eb7 Ltd Studio F7, Battersea Studios
80 Silverthorne Road, London, SW8 3HE

Sustainability Plan

2 x Town Houses
Willes Road
London
NW5 3DT

2nd March 2012

Prepared for:

Kutner Associates.
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CONTENTS

1. INTRODUCTION

This report sets out the sustainability issues and targets intended for the development of 2 x new build town houses at Willes Street, Kentish Town.

The development comprises the redevelopment of an existing plot that was previously occupied by other buildings that were demolished as part of the refurbishment of the adjacent leisure centre building.

The Developer of the site acknowledges the current issue with regard to concerns about climate change and the contribution that building stock makes in the form of emissions to the atmosphere, the use of water, waste generation and the use of polluting materials.

It is proposed that the redevelopment sets out to meet the requirements of the Code for Sustainable Homes, Code Level 3, and current Best Practices.

The aim of the development is to:-

- Reduce greenhouse gas emissions.
- Reduce impact on the environment overall.

2. SUSTAINABILITY

TARGET

It is the team's aim to achieve level 3 of the Code for Sustainable Homes for the property. This report sets out how it is intended that this be achieved, and a pre-assessment estimator is attached at Appendix A that demonstrates how the dwellings will meet Code for Sustainable Homes Level 3, as well as how 50% of the level 3 credits will be met from the Energy, Water and Materials sections.

For level 3 to be obtained the following criteria must be met:-

- The Dwelling Emission Rate (DER) must be compliant when compared to the maximum DER allowed under Building Regulations Part L 2010
- Potable water usage must be limited to 105 litres/per person/per day.
- At least 3 of the 5 key elements of the structure should achieve a BRE Green Guide 2006 rating of at least D.
- Ensure surface water run-off rates and annual volumes of run off are no greater than the previous conditions for the site.
- Household waste storage and recycling facilities shall feature in the proposals.

Overall, 57 points will be required for the various categories set out in the Code. This report sets out the aims of the project to achieve this.

ENERGY AND CO2 (CfSH Category 1)

The scheme will be designed to limit the emissions of carbon dioxide to the atmosphere from the operation of the building services.

i) Dwelling Emission Rate

The dwelling emission rate will be set at a 50% + improvement over the 2010 Building Regulations Part L Standard. This will be achieved with the use of the following specification:-

1. Walls – solar block and 60mm celotex in 100mm cavity u = 0.23
2. Roofs/terraces - warm roof construction with 125mm celotex u = 0.16
3. Floor – 100mm celotex under screed u= 0.16
4. Windows u=1.3
5. 6Kw heat pump to radiators, based upon Daikin EBHQ006BAV3 monobloc with 6Kw BUH, with 145l HWT
6. ATT at 6
7. 75% low energy lighting
8. 1Kwp PV array

This outstanding performance is in excess of the requirements of The London Plan policies and is demonstrated via the SAP2009 software outputs attached at Appendix B

ii) Building Fabric

The initial assessments of the project indicate that Fabric Energy Efficiency of $\leq$ 48 Kwh/m^2/yr will not be achieved in a feasible manner for the mid terraced unit on a highly restricted site

iii) Display Energy Device

The project brief will require that display energy devices will be installed to the subject properties, enabling occupants to accurately monitor both primary fuel use and electricity use

iv) Other Energy

It is proposed that a clothes drying space be provided in a secure location in the rear gardens

v) Eco-Labelled White Goods

Electrical appliances used shall have an A+ rating under the EU Energy Efficiency Scheme, with the exception of washing machines and dishwashers were an A rating shall be applied and a B rating for tumble dryers.

vi) External Lighting

External lighting shall use low energy sources. Security lighting shall have a maximum rating of 150W and be controlled by proximity detection and with a daylight shut off.

vii) Low Carbon Energy Technologies

Low and zero carbon technologies have been considered for this project as tabulated below:-

Technology	Commentary	viability
Wind turbine	Inappropriate in conservation area, and not feasible in dense urban scenarios - insufficient wind flow	No
Biomass	Small property with very limited space for boiler/fuel storage. High capital cost. High-level of NOx emissions in dense urban location	No
Community heating/CHP	Community system clearly not applicable to one-off unit and in addition, development site not within existing community network. For CHP to be feasible there needs to be either a year-round demand for the heat generated, of a scheme of sufficient scale to enable the heat load to be split between boilers (winter use) and CHP (year-round). The scale of this project does not facilitate either	No
Heat Pumps	Insufficient grounds for GSHP loops/boreholes. ASHP could be located at roof level behind parapet	Yes
Solar Thermal panels –	Limited roof space - overshadowing from adjacent 4 storey property.	No
Solar PV Panels	Limited roof space - overshadowing from parapet and adjacent 4 storey property to south east. Also, conservation area issues may preclude use of roof top panels	No

Accordingly, the use of an air source heat pump has been selected in order to ensure a high efficiency heating solution and reduced emissions. In addition, a waste water heat recovery system will be installed to the second floor bathroom. The methodology achieves a reduction in emissions of over 12% via the use of renewable technologies.

viii) Cycle Storage

As access form rear garden to the public highway can only be achieved via the property itself, the credits cannot be achieved.

ix) Home Office

The development includes the provision for a home office (studio).

WATER USAGE (CfSH Category 2)

Efficient use of water is a mandatory requirement of the Code for Sustainable Homes. The production and delivery of water is a high energy process and added to the fact that the water infrastructure is severely strained it is essential that water is used in an efficient and non-profligate manner.

In line with the Code for Sustainable Homes water usage will be set at 105 litres/person/day. It is intended that 6/4 dual flush WCs be installed, that taps will be of the reduced flow/aerated type, shower flow rates would be in the range of 9-10 litres per second, dishwasher water usage per cycle would be limited to 18 litres and washing machines would have a maximum consumption of 60 litres/cycle.

The properties will also be supplied with external water buts to enable the collection of rainwater for the upkeep of soft landscaped areas

MATERIALS (CfSH Category 3)

Materials for use in the site will be responsibly sourced where possible and with the main build elements designed to meet the BRE Green Guide ratings of a rating to grade D or better.

