Energy and Sustainability Strategy

New Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, OX4 1DJ

PR11278

Date: 25/01/2024

Suite L, The Kidlington Centre,
High Street, Kidlington, OX5 2DL

www.ersltd.co.uk

Notice

Document History

Client: Nick Turner
Project: New Caretakers Dwelling, Central Mosque
Document title: Energy & Sustainability Strategy
ERS reference: PR11278

Revision	Remarks	Author	Checked	Approved	Date
00		Michael McKinney	RD	Yes	25/01/2024

Contents

Executive summary

ERS Consultants Ltd has been appointed to prepare an Energy & Sustainability Statement for the site located at New Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, OX4 1DJ.

The proposal is for the development of a house. This report will be focusing on implementing careful design and sustainable measures to address the current housing needs in the area.

Proposed schedules of accommodation are as follows:

Total Number of Dwellings = 1 Bungalow

1 Bungalow

- Type = 1 x 1 Bedroom property

Total combined floor area for the habitable dwelling: 62.47 m²

This energy and sustainability strategy outlines the key measures to be incorporated in the design, in regards to sustainability, carbon emissions, renewable energy and environmental impact of the considered development in accordance with guidance from the following documents and policies:

- Oxford City local plan (Policy RE1)
- The National Planning Policy Framework (NPPF) July 2021

In line with Oxford City Local plan Policy RE1, the development would need to achieve a 40% reduction in regulated CO_2 emissions over a part L 2013 compliant scheme. As this development will be completed under the 2021 Part L document, the carbon factors and figures that have been determined in that document will be used. Part L1 2021 also represents a 31% improvement the previous Part L 2013 document.

This energy & sustainability statement will demonstrate how a selection of sustainable energy efficient measures and low-carbon technologies are used in the reduction of carbon emissions for the development.

A detailed calculation has been undertaken to establish the energy consumption and carbon emissions of the proposed development.

The methodology used to determine the expected operational CO_2 emissions for the development is in accordance with the standard three-step Energy Hierarchy and the CO_2 savings achieved for each step are outlined below:

Baseline – (CO2 emissions Part L of the Building Regulation)

Initially in the energy assessment, it must be established that the regulated CO_2 emissions of the development comply with Part L SAP10 Standards of the Building Regulations using the approved compliance software for SAP. The baseline regulated CO2 emissions calculated for the site **0.70 Tonnes CO_2/Year.**

Be Lean – Use less energy

Emphasis will be put on the buildings fabric performance in order to reduce energy consumption, as less heating and cooling will be lost through the high-performance fabric. Fabric first measures include levels of insulation beyond Building Regulation 2021 requirements which will help in achieving low air tightness levels.

With the addition of the lean fabric improvements the energy regulated CO_2 emissions are shown to reduce by **41.58% (0.41 Tonnes CO_2/Year)** for the proposed site.

Be Clean – Supply energy efficiently

Once demand for energy has been minimised, all planning applications must demonstrate how their energy systems will exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly to reduce CO2 emissions.

When selecting the proposed heating system, it is imperative to consider carbon dioxide emissions, as all combustion processes can emit oxides of Nitrogen (NOx) and, solid or liquid fuelled appliances (such as those using biomass or biodiesel) can also emit Particulate Matter. These pollutants contribute to Oxford's poor air quality and can have negative impacts on the health of local residents and occupiers of the development. It is important that these impacts are taken into account in determining the heating strategy of a development.

The space conditioning and hot water system network in this stage of the development will have no changes as there is no need to better the proposed systems applied at the previous development stage of the project.

In this project there will be no direct heating networks or CHP incorporated so therefore, the Be Clean scenario will not further reduce CO2 emissions on site for the proposed development, therefore meaning there are no changes to be implemented to the development.

There is no change from the previous stage and the CO2 emissions remain the same at **41.58% (0.41 Tonnes CO_2/Year)** for the proposed site.

Be Green – Use renewable energy

At this stage of the project, various low-zero carbon options were considered to meet the required reduction. As an air source heat pump is already proposed, at this stage a model with a higher efficiency beyond the notional standards of Part L 2021 will be implemented. For the as-built stage the heat pump is to be sized appropriately and have an MCS certificate to commission the installation.

By implementing this change, the regulated carbon emissions have been reduced by **50.14% (0.35 Tonnes CO_2/Year)** from the baseline.

This concludes this proposed development using the proposed specification in this report completes the **40% Carbon Emissions Reduction** against **future Part L Building Regulations standards by using the Part L 2021 carbon emission factors**.

This development has taken this approach to compliance as the development is to be completed under Part L 2021.

Energy & carbon demand summary

Table 1 Energy and Carbon Reductions for Site Wide Reduction					
	Primary energy kWh/year	Energy Consumption Savings (%)	Total CO_2 Emissions (Tonnes CO_2/Year)	CO_2 Emissions Savings (%)
Baseline	3,736		0.70	
Be Lean	4,290	-14.84%	0.41	41.58%
Be Clean	4,290	00.00%	0.41	00.00%
Be Green	3,670	16.60%	0.35	8.56%
Total Reduction		**1.76%**		**50.14%**

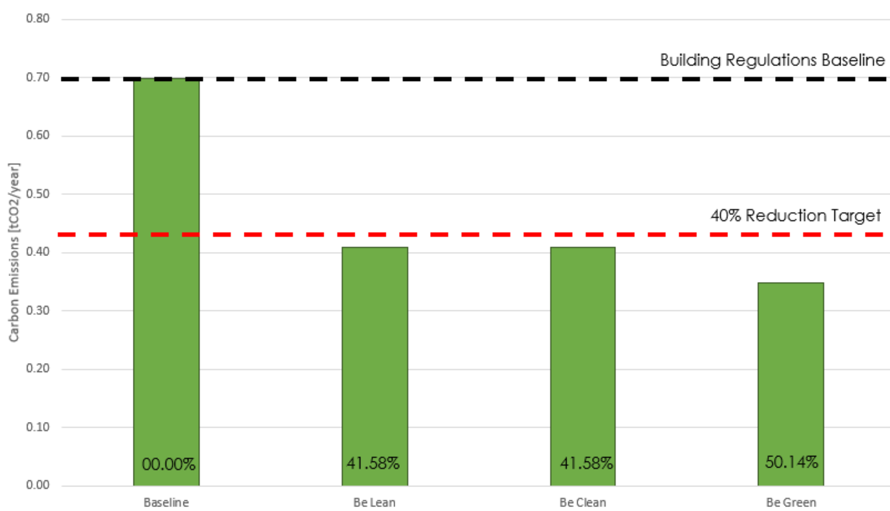


Fig.1 CO_2 Reduction for Site-wide carbon reduction

SAP calculations always refer to 'regulated' energy loads, which are those addressed by building regulations, 'unregulated' loads, for example is energy used by white goods and cooking.

As shown in Table 1, the provisional baseline annual carbon dioxide emissions of the proposed development have been calculated to achieve **0.70 Tonnes CO_2/Year** for the site and through the design development this has been reduced to **50.14% (0.35 Tonnes CO_2/Year).**

Table 2: Proposed Fabric Specifications			
Fabric Construction and Insulation			
Element	**Type**	**U-Value**	
Heat Loss Floor	Ground Floor - Solid	0.12	
External Walls	Cavity Wall	0.17	
Roof	Pitched – insulated at joists	0.12	
Windows	Window	Double glazed, argon filled, 16mm unit with low-e coat and thermally broken lintel, IG or similar; G-Value of 63%; Aluminium frame;	1.20
Half Glazed Door	Half Glazed Door	Double glazed, argon filled, 16mm unit with low-e coat and thermally broken lintel, IG or similar; G-Value of 63%; Aluminium frame;	1.20

<table>
<tr><th colspan="8">Table 3: Proposed System Specifications</th></tr>
<tr><th colspan="8">Space Heating</th></tr>
<tr><td>Main Heating System</td><td colspan="7">SAP default Air Source Heat Pump with an MCS Certificate used for Energy Statement calculations; Connected to radiators;</td></tr>
<tr><td>Heating Controls</td><td colspan="7">Time and temperature zone control;</td></tr>
<tr><td>Secondary Heating</td><td colspan="7">N/A;</td></tr>
<tr><th colspan="8">Water Heating</th></tr>
<tr><td>Heat source</td><td colspan="2">From Main Heating</td><td colspan="2">Cylinder Size</td><td>300 litres</td><td>Insulation Thickness</td><td>80mm</td></tr>
<tr><td>WWHRS Instantaneous System 1</td><td colspan="2">N/A</td><td colspan="2">WWHRS Instantaneous System 2</td><td colspan="3">N/A</td></tr>
<tr><td>Water Use <=125 l/p/d</td><td colspan="2">Yes</td><td colspan="2">Cold Water Source</td><td colspan="3">From Mains</td></tr>
<tr><td>Shower(s)</td><td colspan="2">Combination boiler or unvented hot water system</td><td colspan="2">Flow Rate [l/min]</td><td>8 l/min</td><td colspan="2">Connected to the Hot Water Cylinder</td></tr>
<tr><td>Bath Count</td><td colspan="2">1</td><td colspan="5">Cylinder Pipework is fully insulated where possible; Full cylinder heating controls installed;</td></tr>
<tr><td>Solar Thermal</td><td colspan="7">Not Installed;</td></tr>
<tr><th colspan="8">Ventilation</th></tr>
<tr><td>Mechanical Ventilation System</td><td colspan="2">Intermittent Extract;</td><td colspan="3">Number of Wetrooms, excluding kitchen</td><td colspan="2">1</td></tr>
<tr><td>Cooling system</td><td colspan="7">Not installed;</td></tr>
<tr><td>Pressure Test Blower Door</td><td colspan="7">5.00m³/hm² @ 50 Pa Please note ERS can provide Air Leakage Testing</td></tr>
<tr><th colspan="8">Other</th></tr>
<tr><td>Detailing (linear thermal bridging junctions – formerly ACDs)</td><td colspan="7">Enhanced construction details from the insulation manufacturer have been used where available. The dwelling must be constructed to this standard, and the relevant forms must be completed as building work progresses. Any deviation from this will require an update to the SAP calculations as the psi-values will change; Building Alliance Recognised Construction Details; Masonry Cavity Wall Hybrid; 90mm / 0.019W/mK / 0.28W/mK</td></tr>
<tr><td>Lighting</td><td>No. Fittings</td><td>12</td><td>Power [W]</td><td>2</td><td>Efficacy [lm/W] 75</td><td>Capacity [lm]</td><td>150</td></tr>
<tr><td>Tariff and Meters</td><td colspan="2">Standard</td><td colspan="2">Smart Electricity Meter</td><td>Yes</td><td>Smart Gas Meter</td><td>No</td></tr>
<tr><td>PV/Renewables</td><td colspan="7">N/A;</td></tr>
<tr><td colspan="8">Please note: There may be upgrades compared to your original specification to achieve building regulation approval under the relevant Approved Document Part L. Failure to implement these upgrades may result in a Building Regulation Failure at final stage. Please ensure any changes to the specification are made through this office to ensure ongoing compliance.</td></tr>
</table>

Introduction

Site & proposal

The site is located at **New Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, OX4 1DJ**

Gross Internal Area for the dwelling: 62.47m²

The approximate site location of the proposed development is shown in the site plan Fig.2.

