ENERGY & SUSTAINABILITY STATEMENT

17 Goldington Crescent
Camden
NW1 1UA

DECEMBER 2013
REPORT REF: ESS/GC/20131209 - AT

Disclaimer

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DOCUMENT CONTROL SHEET

Rev.	Issue Purpose	Author	Checked	Date
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1. INTRODUCTION

1.1 NRG Consulting have been appointed by Boyer Planning London to undertake an Energy Statement on a proposed development in Camden comprising 6 dwellings.

1.2 The Floor Areas in this report have been taken from the Accommodation Schedule provided by the Architects for the scheme.

1.3 This document has been produced to satisfy Policy 5.2 of the London Plan by providing a 25% improvement in CO_2 over regulated emissions.

1.4 Full Code for Sustainable Homes Certification to Level 4 is also sought and an Assessment is being provided under a separate cover.

1.5 Camden Local Policies CS13 & DP22 are also to be followed.

1.6 The proposed Construction Details shown in Section 4 and the subsequent PV figure is just draft at this stage for various reasons. They include:

- Construction Methods not yet confirmed.
- Full Architectural Detailing/Drawings (Stage E) have not yet been produced.

Therefore it is conceivable that some of the U-Values / SAP Inputs will change and this will therefore have a knock-on effect of the PV.

The final specification and PV figure will be fully confirmed at Construction Stage but will still meet the targets of this report and subsequent Local and Regional Plan Policies.

2. POLICY FRAMEWORK

2.1 With 6 residential units proposed the development falls within the Government's "minor" category of planning applications.

This report will comply with both the Local Policies of the London Borough of Camden and also the over-arching Regional Policies of the Greater London Authority (as set out in The London Plan (July 2011)).

2.2 The London Plan was updated in July 2011. In this update a change of priority was initiated in that a "fabric first" approach was adopted to ensure that a development was as energy efficient as possible before renewable energy was added. This is in contradiction to the previous London Plan, Policy 4A.7 that promoted renewable energy above all else.

2.3 Policy 5.2 of The London Plan (2011) states:

A Development proposals should make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy:

1 Be lean: use less energy

2 Be clean: supply energy efficiently

3 Be green: use renewable energy

B The Mayor will work with boroughs and developers to ensure that major developments meet the following targets for carbon dioxide emissions reduction in buildings. These targets are expressed as minimum improvements over the Target Emission Rate (TER) outlined in the national Building Regulations leading to zero carbon residential buildings from 2016:

Residential buildings:

Improvement on 2010 Building Regulations: 2010 – 2013 - **25 per cent**

(Code for Sustainable Homes level 4)

C Development proposals should include a detailed energy assessment to demonstrate how the targets for carbon dioxide emissions reduction outlined above are to be met within the framework of the energy hierarchy.

D As a minimum, energy assessments should include the following details:

a. Calculation of the energy demand and carbon dioxide emissions covered by the Building Regulations and, separately, the energy demand and carbon dioxide emissions from any other part of the development, including plant or equipment, that are not covered by the Building Regulations.

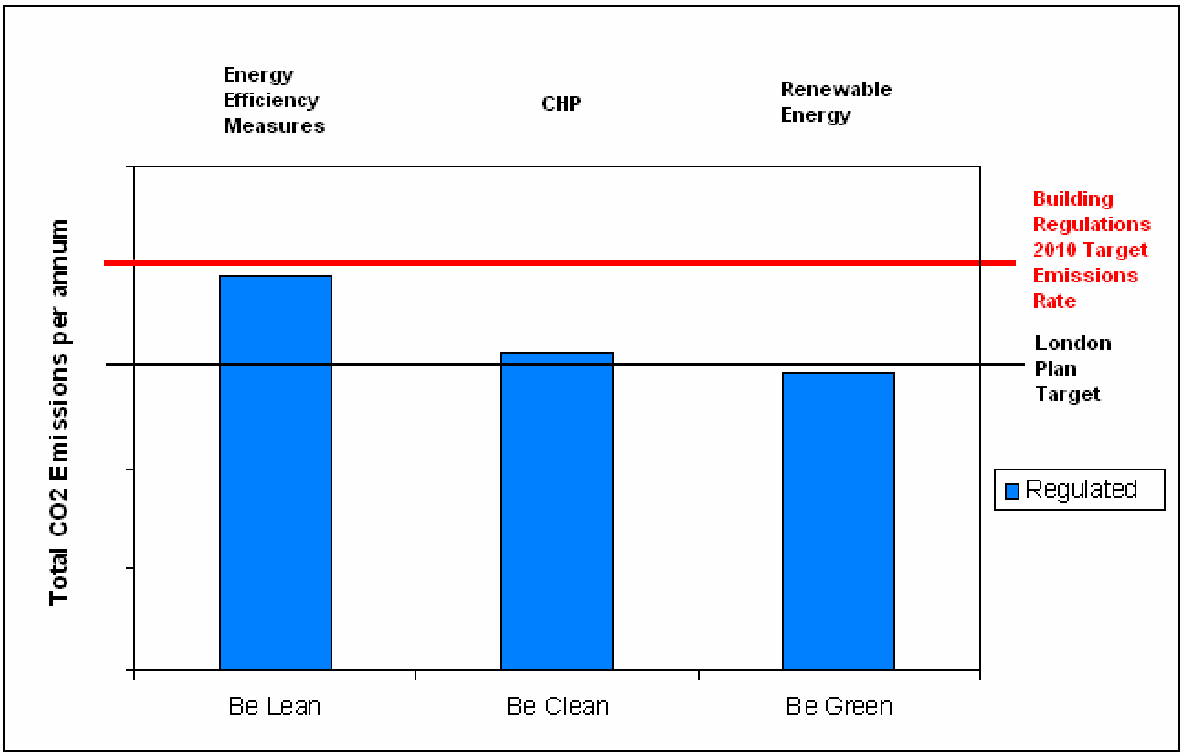
b Proposals to reduce carbon dioxide emissions through the energy efficient design of the site, buildings and services

c Proposals to further reduce carbon dioxide emissions through the use of decentralised energy where feasible, such as district heating and cooling and combined heat and power (CHP)

d Proposals to further reduce carbon dioxide emissions through the use of on-site renewable energy technologies.