SURFACE WATER RUN OFF (CfSH Category 4)

The site is in a flood risk area and a flood risk assessment will be produced to demonstrate this. Given the previous land use, it is not expected that there will be an increase in permeable areas; indeed, the introduction of soft landscaped areas in the rear gardens will improve rainwater attenuation

WASTE (CfSH Category 5)

a) <u>Household Waste</u>:

Household waste recycling facilities will be incorporated into the project including 3 No. internal recycling storage bins with a total capacity of 30 litres or more, as well as adequate external storage, readily accessible, to meet the local authority bin storage requirements

b) <u>Construction Waste</u>:

A construction waste policy will be set up that will require that the WRAP/ENVIROWISE guidance is adopted, in addition to a commitment to minimise construction waste

c) <u>Composting</u>:

The properties will be supplied with composting bins, as well as guidance on the composting process within the Home User Guide

POLLUTION (CfSH Category 6)

a) Global Warming Potential:

It is intended that all insulation material used has a GWP of less than 5 and ozone depletion potential of 0.

b) Nitrous Oxide (NOx) Emissions:

The use of electrically driven air source heat pumps precludes the development from achieving credits under this section

HEALTH AND WELLBEING (CfSH Category 7)

a) Daylight:

The development has been designed to ensure good daylighting to kitchens, lounge and dining areas, as well as to the home office provision

b) Sound Insulation:

Sound insulation to the development will be as a minimum to the requirements of Part E of the Building Regulations. Post-completion tests will be undertaken.

c) Private Space:

The development currently includes private rear gardens top ensure that adequate private space is provided

d) Lifetime Homes:

The following standards as set out by the Lifetime Homes documents will be adopted.

MANAGEMENT (CfSH Category 8)

a) Home User Guide:

A Home User Guide will be incorporated into the manuals and information handed to the building occupiers.

b) Considerate Contractor Scheme:

The development specification to the Principal Contractor will require that he meets with Best Practices under the Considerate Contractor Scheme.

c) Security:

It is intended that the development complies with 'Secured by Design - New Homes - Section 2 Physical Security'.

ECOLOGY (CfSH Category 9)

a) Ecological Value of the Site:

It is believed that the land is of low ecological value as defined by the BRE Ecological Value Checklist, given that the site consists of a vacant site previous occupied by other buildings. Accordingly, the ecology of the site will be enhanced via the introduction of garden planting

3. CONCLUSIONS/SUMMARY

It is the intention of our Client to provide a highly insulated structure which will inherently reduce the energy usage of the proposed scheme. The proposal will target high standards in terms of Code for Sustainable Homes and will achieve Code 3 by the measures set out in this report.

High efficiency air source heat pumps will be used for primary heating and hot water

Waste water heat recovery will further reduce dwelling energy requirements by recovering heat from shower water.

All appliances and equipment used from taps and boilers to white goods will be of the highest quality and selected to provide the most sustainable systems.

All materials selected will be from the most sustainable sources, and all construction work itself will be carried out in the most sustainable manner including everything from demolition to transportation.

Attached at Appendix A is a Pre-assessment Estimator compiled by an approved Code for Sustainable Homes Assessor. It contains a brief introduction that demonstrates how the project will meet 49.3% of the credit requirement in the Energy, Water and Materials section, and indicate the evidence that the developer will put forward at the formal design stage assessment. It is considered reasonable, given the site limitations, that, this level of contribution from the energy, materials and water sections should be acceptable

Attached at Appendix B, the SAP2009 software outputs demonstrate how the fabric specification and use of renewable technologies achieve an improvement of DER over TER of 40% +, and reduced emissions by over 12% as a result of the use of renewable technologies

Appendix A – Pre-assessment Estimator

Code for Sustainable Homes

November 2010

Pre-assessment—Code Level 3

2 x Town Houses
Willes Road
London
NW5 3DT

2nd March 2012

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2 x Town Houses, Willes Road, NW5 3DT

DISCHARGE OF PLANNING CONDITION – CODE FOR SUSTAINABLE HOMES SUPPORTING INFORMATION

APPLICATION NUMBER **2010/4273/P Condition 21iii)**

WHAT IS THE CODE FOR SUSTAINABLE HOMES?

The Code is a sustainability assessment which can be applied to each unit within a development to demonstrate exemplary design and construction. The National Standard has been prepared by the Government working closely alongside the Building Research Establishment and Construction Industry Research and Information Association. Compliance to Code 3 is increasingly required by local planning authorities and Code 4 for affordable housing units.

OBJECTIVE OF THE CODE FOR SUSTAINABLE HOMES

The objective is to measure environmental performance of a building by creating mandatory targets which must be achieved through:

- Carbon dioxide (CO_2) emissions - must demonstrate an improvement over the ADL1A 2006 target emission rate (TER) of 25% or more (to achieve the required Code Level 3), the equivalent of meeting the TER under ADL1A 2010
- Potable water consumption - from WC's, showers, baths and hand basins should not exceed 105 litres per person per day (to achieve the Code Level 3/4)
- Materials - 3 out of 5 key elements of construction should have at least a 'D' rating in accordance with the BRE Green Guide 2006.
- Surface Water Run-Off - Ensure that peak flow rates will not exceed previous site conditions.
- Construction Site Waste Management - Ensure a site waste plan is in operation and that it monitors resource use of the site.
- Household Waste Storage and Recycling Facilities - External containers should be provided which can be through a Local Authority Collection Scheme. They should be accessible by wheelchair users as well as able bodied persons.

The minimum standards must be met for each of the above items in order to accumulate points to contribute towards achieving a Code Level rating.

ADVANTAGES OF THE STANDARD

1. Reduced maintenance costs.
2. Reduced green house gases.
3. Reduced impact on environment.
4. Provide affordable warmth.
5. Healthy and comfortable internal environment.
6. Improved sustainability credentials.
7. Increased level of occupant satisfaction.
8. Outperforms open market housing in terms of energy demand - increased sale-ability.
9. Demonstrates forward thinking and environmental awareness on the part of the Developers and Housing providers.

CODE ISSUES

The Code for Sustainable Homes Assessment covers the following areas:

- Energy / CO2
- Water
- Pollution
- Surface Water Run Off
- Waste Management
- Ecology
- Health and well being
- Materials

STANDARDS

Code Levels Total Points

1	**36**
2	**48**
3	**57**
4	**68**
5	**84**
6	**90**

The proposed development is required to achieve **Code Level 3** with **50%** of the credits achieved under the Energy, Water & Materials sections

2 x Town Houses, Willes Road, NW5 3DT

SUGGESTED UPGRADED SPECIFICATION

Energy / CO2

1. Utilisation of good thermal envelope design to achieve the minimum requirement of meeting the TER under Part L 2010 emission levels and reducing carbon emissions further utlising renewable technologies as per the local planning authority requirements
2. Display energy devices to be installed to all units, allowing occupants to monitor and manage energy consumption within the home
3. External drying line to be installed in patio/terraced areas to reduce dependence and energy use of tumble dryers.
4. External lighting specified to be low energy type.

