VISION ENERGY

Document Version

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1.Executive Summary

1.1 Introduction

This energy strategy has been prepared, in support of a full planning application for the development known as “9 Cheyne Avenue”, hereafter referred to as the Development.

1.2 Policies and Requirements

This statement summaries the relevant policies and requirements in relation to Energy, Sustainability and Carbon emissions, the below document is to determine the $C0^2$ reductions in light of the proposed planning application. A 35% reduction in carbon emissions target has been adopted on-site reduction as a minimum.

1. London Borough of Richmond Upon Thames Local Plan
2. Policy LP 22: Sustainable Design and Construction

1.3 Energy Efficiency Measures

The proposed development incorporates several energy efficiency measure and designs to ensure compliance & $C0^2$ reduction including:

- Fabric Insulation improvements on Building Regulations Part L1a minimum standards,
- Air permeability improvements on Building Regulations Part L1a minimum standards,
- Improved U & G Values for the development,
- Low Energy lighting scheme adopted on site.

1.4 Low Carbon Energy Supply

The proposed development is not within an area of which allows for a decentralised energy network to be utilised, therefore this option will not be explored further within this energy statement. However, it is recommended to prepare the site for future connection to a low carbon heat network.

1.5 On-site renewable technologies

The proposed design of the development incorporates the use of Solar PV, the use of on-site renewable technologies has been reviewed in further details within this statement.

1.6 Site Description

The proposed development is set at 9 Cheyne Avenue, London, TW2 6AN, the proposed works to the site is the development of 1no. residential dwelling. The proposed development is to incorporate a high level of thermal performance and incorporate on-site renewable technologies to ensure the new development achieve the local policy requirements.

Fig.1 Site Plan

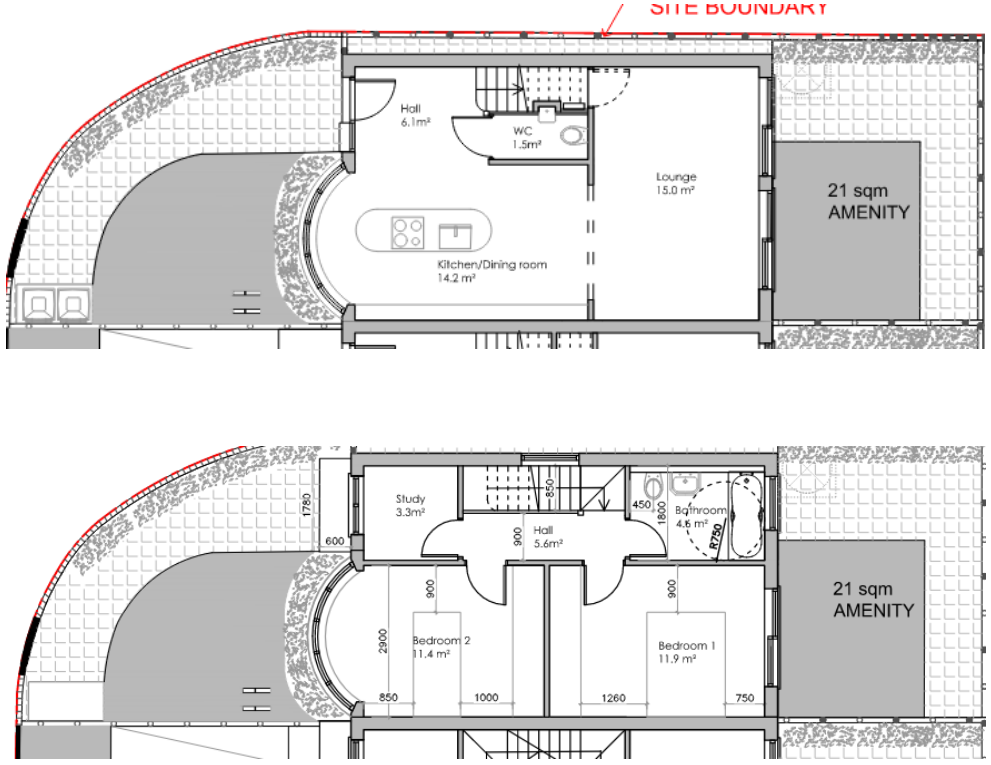


Fig 2. Proposed development

Fig.3 Proposed elevations

1.7 Renewable and Low Carbon Energy

Overall, **36%** of the predicted energy requirements is to be produced utilising Renewable or Low Carbon technologies as shown below, totalling a reduction of 36.2% site wide.