2.4 Carbon dioxide emissions from new development should be reduced by sustainable use of energy in accordance with the Mayor's energy hierarchy. The first step in the hierarchy, to reduce energy demand, should be met through adopting sustainable design principles outlined in Policy 5.3. The second step, to supply energy efficiently, should be met by prioritising decentralised energy, as outlined in Policies 5.5 and 5.6. The third step, to use renewable energy, is outlined in Policy 5.7.

2.5 A visual representation of the GLA Target in relation to Building Regulations where feasible is:



CAMDEN LOCAL POLICIES

2.6.1 **Camden Policy CS13 of the Core Strategy (2010)** states that:

CS13 - Tackling climate change through promoting higher environmental standards

Reducing the effects of and adapting to climate change

The Council will require all development to take measures to minimise the effects of, and adapt to, climate change and encourage all development to meet the highest feasible environmental standards that are financially viable during construction and occupation by:

a) ensuring patterns of land use that minimise the need to travel by car and help support local energy networks;

b) promoting the efficient use of land and buildings;

c) minimising carbon emissions from the redevelopment, construction and occupation of buildings by implementing, in order, all of the elements of the following energy hierarchy:
- ensuring developments use less energy,
- making use of energy from efficient sources, such as the King's Cross, Gower Street, Bloomsbury and proposed Euston Road decentralised energy networks;
- generating renewable energy on-site; and

d) ensuring buildings and spaces are designed to cope with, and minimise the effects of, climate change.

The Council will have regard to the cost of installing measures to tackle climate change as well as the cumulative future costs of delaying reductions in carbon dioxide emissions

Local energy generation

The Council will promote local energy generation and networks by:

e) working with our partners and developers to implement local energy networks in the parts of Camden most likely to support them, i.e. in the vicinity of:
- housing estates with community heating or the potential for community heating and other uses with large heating loads;
- the growth areas of King's Cross, Euston; Tottenham Court Road; West Hampstead Interchange and Holborn;
- schools to be redeveloped as part of Building Schools for the Future programme;
- existing or approved combined heat and power/local energy networks (see Map 4);

and other locations where land ownership would facilitate their implementation.

f) protecting existing local energy networks where possible (e.g. at Gower Street and Bloomsbury) and safeguarding potential network routes (e.g. Euston Road);

Therefore, the viability of Combined Heat and Power and District Heating Networks will be investigated on this development.

2.6.2 **Camden Policy DP22 of the Local Development Framework (2009)** states that:

Policy DP22 - Promoting sustainable design and construction

The Council will require development to incorporate sustainable design and construction measures. Schemes must:

a) demonstrate how sustainable development principles, including the relevant measures set out in paragraph 22.5 below, have been incorporated into the design and proposed implementation; and
b) incorporate green or brown roofs and green walls wherever suitable.

The Council will promote and measure sustainable design and construction by:

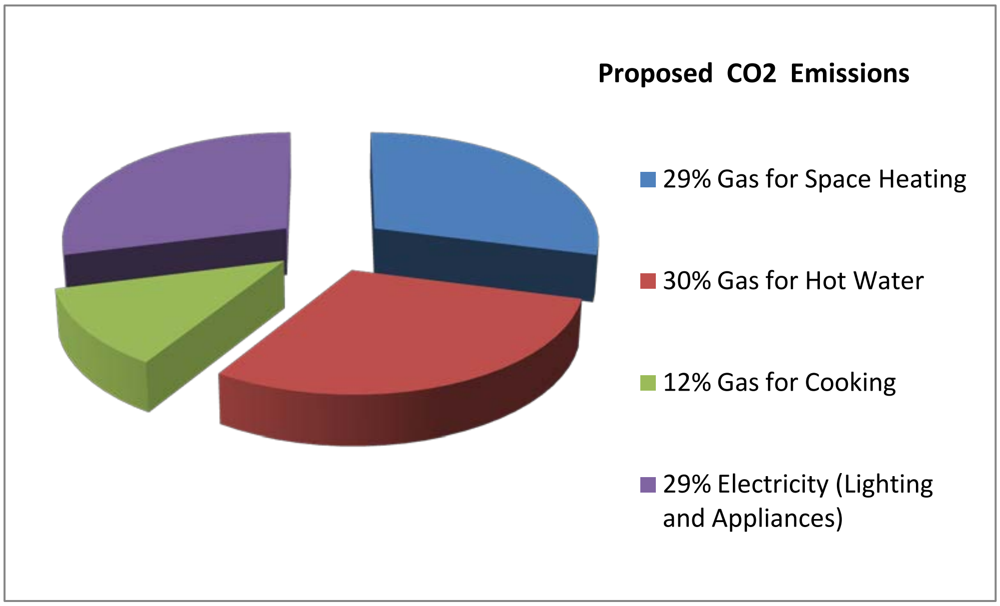
c) adopting the government target that all new build housing will be zero carbon by 2016 (Code for Sustainable Homes Level 6), along with the stepped targets of Code 3 by 2010 and Code 4 by 2013;
d) expecting developments (except new build) of 500sqm of residential floorspace or above or 5 or more dwellings to achieve 'excellent' in EcoHomes assessments from 2013 and at least 'very good' prior to 2013;
e) expecting non-domestic developments of 500sqm of floorspace to achieve 'very good' in BREEAM assessments, with the aim of increasing the target to a rating of at least 'excellent' in 2016, if feasible, and zero carbon from 2019, in line with the government's ambitions.