Water

5. Mandatory element that must be achieved and potable water use of <105l/person/day should be targeted. This will require low flow fittings - dual flush toilets, aerators to taps reducing the flow of water and low flow rate to showers.
6. Rainwater harvesting techniques could be employed to further reduce wholesome water use

Materials

7. Elements specified are generally to be 'A' rated in accordance with BRE 'The Green Guide to Housing Specification' 2006 which means that the full life cycle costs and the impact on the environment are assessed. In addition, where possible, developer to use responsibly resourced materials for basic build elements, as well as internal finishes.

Surface water Run-Off

8. Development within flood zone 1. Hydrologists report will be required to confirm flood zone and confirmation of control of run-off rates to that no greater than pre-development

Waste

9. Appropriate levels of ourdoor space will be provided for the storage of household watse, as well as sufficint internal space to encourage recycling in line with Camden Council recycling policies

Pollution

10. Insulation used on site will contain no ozone depleting substances i.e. CFC and HCFC free and have a global warming potential of less than 5.

Health and Well Being

11. Day-lighting calculations will be provided to demonstrate high levels of natural daylight within the dwelling.

Management

12. A guide will be provided by the developer for the occupants of the dwellings highlighting building performance and providing information on surrounding facilities.
13. The Secured by Design section 2 shall be sought through discussions with Local Police Architectural Liaison Officer or Crime Prevention Design Advisor. The aim is to ensure the completed dwellings are safe and secure through boundary treatment, toughened doors and windows and external lighting as examples.
14. The contractor should commit to meeting best practice under the Considerate Constructors Scheme as well as using best practice to reduce pollution from dust and ground water pollution

Ecology

15. The development site is currently 100% building or hardstanding and as such has low ecological value and the developer may take the opportunity to improve biodiversity via the use of a green walls in the installation of bat and bird boxes

Overall Score

The proposed dwelling should achieve **57.25** credits which equates to a '**Code Level 3**' Rating, with **28.2** of the credits achieved under the Energy, Materials & Water sections – a total of **49.26%** of credits achieved

Pre-assessment Estimator

A detailed breakdown of the Code categories, the recommendations to the developers and how the development will achieve the necessary credits for a Code Level 3 is attached in Appendix A. This also includes the evidence that will be needed to be provided at the Design Stage Assessment.

CONCLUSION

The Developer and Principle Contractor will be committed to achieving the required score with the above recommendations incorporated into the specification. Occupiers of the homes will enjoy reduced operating and life cycle costs due to the enhancement over and above current Building Regulations and built in features designed to reduce environmental impact and green house gases. Overall the carbon footprint of the scheme will be minimised along with its Ecological impact. All stakeholders involved stand to benefit as a result of the assessment and recommendations.

Report Prepared by **:-**

EB7
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Assessor **Date: 2nd March 2012**

Checked **Date: 2nd March 2012**

Appendix A

Pre-assessment Estimator

Code for Sustainable Homes

Technical Guide November 2010 - Full Technical Guide

Pre-Assessment Report

STROMA CERTIFIED CODE ASSESSOR

THE CODE FOR SUSTAINABLE HOMES
CERTIFICATION MARK

Report Reference:	
Site Registration:	**002943-120201-18-1049**
Site Name:	**Willes Road**
Assessor Number:	**STRO002943**
Company:	**EB7**
Assessor:	**Neil Ingham**

Code for Sustainable Homes
Pre-Assessment Report (Report Reference:)

Site Details	
Site Name:	Willes Road
Site Registration:	002943-120201-18-1049
Site Address:	Willes Road
	Kentish Town
City/Town:	London
County:	Greater London
Postcode:	NW5 3DT
No. of Dwellings:	2
No. of Dwelling Types:	1
Planning Authority:	Camden Council
Funding Body:	

Assessor Details	
Company:	EB7
Assessor Name:	Neil Ingham
Cert Number:	STRO002943
Address:	Studio F7
	Battersea Studios
	80 Silverthorne Road
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Client Details	
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Architect Details	
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Developer Details	
Company:	
Contact Name:	D Kutner
Job Title:	
Email:	
Tel:	
Address:	56d Upper Montagu Street
City/Town:	London
County:	
Postcode:	W1H 1SN

Dwelling ID	Plot No.	Address	Social Unit
1	1	13 Willes Road Kentish Town	No
2	2	15 Willes Road Kentish Town	No

Development Summary & Ratings

Dwelling ID	Dwelling Type	Description	Level	Score
1	Willes Road		3	57.25
2	Willes Road		3	57.25

Deviations from Standard

No deviations from standard

Score Sheet for Willes Road

	ENE									WAT		MAT			SUR		WAS			POL		HEA				MAN				ECO					Summary	
Dwelling ID	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**1**	**2**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**	**Score**	**Level**
1	4.8	0	2	1	2	2	1	0	1	3	1	14	4	2	0	2	4	1	1	1	0	3	0	1	4	3	1	1	2	1	0	1	2	0	57.25	3
2	4.8	0	2	1	2	2	1	0	1	3	1	14	4	2	0	2	4	1	1	1	0	3	0	1	4	3	1	1	2	1	0	1	2	0	57.25	3