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	-0.1	-5%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.6	41%
Cumulative on-site savings	**0.5**	**36%**
Annual savings from off-set payment	0.9	-

2. Methodology

2.1 Limitations

The calculations and figures utilised within this energy statement are based on Building regulations Part L methodology and should not be understood as a predictive assessment of likely future energy requirements. Other external factors will be present such as occupant system operation patterns and weather patterns.

2.2 Energy Hierarchy

The assessment has been carried out in accordance to the energy hierarchy method in line with GLA policy/s. The energy hierarchy method has been utilised to ensure the design of the development has reduced the demand for energy as far as reasonably practicable prior to the consideration of integrating Low or Zero Carbon technologies.

2.3 Carbon Factors

The below emissions factors were used to convert the energy requirement figures into $C0^2$ emissions; figures taken from Building Regulations Part L. The below SAP2012 emission factors have been used within the calculations to determine the future emissions for the development.

Fuel	Emission Factor ($kgC0^2/KWh$)
Gas	0.210
Electricity	0.519

3. Be Lean Measures

The following sections details the design measures that have been considered/to be implemented at the development.

3.1 Thermal insulation

In order to reduce the overall heating and cooling requirements for the development it is imperative that the development incorporates an efficient thermal envelope. The below elements have been considered for the development.

- Fabric Insulation improvements on Building Regulations Part L1b minimum standards,
- Air permeability improvements on Building Regulations Part L1b minimum standards,
- Improved U & G Values for the development,
- Low Energy lighting scheme adopted on site.

The table below outlines the u-value targets for the development in comparison to the limiting factor set out in Building regulations Part L.

Element	U-Value (W/m2K)	
	Part L1 Limiting Factor	Development
Ground Floor	0.25	0.16
External Façade	0.30	0.23
Roof	0.20	0.12
Glazing	2.0	1.3
Air Permeability	10	5
Low Energy Lighting	75%	100%

3.2 Fabric Air Permeability

Fabric air permeability is a measure of the volume of air that can penetrate through the fabric of a building leading to ventilation heat loss and gain. An improved air permeability rate has been included within the development to reduce the heat loss and gain and therefore reduce the heating and cooling requirements.

3.3 Improved Glazing Elements

Improvement measures have been made to the glazed elements of the development, the u-values for the glazing whole units are to achieve 1.3 W/m2k.

3.4 Summary of Be Lean Measures

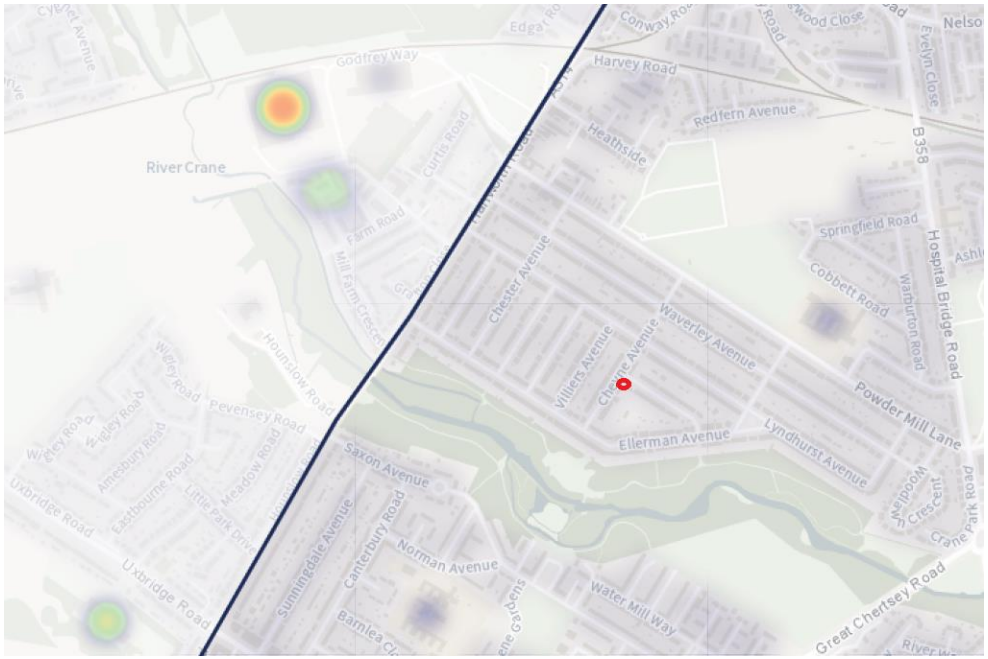
Element	
Ground Floor	0.16 (W/m2K)
External Façade	0.23 (W/m2K)
Roof	0.12 (W/m2K)
Glazing	1.3 (W/m2K)
Air Permeability	5
Low Energy Lighting	100%