Therefore, as this is a Domestic development, a 25% reduction in CO_2 emissions is to be achieved on this project. This is in line with achieving the required Code for Sustainable Homes Level 4, a Pre-Assessment for which is being provided under a separate cover. This satisfies the Local Policies and is also in accordance with the London Plan (2011).

3. PREDICTED ANNUAL CARBON DIOXIDE EMISSIONS

3.1 SAP calculations have been carried out on all dwellings using the NHER Plan Assessor Version 5.4.2 (SAP v9.90) to gain the total emissions for the site. A licensed and OCDEA accredited SAP Assessor has carried out the calculations.

3.2 Typical CO2 emissions for housing developments is broken down as follows



3.3 In addition to and in accordance with potential planning requirements, compliance is to be achieved on the unit in order to reach Level 4 of the Government's Code for Sustainable Homes scheme (November 2010).

It should be noted that the requirement for Policy 5.2 of The London Plan is in-line with Code for Sustainable Home Level 4 requirements for ENE 1 and this has been incorporated into the design.

3.4 A table can be found in the Appendices which sets out the floor area of the dwelling, the Target Emission Rate (TER) and Dwelling Emission Rate (DER) in terms of kg/m^2/year and the percentage reduction of the DER over the TER. In addition, another column shows the CO_2 saved through the proposed use of energy efficient measures.

3.5 Based upon the figures as set out in the Appendices, with a total gross internal floor area of **384.31m^2,** the development has a baseline production of **7.7 tonnes CO_2/year.**

3.6

	Carbon Dioxide Emissions (tonnes per Annum)
	Regulated
Building Regulations 2010 Part L Compliant Development	7.7
After proposed construction details	
After CHP	
After renewable energy	

4. ENERGY EFFICIENT DESIGN MEASURES

4.1 Area weighted average U-values have been selected to ensure that all fabric U-values exceed the requirements of Part L of the Building Regulations (2010).

A full SAP Data Input Sheet is provided in the Appendices.

4.2 The U-values and general construction details for the development are as follows:

Elements	U Value	Further information
Ground Floor	0.13 w/m2/k	
Upper (Over Basement)	0.25 w/m2/k	
Main External Walls	0.22 w/m2/k	
Party Walls	0 w/m2/k	Fully Filled Cavity
Flat Roof	0.16 w/m2/k	
Windows	1.4 w/m2/k	
Doors	1.4 w/m2/k	
Air Permeability	$5m^3/hm^2$@50Pa	
Ventilation	System 1 - Trickle Ventilation	
Heating	Gas Heating – Condensing Boiler	89.0 % SEDBUK 2009 efficiency
Controls	Full Zone Control	
Compensator	Weather Compensator	
Emitters	Radiators	
Cylinder	N/A	
Secondary Heating	No	
Thermal Bridging	0.08 w/m2/k	Accredited Details
Lighting	100%	Low Energy **Bulbs**

4.3 The Dwelling Emission Rate is based upon this form of design and construction with the internal lighting (100%) having dedicated low energy light bulbs that have a luminous efficacy of over 45 lumens/circuit/watt.

4.4 A highly efficient Gas Boiler is being installed to the scheme. This will be 89.0% efficient (SEDBUK 2009 rating) - a big improvement over the 86.0% assumed as the minimum for Part L1a of the Building Regulations. In addition, modern controls (Full Zone Control) will be installed so each area can be independently zoned.

4.5 The development has been designed to be airtight. For this, an Air Permeability of 5m3/hm2@50PA has been targeted: this represents a great improvement over the Building Regulations Part L target of 10m3/hm2@50PA.

4.6 The U-Values of all glazed elements will exceed Building Regulations standards, and incorporate low emissivity coating, resulting in an efficient balance between passive solar gain and the thermal losses from each room.

Daylight levels are high throughout and are supplemented with low energy light bulbs. The orientation of the building reduces peak solar gain while ensuring optimum levels of daylight both morning and evening.

4.7 When taking into account proposed construction details and U Values, but excluding the imposition of renewable energy technologies gives the development emissions of **7.8 tonnes CO_2/year**; a small **0.91%** increase in CO_2 emissions over the Part L 2010 baseline.

4.8

	Carbon Dioxide Emissions (tonnes per Annum)
	Regulated
Building Regulations 2010 Part L Compliant Development	7.7
After proposed construction details	7.8
After CHP	
After renewable energy	

5. FEASIBILITY OF RENEWABLE ENERGY

Communal Heat and Power

5.1.1 Pursuant to Policy 5.5 of the London Plan, to the knowledge of the authors, there are no existing large scale CCHP/CHP distribution networks to connect into and the use of site wide CCHP/CHP powered by renewable energy or mains gas would not be possible on this site due to the tiny summer heating demand, maintenance issues and payback over 20 years.

5.1.2 The London Heat Map has been checked and no viable local connections are available. The red shape in the centre of the Picture is the Site. The red dot represents part of the existing building which is to be cleared during construction and is therefore of no use.