Summary Score Sheet
Dwelling Type: Willes Road

Dwelling IDs: 1, 2

	Credit Score	Credits Available	Score Assessment Sub Total	Credits Available	%	Weighting Factor	Points Score
Energy & CO2 Emissions							
ENE 1 Dwelling Emission Rate	4.8	10	13.8	31	44.52	36.4	16.2
ENE 2 Fabric Energy Efficiency	0	9					
ENE 3 Energy Display Device	2	2					
ENE 4 Drying Space	1	1					
ENE 5 Energy Labelled White Goods	2	2					
ENE 6 External Lighting	2	2					
ENE 7 Low or Zero Carbon Energy Technologies	1	2					
ENE 8 Cycle Storage	0	2					
ENE 9 Home Office	1	1					
Water							
WAT 1 Internal Water Use	3	5	4	6	66.67	9	6
WAT 2 External Water Use	1	1					
Materials							
MAT 1 Environmental Impact of Materials	14	15	20	24	83.33	7.2	6
MAT 2 Responsible Sourcing (Basic Building Elements)	4	6					
MAT 3 Responsible Sourcing (Finishing Elements)	2	3					
Surface Water Run-off							
SUR 1 Management of Surface Water Run-Off from Site	0	2	2	4	50	2.2	1.1
SUR 2 Flood Risk	2	2					
Waste							
WAS 1 Household Waste Storage and Recycling Facilities	4	4	6	8	75	6.4	4.8
WAS 2 Construction Site Waste Management	1	3					
WAS 3 Composting	1	1					
Pollution							
POL 1 Global Warming Potential of Insulants	1	1	1	4	25	2.8	0.7
POL 2 NOx Emissions	0	3					
Health & Wellbeing							
HEA 1 Daylighting	3	3	8	12	66.67	14	9.33
HEA 2 Sound Insulation	0	4					
HEA 3 Private Space	1	1					
HEA 4 Lifetime Homes	4	4					
Management							
MAN 1 Home User Guide	3	3	7	9	77.78	10	7.78
MAN 2 Considerate Constructors Scheme	1	2					
MAN 3 Construction Site Impacts	1	2					
MAN 4 Security	2	2					
Ecology							
ECO 1 Ecological Value of Site	1	1	4	9	44.44	12	5.33
ECO 2 Ecological Enhancement	0	1					
ECO 3 Protection of Ecological Features	1	1					
ECO 4 Change of Ecological Value of Site	2	4					
ECO 5 Building Footprint	0	2					
	Level Achieved: 3		Total Points Scored: 57.25				

Evidence for ENE 1 (Dwelling Emission Rate) - Willes Road
Improvement above Part L Building Regulations 2010. 4.8 credits allocated
The developer has commited to the achievement of a Code 3 rating for the development, as such, the developer will be required to achieve the target emmission rate as set down by AD L1A 2010. The local planning authority have a requirement to meet 50% of the developments "Code" credits under the Energy, Water & Materials catagories, accordingly, SAP caculations have been undertaken and a specification agreed in order to achieve a 54.7% improvment over Part L 2010
Assumptions for ENE 1

Evidence for ENE 2 (Fabric Energy Efficiency) - Willes Road
Not Sought 0 credits allocated
Due to the highly limited opportunity to create the level of building fabric required on such a restricted site, the credits are not sought under this section
Assumptions for ENE 2

Evidence for ENE 3 (Energy Display Device) - Willes Road
Default Case: Electricity is the primary heating and current electricity. This will be displayed on a correctly specific device.
In order to assist the managment of energy consumption within the dwelling, the developer will install display energy devices to monitor both gas and electrical consumption within the new development. Information on the display energy device will be supplied as well the consumption data that it will display for both primary fuel and electricity.
Assumptions for ENE 3

Evidence for ENE 4 (Drying Space) - Willes Road
Compliant external drying space
In order to reduce the reliance on tumble drying of clothes, the developer is to supply 6m of external drying line in the rear garden areas The developer will supply full details of the line to be supplied, the locations (marked on plan) and fixing points
Assumptions for ENE 4

Evidence for ENE 5 (Energy Labelled White Goods) - Willes Road
A+ rated fridge & freezers or fridge/freezer A rated washing machine and dishwasher AND B rated washer-dryers & tumbles dryers, or EU energy efficiency labelling scheme leaflet where washing machines and/or dishwashers not provided
The developer has commited to supplying energy efficient white goods to the development Developer to provide details of all white goods provided and the energy ratings to include A+ rated fridges and fridge freezers, A rated washing machines and dishwashers and B rated tumble dryers. A copy of the EU energy labelling scheme will be included as part of the Home User Guide
Assumptions for ENE 5

Evidence for ENE 6 (External Lighting) - Willes Road
Compliant space lighting Compliant security lighting
The development is to have a low energy lighting strategy including all space and security lighting. Developer to supply details of all lighting including make, type and efficacy in lumens/circuit watt. Burglar security lights will be fitted with a max wattage of 150w, with PIR and dawn/dusk controls

Assumptions for ENE 6
All security and space lighting to be of the low energy type. All buglar security lights to be max 150w and fitted with PIR and dusk/dawn controls.

Evidence for ENE 7 (Low or Zero Carbon Energy Technologies) - Willes Road
Contribution of low or zero carbon technologies greater than or equal to 10%
In ordert to comply with the requirements of Camden Council, the developer has confirmed a energy strategy for the development that will utilise renewable technologies in order to reduce the carbon emissions from the new build dwelling At the design stage, the developer will provide SAP outputs to confirm the overall carbon emmissions, and the reductions achieved via the use of renewable technologies used - air source heat pumps and PV panels on A frames to the flat roof
Assumptions for ENE 7

Evidence for ENE 8 (Cycle Storage) - Willes Road
Credit(s) not sought or no compliant cycle storage
The terrace nature of the property, with no direct access form rear garden to public highway, means that the credits can not be achieved under this section
Assumptions for ENE 8

Evidence for ENE 9 (Home Office) - Willes Road
Compliant home office
The developer has confirmed that a compliant home office facility will be provided in the upper floor areas; 1.8m of wall desk space will be required, with appropriate sockets, telephone point and access to broadband. The sketch plans clearly show a well lit room, with adequate ventilation that will comply.
Assumptions for ENE 9

Evidence for WAT 1 (Internal Water Use) - Willes Road
Internal water use less than or equal to 105 litres per person per day
The development requires to meet the stringent water consumption rates to achieve the Code 3 level status, this will require low flow/flush fittings, for example:- Dual flush toilets at 5l/2.5/ flush rates Low capacity baths cica 180l Low flow taps in kitchens ad bathrooms, cicra 5l/min Low flow showers at circa 8l/min Developer to supply full details of all sanitaryware including make/model, flush/flow rates, locations and a completed water efficiency calculation for each dwelling.
Assumptions for WAT 1
It is assummed that the development will meet the minimum standard of 105l/p/day as required for Code level 3&4

Evidence for WAT 2 (External Water Use) - Willes Road
Compliant individual rainwater collection system
The developer is to supply rainwater butts to each unit. The rainwater collected will then be used for the irrigation of soft landscaped areas. The developer will supply details of the water butts to be supplied
Assumptions for WAT 2

Evidence for MAT 1 (Environmental Impact of Materials) - Willes Road
Mandatory requirements met: At least 3 elements rated A+ to D, 14 credits scored
The developer will provide detailed specification for all the main build elements, it is expected that elements with a high Green Guide rating will be utilised which will indicate that the build elements specified have a low environmental impact The Mat 1 calculator will be completed to demonstrate compliance
Assumptions for MAT 1