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)
Development total	51.00	48.40	5%

4. Be Clean Measures

4.1 Low Carbon Energy Supply

The proposed development is not within an area of which allows for a decentralised energy network to be utilised, therefore this option will not be explored further within this energy statement. However, it is recommended to prepare the site for future connection to a low carbon heat network.



5. Be Green Measures

The following sections discuss the renewable energy generation measures that have been considered, and
those which will be implemented at the Development.

Renewable technologies harness energy from the environment and convert this to a useful form. Many renewable technologies are available. However, not all these are commercially viable, suitable for city-centre locations or appropriate for the development.

Technologies considered for the Development include:

- Solar Hot Water Panels (Solar Thermal)
- Photovoltaic (PV) Cells
- Combined Heat and Power (CHP) and Micro-CHP (mCHP)
- Ground Source Heat Pumps (GSHP)
- Air Source Heat Pumps (ASHP)
- Wind Turbines

5.1 Solar Hot Water Panels

Solar Hot Water Panels or, Solar Panels as they are commonly known, are used to supplement the energy required for the domestic hot water requirement. The system will collect and absorb solar radiation and transfer the heat directly to the storage tank. The circulation may then be either 'passive' thus relying on the natural convection or 'active' using a pump which increases a system's efficiency but has additional costs for the controls and energy requirement.
There are two main types of solar panel collector available to the UK market. The first is Flat Plate Collectors which consist of a dark absorber sheet with pipes built into the sheet encased in a weatherproof box. This will pump the collected solar radiation to the storage device to heat the water for use. The second main system is Evacuated Tube Collectors. These devices are more efficient and are effective under a "...wider range of conditions..." (TM38:2006) due to the energy being drawn from "...light rather than outside temperature..." This therefore allows this type of system to adapt to cooler climes.

Solar Hot Water Panels have not been deemed viable on this project. The use of solar thermal would be feasible, and the available roof space would allow for the system, however a more suitable low carbon alternative has been selected.

5.2 Photovoltaic (PV) Cells

Solar panel electricity systems, also known as solar Photovoltaics' (PV), capture the sun's energy using photovoltaic cells. These cells do not need direct sunlight to work - they can still generate some electricity on a cloudy day. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.

PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on your roof.

The power of a PV cell is measured in kilowatts peak (kWp). That is the rate at which it generates energy at peak performance in full direct sunlight during the summer. PV cells come in a variety of shapes and sizes. Most PV systems are made up of panels that fit on top of an existing roof, but you can also fit solar tiles.

Photovoltaic (PV) Cells have been considered and deemed viable for this project to further reduce carbon emissions. A 1.1Kw system facing Southeast has been included within the calculations as a minimum.

5.3 Combined Heat and Power (CHP) and Micro-CHP (mCHP)

Micro-CHP' stands for micro combined heat and power. This technology generates heat and electricity simultaneously, from the same energy source, in individual homes or buildings. The main output of a micro-CHP system is heat, with some electricity generation, at a typical ratio of about 6:1 for domestic appliances.