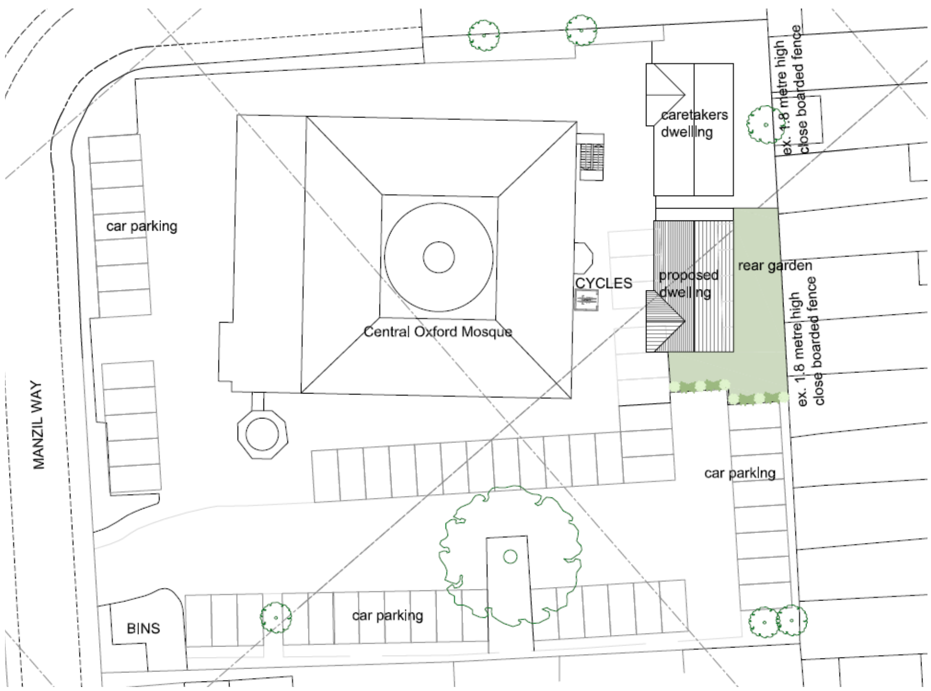


Fig.2 Site Plan

Policy context

This energy and sustainability statement will seek to respond to the energy policies that apply to this development. The most relevant applicable energy policies in the context of the proposed development are presented below.

- Oxford City local plan (Policy RE1)
- The National Planning Policy Framework (NPPF) July 2021

All the aforementioned policies focus on zero carbon targets for residential developments with a minimum 40 per cent on site reduction beyond Part L 2021.

Calculation methodology

The sections below present the methodology followed in determining carbon emissions reduction savings for the proposed scheme.

The methodology employed by the energy and sustainability statement is in line with the GLA's Guidance on preparing energy assessments.

The baseline CO_2 emissions are first established, i.e., the emissions of a scheme that is compliant with Part L 2021 of the Building Regulations.

The approved software used to model and calculates the energy performance and carbon emissions are SAP 10 Online version by Elmhurst Energy Systems Ltd.

To calculate our results for the site-wide development a suitable sample number of units is selected and the results are scaled up as per the proposed development Gross Internal Area.

The TER which is used as the baseline figure for the carbon reductions for each domestic element is multiplied by its floor area to establish the total baseline emissions.

Baseline:

The baseline for this property is calculated using the Part L 2021 notional specification, and is effectively the target against which compliance is achieved and all further reductions are judged. The full specification for the baseline can be found in Table 1.1 of the Approved Document L Volume 1, 2021 edition.

Be Lean: use less energy

The demand for energy is reduced through a range of passive and active energy efficiency measures; as part of this step the dwelling fabric u-values and glazing have been improved to a high standard, in addition to this suitable heating systems are utilised as per the specifications in Table 2 and 3.

Be Clean: supply energy efficiently

As much of the remaining energy demand is supplied as efficiently as possible in the previous stage, we consider the option of communal and network-based heating strategies, but due to high costs and the scale of the development this is not a viable option.

Be Green: use renewable energy

Renewable and low-zero carbon technologies are incorporated to offset part of the carbon emissions of the development. The uptake of renewable technologies is based on feasibility and viability considerations, including their compatibility with the energy system determined in the previous step.

The implementation of the Energy Hierarchy determines the total regulated carbon savings that can be feasibly and viably achieved on site.

The 40% improvement for the development against the baseline emissions is compared to the relevant targets for each element and in case of a shortfall; savings through off-site measures should be achieved.

The Conclusions section summarizes the energy strategy and associated carbon savings for the proposed development.

The carbon emissions factors used in all calculations in this document are those used for Part L of the Building Regulations. The relevant factors are reproduced in Table 4 below.

Table 4 Carbon Emission Factors for selected fuel type		
Fuel	**Emissions kg CO2e per kWh**	**Primary energy factor**
Mains Gas	0.210	1.130
Bulk/Bottled LPG	0.241	1.141
Liquid Fuels	0.024	1.286
Heating Oil	0.298	1.180
Wood Pellets	0.053	1.325
Grid Electricity	0.136	1.501

* Table extracted from the document SAP Version 10.2 (21-04-2022). Table 12: Fuel prices, emission factors and primary energy factors, Page 189. this can be found in the appendix of the report.

Be Lean – Use less energy

The proposals incorporate a range of passive and active design measures that will reduce the energy demand for space conditioning, hot water, and lighting.

Measures will also be put in place to reduce the risk of overheating, the regulated carbon saving achieved in this step of the Energy Hierarchy is **41.58%** when compared against the baseline level for the development.

Passive design measures

Materials and Waste

A site waste management plan that provides details of waste minimisation, sorting, reuse and recycling procedures is required for all levels in the planning guidance. Sustainable waste management should follow the hierarchy described in *BS 5906: Waste management in buildings. Code of practice*. This outlines the following principles in decreasing order of desirability:

- Reuse land and buildings wherever feasible and consistent with maintaining and enhancing local character and distinctiveness.
- Reuse and recycle materials that arise through demolition and refurbishment, including the reuse of excavated soil and hardcore within the site.
- Prioritise the use of materials and construction techniques that have smaller ecological and carbon footprints, help to sustain or create good air quality, and improve resilience to a changing climate where appropriate.
- Incorporate green roofs and/or walls into the structure of buildings where technically feasible to improve water management in the built environment, provide space for biodiversity and aid resilience and adaptation to climate change.
- Consider the lifecycle of the building and public spaces, including how they can be easily adapted and modified to meet changing social and economic needs and how materials can be recycled at the end of their lifetime.

Space is provided and appropriately designed to foster greater levels of recycling of domestic waste.

Using Recycled/Recyclable Materials and Sourcing them Responsibly

The following measures will be put in place to minimise environmental impact

Regard for reuse & efficient use of materials: Material efficiency will be a priority for the design team and will be one of the key considerations during detailed design. Potential measures for reducing the material demand and for designing out waste will be explored by all key design team disciplines at each design stage, according to the first stages of the Waste Hierarchy.

Regard will be given to reducing the use of virgin materials, such as ensuring a recycled aggregate of content 10-15% in concrete, for example.

Specifically, the following notes have been made on the durability and recycling potential of project materials:

- Brick in the wall finishes has a long usable life and can be reclaimed / re-used in the future. It can also be recycled although it is a more a down-cycle into rubble material for aggregates.
- Window glass, carpeting, and concrete can also be down-cycled.
- The hard landscaping has many timber elements (seats, benches, fences, the acoustic fence) which is a renewable material and is likely to be FSC certified. It can also be recycled or down-cycled into chipboard / crushed timber.
- Off-site construction and Prefabrication; An effective way of managing materials efficiency is through off-site construction or 'Prefabrication', meaning that major components of buildings are manufactured off-site and assembled on-site. This has many benefits, as factory environments help to ensure quality of construction, reduce waste because of spoilage on site (e.g., due to poor storage practices or inclement weather) and encouraging the re-use of materials that otherwise may be wasted. This will be actively explored particularly in relation to the houses.
- Similarly, the use of pre-made sections, such as pre-cast floor slabs in the flatted element will reduce waste and maximise material efficiency. A study by the HSE concluded that waste reductions approaching 70% were possible when compared with traditional techniques.
- The design seeks to use prefabrication for some internal spaces and will be used, subject to the availability of skilled labour and resources within a reasonable distance of the site.

- The design utilises stacking, repeating floor plans where possible within the site constraints, making the use of modular construction possible. If this is a viable option it would reduce transport journeys, reduce site congestion and increase safety.

Environmentally conscious materials

- Materials with the lowest environmental impact tend to have only minimal processing requirements and contain as many naturally occurring constituents as possible. The design team will ensure that 'good practice' is implemented in the specification of materials, making conscious decisions to specify more natural products and wider environmental impact of the materials will be considered when choosing between different options. This could include reviewing Environmental Product Declarations.

- Furthermore, efforts will be made to use materials with low/zero Global Warming Potential (GWP), low Ozone Depletion Potential (ODP) and low embodied energy.

- Local and responsible sourcing Transport associated with extracting, processing and delivering materials can contribute significantly to their carbon and environmental footprint. A robust system of responsible materials sourcing will ensure that native materials will be used as a matter of preference, before any are sourced internationally. It is reasonable to expect as well that deliveries will be made using fuel efficient vehicles.

- The responsible sourcing of materials will be a key consideration in the selection of suppliers, and a sustainable procurement strategy will be produced for the development prior to construction.

- Materials from suppliers who participate in responsible sourcing schemes such as the BRE BES 6001:2008 Responsible Sourcing Standard will be prioritised where economically possible.

Where there are suitable opportunities to recycle a proportion of the material recovered from the existing site it should always be done.

Enhanced U-values

The heat loss of different building fabric elements is dependent upon their U-value. A building with low U-Values provide better levels of insulation and reduced heating demand during the cooler months.

The proposed development will incorporate high levels of insulation and high-performance glazing beyond Part L 2021 targets and notional building specifications, to reduce the demand for space conditioning (heating and/or cooling).

Table 5 demonstrates the improved performance of the proposed building fabric beyond the Building Regulations requirements.

Table 5 Proposed fabric U-Values		
Domestic (U-Values in W/m²k)		
Element	**Part L 2021 Building Regulation**	**Proposed**
Wall	0.26	0.17 (External Wall)
Floor	0.18	0.12 (Ground floor)
Roof	0.16	0.12 (Plane Roof)
Windows/ Glazed Doors	1.40	1.20
These u-values are recommended but may change during the construction stage, to meet site constraints, any worsening of the u-values must ensure the required 40% reduction in Carbon is met before completion;		

Air tightness improvement

Heat loss may also occur due to air infiltration. Although this cannot be eliminated altogether, good construction detailing and the use of best practice construction techniques can minimise the amount of air infiltration.