The Map picture is:

5.2 The potential renewable energy applicable to this development is:

- Solar PV
- Solar Hot Water
- Ground Source Heat Pump
- Air Source Heat Pump
- Biomass Boilers

The feasibility of these items is investigated below:

5.3 Photovoltaic Panels

Advantages	Disadvantages	Feasibility
Can have significant impact on carbon by offsetting electricity which has a high carbon footprint. Low maintenance No noise issues associated with PV No additional land use from the installation of PV panels	High capital investment required Needs unobstructed space on roof	The development incorporates a flat roof which is perfectly suited to PV. PV would be feasible as it can contribute to meet the on-site electrical demand and any unused electricity can be sent back to the grid.

5.4 Solar Thermal Collectors

Advantages	Disadvantages	Feasibility
No noise issues associated with Solar thermal collectors No additional land use from the installation of solar thermal collectors Low maintenance and easy to manage Low capital cost	The hot water cylinder will need to be larger than a traditional cylinder. Consideration will need to be given to the space required especially as combination boilers are planned. Needs unobstructed space on roof.	Solar thermal collectors are feasible for the development, although it is not possible to meet a 25% carbon saving as the maximum demand that solar thermal collectors can be designed to meet can be no greater than 50% of the hot water demand. Solar thermal collectors have therefore not been investigated further.

5.5 Biomass Heating

Advantages	Disadvantages	Feasibility
Potential to reduce large component of the total CO_2 A biomass boiler would replace a standard gas heating system so some of the cost may be offset through money saved on a traditional boiler.	Regular maintenance will be required Reliability of fuel may become a problem, therefore limited cost saving for residents A plant room and fuel store will be required which may take additional land from the proposed development or surroundings The fuel will need to be delivered, which can cause issues with access etc. Biomass is often not a favoured technology in new development due to the potential local impacts of NOx emissions and delivery vehicles.	This is a small, tight, top floor site in an urban area. Biomass is not considered feasible for such a development due to the need for space to accommodate fuel storages, access for delivery vehicles and local NO_x emissions.

5.6 Ground Source Heat Pumps

Advantages	Disadvantages	Feasibility
Low maintenance and easy to manage Optimum efficiency with under-floor heating systems As heat pumps would replace standard heating systems, some of the cost may offset through money saved on a traditional boiler.	The heat pump has a noise level around 45-60dB so some attenuation may be required and it should be sensibly located Relatively high capital cost Requires electricity to run the pump, therefore limited carbon savings in most cases For communal systems plant room required which may take additional land from the proposed development/surroundings High payback.	Limited Space on site and large communal infrastructure needed would remove and reduce amenity space. As PV offers a much simpler installation offering equal/greater savings, GSHP has not been investigated further.

5.7 Air Source Heat Pumps

Advantages	Disadvantages	Feasibility
ASHP systems are generally cheaper than ground source as there is no requirement for long lengths of buried piping. Low maintenance and easy to manage Optimum efficiency with under-floor heating systems As heat pumps would replace standard heating systems, some of the cost may offset through money saved on a traditional boiler.	The heat pump has a noise level around 50-60dB so some attenuation may be required and it should be sensibly located. The potential noise from the external unit may mean there is local opposition to their installation. Requires electricity to run the pump, therefore limited carbon savings in most cases For communal systems plant room required which may take additional land from the proposed development/surroundings Potential noise issues	The use of conventional air source heat pumps would not be preferable for a site with mains gas available. With the cost of electricity increasing, the payback of ASHPs may further increase.

6. RENEWABLE ENERGY MEASURES

6.1 Following the above feasibility, the chosen technology, Solar PV, will be implemented.

6.1.1 With CO_2 emissions of **7.8 tonnes** CO_2/yr after proposed construction details the 25% reduction i.e. **2.0 tonnes** CO_2/yr will be met through the use of Solar PV to the dwelling. This comprises of a reduction of **0.1 tonnes** CO_2/yr t reach the Part L (2010) Baseline and a further reduction of **1.9 tonnes** CO_2/yr achieve the 25% reduction in CO2 emissions necessary to satisfy Local and Regional Policies.

6.2.1 The amount of CO_2 reduction required will be through generating electricity from photovoltaic cells. This effectively off-sets the consumption of mains grid electricity, most of which is generated by coal fired power stations, which has an emission factor of 0.529.

6.2.2 Assuming the use of optimally orientated monocrystalline modules producing **858.4** kWh per kWp (SAP v9.90) for all plots; 1kwp of PV array offsets **454.09** kg/CO2/year. The orientation of the panels will be orientated between Horizontal and 30 degrees on a South orientation.

6.2.3 Based on the above figures, **4.40 kWp** of PV is required. This is satisfied by **18 panels** which generate **250 watts** each across the site, for a total of **4.50 kWp.**

6.3 For confirmation of this, please see the Appendices that contain an Architectural drawing showing a sketch of the proposed PV provision to the Site. A Manufacturer Datasheet for a typical PV Panel is also provided in the Appendices.

	Carbon Dioxide Emissions (tonnes per Annum)
	Regulated
Building Regulations 2010 Part L Compliant Development	7.7
After proposed construction details	7.8
After CHP	
After renewable energy	5.8

7. CONCLUSION

7.1 Following the above feasibility, the chosen technology, Solar PV, will be implemented. In line with The London Plan (2011), this Strategy has been written and produced to illustrate savings in terms of CO_2 for the proposed development.

7.2 The baseline emissions for the development have been assessed in accordance with Part L (2010) of the Building Regulations for the total (regulated and unregulated) emissions at **7.7 tonnes CO_2/year.**

7.3 Taking into account proposed construction details and U-Values to all thermal elements, high levels of energy efficient lighting and a low air permeability rating, the CO_2 savings from energy efficiency measures equate to a small **1.22%** increase in CO_2 emissions over the Part L 2010 baseline.