A typical domestic system will generate up to 1kW of electricity once warmed up: the amount of electricity generated over a year depends on how long the system is able to run. Any electricity you generate and don't use can be sold back to the grid.

Domestic micro-CHP systems are currently powered by mains gas or LPG; in the future there may be models powered by oil or bio-liquids. Although gas and LPG are fossil fuels rather than renewable energy sources, the technology is still considered to be a 'low carbon technology' because it can be more efficient than just burning a fossil fuel for heat and getting electricity from the national grid. Micro-CHP systems are similar in size and shape to ordinary, domestic boilers and like them can be wall hung or floor standing. The only difference to a standard boiler is that they are able to generate electricity while they are heating water.

For the householder, there is little difference between a micro-CHP installation and a standard boiler. If the dwelling already has a conventional boiler then a micro-CHP unit should be able to replace it as it's roughly the same size. However, the installer must be approved under the Micro generation Certification Scheme. Servicing costs and maintenance are estimated to be similar to a standard boiler – although a specialist will be required.

CHP and mCHP have been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions.

5.4 Ground Source Heat Pumps (GSHP)

Ground source heat pumps use pipes which are buried in the garden to extract heat from the ground. This heat can then be used to heat radiators, underfloor or warm air heating systems and hot water in the home.

A ground source heat pump circulates a mixture of water and antifreeze around a loop of pipe - called a ground loop - which is buried in the garden. Heat from the ground is absorbed into the fluid and then passes through a heat exchanger into the heat pump. The ground stays at a fairly constant temperature under the surface, so the heat pump can be used throughout the year - even in the middle of winter.

The length of the ground loop depends on the size of the home and the amount of heat needed. Longer loops can draw more heat from the ground, but need more space to be buried in. If space is limited, a vertical borehole can be drilled instead. Running costs will depend on a number of factors - including the size of the dwelling and how well insulated it is.

Ground Source Heat Pump has been considered for this project but the available space for the GSHP is limited and therefore the GSHP has not been deemed viable.

5.5 Air Source Heat Pumps (ASHP)

Air source heat pumps absorb heat from the outside air. This heat can then be used to heat radiators, underfloor heating systems, or warm air convectors and hot water in dwellings.

An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can get heat from the air even when the temperature is as low as -15° C. Heat pumps have some impact on the environment as they need electricity to run, but the heat they extract from the ground, air, or water is constantly being renewed naturally.

Running costs will vary depending on a number of factors - including the size of the home, and how well insulated it is, and what room temperatures are achieved.

Air Source Heat Pump has been considered for the project and deemed a viable option for the project, however due to the financial, noise and planning implications associated with a heat pump, a more suitable option has been selected.

5.6 Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. Forty percent of all the wind energy in Europe blows over the UK, making it an ideal country for domestic turbines (known as 'microwind' or 'small-wind' turbines). A typical system in an exposed site could easily generate more power than a dwelling's lights and electrical appliances use.

Wind turbines use large blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine:

Pole mounted: these are free standing and are erected in a suitably exposed position, often around 5kW to 6Kw

Building mounted: these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size. Wind turbines are eligible for the UK government's Feed-in-Tariffs which means money can be earned from the electricity generated by the turbine. Payments for the electricity not use and export to the local grid are available as well. To be eligible, the installer and wind turbine product must be certified under the Microgeneration Certification Scheme (MCS). If the turbine is not connected to the local electricity grid (known as off grid), unused electricity can be stored in a battery for use when there is no wind. Please note that the Feed-in Tariffs scheme is not available in Northern Ireland.

Wind Turbines have been considered for this project, however with the nature of the development and urban location, pole mounted wind turbine has been excluded and building mounted would not achieve the required reductions on site to meet the local requirements, therefore this has not been explored further.

5.7 Biomass

Energy from Biomass is produced by burning organic matter. Biomass fuel sources include trees, crops or animal dung are "...harvested and processed to create energy in the form of Electricity, Heat and Steam." (TM38:2006) Biomass is carbon based and when used as a fuel, produces carbon emissions. However, the carbon emitted during the combustion process is "...equivalent to the amount absorbed during growth..." (TM38:2006) The only carbon emissions associated with this energy source is treatment and transportation costs of the fuel to the end user.