The proposed development will aim to improve upon the Part L 2021 minimum standards for air tightness by targeting air permeability rates of **5.00m³/m².h at 50Pa for the unit**, should the air test be below 3.00m³/m².h at 50Pa Mechanical ventilation will be required.

Reducing the need for artificial lighting

The development has been designed to maximize daylight in all habitable spaces as a way of improving the health and wellbeing of its occupants.

Natural light Natural lighting reduces the energy used for artificial lighting and creates a healthier internal environment. Issues to consider include how much of the sky is visible through a window (the more, the better), the dimensions of the interior living/working space and distance from the window, and the proportion of glazed surfaces. The depth of the room is an important factor in determining the amount of natural light received. Naturally dark rooms may be lit naturally through measures such as sun tubes which 'pipe' sunlight from sunny areas to internal areas.

Glare created by natural or artificial light can be uncomfortable for people both inside and outside a building. This can be minimised if considered early in the design process through building layout (e.g., low eaves height) or building design (e.g. blinds, brise soleil screening). If considered together with a lighting strategy this can reduce energy consumption.

All of the habitable areas will benefit from suitable level glazed fenestration to increase the amount of daylight within the internal spaces where possible. This is expected to reduce the need for artificial lighting whilst delivering pleasant, healthy spaces for occupants.

Active design measures

High efficacy & low energy lighting

Where artificial lighting will be needed it will low energy lighting without compensating for luminance, and will accommodate LED.

Water

Policy RE1 requires water efficiency in new development to meet the highest national standard. For residential development, this is defined in the supporting text as the 'optional Building Regulation' for water efficiency in new dwellings, which is 125 litres per day per person, or a tighter standard if one becomes available nationally. If a new, tighter national standard is introduced, this will be adopted automatically by virtue of Policy RE1.

For all developments, the submitted information should set out an approach to water management that reduces water usage and waste and priorities demand reduction measures over supply measures.

Reducing water use

Development, whether new construction or change of use and refurbishment, can save water by including measures such as:

- systems for greywater reuse
- aerated washbasin/kitchen taps and shower heads,
- tapered and low-capacity baths,
- sensor and low flush toilets, shower timers, and,
- water efficient white goods and appliances such as washing machines and dishwashers.

Water use during construction can be reduced through measures including:

- closed loop wheel washers,
- waterless wheel washing using angled steel grids to remove debris,
- high pressure low volume power hoses,
  recirculating water where possible,
- limiting the water used for flushing building services by stopping it as soon as the flush water turns clear, and
- employing a regime for monitoring water use and water waste.

Choosing the best location for a boiler can reduce water consumption and heat loss. By minimising the length of hot water pipes the volume of water that must be drawn off each time a tap or shower is used can be reduced. Positioning hot water pipes above pipes carrying cold water will reduce heat transfer. Further heat loss can be reduced by insulating the piping.

For all new dwellings, a completed "water efficiency calculator for new dwellings" worksheet that accords with Part G of the building regulations' Approved Documents should be provided prior to occupation. The calculation must demonstrate that the new dwellings will achieve a maximum water usage of 125 litres per person per day.

Rainwater harvesting

Rainwater harvesting is the collection of rainwater directly from a surface it falls on (e.g., a roof). Once collected and stored it can be used for non-potable purposes such as watering gardens, supplying washing machines and flushing toilets, thereby reducing consumption of potable water. Potable water is produced through a purification process and is pumped over large distances, both of which require energy and result in embodied carbon that is not present in water harvested locally. In a residential development, rainwater can be captured for domestic use using water butts connected to a down pipe. Larger systems can use water stored in underground water tanks.

Schemes should be designed to include space for water storage. In residential developments, down pipes should be carefully placed so that water collection and use is convenient for residents.

Greywater re-use

Water that is recycled from bathrooms and kitchens for non-potable uses is known as greywater. Greywater systems must ensure treatment on a regular basis to prevent a build-up of bacteria, and some systems are powered, which entails an energy cost. As a result, greywater reuse is generally less preferable than water use minimisation measures.

Water recycling systems are better suited to new developments rather than retrofitting in existing buildings because of the excavation required for storage tanks and changes needed to the plumbing system, and they are generally more cost effective for new developments and developments of a larger scale.

Recycling systems should be backed up by a mains supply or a sufficiently large reserve storage system to meet higher demands during dry spells. Storage tanks will need an overflow to allow excess water to be released which should be able to flow into a soakaway.

Controls and Monitoring

Advanced lighting and space conditioning controls will be incorporated, specifically:

- For areas of infrequent use, occupant sensors will be fitted for lighting, whereas day lit areas will incorporate daylight sensors where appropriate;
- Heating and cooling systems controls will comprise time and temperature controls, both centrally for the whole building, and locally for each space;
- Smart metering to be installed on all new dwellings for adequate monitoring;

Overheating Risk analysis

Passive solar gain refers to the process whereby a building is heated by the sun, either directly from sunlight passing through a window and heating the inside of the building, or indirectly as sunlight warms the external fabric of the building and the heat travels to the interior. The level of passive solar gain can significantly impact upon the quality of a building, how it is used and the energy needed for it to be inhabited comfortably. Passive solar gain can reduce the need for mechanical heating, which in turn reduces energy use and carbon emissions.

Key factors that influence passive solar gain include the physical characteristics of the site, immediate surroundings, orientation of buildings, external design, internal layout and the construction materials used.

Whilst passive solar gain can reduce the carbon emissions associated with heating, if used incorrectly it can lead to overheating, which in turn can lead to the installation of mechanical cooling equipment (e.g., air conditioning). Mechanical cooling increases energy consumption and requires maintenance, resulting in costs and carbon emissions. Mechanical cooling units also produce heat that requires dissipation. The need for mechanical cooling can be avoided or lessened by designing-in passive ventilation and passive cooling measures. Developments should not incorporate mechanical cooling unless passive measures have been fully explored and appraised and proposals that include mechanical cooling should clearly demonstrate that passive measures would not be adequate.

The potential overheating for the development is to be assessed in accordance to Part O of the Building Regulation. Utilising the simplified approach is the first protocol to ensure the scheme does not over heat, where the simplified approach fails to meet the required reduction, a dynamic simulation will need to be undertaken.

The following list includes some of the key considerations in the design of new schemes:

- Rooms that are most frequently occupied should benefit from a southerly aspect, but with appropriate measures to avoid overheating.
- Orientation and layout of habitable rooms, and window size and orientation, should be carefully considered in relation to the path of the sun.
- Rooms that include a concentration of heat generating appliances (e.g., kitchens) or are less frequently occupied (e.g. bathrooms) should be located in the cooler part of the building, generally the northern side.
- Deep projections that overshadow windows should be avoided, particularly on south facing elevations. Projections should be sized appropriately so that they provide shading from the sun during the hottest part of the year but allow solar gain in the colder months.
- Where there is a chance that overheating can occur (e.g., due to large expanses of glazing on roofs and south facing elevations), design measures such as roof overhangs, brise soleil, external shuttering, photochromatic and thermochromic glass and a lighter colour palette can help.

- Zonal heating and ventilation systems and controls can be used allowing areas subject to high solar gain to occupy their own temperature control zone. Dynamic controls reduce energy waste.

- Use of materials to build in thermal mass to absorb excess heat during warmer periods and release it slowly during cooler periods (e.g., day/night, summer/winter).

- Buildings should be designed for passive ventilation:
    - cross ventilation with windows located on opposite walls and/or roof mounted turbines or wind cowls that assist with circulation of air by drawing air through windows or top floor openings and
    - passive stack ventilation (PSV) that uses pressure differences to draw in fresh air from outside to replace rising warm air which is released from the top of the building. A heat exchanger can be placed where the air escapes the building to reduce heat loss.

Be Lean CO_2 emissions & savings

By means of energy efficiency measures and suitable heating systems, regulated CO_2 emissions for the property are shown to reduce by **41.58**% compared to the baseline.

Be Clean – Supply energy efficiently

There are no changes from the previous stage, however research into low carbon energy sources is still completed as a due diligence for the alternative solutions. Carbon Emissions Reduction is shown to remain at **41.58%** compared to the baseline.

Low Carbon Energy Sources

Combined Heat and Power (CHP)

The presence of a year-round base hot water generation heat load in residential units is favourable to CHP. To date, there are readily available micro gas fired CHP units (such as EC power) on the market. At this stage gas fired CHP will be provisionally incorporated into the development's LZC strategy, however, the carbon reductions due to CHP are extremely sensitive to the system design, unit selection and running time.

CHP (Combined Heat & Power) is a great technology to use, however the system itself needs to run on a 24-hour basis. The heat generated would be exceeding the demand and needs for this site, and would require to have an outlet area which can profit from this excess; however, this development does not have a space that benefit from this; therefore, this option has considered not feasible for this development.

Heat Networks

All new developments should look connect, or be connection ready, where a heat distribution network already exists. The investigation of opportunities should cover all scales and should not be limited to district heating systems.

Where such networks exist and developments should propose to connect to them, the energy statement should set out details showing how connection will occur (a connection strategy). Where such networks exist, and developments do not propose to connect to them, the energy statement must set out clear reasons as to why the connection is not feasible, or why an alternative source of energy would be more sustainable.

Be Green – Use renewable energy

Renewable technologies feasibility study

Methods of generating on-site renewable energy (Green) were assessed, once Lean and Clean measures were considered.

This section provides an overview of the technologies considered, a brief assessment of their feasibility, a proposed mixture of suitable technologies.

The proposed development will benefit from an energy efficient building fabric which will reduce the energy consumption of the proposed development in the first instance.

A range of renewable technologies were subsequently considered including:

- Biomass;
- Ground/water source heat pumps;
- Wind energy;
- Photovoltaic panels, and,
- Solar thermal panels.

In determining the appropriate renewable technology for the site, the following factors were considered:

- CO_2 savings achieved;
- Site constraints;
- Financial benefit
- Any potential visual impacts

Demand profiles

The balance of technologies chosen will depend on the development's energy demand patterns.

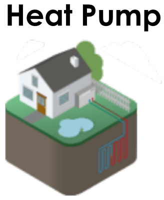
Keeping in mind that the space heating energy demand changes according to the season. While hot water energy demand will provide a significant base load throughout the year.

Electrical demand is likely to be moderate throughout the year. Lighting loads will be highest during the evening but will continue at reduced levels throughout the night and during the day.

Feasibility

At this early stage in the design, it is possible only to outline the likely feasibility of specific technologies. Further descriptions of the LZC technologies below are included in Appendix A.