7.4 The final 2010 baseline equates to **7.8 tonnes CO_2/year** and therefore the chosen renewable energy technology, Solar PV, needs to provide an offset of **2.0 tonnes CO_2/year** in order to meet the 25% reduction in CO2 emissions required under London Regional Policies. Therefore, **4.40 kWp** of PV is required based on a South orientation. This is equivalent to **18 panels** which generate **250 watts** each across the site, for a total of **4.50 kWp**.

7.5 When taking into account the installation of such a system a reduction in total (regulated and unregulated) CO2 emissions by **25.59%** is achieved**.** This is in excess of both the requirement for a 25% reduction in CO2 emissions specified.

7.6 The above therefore is in compliance with the London Plan (2011) and Camden Policies CS13 and DP22.

Appendix 1

17 Goldington Crescent, Camden - 25% Carbon Dioxide Reduction Calculations

1	2	3	4	5	6
PLOT	AREA	TER	DER	Multiple	Multiple
				TER	DER
	m2	kg/CO_2/m2/yr	kg/CO_2/m2/yr	kg/CO_2/yr	kg/CO_2/yr
1	49.8	22.46	24.21	1119	1206
2	80.21	18.99	19.49	1523	1563
3	62.8	19.85	19.43	1247	1220
4	62.5	21.46	21.41	1341	1338
5	62.8	19.08	18.52	1198	1163
6	66.2	19.51	19.62	1292	1299
Total	384.31			7719	7789
			1m2 figure	**20.09**	**20.27**
			kg/Co2/m2/year		
Total Site	384.31			**7,719**	**7,789**

Multiple TER	**7,719**	**kg/CO_2/yr**
Multiple DER	**7,789**	**kg/CO_2/yr**
25% Improvement on TER	**5,789**	**kg/CO_2/yr**
Needed to Offset	**2,000**	**kg/CO_2/yr**
1kWP PV	**454.09**	**kg/CO_2/yr**
PV	**4.40**	**kWp**

Appendix 2

Data Input Report
Design - Draft

NHER

This design submission has been carried out using Approved SAP software. It has been prepared from plans and specifications and may not reflect the property as constructed.

Assessor name	Mr Neil Rothon	Assessor number	4282
Client		Last modified	03/12/2013
Address	5 17 Goldington Crescent, London, NW1 1UA		

Dwelling

Development:		House type:	
Property type:	Flat		
Flat type:	Top floor	Year built:	2013
Tariff:	Standard	Assess summer overheating:	Yes
Thermal mass:	Medium	Thermal mass parameter:	250.00
Separated heated conservatory:	No	Degree day region:	Thames
Sheltered sides:	2	Terrain:	Dense Urban

Storeys:

Name	Area (m²)	Height (m)
Lowest occupied	62.80	2.50

Floors

Ref - Name	Type	Construction	Storey Location	Living Area (m²)	Area (m²)	U-value (W/m²K)

Living area that has no heat loss: 26.90

Walls

Ref - Name	Type	Construction	Gross Area (m²)	U-value (W/m²K)
Wall 1 - main external	External	Cavity	46.87	0.20
Wall 4 - to corridor	Sheltered	Cavity	13.25	0.25
Wall 2 - party new	Party	Fully filled cavity with sealed edges	24.82	0.00

Roofs

Ref - Name	Construction	Gross Area (m²)	U-value (W/m²K)
Roof 1 - Roof 1	Flat	62.80	0.13

Openings

Opening Ref: 1 Door to corridor, N/A, ' N/A', master: Yes, linked to: 0

Location:	Wall 4	Source:	Table 6e (SAP 2009)	Orientation:	North East
Overshading:	N/A	Width (m):	0.91	Height (m):	2.10
Frame:	u-PVC	Transmittance factor:	N/A	U-value (W/m²K):	1.40

Opening Ref: 2 Window, Double glazed (low-E), ' N/A', master: Yes, linked to: 0

Location:	Wall 1	Source:	From Manufacturer	Orientation:	South East
Overshading:	Average / Unknown	Width (m):	1.15	Height (m):	1.80
Frame:	u-PVC	Transmittance factor:	0.63	U-value (W/m²K):	1.50

Opening Ref: 3 Window, Double glazed (low-E), ' N/A', master: No, linked to: 2

Location:	Wall 1	Source:	From Manufacturer	Orientation:	South West
Overshading:	Average / Unknown	Width (m):	1.15	Height (m):	1.80
Frame:	u-PVC	Transmittance factor:	0.63	U-value (W/m²K):	1.50

Opening Ref: 4 Window, Double glazed (low-E), ' N/A', master: No, linked to: 2

Location:	Wall 1	Source:	From Manufacturer	Orientation:	South West
Overshading:	Average / Unknown	Width (m):	4.69	Height (m):	1.80
Frame:	u-PVC	Transmittance factor:	0.63	U-value (W/m²K):	1.50

Opening Ref: 5 Rooflight, Double glazed (low-E), ' N/A', master: Yes, linked to: 0

Location:	Roof 1	Source:	From Manufacturer	Orientation:	Horizontal
Overshading:	None / Very little	Width (m):	0.50	Height (m):	0.50
Frame:	u-PVC	Transmittance factor:	0.63	U-value (W/m²K):	1.40

Opening Ref: 6 Rooflight, Double glazed (low-E), ' N/A', master: No, linked to: 5

Location:	Roof 1	Source:	From Manufacturer	Orientation:	Horizontal
Overshading:	None / Very little	Width (m):	0.50	Height (m):	0.50
Frame:	u-PVC	Transmittance factor:	0.63	U-value (W/m²K):	1.40