Carbon savings that can be attributed to this technology type are significant. Biomass boiler installation can "...deliver all of the heating requirements for a building...using an almost carbon neutral fuel source." (TM38:2005) Biomass can be cost effective when directly compared to convention as oil and electricity heating sources. The benefit can be increased when the biomass source, for example wood chips, is diverted from the waste stream. However, maintenance requirements of a biomass system are higher and should be taken into account when installing one. Additionally, the UK introduced the Clean Air Act (1993) (www.uksmokecontrolareas.co.uk) to control the smoke pollution in areas caused by burning of smoky fuels.

Biomass been considered for the project, in order to house the system, an external additional plant area would be required and therefore the feasibility of the CHP has not been deemed acceptable or viable due to planning restrictions.

5.8 Summary of Be Green Measures

Technology	Deemed Viable	Adopted on site
Solar Hot Water Panels (Solar Thermal)	✓	✗
Photovoltaic (PV) Cells	✓	✓
Combined Heat and Power (CHP) and Micro-CHP (mCHP)	✗	✗
Ground Source Heat Pumps (GSHP)	✗	✗
Air Source Heat Pumps (ASHP)	✓	✗
Wind Turbines	✗	✗
Biomass	✗	✗

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	-0.1	-5%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.6	41%
Cumulative on site savings	**0.5**	**36%**
Annual savings from off-set payment	0.9	-

6. Sustainability Policies & Statement

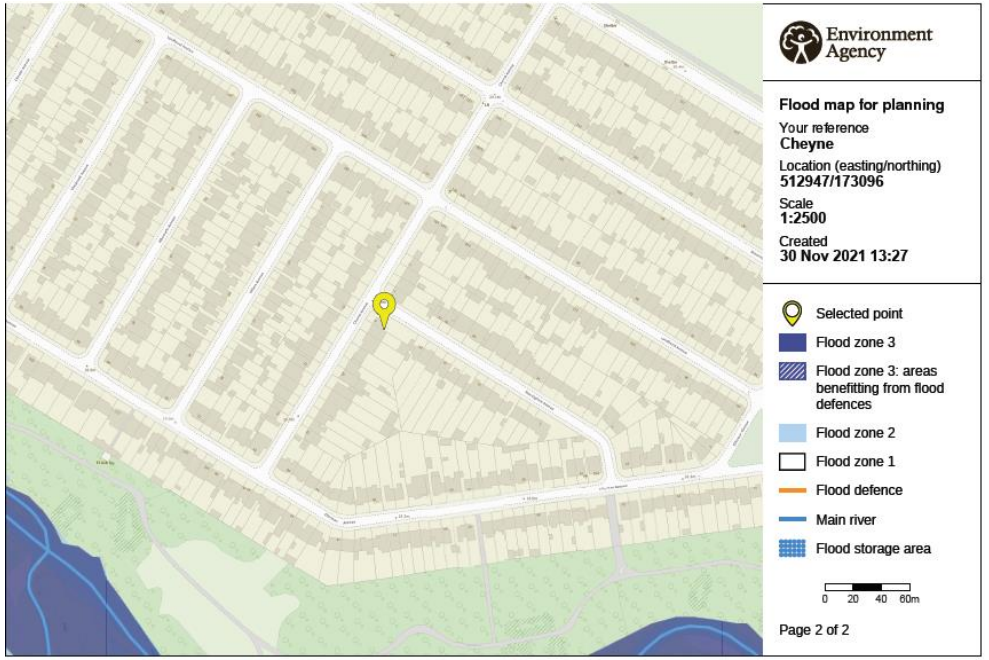
The following section will outline the sustainability measures to be adopted on-site during and after completion, these points may recommend further investigative action if any additional risk is identified.

6.1 Overheating

Overheating analysis has been undertaken at a basic level via the SAP Calculations and displays a **Slight** overheating risk, if any additional concerns on overheating arise a TM59 assessment is recommended to investigate further.