Table 6. Renewable and Low Zero Carbon Technologies

Renewable Technology	Comments	Lifetime (Years)	Maintenance	External Impact	Site Feasibility	Adopted for Site
BIOMASS 	Burning of wood pellets releases high NOx emissions and there are limitations for their storage and delivery within an urban location.	20	High	High	1	☐
PV 	PV panels would generate significant carbon savings, whilst having minimal impact on the appearance of the building and no adverse impact on the amenity of neighbouring buildings.	25	Low	Med	9	☐
Solar Thermal 	Solar thermal array mounted on the roof may contribute to carbon reductions, but will reduce the amount of available roof space where Photo voltaics are proposed	25	Low	Med	7	☐
Air/Ground Source Heat Pump 	Ground loops requires space, additional time at the beginning of the construction process and very high capital costs, however in terms of the air source heat pump solution is a viable and cost-effective solution to meet the required carbon reductions.	20	Med	Low	9	▣
Wind 	Due to insufficient open area for installation of a stand-alone wind turbine and planning issues this option has not considered in this development.	25	Med	High	0	☐

Detailed assessment of Photovoltaic Panels

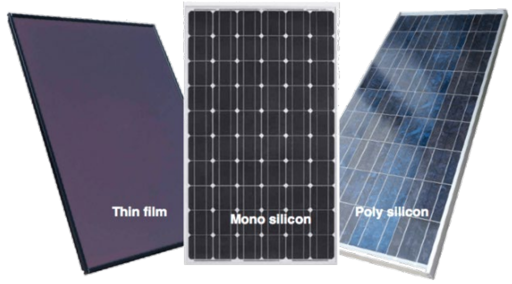


Fig 3. Photovoltaic Panels

Four types of solar cells are available on the market at present and these are mono-crystalline, polycrystalline, thin film and hybrid panels as seen in Figure 3. Although mono-crystalline and hybrid cells are the most expensive, they are also the most efficient with an efficiency rate of 12-20%. Poly-crystalline cells are cheaper but they are less efficient (9-15%). Thin film cells are only 5-8% efficient but can be produced as thin and flexible sheets.

Air Source Heat Pumps is considered as a highly efficient low zero carbon technology solution to meet the required carbon reductions for the houses.

Photovoltaic Panel is considered a suitable technology as the development provides an extent of roof space for the installation of PV panels. In addition to this the PV arrays are relatively easy to install when compared to other renewable systems and provide a significant amount of CO_2 savings. While suitable, however, it is not required to meet the reduction set by RE1, so is not implemented at this stage.

Be Green CO_2 emissions & savings

The incorporation of renewable technologies will further reduce CO_2 emissions of the Site by a further **50.14%** compared to the baseline.

Sustainable Urban Drainage Systems (SuDS)

SuDS offer multiple benefits – they can help to manage flood risk, improve water quality, provide opportunities for water efficiency, enhance landscape and visual quality, provide amenity value and offer opportunities for biodiversity. The design of SuDS should explore fully the potential to deliver these benefits.

SuDS limit the volume and rate of surface water entering the public sewer system. They therefore have the potential to play an important role in helping to ensure the sewerage network has the capacity to cater for population growth and is resilient to the effects of climate change.

Flood zone risk assessment for planning

The Environment Agency has developed a flood risk map for planning to identify the relative risk of flooding for proposed development planning locations. Flood zones assume that no defences are present and so where these do exist, they are only indicative of the potential for flooding.

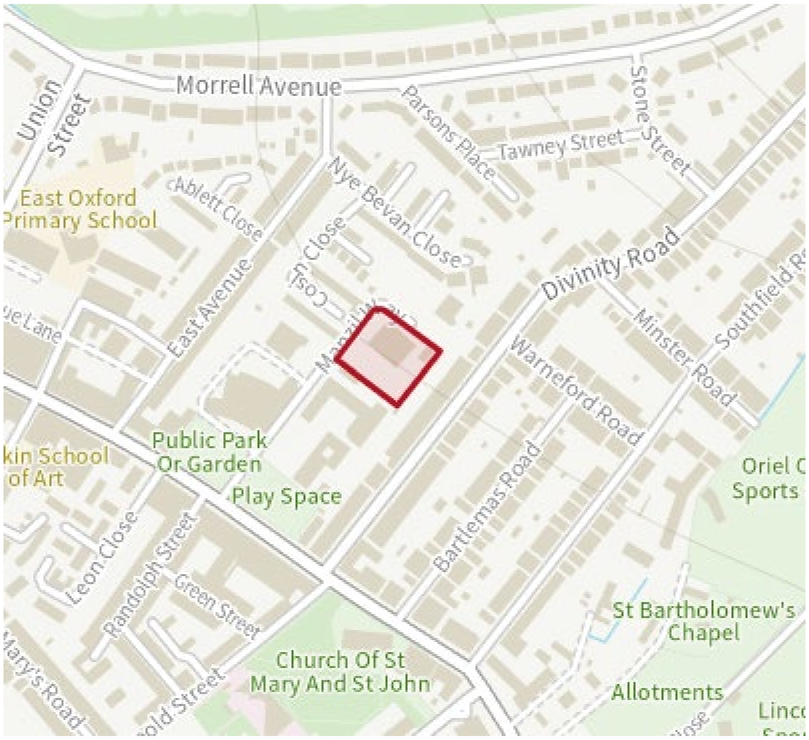


Fig 4. Environment Agency Flood Zone Interactive Map

The whole of the development lies within flood zone 1 of the Environment Agency's flood risk map as seen in fig. 4. Land located within flood zone 1 is at low risk of flooding having an associated annual probability of flooding of less than 1 in 1000 (0.1%).

Study approach

In accordance with Planning Practice Guidance for Flood Risk document, land within flood zone 1 is suitable for all uses. Assessment of this site has been based upon the Environment Agency's flood interactive map, the topographical site survey and the architect's proposed development layout.

Flood vulnerability

Based on the Environment Agencies flood map, the development site is located within Flood Zone 1 and in accordance with Planning Practice Guidance for Flood Risk neither a sequential or exception test is required.

Conclusion

Following the implementation of the three-step Energy Hierarchy, the regulated CO_2 savings for the site are calculated at **50.14%,** against Part L 2021 SAP 10 performance standards.

Overall, the proposed development has been designed to meet energy policies set out by the proposed development local and national planning requirements, which demonstrates the client and the design team's commitment to enhancing sustainability of the scheme.

Table 8. Summarizes the implementation of the Energy Hierarchy for the proposed scheme and details the CO_2 emissions and savings against the baseline scheme for each step of the hierarchy. After all steps were implemented, the reduction exceeds the 40% requirement over a Part L1A 2021 baseline as set by Oxford City Local Plan RE1.

Table 8. Energy and Carbon Reductions for Site Wide Reduction

	Primary energy kWh/year	Energy Consumption Savings (%)	Total CO_2 Emissions (Tonnes CO_2/Year)	CO_2 Emissions Savings (%)
Baseline	3,736		0.70	
Be Lean	4,290	-14.84%	0.41	41.58%
Be Clean	4,290	00.00%	0.41	00.00%
Be Green	3,670	16.60%	0.35	8.56%
Total Reduction		**1.76%**		**50.14%**

Based on the results and outline figures, the proposed development **New Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, OX4 1DJ** will satisfy the relevant policies for sustainable design and construction requirements of energy consumption and carbon emissions.

The new development will be designed with a high level of insulation and low air permeability to reduce heat loss as much as is practically possible. Also, the use of low energy lighting and A – Rated White goods are essential for the reduction of energy consumption.

The control strategy for the property must also be carefully designed to ensure the most economical operation of all equipment.

The proposed development site is not in a close proximity of an existing heat network making this an unviable solution to improve the heating system in the dwelling at time of this application. This means the most suitable heating system is a highly efficient Air Source Heat Pump, which will provide hot water via a storage cylinder.

All buildings are to have suitable meter/smart meter management installed on every household, so that the homeowner can benefit from accurate savings to allow for suitable management of energy usage.

The baseline annual energy consumption of the site on this development have been calculated to be **0.70 Tonnes CO_2/Year** of CO2 emissions. By incorporating on-site renewable/ LZC technologies the total CO2 emissions will be reduced to **0.35 Tonnes CO_2/Year**, equivalent to a **50.14%** reduction over Part L 2021 requirements.

Different possible renewable energy options have been identified; bearing in mind that selection is a complex process which requires a more detailed estimation of energy demand patterns; therefore, further analysis will be undertaken as the design progresses.

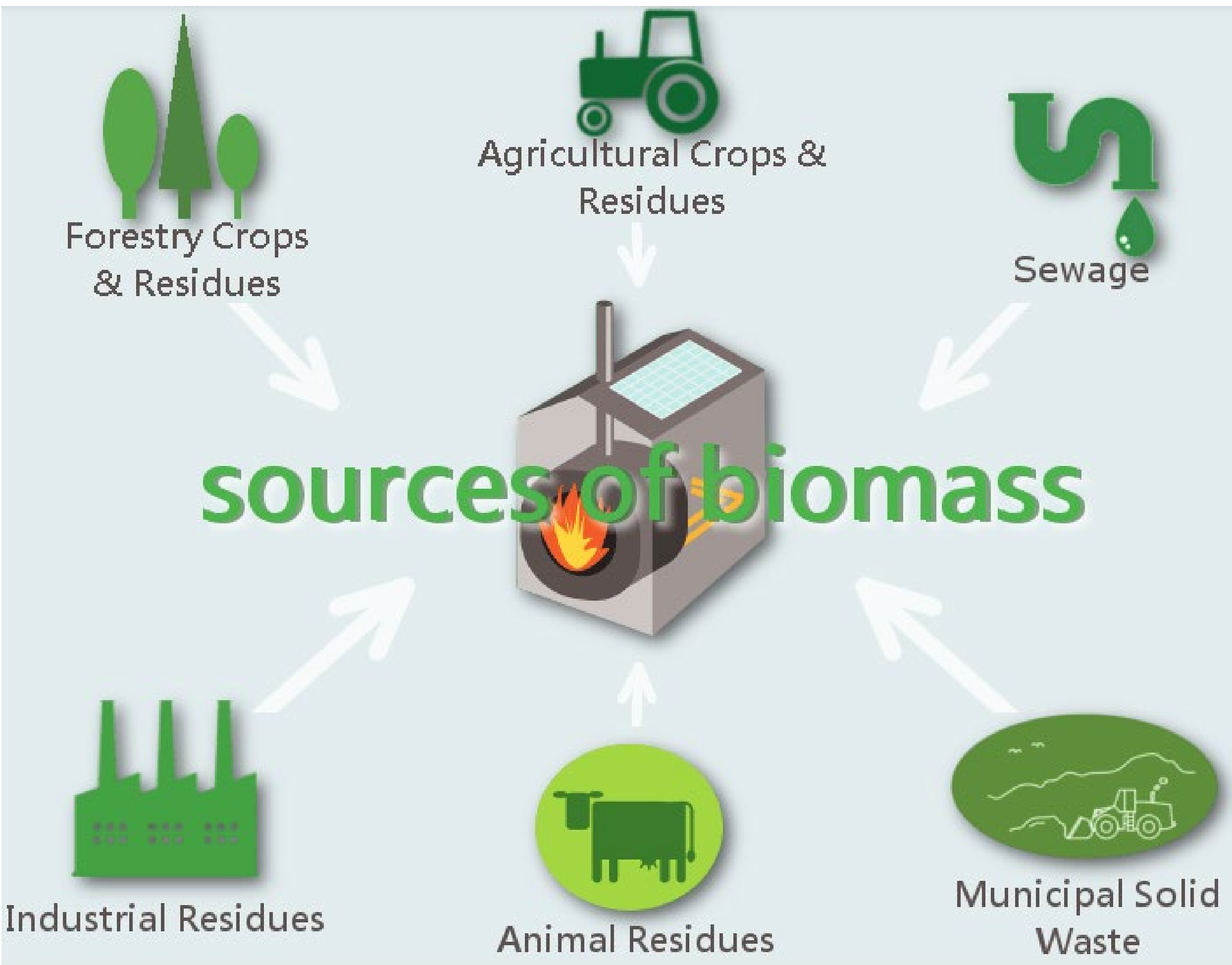
Post construction the dwelling is to have suitable testing to be provided to ensure the dwellings satisfy the requirements of this document and building regulation standards at the time of completion. This report is to be provided along with as As-Built SAP worksheets, EPC and Air testing, for all conditioned spaces in the development.