Ventilation

Air permeability entered:	Yes	Seek exemption (<3 dwellings):	No
Design air permeability rate:	3.00		

Number of...	Open fireplaces	Open flues	Flueless gas fires	Extract fans	Passive vents
	0	0	0	2	0

Mechanical ventilation: Not present (natural)

Space heating

Main heating category:	Individual system/s	Number of systems:	1
Secondary heating:	No	Open flue or chimney:	No
Unconnected gas point:	N/A	Smoke control area:	Not known
Type:	Boiler	Efficiency source:	Manufacturer declared
Product index:	N/A		
Product details:	N/A N/A N/A		
Boiler type:	Combi	Fuel:	Mains gas
Condensing:	Yes	Flue type:	Balanced
Fan assisted flue:	Yes		
Combi type:	Instantaneous	Uses electricity:	N/A
Keep hot power rating:	N/A		
System:	Condensing combi with automatic ignition (1998 or later)		
Controls:	Programmer, room thermostat and TRVs		
Interlock:	Yes	Delayed start thermostat:	Yes
Compensation:	None	Burner control:	Modulating
Emitter:	Radiators	Pump in heated space:	Yes
Efficiency Type:	2009 SEDBUK	Efficiency (%):	89.00
Manufacturer efficiency description:	a		
FGHRS:	No		

Water heating

Type:	From main	Fuel:	Mains gas
Water separately timed:	N/A	Water use ≤125 litres/person/day:	Yes
Heat pump uses immersion:	N/A	Summer immersion:	N/A
Thermal store type:	N/A		

Store details:

Cylinder volume (litres):	N/A		
Thermostat:	N/A	In heated space:	N/A
Primary pipework insulated:	N/A		

WWHRS:

WWHRS: N/A

Renewables

No renewables present

Other

Thermal Bridging

Thermal bridge specification:	Enter y value	y-value:	0.08
y-value description:	assumed		

Internal lighting

Standard fittings:	0	Low energy fittings:	6	Total fittings:	6

Summer overheating

Thermal mass parameter (TMP):	250.00		
User defined air change rate:	No	Air change rate (ach):	N/A
Cross ventilation on most floors:	No	Window ventilation:	Fully open
Source of user defined values:	N/A		
Curtains closed in daylight hours:	No	Fraction curtains closed:	N/A
Blind/curtain type:	N/A		

Special features (Appendix Q)

No Appendix Q special features present

Cooling details

No space cooling present

L1A 2010 - Regulations Compliance Report
Design - Draft

This design draft submission provides evidence towards compliance with Part L of the Building Regulations, in accordance with Appendix A of AD L1A. It has been carried out using Approved SAP software. It has been prepared from plans and specifications and may not reflect the 'as built' property. This report covers only items included within the SAP and is not a complete report of regulations compliance.

Assessor name	Mr Neil Rothon	Assessor number	4282
Client		Last modified	03/12/2013
Address	5 17 Goldington Crescent, London, NW1 1UA		

Check	Evidence	Produced by	OK?
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target			
TER (kg CO_2/m^2.a)	Fuel = Mains gas Fuel factor = 1.00 TER = 19.08	Authorised SAP Assessor	
DER for dwelling as designed (kg CO_2/m^2.a)	DER = 18.52	Authorised SAP Assessor	
Are emissions from dwelling as designed less than or equal to the target?	DER 18.52 < TER 19.08	Authorised SAP Assessor	Passed
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits			
Fabric U-values			
Are all U-values better than the design limits in Table 2?	**Element** / **Weighted average** / **Highest** Wall: 0.21 (max 0.30) / 0.25 (max 0.70) Party wall: 0.00 (max 0.20) / N/A Floor: (no floor) Roof: 0.13 (max 0.20) / 0.13 (max 0.35) Openings: 1.48 (max 2.00) / 1.50 (max 3.30)	Authorised SAP Assessor	Passed
Thermal bridging			
How has the loss from thermal bridges been calculated?	Thermal bridging calculated using user-specified y-value of 0.08, with reference: assumed	Authorised SAP Assessor	
Heating and hot water systems			
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler a Data from manufacturer Efficiency = 89.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor	
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	Schedule of installed fixed internal lighting Standard lights = 0 Low energy lights = 6 Percentage of low energy lights = 100 % Minimum = 75 %	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	Overheating risk (June) = Not significant Overheating risk (July) = Slight Overheating risk (August) = Slight Region = Thames Thermal mass parameter = 250.00 Ventilation rate in hot weather = 4.00 ach Blinds/curtains = None	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability ($m^3/(h.m^2)$ at 50Pa)	Design air permeability = 3.00 Max air permeability = 10.00	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	The following walls/wall have a U-value less than 0.2W/m²K: • party new (0.00) The following openings have a U-value less than 1.5W/m²K: • Door to corridor reference 1 (1.40) • Rooflight reference 5 (1.40) • Rooflight reference 6 (1.40) Design air permeability of 3 $m^3/(h.m^2)$ is less than 5 $m^3/(h.m^2)$ at 50 Pa	Authorised SAP Assessor	

Appendix 3

Panasonic
ideas for life

HIT® photovoltaic module

H250
H245

EN

R&D technology adaptation

Reduction of carrier recombination loss
- preserving as much of the generated electricity as possible
- realizing even higher voltage

HD cell design

Use resources effectively
- by cutting the wafer almost round the HD cell produces less material waste
- compact module size but high power generation

Anti-reflection glass

Reduction of optical loss
- enabling as much incoming sunlight as possible to reach the electrical generating layer (crystalline silicon)
- retriving even higher current

18.0%*
180 W/m^2

* For H250

HIT cell technology

The HIT (Heterojunction with Intrinsic Thin layer) solar cell is made of a thin monocrystalline silicon wafer surrounded by ultra-thin amorphous silicon layers. This product provides the industry's leading performance and value using state-of-the-art manufacturing techniques. The development of the HIT solar cell was supported in part by the New Energy and Industrial Technology Development Organization (NEDO).