Evidence for MAT 2 (Responsible Sourcing (Basic Building Elements)) - Willes Road
4 credits scored
The developer intends to use responsibly sourced materials for the main build elements. Full details of the materials used and their EMS certification to be provided which will identify the level of certification, be it key process or key process & supply chain Mat 2 calculator to be completed to demonstrate compliance
Assumptions for MAT 2

Evidence for MAT 3 (Responsible Sourcing (Finishing Elements)) - Willes Road
2 credits scored
The developer will use responsibly sourced materials for finishing elements, and will provide the EMS certification as appropriate to confirm compliance under key process and supply chain The completed Mat 3 calculator tool will demonstrate compliance
Assumptions for MAT 3

Evidence for SUR 1 (Management of Surface Water Run-Off from Site) - Willes Road
Special Case: No change/decrease in impermeable area. Credits not available Credits not sought, water quality criteria not met/sought.
The developer will supply a site specific flood risk assessment to demonstrate that surface water run-off is no greater than pre-development. The development is on an area of existing buildings and hardstanding, as such there is no decrease in impermeable area and as such, the special case exemption will be demonstrated
Assumptions for SUR 1
The developer does not wish to pursue further credits under this section

Evidence for SUR 2 (Flood Risk) - Willes Road
Low flood risk - zone 1
The EA flood maps show site lies within Zone 1 - low risk of flooding. The site specific flood risk assessment will confirm that the development sits within an area with a low risk of flooding from all sources
Assumptions for SUR 2

Evidence for WAS 1 (Household Waste Storage and Recycling Facilities) - Willes Road
Mandatory requirements met: Adequate storage of household waste with accessibility in line with checklist WAS 1. Local authority collection: After collection sorting with appropriate internal storage of recyclable materials
The developer will be required to install 3 x recycling bins with minimum capacity of 30 litres in a fixed unit within the kitchen, as well as providing adequate external storage areas for general waste - which will be marked on the plans Checklists Cat 5.1 and IDP will need to be completed as well as evidence of internal storage - number, type and locations. In addition, documented details of the Camden Council collection scheme for general waste and recyclables will be supplied, which includes card & paper, metals & plastics, garden waste and food waste

Assumptions for WAS 1

Evidence for WAS 2 (Construction Site Waste Management) - Willes Road
Compliant site waste management plant containing appropriate benchmarks, commitments and procedures for waste minimisation in line with the criteria and with Checklist WAS 2a, 2b & 2c
The developer will not be pursuing credits under this section
Assumptions for WAS 2
Given the scale of the development, it is assumed that a SWMP will be put in place

Evidence for WAS 3 (Composting) - Willes Road
Individual compositing facility/facilities
The developer will supply details of Camden Councils garden waste and food waste recylcing programme to demonsrate compliance, as well as supplying a compost bin to each property The developer will supply details of the compost bins to be supplied In addition, the developer will supply information to the occupants on the composting process and the local authorities collections within the Home User Guide
Assumptions for WAS 3

Evidence for POL 1 (Global Warming Potential of Insulants) - Willes Road
All insulants have a GWP of less than 5
The developer will supply a copy of Checklist Pol1, with supporting evidence, to demonstrate that all insulants used within the development will have a GWP < 5
Assumptions for POL 1

Evidence for POL 2 (NOx Emissions) - Willes Road
Credit(s) not sought
The Consultant Engineers to the project have confirmed that an air source heat pump will supply the heating and hot water needs for the properties. As grid supplied electricity is the energy source, no credits can be achieved
Assumptions for POL 2

Evidence for HEA 1 (Daylighting) - Willes Road
Kitchen: Average daylight factor of at least 2% Living room: Average daylight factor of at least 1.5% Dining room: Average daylight factor of at least 1.5% Home office: Average daylight factor of at least 1.5% All rooms (kitchen, living, dining and where applicable the home office) have 80% of the working plane with direct light from the sky
It is assumed that, given the design drawings, that good levels of daylight will be achieved throughout the development. The developer will supply formal daylighting calculations as set out in Littlefair 1998, to demonstrate compliance in the office/studio, kitchen lounge and dining area
Assumptions for HEA 1

Evidence for HEA 2 (Sound Insulation) - Willes Road
Credit(s) not sought
Site plans and sections have been provided by the developer. Clearly habitable rooms are adjacent to other properties, but the developer has confirmed that credits will not be pursued under this section
Assumptions for HEA 2

Evidence for HEA 3 (Private Space) - Willes Road
Individual private space provided
The supplied drawings demonstrate that there is rear gardens to the property Although formal calculations will need to be submitted, there is clearly adequate outdoor space and the credits can be awarded
Assumptions for HEA 3

Evidence for HEA 4 (Lifetime Homes) - Willes Road
All criteria of Lifetime Homes in line with all 16 principals of Lifetime Homes
There is a specific planning requirment - a planning condition - to meet the Lifetimes Homes standard. The development has been designed to meet the Lifetime Homes standard as confirmed by the architects and the credits can be awarded
Assumptions for HEA 4

Evidence for MAN 1 (Home User Guide) - Willes Road
All criteria inline with checklist MAN 1 Part 1 - Operational Issues will be met All criteria inline with checklist MAN 1 Part 2 - Site and Surroundings will be met
The developer will supply a Home User Guide to the development. The guide will include details required under Checklists Man1, parts 1 & 2. The developer will confirm in writing that such Home User Guides will be supplied to the dwelling, as well as a copy of the Guide for the assessor when prepared.
Assumptions for MAN 1

Evidence for MAN 2 (Considerate Constructors Scheme) - Willes Road
Considerate constructors scheme: Best practise only, a score of between 24 and 31.5 and at least a score of 3 in every section
There is a specific planing requirement for the contractor to join the Considerate Constructors Scheme The developer has commited to meeting this requirement as well as confirming that a score of 24, with a score of at least 3 in each section, will be met.
Assumptions for MAN 2

Evidence for MAN 3 (Construction Site Impacts) - Willes Road
Monitor, report and set targets for CO2 production or energy use from site activities Monitor, report and set targets for water consumption from site activities
The developer has not committed to achieving credits under this section
Assumptions for MAN 3

Evidence for MAN 4 (Security) - Willes Road
Secure by design section 2 compliant
The developer will consult with the local architectural Liaison Officer, undertake the recommendations and meet Section 2 - Physical Security from Secured by Design - New Homes. The developer will provide detailed documentary evidence of the above process
Assumptions for MAN 4

