse																			
Installation Type	**Unit of measure**	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		**Dual**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Click to Select**		**Click to Select**		**Click to Select**	
WC	Full flush volume	4	5.84		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Part flush volume	2.6	7.70		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	2.5	5.53		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Are both a Bath & Shower Present?		**Bath & Shower**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**	
Bath	Capacity to overflow	170	18.70		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	11	48.07		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	6	13.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a washing machine been specified?		**Yes**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**	
Washing Machine	Litres / kg	6	12.60		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a dishwasher been specified?		**Yes**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**		**Select option:**	
Dishwasher	Litres / place setting	0.461	1.66		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a waste disposal unit been specified?		**No**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00	**Select option:**	0.00
Water Softener	Litres / person / day	0	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Calculated Use		113.1		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	Normalisation factor		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91
Code for Sustainable Homes	**Total Consumption**		102.9		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**
	Mandatory level		Level 3/4		-		-		-		-		-		-		-		-		-