Quality

Panasonic is truly committed to quality since it began developing and manufacturing solar PV modules in 1975. Our long track record is supported with our claim-rate of only 0.00214 % or 62 product-guarantee cases out of 2,885,689 solar modules produced in our European factory in Dorog, Hungary (as of Nov. 2011) with 0 cases of output guarantee and 0 guarantee- related legal challenges.

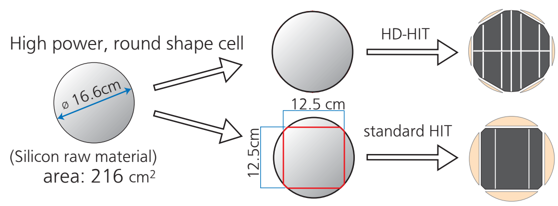
Special features

HIT solar modules are 100% emission free, have no moving parts and produce no noise. The dimensions of the HIT modules enable a space saving installation and the achievement of maximum output power possible on a given roof area.

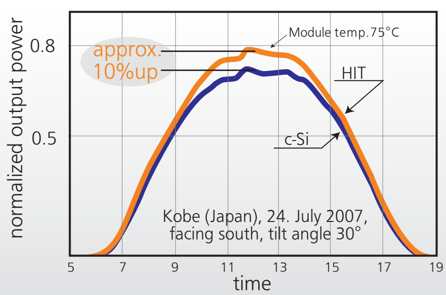
High performance at high temperatures

Even at high temperatures, the HIT solar cell can maintain higher efficiency than a conventional crystalline silicon solar cell.

HIT® HD solar cell



Changes in generated power daytime



HIT® Photovoltaic Module

The HIT cell and module have very high conversion efficiency in mass production.

Model	Cell Efficiency	Module Efficiency	Output/m^2
H250	20.8%	18.0%	180 W/m^2
H245	20.4%	17.7%	177 W/m^2

Electrical and Mechanical Characteristics H250, H245

EN

Electrical data (at STC)

	VBHH250AE01	VBHH245AE01
Maximum Power (Pmax) [W]	250	245
Max. power voltage (Vmp) [V]	34.9	34.4
Max. power current (Imp) [A]	7.18	7.14
Open circuit voltage (Voc) [V]	43.1	42.7
Short circuit current (Isc) [A]	7.74	7.73
Maximum over current rating [A]	15	
Output power tolerance [%]	+10/-5*	
Maximum system voltage [V]	1000	

Note: Standard Test Conditions: Air mass 1.5, Irradiance = 1000W/m², cell temperature = 25°C
* All modules measured by SANYO facility have output with positive tolerance

Temperature characteristics

Temperature (NOCT) [°C]	46.0	46.0
Temp. coefficient of Pmax [%/°C]	-0.30	-0.30
Temp. coefficient of Voc [V/°C]	-0.108	-0.107
Temp. coefficient of Isc [mA/°C]	2.32	2.32

At NOCT

Maximum power (Pmax) [W]	188.9	185.4
Max. power voltage (Vmp) [V]	32.8	32.4
Max. power current (Imp) [A]	5.76	5.73
Open circuit voltage (Voc) [V]	40.5	40.1
Short circuit current (Isc) [A]	6.23	6.23

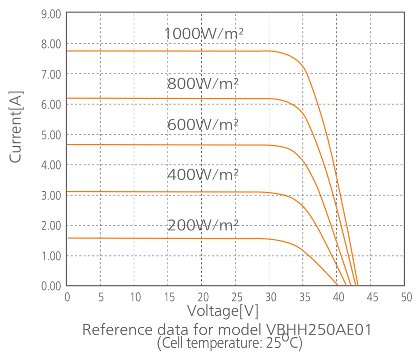
Note: Nominal Operating Cell Temperature : Air mass 1.5 spectrum, Irradiance = 800W/m², Air temperature = 20°C , wind speed 1 m/s

At low irradiance

Maximum power (Pmax) [W]	48.8	47.7
Max. power voltage (Vmp) [V]	34.1	33.6
Max. power current (Imp) [A]	1.43	1.43
Open circuit voltage (Voc) [V]	40.1	39.7
Short circuit current (Isc) [A]	1.55	1.55

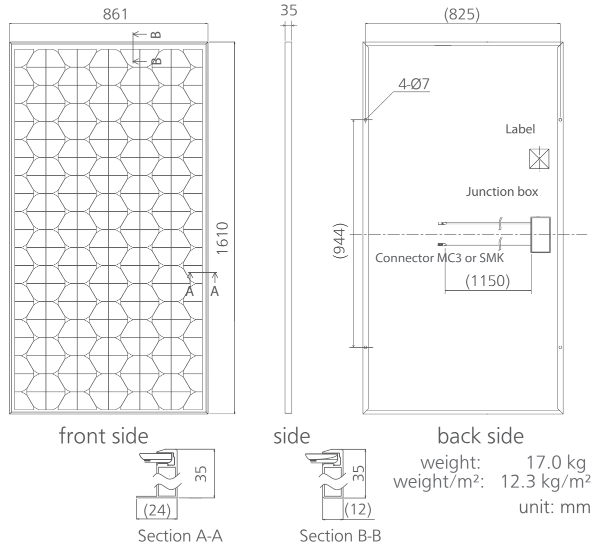
Note: Low irradiance: Air mass 1.5 spectrum, Irradiance = 200W/m², cell temp. 25°C