Appendix A - Low or Zero Carbon Energy Sources

Biomass As a fuel

Biomass is a renewable energy source, generated from burning wood, plants and other organic matter, such as manure or household waste. It releases CO2 when burned, but considerably less than fossil fuels. We consider biomass a renewable energy source, if the plants or other organic materials being burned are replaced.

Biomass is known for its versatility, given it can be used to generate heat, electricity, be used in combined heat and power units and be used as liquid fuel. In domestic settings, it tends to be found in the form of wood-fueled heating systems.



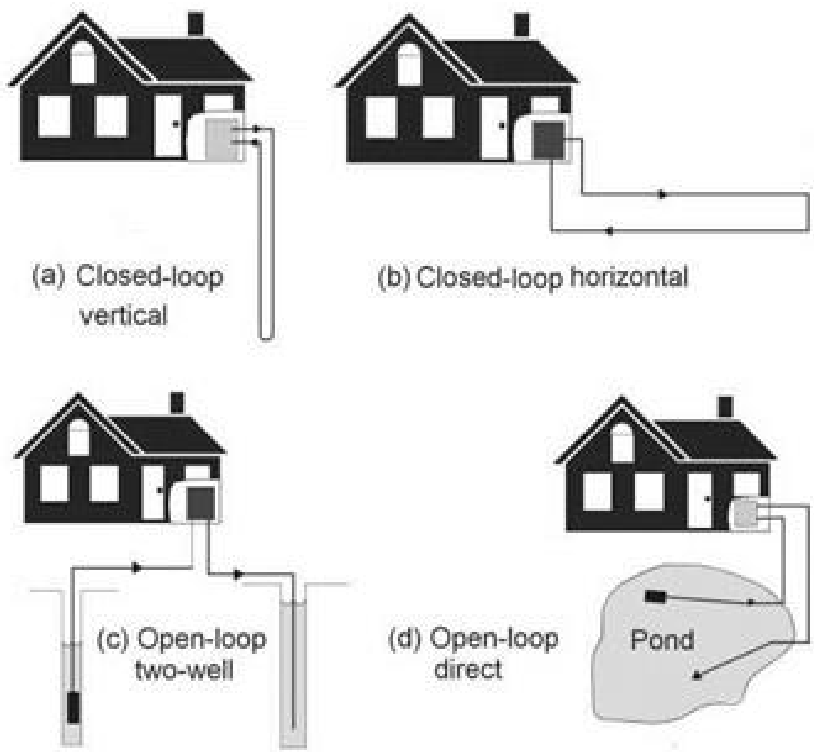
Geothermal Energy:

Geothermal energy technologies use the heat energy stored in ground; either for direct-use applications: such as using the grounds' heat to defrost a driveway or the indirect use with additional equipment such as a geothermal heat pump. Most commercial installations couple a heat pump with the ground to upgrade the low-grade heat from the ground or ground water to a higher-grade heat, where it can be used for heating purposes.

The suitability of a ground source system depends heavily on the type of earth coupling heat exchange system used:

Ground source earth coupling options

The right choice of appropriate heat exchanger depends on several factors such as: size of space heating/hot water system, available site area for the heat exchangers, and local ground conditions. Due to the specialist nature of this technology, we recommend that a specialist is employed to size the heat exchangers based on a desk-top study of the site's geological conditions – this normally being required in advance of any other contractor appointment.



Vertical Closed Loop System

A frequently used and simple ground source heat exchanger, for a small to medium size project, is a closed loop vertical system. The system comprises of vertically drilled boreholes, usually up to 100 m deep, into which are inserted two polyethylene pipes with a U-shape connector at the base of the hole – effectively providing a flow down to the bottom of the hole and return back up to the surface. All the flow and return loops are connected together across the site - completing the entire heat exchange loop.

Water is pumped around the loop and is then circulated around the heat pump to achieve the required heat exchange. The distance between boreholes is dependent on ground conditions but is typically a minimum of a 6mx6m grid, to prevent overlapping of the heat exchange process between loops.

Horizontal Closed Loop System

Horizontal closed loop heat exchangers are usually applied to small projects such as individual houses, which usually require a relatively low heat output. Consisting of horizontal trenches 1.5-2m deep, with either straight pipes or 'slinky' coiled pipes, these require significant excavation work and significant site area to achieve appreciable outputs as such are not normally suited to medium to large projects.

Vertical Open Boreholes System

A further option is a vertical open borehole system. The system involves the abstraction and discharge of natural ground water using boreholes; into which pumps are inserted, connected to collapsible pipework. Each borehole pump abstracts ground water, circulates it around the heat pump and then discharges the water back to the ground via an absorbing well, some distance from the original abstraction borehole. The system is capable of providing very high rates of heat exchange for a relatively small number of boreholes, which makes it very efficient in terms of site area required. However, this depends greatly on the availability of ground water, which in turn varies according to location. A major downside of this system is that the extraction of water from deep boreholes via pumps consumes a lot of energy, as the water has to be physically lifted to the surface by the pump – this in effect reduces the carbon emissions saved by this system as a whole.

Ground source heat exchange options in summary:

Vertical loop system - closed boreholes

- moderate heat capacity
- relatively low installation cost

Vertical open system - open boreholes

- high heat capacity
- high running energy
- high installation cost

Horizontal loop system – straight pipes

- low capacity,
- high installation cost
- extensive ground excavation work

Horizontal coiled loop system – 'slinky' pipes

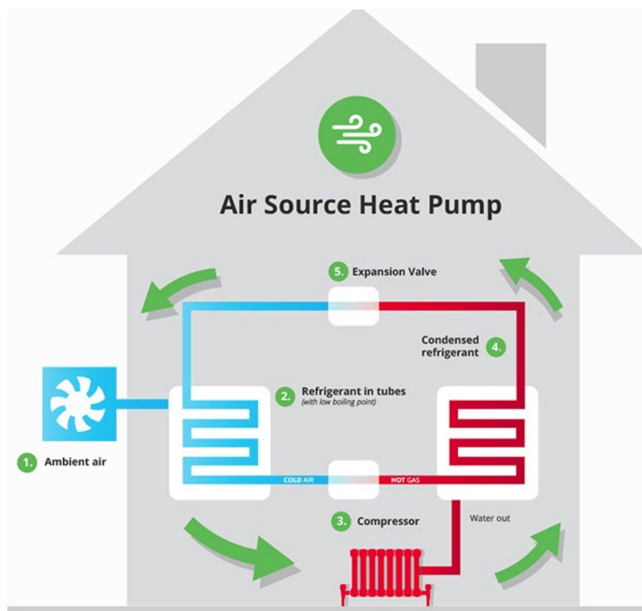
- good capacity
- low installation cost
- extensive ground excavation work

Air Source Heat Pumps

Heat pumps are basically refrigeration units which work in reverse – instead of cooling being produced and heat rejected, the unit produces heat and rejects cooling. Conventional heat pumps use air as the medium to reject this 'coolth' to atmosphere. Ground source units use the ground as a means of improving the unit efficiency because the ground is a constant 11-13 °C at depths of 50m down – this suits the heat pump much better during the coldest weather than the extremes of air temperature. Reversible heat pumps can also be used for cooling, however this is not being considered further for this project.

A heat pump consumes electrical power to drive the compressor and other ancillary elements. The ratio between total energy input and heat energy output of the heat pump is a measure of its efficiency – usually referred to as 'Coefficient of Performance' - COP. A ground source heat pump has a higher COP than an air cooled heat pump – this additional energy effectively being the grounds' natural contribution to the system.

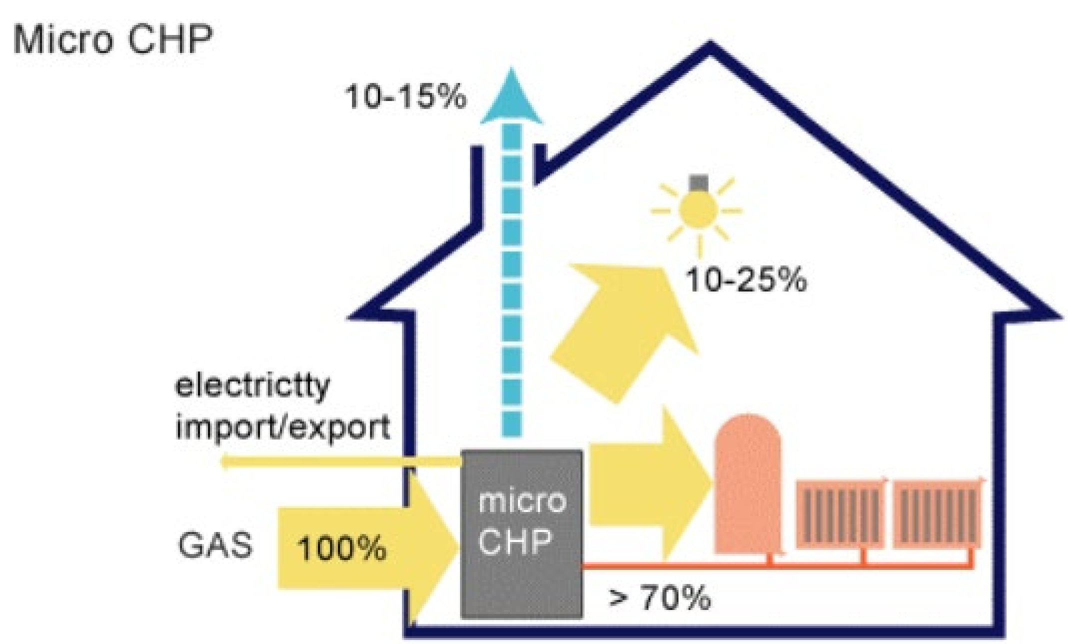
The heat produced by a heat pump is usually used to either provide space heating say to underfloor heating or radiators or the heat is used to generate domestic hot water via a storage vessel.