Evidence for ECO 1 (Ecological Value of Site) - Willes Road
Land of low ecological value, achieved through checklist ECO 1. Development site has been identified as low ecological value by a suitably qualified ecologist
The development site consists of land that is 100% building or hardstanding. As such the site can be signed off by the assessor as having low ecological value

Assumptions for ECO 1

Evidence for ECO 2 (Ecological Enhancement) - Willes Road
Credit not sought or no compliant enhancement
Given the lack of significant external space for ecological enhancement, the developer has not instructed an ecologist to undertake a report and the credits are not sought
Assumptions for ECO 2

Evidence for ECO 3 (Protection of Ecological Features) - Willes Road
Land of low ecological value as identified under ECO 1
Credit by default as land is of low ecological value under Ene 1
Assumptions for ECO 3

Evidence for ECO 4 (Change of Ecological Value of Site) - Willes Road
Neutral: Greater than -3 and less than or equal to +3
This section will be calculated by the assessor as the land was 100% building or hardstanding prior to development The developer will supply plans of the site both before and after the proposed development marking the areas of buildings, hard standing and planted areas by plot categories. A neutral outcome is expected
Assumptions for ECO 4

Evidence for ECO 5 (Building Footprint) - Willes Road
Credit not sought
The plans demonstrate that the development is arranged over 3 storeys Formal calculations will be required, but it is clear that the development has a footprint to floor area ratio less than 2.5:1 and 1 credits can not be awarded
Assumptions for ECO 5

Assessor Declaration

I Neil Ingham, can confirm that I have compiled this report to the best of my ability, I have based all findings on the information that is referenced within this report, and that this report is appropriate for the registered site.

To the best of my knowledge all the information contained within this report is correct and accurate. I have within my possession all the reference material that relates to this report, which is available for inspection by the client, the clients representative or Stroma Certification for Quality Assurance monitoring.

Signed:

Neil Ingham
EB7
02 March 2012

Information about Code for Sustainable Homes

The Code for Sustainable Homes (the Code) is an environmental assessment method for rating and certifying the performance of new homes. It is a national standard for use in the design and construction of new homes with a view to encouraging continuous improvement in sustainable home building. The Code is based on EcoHomes©.

It was launched in December 2006 with the publication of 'Code for Sustainable Homes: A stepchange in sustainable home building practice' (Communities and Local Government, 2006), and became operational in England from April 2007.

The Code for Sustainable Homes covers nine categories of sustainable design. Each category includes a number of environmental issues. Each issue is a source of impact on the environment which can be assessed against a performance target and awarded one or more credits. Performance targets are more demanding than the minimum standards needed to satisfy Building Regulations or other legislation. They represent good or best practice, are technically feasible, and can be delivered by the building industry. The issues and categories are as follows:

- Energy & CO2 Emissions
  - Dwelling Emission Rate
  - Building Fabric
  - Internal Lighting
  - Drying Space
  - Energy Labelled White Goods
  - External Lighting
  - Low or Zero Carbon Technologies
  - Cycle Storage
  - Home Office
- Water
  - Internal Water Use
  - External Water Use
- Materials
  - Environmental Impact of Materials
  - Responsible Sourcing of Materials - Basic Building Elements
  - Responsible Sourcing of Materials - Finishing Elements
- Surface Water Run-off
  - Management of Surface Water Run-off from the Development
  - Flood Risk
- Waste
  - Storage of Non-Recyclable Waste and Recyclable Household Waste
  - Construction Site Waste Management
  - Composting
- Pollution
  - Global Warming Potential of Insulants
  - NOx Emissions

- Health & Wellbeing
  - Daylighting
  - Sound Insulation
  - Private Space
  - Lifetime Homes
- Management
  - Home User Guide
  - Considerate Constructors Scheme
  - Construction Site Impacts
  - Security
- Ecology
  - Ecological Value of Site
  - Ecological Enhancement
  - Protection of Ecological Features
  - Change in Ecological Value of Site
  - Building Footprint

The Code assigns one or more performance requirements (assessment criteria) to all of the above environmental issues. When each performance requirement is achieved a credit is awarded (with the exception of the four mandatory requirements which have no associated credits). The total number of credits available to a category is the sum of credits available for all the issues within it.

Mandatory minimum performance standards are set for some issues. For four of these, a single mandatory requirement is set which must be met, whatever Code level rating is sought. Credits are not awarded for these issues. Confirmation that the performance requirements are met for all four is a minimum entry requirement for achieving a level 1 rating. The four un-credited issues are:

- Environmental Impacts of Materials
- Management of Surface Water Run-off from Developments
- Storage of Non-Recyclable Waste and Recyclable Household Waste
- Construction Site Waste Management

If the mandatory minimum performance standard is met for the four un-credited issues, four further mandatory issues need to be considered. These are agreed to be such important issues that separate Government policies are being pursued to mitigate their effects. For two of these, credits are awarded for every level of achievement recognised within the Code, and minimum mandatory standards increase with increasing rating levels.

The two issues with increasing mandatory minimum standards are:

- Dwelling Emission Rate
- Indoor Water Use

For one issue a mandatory requirement at Level 5 or 6:

- Fabric Energy Efficiency

The final issue with a mandatory requirement for Level 6 of the Code is:

- Lifetime Homes

Further credits are available on a free-choice or tradable basis from other issues so that the developer may choose how to add performance credits (converted through weighting to percentage points) achieve the rating which they are aiming for.

The environmental impact categories within the Code are not of equal importance. Their relative value is conveyed by applying a consensus-based environmental weighting factor (see details below) to the sum of all the raw credit scores in a category, resulting in a score expressed as percentage points. The points for each category add up to 100.

The weighting factors used in the Code have been derived from extensive studies involving a wide range of stakeholders who were asked to rank (in order of importance) a range of environmental impacts. Stakeholders included international experts and industry representatives.

It is also important to note that achieving a high performance in one category of environmental impact can sometimes result in a lower level of performance for another. For instance, if biomass is used to meet heating demands, credits will be available for performance in respect of energy supplied from a renewable source, but credits cannot be awarded for low NOX emission. It is therefore impossible to achieve a total percentage points score of 100.