Dependence on irradiance



Reference data for model VBHH250AE01
(Cell temperature: 25°C)

Dimensions and weight



weight: 17.0 kg
weight/m²: 12.3 kg/m²
unit: mm

Guarantee

Power output: 10 years (90% of Pmin) 25 years (80% of Pmin)
Product workmanship: 10 years
(Based on guarantee documents)

Materials

Cell material: Honeycomb Design HIT cells
Glass material: AR coated tempered glass
Frame materials: Black anodized aluminium
Connector type: MC3 or SMK

Certificates

www.tuv.com TÜVRheinland ID: 0000023431
- Quality tested, IEC 61215
- Safety tested, IEC 61730
- Periodic inspection

APPROVED PRODUCT
MCS BRE GLOBAL LISTED
Certificate No. MCS PV0034
Photovoltaic System

www.tuv.com TÜVRheinland ID: 0000023431
- Ammonia resistance tested
- Salt mist corrosion tested
- Periodic inspection

RoHS COMPLIANT

Electrical Protection Class II

CE

Member of

PV CYCLE

Please consult your local dealer for more information.

⚠ CAUTION! Please read the installation manual carefully before using the products.

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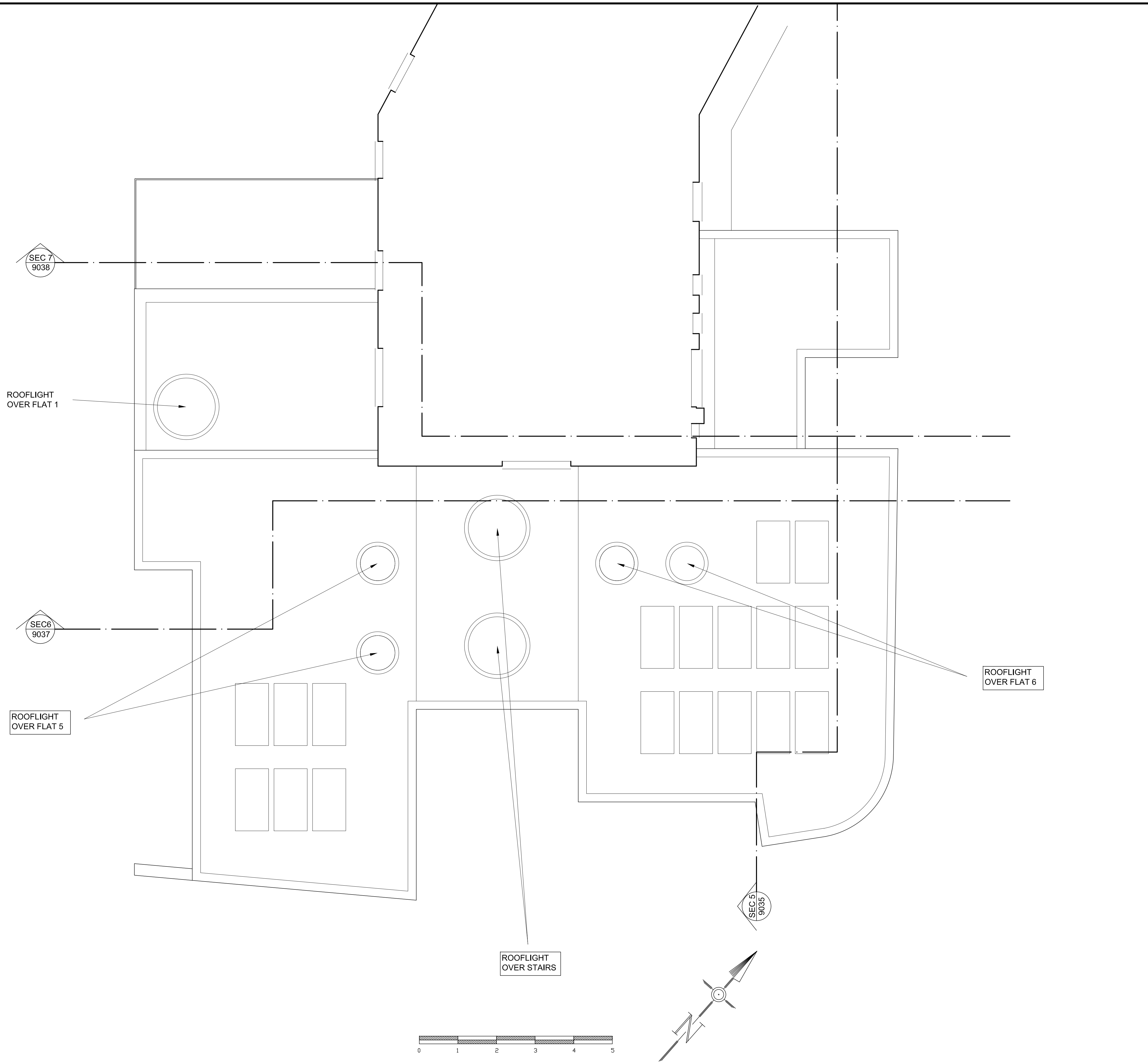

P02 - REVISED & UPGRADED TOINCLUDE PANASONIC HIT PHOTOVOLTAIC MODULES - x 18
06.12.13

P01 - REVISED & UPGRADED TO BOYER COMMENTS
12.07.13

REVISIONS | DATE

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DWG: PROPOSED ROOF PLAN

JOB NO.	1309	DWG NO.	9033	SCALE @ A3	1:100	DRAWN BY	
REV	P-02	STATUS	PRELIM	DATE		CHECKED BY	