CHP

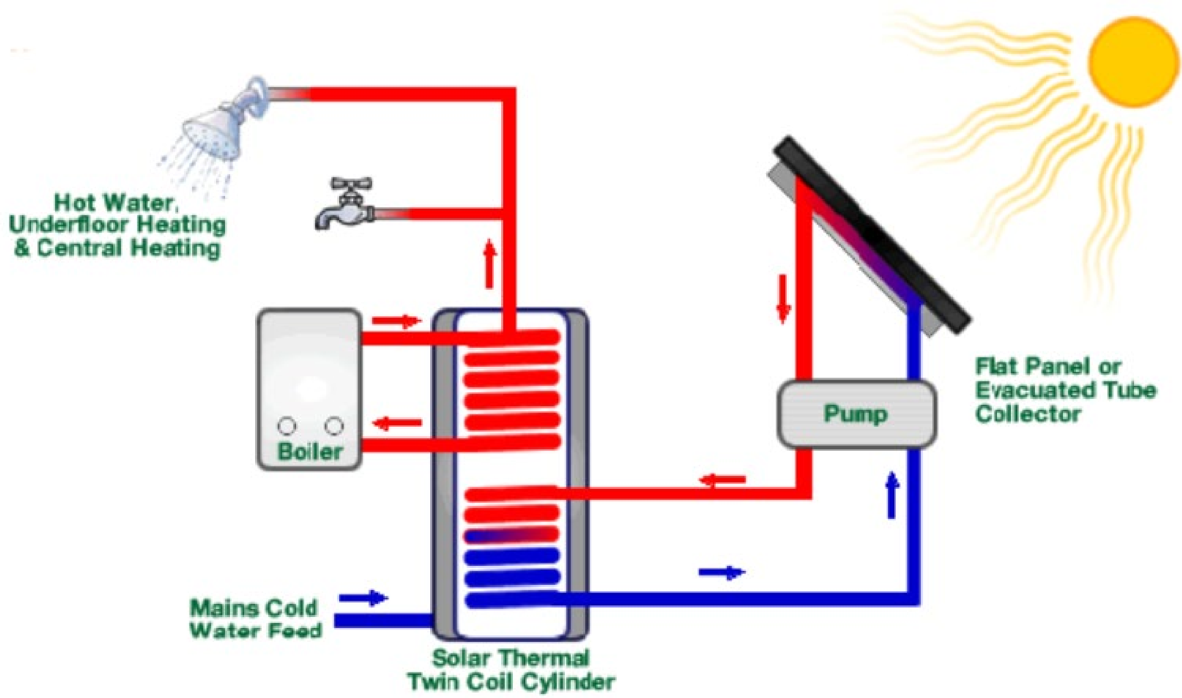
Combined heat and power (CHP) is a process involving simultaneous generation of heat and electricity, where the heat generated in the process in harnessed via heat recovery equipment. CHP at the large commercial size is now fairly common in premises which have a simultaneous demand for heating and electricity for long periods, such as hospitals, recreational centres and hotels. In addition, small CHP systems are now becoming available for individual houses, group residential units and small non-domestic premises. Compared with using centrally generated electricity supplied via the grid, CHP can offer a more efficient and economic method of supplying energy demand, if installed and operated appropriately, owing to the utilization of heat which is normally rejected to the atmosphere from central generating stations, and by reducing network distribution losses due to local generation and use.

Heat generated will be used for space and water heating, and additional heat storage may be used to lengthen use periods, to assist in warm-up and to improve overall energy efficiency. For overall good energy efficiency, as with all CHP, usage must be heat demand led. Thus, a sophisticated control system is required and users should be made aware of efficient operating practices.



Solar thermal collectors

Solar thermal collectors (flat plate or evacuated tubes) convert solar thermal energy into heat for hot water generation. These are usually located on a roof oriented south facing in an ideal slope of 45 degree. Solar collectors properly sized and designed provide approx 50% of annual hot water demand.



Photovoltaic

Photovoltaic modules convert sunlight directly into DC electricity and can be integrated into buildings. Photovoltaics (PVs) are distinct from other renewable energy technologies since they have no moving parts to be maintained and are silent. PV systems can be incorporated into buildings in various ways: on sloped roofs and fl at roofs, in façades, atria and shading devices. Modules can be mounted using frames or they can be fully incorporated into the actual building fabric; for example, PV roof tiles are now available which can be fitted in place of standard tiles.

Currently, a PV system will cost between £1500 and £2500 per kWp, and frequently part of this cost can be offset owing to the displacement of a conventional cladding material. Costs have fallen significantly since the first systems were installed (1980s) and are predicted to fall further still.

While single crystal silicon remains the most efficient flat plate technology (15–16% conversion efficiency); it also has the least potential for cost reduction. PV cells made from poly-crystalline silicon have become popular as they are less expensive to produce, although they have a slightly lower efficiency.

Thin film modules are constructed by depositing extremely thin layers of photosensitive materials on a low-cost backing such as glass, stainless steel or plastic. As much less semiconductor material is required as for crystalline silicon cells, material costs are potentially much lower. Efficiencies are much lower, around 4–5%, although this can be boosted to 8–10% by depositing two or three layers of thin film material. Thin film production also requires less handling as the films are produced as large, complete modules and not as individual cells that have to be mounted in frames and wired together. Hence, there is the potential for significant cost reductions with volume production.

Since PVs generate DC output, an inverter and other equipment is needed to deliver the power to a building or the grid in an acceptable AC form. The cost of the inverter and these 'Balance of System' (BOS) components can approach 30% of the total cost of a PV system. Hence, simplification and cost reductions in these components over the coming years will also be necessary to make PV systems affordable.

Wind energy

Wind power is the most successful and fastest spreading renewable energy technology in the UK with a number of individual and group installations of varying size, capacity and location. Traditionally, turbines are installed in non-urban areas with a strong trend for large offshore wind farms. In parallel with the design and development of ever-bigger machines, which are deemed to be more efficient and cost-effective, it is being increasingly recognized that smaller devices installed at the point of use, i.e. urban settings, can play an important role in reducing carbon emissions if they become mainstream.

At present there is a wide range of available off-the-shelf wind products, many manufactured in the UK and EU with proven good performance and durability. The dominant type is horizontal axis wind turbines (HAWT), which are typically ground mounted. Vertical axis wind turbines (VAWT) have limited market presence and there is a trade-off between lower efficiency and potentially higher resistance to extreme conditions. Capacity ranges from 500W to more than 1.5MW, but, for practical purposes and in built-up areas in particular, machines of more than 1kW and below 500kW are likely to be considered.
Wind technology is also currently one of the most cost-effective renewable energy technologies, which is attributable to the large scale of installations reducing the unit output cost. Individual building or community wind projects, although smaller, have the advantage of feeding electricity directly into the building's electricity circuit, thus sparing costly distribution network development and avoiding distribution losses. The downside is the still high capital cost per kW installed for smaller turbines, plus location constraints, such as visual intrusion and noise. The wind regime in urban areas is also a concern owing to higher wind turbulence which reduces the potential electricity output.

In most cases, wind turbines are connected to the electricity grid and all generated energy is used regardless of the building demand fluctuations. The output largely depends on the wind speed and the correlation between the two is a cube function. This means that in short periods of above-average wind speeds the generation increases exponentially. As a result, it is difficult to make precise calculations of the annual output of a turbine, but average figures can provide useful guidance to designers and architects. In reasonably windy areas (average wind speed of 6m/s) the expected output from 1kW installed is about 2500kWh annually.

The cost per kW installed varies considerably by manufacturer and size of machine with an indicative bracket of £2,500–£5,000. With a lifespan of more than 20 years, wind turbines can save money if design and planning are carried out in a robust way.

Building-integrated wind turbines are starting to be a reality in the UK, but potential projects may face difficulties with obtaining planning permission. There are a few examples now of permitted development rights for certain rooftop turbines in some local councils. A number of horizontal axis devices specifically designed for building integration are now available commercially, having design and reliability parameters relevant to the urban context. Building-mounted vertical axis devices are under development. At present, turbines installed near buildings, as well as community installations for groups of buildings, should be regarded as the larger wind energy source related to buildings, when they contribute to the carbon emissions from these premises using 'private wire' networks. However, the contribution of several building-integrated turbines in a development is likely to become significant in the next few years.

Appendix B-Fuel prices and emission factors

	Standing Charge £	Unit Price p/kWh	Emission Kg CO2 p/kWh	PE Factor	Fuel Code
Gas fuels:					
mains gas	92	3.64	0.210	1.130	1
bulk LPG	62	6.74	0.241	1.141	2
bottled LPG (for main heating system)		9.46	0.241	1.141	3
bottled LPG (for secondary heating)		11.20	0.241	1.133	5
LPG subject to Special Condition 11F (a)	92	3.64	0.241	1.163	9
biogas (including anaerobic digestion)	62	6.74	0.024	1.286	7
Liquid fuels:					
heating oil		4.94	0.298	1.180	4
bio-liquid HVO from used cooking oil (d)		6.79	0.036	1.180	71
bio-liquid FAME from animal/vegetable oils (e)		6.79	0.018	1.180	73
B30K (0		5.49	0.214	1.136	75
bioethanol from any biomass source		47	0.105	1.472	76
Solid fuels: (g)					
house coal		5.58	0.395	1.064	11
anthracite		4.19	0.395	1.064	15
manufactured smokeless fuel		5.91	0.366	1.261	12
wood logs		5.12	0.028	1.046	20
wood pellets (in bags for secondary heating)		6.91	0.053	1.325	22
wood pellets (bulk supply for main heating)		6.25	0.053	1.325	23
wood chips		3.72	0.023	1.046	21
dual fuel appliance (mineral and wood)		4.77	0.087	1.049	10
Electricity: (a)					
standard tariff	81 30	16.49	0.136 (s)	1.5010t)	
7-hour tariff (high rate) (h)	7 32	19.60	0.136 (s)	1.5010t)	
7-hour tariff (low rate) (h)		9.40 31	0.136 (s)	1.501 (t)	
10-hour tariff (high rate) (">	21 34	20.54	0.136 (s)	1.501 (t)	
10-hour tariff (low rate) fib)		12.27 33	0.136 (a)	1.501 (0	
18-hour tariff (high rate) (">	26 38	17.41	0.136 (s)	1.501 (0	
18-hour tariff (low rate) 00		14.17 40	0.136 (s)	1.501 (t)	
24-hour heating tariff	26 35	14.04	0.136 (s)	1.501 0)	
electricity sold to grid, PV		5.59 (0 60	0.136 (s)	0.501 0)	
electricity sold to grid, other		5.59 () 36	0.136 (s)	0.501 0)	
electricity, any tariff 0)		N/A 39	0.136 (s)	1.501 0t)	
Heat networks: (k)	92 0)				
heat from boilers - mains gas		4.44 51	0.210	1.130	
heat from boilers - LPG		4.44 52	0.241	1.141	
heat from boilers - oil (assumes 'gas oil')		4.44 53	0.335	1.180	
heat from boilers that can use mineral oil or biodiesel		4.44 56	0.335	1.180	
heat from boilers using HVO from used cooking oil		4.44	0.036	1.180	