The Code uses a rating system of one to six stars. A star is awarded for each level achieved. Where an assessment has taken place by where no rating is achieved, the certificate states that zero stars have been awarded:

Code Levels	Total Points Score (Equal to or Greater Than)
Level 1 ★☆☆☆☆☆	**36 Points**
Level 2 ★★☆☆☆☆	**48 Points**
Level 3 ★★★☆☆☆	**57 Points**
Level 4 ★★★★☆☆	**68 Points**
Level 5 ★★★★★☆	**84 Points**
Level 6 ★★★★★★	**90 Points**

Formal assessment of dwellings using the Code for Sustainable Homes may only be carried out using Certified assessors, who are qualified ‘competent persons’ for the purpose of carrying out Code assessments.

Energy & CO2 Emissions
ENE 1: Dwelling Emission Rate **Available Credits:**10 **Aim:**To limit CO2 emissions arising from the operation of a dwelling and its services in line with current policy on the future direction of regulations.
ENE 2: Fabric Energy Efficiency **Available Credits:**9 **Aim:**To improve fabric energy efficiency performance thus future-proofing reductions in CO2 for the life of the dwelling.
ENE 3: Energy Display Device **Available Credits:**2 **Aim:**To promote the specification of equipment to display energy consumption data, thus empowering dwelling occupants to reduce energy use.
ENE 4: Drying Space **Available Credits:**1 **Aim:**To promote a reduced energy means of drying clothes.
ENE 5: Energy Labelled White Goods **Available Credits:**2 **Aim:**To promote the provision or purchase of energy efficient white goods, thus reducing the CO2 emissions from appliance use in the dwelling.
ENE 6: External Lighting **Available Credits:**2 **Aim:**To promote the provision of energy efficient external lighting, thus reducing CO2 emissions associated with the dwelling.
ENE 7: Low or Zero Carbon Technologies **Available Credits:**2 **Aim:**To limit CO2 emissions and running costs arising from the operation of a dwelling and its services by encouraging the specification of low and zero carbon energy sources to supply a significant proportion of energy demand.
ENE 8: Cycle Storage **Available Credits:**2 **Aim:**To promote the wider use of bicycles as transport by providing adequate and secure cycle storage facilities, thus reducing the need for short car journeys and the associated CO2 emissions.
ENE 9: Home Office **Available Credits:**1 **Aim:**To promote working from home by providing occupants with the necessary space and services thus reducing the need to commute.

Water
WAT 1: Indoor Water Use **Available Credits:**5 **Aim:**To reduce the consumption of potable water in the home from all sources, including borehole well water, through the use of water efficient fittings, appliances and water recycling systems.
WAT 2: External Water Use **Available Credits:**1 **Aim:**To promote the recycling of rainwater and reduce the amount of mains potable water used for external water uses.

Materials
MAT 1: Environmental Impact of Materials **Available Credits:**15 **Aim:**To specify materials with lower environmental impacts over their life-cycle.
MAT 2: Responsible Sourcing of Materials - Basic Building Elements **Available Credits:**6 **Aim:**To promote the specification of responsibly sourced materials for the basic building elements.
MAT 3: Responsible Sourcing of Materials - Finishing Elements **Available Credits:**3 **Aim:**To promote the specification of responsibly sourced materials for the finishing elements.

Surface Water Run-off
SUR 1: Management of Surface Water Run-off from developments **Available Credits:**2 **Aim:**To design surface water drainage for housing developments which avoid, reduce and delay the discharge of rainfall run-off to watercourses and public sewers using SuDS techniques. This will protect receiving waters from pollution and minimise the risk of flooding and other environmental damage in watercourses.
SUR 2: Flood Risk **Available Credits:**2 **Aim:**To promote housing development in low flood risk areas, or to take measures to reduce the impact of flooding on houses built in areas with a medium or high risk of flooding.

Waste
WAS 1: Storage of non-recyclable waste and recyclable household waste **Available Credits:**4 **Aim:**To promote resource efficiency via the effective and appropriate management of construction site waste.
WAS 2: Construction Site Waste Management **Available Credits:**3 **Aim:**To promote resource efficiency via the effective and appropriate management of construction site waste.
WAS 3: Composting **Available Credits:**1 **Aim:**To promote the provision of compost facilities to reduce the amount of household waste send to landfill.

Pollution
POL 1: Global Warming Potential of Insulants **Available Credits:**1 **Aim:**To promote the reduction of emissions of gases with high GWP associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials.
POL 2:NOx Emissions **Available Credits:**3 **Aim:**To promote the reduction of nitrogen oxide (NOX) emissions into the atmosphere.

Health & Wellbeing
HEA 1: Daylighting **Available Credits:**3 **Aim:**To promote good daylighting and thereby improve quality of life and reduce the need for energy to light the home.
HEA 2: Sound Insulation **Available Credits:**4 **Aim:**To promote the provision of improved sound insulation to reduce the likelihood of noise complaints from neighbours.
HEA 3: Private Space **Available Credits:**1 **Aim:**To improve quality of life by promoting the provision of an inclusive outdoor space which is at least partially private.
HEA 4: Lifetime Homes **Available Credits:**4 **Aim:**To encourage the construction of homes that are accessible and easily adaptable to meet the changing needs of current and future occupants.

Management
MAN 1: Home User Guide **Available Credits:**3 **Aim:**To promote the provision of guidance enabling occupants to understand and operate their home efficiently and make the best use of local facilities.
MAN 2: Considerate Constructors Scheme **Available Credits:**3 **Aim:**To promote the environmentally and socially considerate, and accountable management of construction sites.
MAN 3: Construction Site Impacts **Available Credits:**2 **Aim:**To promote construction sites managed in a manner that mitigates environmental impacts.
MAN 4: Security **Available Credits:**2 **Aim:**To promote the design of developments where people feel safe and secure- where crime and disorder, or the fear of crime, does not undermine quality of life or community cohesion.

Ecology
ECO 1: Ecological value of site **Available Credits:**1 **Aim:**To promote development on land that already has a limited value to wildlife, and discourage the development of ecologically valuable sites.
ECO 2: Ecological enhancement **Available Credits:**1 **Aim:**To enhance the ecological value of a site.
ECO 3: Protection of ecological features **Available Credits:**1 **Aim:**To promote the protection of existing ecological features from substantial damage during the clearing of the site and the completion of construction works.
ECO 4: Change in ecological value of site **Available Credits:**4 **Aim:**To minimise reductions and promote an improvement in ecological value.
ECO 5: Building footprint **Available Credits:**2 **Aim:**To promote the most efficient use of a building’s footprint by ensuring that land and material use is optimised across the development.