6.2 Flood Risk, Drought & Surface Run-off

Data from the Environmental Agency shows that the area of the development is an area of low risk (Zone 1). The below map shows this and additional report from the Environmental Agency is attached to the end of the document.



6.3 Internal Water Use

The applicant will reduce the consumption of potable water within the proposed dwelling/s from all sources to be in use, this will be achieved by design and selection of sanitaryware and flow restrictors where required. The water efficiency calculations are to be completed in accordance to Building Regulations Part G and are set to achieve a maximum of 110 **L/P/D** (Litres per person per day)

6.4 Embodied Carbon

Embodied carbon calculations have not been undertaken at this stage, but design decisions have been made to select low carbon materials where possible. The design will be construction from FSC Approved timber frame, compared to a traditional build the embodied carbon will be significantly lower. It is suggested in the interest of reduction in carbon emissions that an embodied carbon options appraisal/report is to be undertaken if concerns are raised on the product selection and material use.

6.5 Waste & Recycling

Materials will be chosen to lower the environmental impact of the development wherever possible. BRE's Green Guide will be consulted when finalising specifications of products and element build types. This applies primary to:

- Roofs
- External walls
- Internal walls (including separating walls)
- Upper and ground floors (including separating floors)
- Windows

In all cases, it is the applicant's intention to secure Green Guide ratings of between A+ and D, exceeding the requirements of the former Code for Sustainable Homes.

All timber used during the development will come from a 'legal source' and will not be on the CITES list, or in the case of Appendix III of the CITES list, it will not have been sourced from a country seeking to protect this species as listed in Appendix III.

To promote the reduction of emissions of gases with high Global Warming Potential (GWP) associated with the manufacture, installation, use and disposal of foamed thermal and acoustic insulating materials, products will be chosen with a GWP of <5 wherever possible.

Wherever possible, products will be chosen which comply with additional voluntary industry standards for responsible sourcing, including FSC Chain of Custody and BES 6001:2008 Framework Standard for Responsible Sourcing of Construction Products certifications where applicable.

Products such as paints and vanishes will be sourced to minimise the use of Volatile Organic Compounds (Formaldehyde, VCM, etc.).

The below criteria are also to be met in accordance with the Local Planning Policies

How a development is constructed

(a) Follow the waste hierarchy of Reduce, Reuse, Recycle

(b) If the development cost is above £300,000 a Site Waste Management Plan is required.

Environmental impact of materials

(a) Source building materials locally (this is expected to be within 50 miles of a development).

(b) All wood products to be FSC certified and 100 per cent of timber from legally certified sources.

Operation of the development

(a) Separate internal storage for recyclables and non-recyclables.

(b) Suitable, secure, attractive and user-friendly external waste and recycling facilities.

(c) For developments with access to outside space, ensure the provision of compost facilities.

6.6 Minimising Site Waste

A Site Waste Management Plan (SWMP) will be required to include procedures, commitments for waste minimisation and diversion from landfill, as well as setting target benchmarks for resource efficiency in accordance with guidance from:

- DEFRA (Department for Environment, Food and Rural Affairs)
- BRE (Building Research Establishment)
- Envirowise
- WRAP (Waste & Resources Action Programme)
- Environmental performance indicators and/or key performance indicators (KPI) from Envirowise or Constructing Excellence.

The applicant will seek to establish a 'take back' scheme from suppliers in order to avoid the unnecessary waste of excess materials. Care will also be taken to minimise loss through breakage etc. following guidance from the Waste and Resources Action Programme (WRAP) and others.

6.7 Pollution

It is recommended that the proposed site undertakes the following reports to ensure the impact of the site is reviewed and the impact minimised during and after the development is complete.

- Air Quality
- Land Quality
- Noise impact

6.8 Biodiversity

The presence of any significant ecological features as defined using guidance from BRE will be noted, and the appropriate measures for protection and conservation undertaken before works begin. Features to promote biodiversity, such as bird and bat boxes will be incorporated into the design wherever feasible.