	57		
heat from boilers FAME from animal/vegetable oils (a)	4.44 58	0.018	1.180
heat from boilers - B30D 0)	4.44 55	0.269	1.090
heat from boilers - coal	4.44 54	0.375	1.064
heat from electric heat pump	4.44 41	0.136 (s)	1.501 0)
heat recovered from waste combustion	4.44 42	0.015 0')	0.063
heat from boilers - biomass	4.44 43	0.029	1.037
heat from boilers - biogas (landfill or sewage gas)	4.44 44	0.024	1.286
heat recovered from power station	3.77 45	0.015 0')	0.063
high grade heat recovered from process (Appendix C4.3)	3.77 47	0.011	0.051
low grade heat recovered from process (Appendix C4.4)	3.77 49	0.136 001)	1.501 (001)
heat recovered from geothermal or other natural processes	3.77 46	0.011	0.051
heat from **CHP**	3.77 48	as above0D	as above0D

Appendix C and D, E, and F

This appendix contains the following reports used in producing the content of this Energy and Sustainability Statement.

Appendix C - Flood risk map for planning to show the location of the site with regards to the relevant flood zone areas.

Appendix D - SAP calculation reports for the selected units that were used to base the calculations on for this report. (All hierarchy steps)

Appendix E - Floor Plans and Elevations used for the SAP Calculations.

Appendix F – Sample water calculations.

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**453199/205708**	**19 Jan 2024 14:56**

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

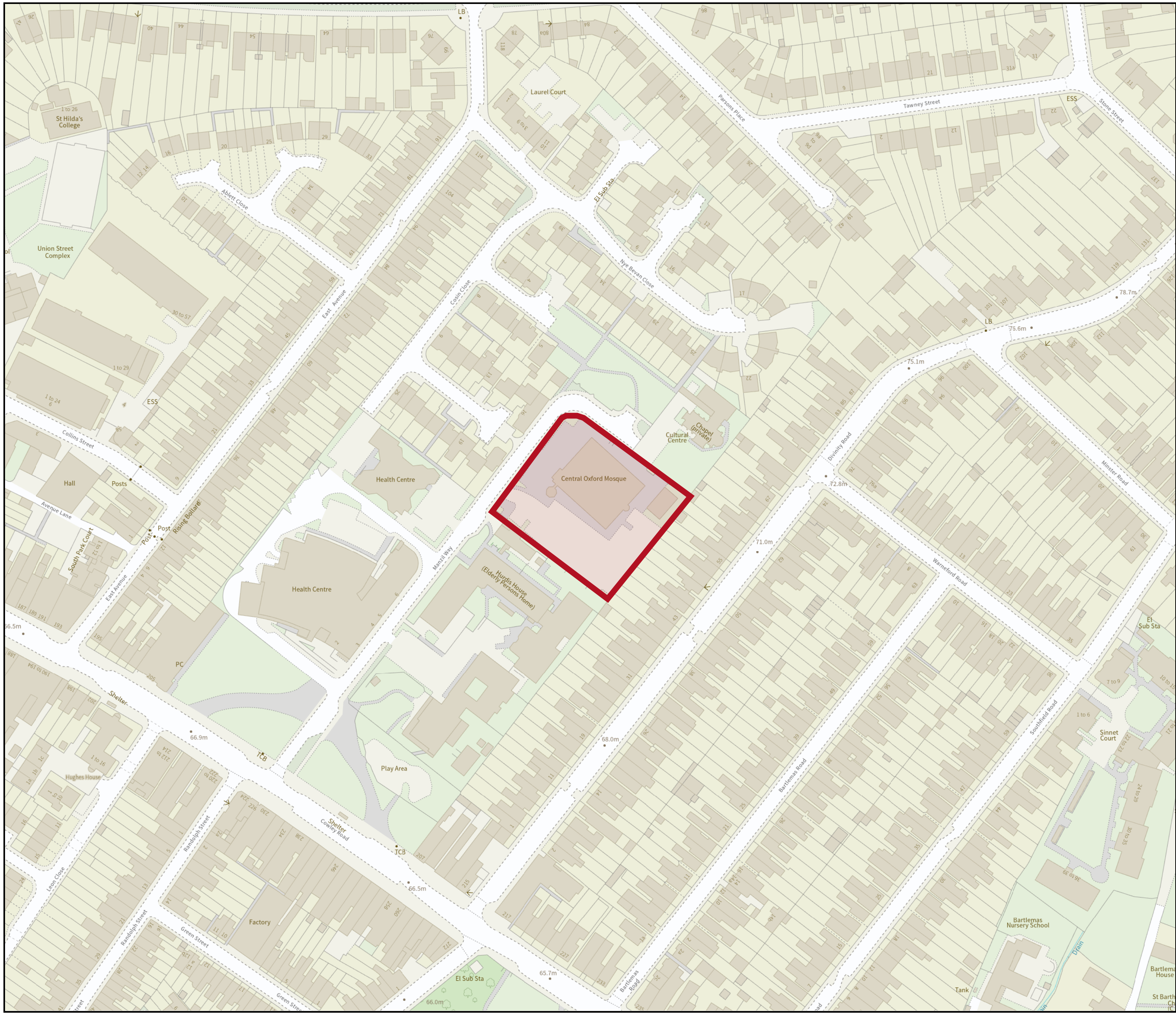
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

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.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
453199/205708

Scale
1:2500

Created
19 Jan 2024 14:56

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Full SAP Calculation Printout

elmhurst energy

Property Reference	PR11278 - Caretaker Dwelling	Issued on Date	19/01/2024
Assessment Reference	002 - Be Lean	Prop Type Ref	
Property	Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, Oxfordshire, OX4 1DJ		

SAP Rating	76 C	DER	6.53	TER	11.19
Environmental	95 A	% DER < TER			41.64
CO_2 Emissions (t/year)	0.37	DFEE	37.65	TFEE	43.12
Compliance Check	See BREL	% DFEE < TFEE			12.70
% DPER < TPER	-14.84	DPER	68.67	TPER	59.80

Assessor Details	Mr. Iraj Maghounaki	Assessor ID	V571-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	62.4700 (1b)	x	2.4000 (2b)	=	149.9280	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 62.4700						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	149.9280	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1334	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3834	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2971	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491	(22b)
Effective ac	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
HG Door			1.9100	1.2000	2.2920			(26a)
Windows (Uw = 1.20)			11.5800	1.1450	13.2595			(27)
Heat Loss Floor			62.4700	0.1200	7.4964	110.0000	6871.7000	(28a)
External Walls	60.6700	13.4900	47.1800	0.1700	8.0206	140.0000	6605.2000	(29a)
Plane Roof	62.4700		62.4700	0.1200	7.4964	9.0000	562.2300	(30)
Total net area of external elements Aum(A, m2)			185.6100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.5649			(33)
Party Walls			21.5300	0.0000	0.0000	20.0000	430.6000	(32)
Internal Walls			61.2000			9.0000	550.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	15020.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		240.4439	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5100	0.0170	0.1787
E3 Sill	9.6000	0.0200	0.1920
E4 Jamb	20.4000	0.0160	0.3264
E5 Ground floor (normal)	25.2800	0.0620	1.5674
E10 Eaves (insulation at ceiling level)	14.9300	0.0670	1.0003
E12 Gable (insulation at ceiling level)	10.3500	0.0550	0.5693

	Length	Psi	L x Psi	
E16 Corner (normal)	4.8000	0.0400	0.1920	
E18 Party wall between dwellings	4.8000	0.0440	0.2112	
P1 Party wall - Ground floor	8.9700	0.0430	0.3857	
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.0400	0.3588	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.9817 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 43.5466 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.2886	28.1507	28.0156	27.3809	27.2621	26.7093	26.7093	26.6069	26.9222	27.2621	27.5023	27.7535	(38)
Heat transfer coeff	71.8353	71.6974	71.5622	70.9275	70.8087	70.2559	70.2559	70.1535	70.4688	70.8087	71.0490	71.3002	(39)

Average = Sum(39)m / 12 = 70.9269

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1499	1.1477	1.1455	1.1354	1.1335	1.1246	1.1246	1.1230	1.1280	1.1335	1.1373	1.1414	(40)
HLP (average)												1.1354	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0505 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	58.6004	57.7198	56.4365	53.9812	52.1692	50.1485	48.9999	50.2735	51.6696	53.8392	56.3472	58.3759	(42a)
Hot water usage for baths	25.3233	24.9472	24.4176	23.4411	22.7099	21.8991	21.4612	21.9871	22.5597	23.4273	24.4239	25.2377	(42b)
Hot water usage for other uses	35.6296	34.3340	33.0383	31.7427	30.4471	29.1515	29.1515	30.4471	31.7427	33.0383	34.3340	35.6296	(42c)

Average daily hot water use (litres/day) 109.8969 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.5533	117.0010	113.8924	109.1650	105.3262	101.1991	99.6126	102.7077	105.9720	110.3048	115.1051	119.2432	(44)
Energy conte	189.3432	166.6078	175.0484	149.4414	141.7893	124.4361	120.4728	127.1736	130.6741	149.6826	163.9883	186.7060	(45)

Energy content (annual) Total = Sum(45)m = 1825.3637

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Distribution loss (46)m = 0.15 x (45)m	28.4015	24.9912	26.2573	22.4162	21.2684	18.6654	18.0709	19.0760	19.6011	22.4524	24.5982	28.0059	(46)

Water storage loss:
Store volume 300.0000 (47)
b) If manufacturer declared loss factor is not known :
Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0115 (51)
Volume factor from Table 2a 0.7368 (52)
Temperature factor from Table 2b 0.5400 (53)
Enter (49) or (54) in (55) 1.3784 (55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total storage loss	42.7290	38.5939	42.7290	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(56)
If cylinder contains dedicated solar storage	42.7290	38.5939	42.7290	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(64)