Disclaimer

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Appendix B – SAP2009 Outputs

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SAP Input

Property Details: Willes Road Townhouse

Address:	Willes Road, LONDON, NW5 3DU
Located in:	England
Region:	Thames valley
UPRN:	9678673968
RRN:	0000-0000-0000-0000-0000
Date of assessment:	02 March 2012
Date of certificate:	02 March 2012
Assessment type:	New dwelling design stage
Transaction type:	New dwelling
Related party disclosure:	No related party
Thermal Mass Parameter:	Calculated
Dwelling designed to use less: than 125 litres per day	True

Property description:

Dwelling type:	House
Detachment:	Mid-terrace
Year Completed:	2012

Floor Location:	Floor area:	Storey height:
Floor 0	75.6 m²	2.6 m
Floor 1	41.31 m²	3 m
Floor 2	41.31 m²	3 m

Living area:	71.98 m² (fraction 0.537)
Front of dwelling faces:	North East

Opening types:

Name:	Source:	Type:	Glazing:	Argon:	Frame:
Front Door	Manufacturer	Half glazed	low-E, En = 0.05, soft coat	Yes	Wood
W1	Manufacturer	Windows	low-E, En = 0.05, soft coat	Yes	Wood
W2	SAP 2009	Windows	low-E, En = 0.05, soft coat	Yes	Wood
W3	SAP 2009	Windows	low-E, En = 0.05, soft coat	Yes	Wood
W4	SAP 2009	Windows	low-E, En = 0.05, soft coat	Yes	Wood
W5	SAP 2009	Windows	low-E, En = 0.05, soft coat	Yes	Wood
W6	SAP 2009	Windows	low-E, En = 0.05, soft coat	Yes	Wood

Name:	**Gap:**	**Frame Factor:**	**g-value:**	**U-value:**	**Area:**	**No. of Openings:**
Front Door	16mm or more mm	0.7	0.57	1.8	2.86	1
W1	16mm or more	0.7	0.57	1.3	10.35	1
W2	16mm or more	0.7	0.57	1.3	1.95	3
W3	16mm or more	0.7	0.57	1.3	1.62	3
W4	16mm or more	0.7	0.57	1.3	3.62	1
W5	16mm or more	0.7	0.57	1.3	1.95	3
W6	16mm or more	0.7	0.57	1.3	1.62	3

Name:	Type-Name:	Location:	Orient:	Width:	Height:
Front Door		External wall	North East	1.1	2.6
W1		External wall	South West	4.5	2.3
W2		External wall	South West	1.115	1.75
W3		External wall	South West	1.115	1.45
W4		External wall	North East	1.765	2.05
W5		External wall	North East	1.115	1.75
W6		External wall	North East	1.115	1.45

Overshading:	Average or unknown

Opaque Elements:

Type:	Gross area:	Openings:	Net area:	U-value:	Ru value:	Curtain wall:	Kappa:

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SAP Input

External Elements							
External wall	104.36	38.25	66.11	0.23	0	False	60
Flat roof	75.6	0	75.6	0.16	0		9
GFloor	75.6			0.16			110
Internal Elements							
Partitions	93.52						9
First and second	82.62						18
Party Elements							
Party wall	153.12						180

Thermal bridges:

Thermal bridges: No information on thermal bridging (y=0.15) (y =0.15)

Ventilation:

Pressure test: Yes (As designed)
Ventilation: Natural ventilation (extract fans)
Number of chimneys: 0
Number of open flues: 0
Number of fans: 3
Number of sides sheltered: 4
Design q50: 6

Main heating system:

Main heating system:
Central heating systems with radiators or underfloor heating
Heat pumps
Fuel: Electricity
Info Source: Manufacturer Declaration
Manufacturer's data
Efficiency: 380.0%
Air-to-water heat pump (electric)
Systems with radiators
Pump in heat space: Yes

Main heating Control:

Main heating Control:
Time and temperature zone control
Control code: 2207
Boiler interlock: Yes

Secondary heating system:

Secondary heating system: None

Water heating:

Water heating:
From main heating system
Water code: 901
Fuel :Electricity
Hot water cylinder
Cylinder volume: 145 litres
Cylinder insulation: Measured loss, 1.32kWh/day
Primary pipework insulation: True
Cylinderstat: True
Cylinder in heated space: True
Waste Water Heat Recovery System:
Total rooms with shower and/or bath: 2
Product index: 080003, Shower-Save Recoh-vert RV3 System A
Number of mixer showers in rooms with a bath: 2
Number of mixer showers in rooms without a bath: 0
Solar panel: False

Others:

Electricity tariff: standard tariff
In Smoke Control Area: Unknown

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SAP Input

Conservatory:	No conservatory
Low energy lights:	75%
Terrain type:	Low rise urban / suburban
EPC language:	English
Wind turbine:	No
Photovoltaics:	None
Assess Zero Carbon Home:	No

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Code for Sustainable Homes Report

Assessor and House Details

Assessor Name: Neil Ingham
Assessor Number: STRO002943
Property Address: Willes Road
LONDON
NW5 3DU

Buiding regulation assessment

	kg/m²/year
TER	25.95
DER	14.19

The following code calculations are taken from the Code for Sustainable Homes Technical Guide (Nov 10)

Ene 1 Assessment - Dwelling Emission Rate

Total Energy Type CO2 Emissions for Codes Levels 1 - 5

	%	kg/m²/year	
DER from SAP 2009 DER Worksheet		14.19	*(ZC1)*
TER		25.95	
Residual CO2 emissions offset from biofuel CHP		0	*(ZC5)*
CO2 emissions offset from additional allowable electricty generation		0	*(ZC7)*
Total CO2 emissions offset from SAP Section 16 allowances		0	
DER accounting for SAP Section 16 allowances		14.19	
% improvement DER/TER	45.33		

Total Energy Type CO2 Emissions for Codes Levels 6

	kg/m²/year	
DER accounting for SAP Section 16 allowances	14.19	*(ZC1)*
CO2 emissions from appliances, equation (L14)	12.29	*(ZC2)*
CO2 emissions from cooking, equation (L16)	1.2	*(ZC3)*
Net CO2 emissions	27.7	*(ZC8)*

Result:

Credits awarded for Ene 1 = 4.8

Code Level = 4

Ene 2 - Fabric energy Efficiency

Fabric energy Efficiency: 58.06

Credits awarded for Ene 2 = 0

Ene 7 - Low or Zero Carbon (LZC) Technologies

Reduction in CO2 Emissions

	%	kg/m²/year	
Standard Case CO2 emissions		31.7	
*Actual Case CO2 emissions		27.7	
Reduction in CO2 emissions	12.62		

Credits awarded for Ene 7 = 1