6.9 Operation Efficiency

During the design process, decisions are being made and designs altered to ensure the emissions and water usage on site are reduce, to ensure the continuation of this and to reduce the performance gap, it is recommended that the below actions are taken

- Clear and informative guidance to be produced for future tenants to show how systems are to be used efficiently
- Smart Meters and clear reporting on energy usage to be made available to future tenants
- Operation performance review to be considered in the following years post completion if the development remains under the same ownership, alternatively recommendations should be make to future tenants/ownerships.

7. Conclusion

After reviewing the above renewable technologies, Solar PV has been deemed the most viable solution and therefore has been adopted on site.

7.1 Summary of energy efficient measures

Element	
Ground Floor	0.16 (W/m2K)
External Façade	0.23 (W/m2K)
Roof	0.12 (W/m2K)
Glazing	1.3 (W/m2K)
Air Permeability	5
Low Energy Lighting	100%

7.2 Summary of renewable or Low Carbon measures

Element	
Main Heating System 1	Worcester Greenstar 30i ERP or equivalent
Hot Water System	From Main Heating System
Solar PV	1.1 kWp Solar PV System facing South East at a 30Deg gradient

7.3. Summary of Carbon Emissions reductions

	Regulated domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: savings from energy demand reduction	-0.1	-5%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.6	41%
Cumulative on site savings	**0.5**	**36%**
Annual savings from off-set payment	0.9	-

7.4 Appendix 1 – SAP Documents

SAP documentation has been included in a separate folder and is to be used in conjunction with this document to validate figures and reductions.

Appendix 2 – Flood Risk Report

Environment Agency

Flood map for planning

Your reference	Location (easting/northing)	Created
Cheyne	**512947/173096**	**30 Nov 2021 13:27**

Your selected location is in flood zone 1, an area with a low probability of flooding.

This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2021 OS 100024198. https://flood-map-for-planning.service.gov.uk/os-terms

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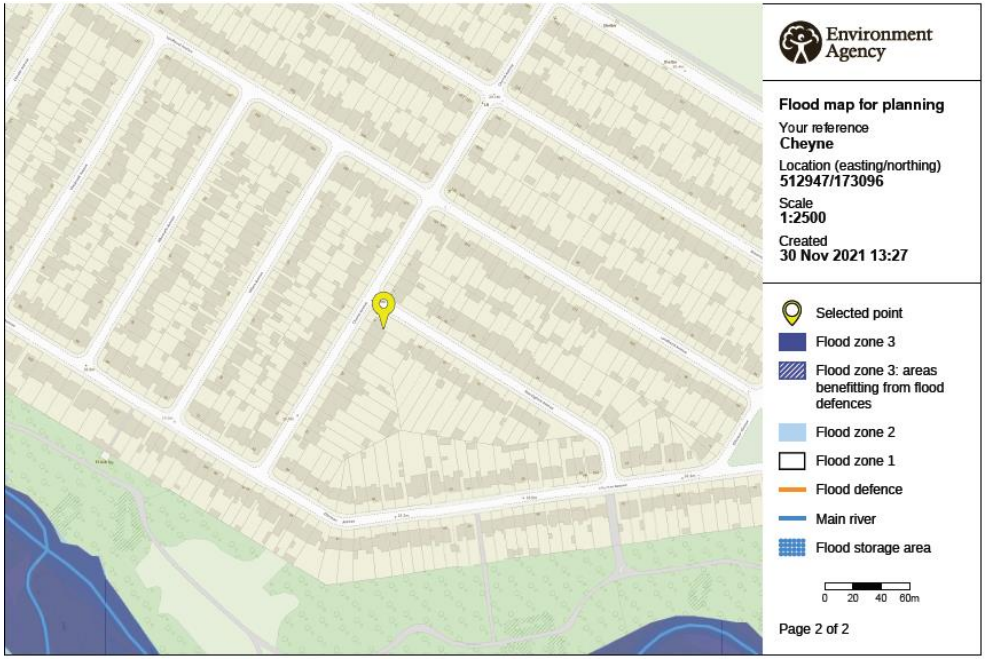

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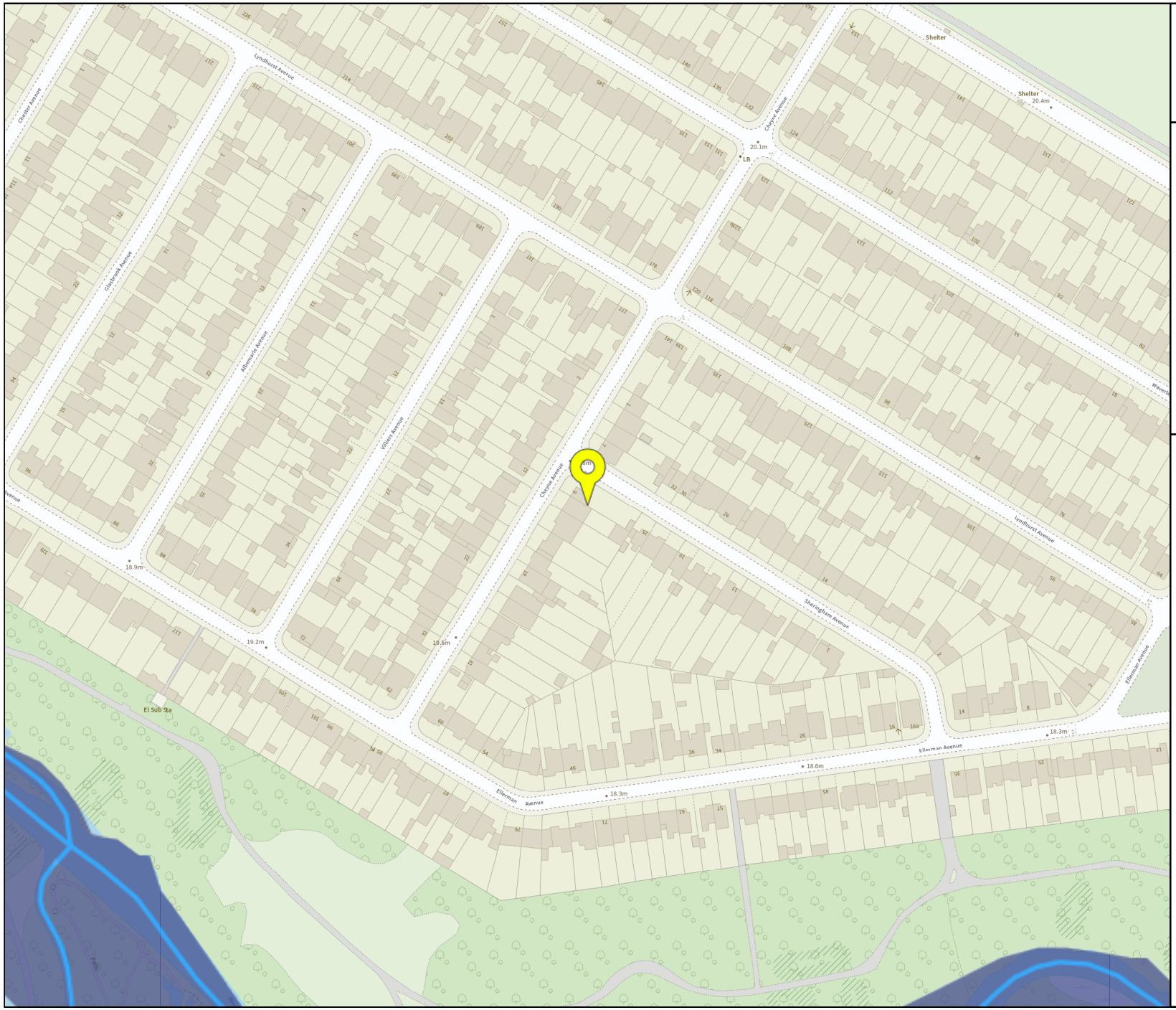

Environment Agency

Flood map for planning

Your reference
Cheyne

Location (easting/northing)
512947/173096

Scale
1:2500

Created
30 Nov 2021 13:27

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m