Total per year (kWh/year) = Sum(64)m = 2602.3590 (64)
12Total per year (kWh/year) 2602 (64)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat gains from water heating, kWh/month	115.7497	103.0812	110.9967	100.7794	99.9381	92.4651	92.8503	95.0783	94.5392	102.5626	105.6162	114.8728	(65)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.5456	100.2469	90.5456	93.5637	90.5456	93.5637	90.5456	90.5456	93.5637	90.5456	93.5637	90.5456	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.1306	180.9894	176.3052	166.3332	153.7454	141.9145	134.0108	132.1520	136.8362	146.8082	159.3960	171.2269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	(71)
Water heating gains (Table 5)	155.5776	153.3946	149.1891	139.9713	134.3253	128.4238	124.7988	127.7934	131.3045	137.8529	146.6892	154.3990	(72)
Total internal gains	482.0118	491.3890	472.7980	456.6264	435.3744	417.6602	403.1133	404.2491	415.4625	431.9647	456.4071	472.9295	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.4000	11.2829	0.6300	0.8000	0.7700	9.4580	(75)
Southeast	4.9800	36.7938	0.6300	0.8000	0.7700	63.9983	(77)
Northwest	4.2000	11.2829	0.6300	0.8000	0.7700	16.5514	(81)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	90.0076	161.9556	244.5421	341.4629	417.5746	429.9976	408.1370	348.9934	277.7339	185.1826	109.3817	76.0097	(83)
Total gains	572.0195	653.3445	717.3401	798.0894	852.9489	847.6577	811.2503	753.2425	693.1964	617.1474	565.7888	548.9393	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	58.0825	58.1942	58.3041	58.8258	58.9245	59.3882	59.3882	59.4748	59.2087	58.9245	58.7252	58.5184	
alpha	4.8722	4.8796	4.8869	4.9217	4.9283	4.9592	4.9592	4.9650	4.9472	4.9283	4.9150	4.9012	
util living area	0.9856	0.9720	0.9427	0.8598	0.7093	0.5195	0.3791	0.4248	0.6602	0.8956	0.9713	0.9881	(86)
MIT	19.8749	20.0808	20.3599	20.6948	20.9051	20.9834	20.9971	20.9951	20.9492	20.6739	20.2231	19.8383	(87)
Th 2	19.9603	19.9621	19.9638	19.9720	19.9736	19.9808	19.9808	19.9821	19.9780	19.9736	19.9705	19.9672	(88)
util rest of house	0.9814	0.9641	0.9267	0.8244	0.6490	0.4414	0.2923	0.3327	0.5778	0.8601	0.9618	0.9845	(89)
MIT 2	18.6807	18.9399	19.2849	19.6820	19.9000	19.9720	19.9799	19.9805	19.9468	19.6708	19.1277	18.6396	(90)
Living area fraction									fLA = Living area / (4) =			0.5278	(91)
MIT	19.3110	19.5420	19.8522	20.2165	20.4305	20.5058	20.5168	20.5160	20.4758	20.2002	19.7058	19.2723	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3110	19.5420	19.8522	20.2165	20.4305	20.5058	20.5168	20.5160	20.4758	20.2002	19.7058	19.2723	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9781	0.9602	0.9247	0.8335	0.6768	0.4822	0.3381	0.3813	0.6193	0.8688	0.9587	0.9815	(94)
Useful gains	559.4818	627.3557	663.3019	665.1999	577.3070	408.7014	274.3219	287.2192	429.2775	536.1892	542.4487	538.7668	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1078.3155	1049.7942	955.5168	802.6524	618.1931	414.9176	275.1766	288.7485	449.2980	679.7785	895.6307	1074.6539	(97)
Space heating kWh	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98a)
Space heating requirement - total per year (kWh/year)												1776.5052	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1776.5052	
Space heating per m2											(98c) / (4) =	28.4377	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	170.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98)
Space heating efficiency (main heating system 1)	170.0000	170.0000	170.0000	170.0000	170.0000	0.0000	0.0000	0.0000	0.0000	170.0000	170.0000	170.0000	(210)
Space heating fuel (main heating system)	227.0660	166.9875	127.8870	58.2151	17.8937	0.0000	0.0000	0.0000	0.0000	62.8414	149.5830	234.5294	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(64)
Efficiency of water heater												170.0000	(216)
(217)m	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	170.0000	(217)
Fuel for water heating, kWh/month	150.1968	133.0664	141.7881	125.4730	122.2239	110.7640	109.6848	113.6265	114.4334	126.8670	134.0300	148.6455	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	25.2898	20.2884	18.2675	13.3836	10.3378	8.4461	9.4305	12.2582	15.9221	20.8907	23.5960	25.9927	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year

Space heating fuel - main system 1	1045.0031	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	170.0000	
Water heating fuel used	1530.7994	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	204.1035	(232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000	(233)
Wind generation	0.0000	(234)

Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2779.9059	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1045.0031	0.1563	163.3449	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1530.7994	0.1407	215.4179	(264)
Space and water heating			378.7628	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	204.1035	0.1443	29.4584	(268)
Total CO2, kg/year			408.2213	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.5300	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1045.0031	1.5787	1649.7236	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1530.7994	1.5203	2327.3232	(278)
Space and water heating			3977.0468	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	204.1035	1.5338	313.0607	(282)
Total Primary energy kWh/year			4290.1075	(286)
Dwelling Primary energy Rate (DPER)			68.6700	(287)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

	Area (m2)			Storey height (m)			Volume (m3)	
Ground floor	62.4700	(1b)	x	2.4000	(2b)	=	149.9280	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 62.4700								(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		=	149.9280	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1334	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3834	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2971	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491	(22b)
Effective ac	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Semi-glazed door			1.9100	1.0000	1.9100			(26a)
TER Opening Type (Uw = 1.20)			11.5800	1.1450	13.2595			(27)
Heat Loss Floor			62.4700	0.1300	8.1211			(28a)
External Walls	60.6700	13.4900	47.1800	0.1800	8.4924			(29a)
Plane Roof	62.4700		62.4700	0.1100	6.8717			(30)

Total net area of external elements Aum(A, m2) 185.6100 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 38.6547 (33)
Party Walls 21.5300 0.0000 0.0000 (32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 240.4439 (35)
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5100	0.0500	0.5255
E3 Sill	9.6000	0.0500	0.4800
E4 Jamb	20.4000	0.0500	1.0200
E5 Ground floor (normal)	25.2800	0.1600	4.0448
E10 Eaves (insulation at ceiling level)	14.9300	0.0600	0.8958
E12 Gable (insulation at ceiling level)	10.3500	0.0600	0.6210
E16 Corner (normal)	4.8000	0.0900	0.4320
E18 Party wall between dwellings	4.8000	0.0600	0.2880
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.1011 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 48.7558 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.2886	28.1507	28.0156	27.3809	27.2621	26.7093	26.7093	26.6069	26.9222	27.2621	27.5023	27.7535	(38)
Heat transfer coeff	77.0445	76.9066	76.7714	76.1367	76.0179	75.4651	75.4651	75.3627	75.6780	76.0179	76.2582	76.5094	(39)

Average = Sum(39)m / 12 = 76.1361

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2333	1.2311	1.2289	1.2188	1.2169	1.2080	1.2080	1.2064	1.2114	1.2169	1.2207	1.2247	(40)
HLP (average)												1.2188	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0505 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	58.6004	57.7198	56.4365	53.9812	52.1692	50.1485	48.9999	50.2735	51.6696	53.8392	56.3472	58.3759	(42a)
Hot water usage for baths	25.3233	24.9472	24.4176	23.4411	22.7099	21.8991	21.4612	21.9871	22.5597	23.4273	24.4239	25.2377	(42b)
Hot water usage for other uses	35.6296	34.3340	33.0383	31.7427	30.4471	29.1515	29.1515	30.4471	31.7427	33.0383	34.3340	35.6296	(42c)

Average daily hot water use (litres/day) 109.8969 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.5533	117.0010	113.8924	109.1650	105.3262	101.1991	99.6126	102.7077	105.9720	110.3048	115.1051	119.2432	(44)
Energy conte	189.3432	166.6078	175.0484	149.4414	141.7893	124.4361	120.4728	127.1736	130.6741	149.6826	163.9883	186.7060	(45)

Energy content (annual) Total = Sum(45)m = 1825.3637

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Distribution loss (46)m = 0.15 x (45)m	28.4015	24.9912	26.2573	22.4162	21.2684	18.6654	18.0709	19.0760	19.6011	22.4524	24.5982	28.0059	(46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	247.9720	219.5629	233.6773	206.1790	200.4181	181.1737	179.1016	185.8024	187.4116	208.3114	220.7259	245.3348	(62)
WWHRS	-26.7897	-23.6930	-24.8099	-20.5436	-19.1459	-16.3833	-15.3567	-16.3303	-16.9508	-19.9831	-22.6384	-26.2936	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1824	195.8699	208.8673	185.6354	181.2722	164.7904	163.7449	169.4721	170.4609	188.3283	198.0874	219.0413	(64)

Total per year (kWh/year) = Sum(64)m = 2266.7524 (64)
12Total per year (kWh/year) 2267 (64)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat gains from water heating, kWh/month	109.8597	97.7611	105.1067	95.0793	94.0480	86.7651	86.9603	89.1883	88.8392	96.6725	99.9162	108.9828	(65)

---

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	91.8657	101.7084	91.8657	94.9279	91.8657	94.9279	91.8657	91.8657	94.9279	91.8657	94.9279	91.8657	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.1306	180.9894	176.3052	166.3332	153.7454	141.9145	134.0108	132.1520	136.8362	146.8082	159.3960	171.2269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	(71)
Water heating gains (Table 5)	147.6608	145.4779	141.2724	132.0546	126.4086	120.5070	116.8821	119.8767	123.3878	129.9362	138.7725	146.4823	(72)
Total internal gains	475.4152	484.9338	466.2014	450.0738	428.7777	411.1075	396.5167	397.6525	408.9099	425.3681	449.8545	466.3329	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W

		W/m2	or Table 6b	or Table 6c	Table 6d		
Northeast	2.4000	11.2829	0.6300	0.7000	0.7700	8.2757	(75)
Southeast	4.9800	36.7938	0.6300	0.7000	0.7700	55.9985	(77)
Northwest	4.2000	11.2829	0.6300	0.7000	0.7700	14.4825	(81)

Solar gains	78.7567	141.7111	213.9744	298.7801	365.3778	376.2479	357.1199	305.3692	243.0172	162.0348	95.7090	66.5085	(83)
Total gains	554.1719	626.6449	680.1758	748.8539	794.1555	787.3554	753.6366	703.0217	651.9270	587.4029	545.5634	532.8414	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	54.1553	54.2524	54.3479	54.8010	54.8866	55.2887	55.2887	55.3638	55.1332	54.8866	54.7137	54.5341	
alpha	4.6104	4.6168	4.6232	4.6534	4.6591	4.6859	4.6859	4.6909	4.6755	4.6591	4.6476	4.6356	
util living area	0.9882	0.9782	0.9574	0.8966	0.7723	0.5878	0.4352	0.4839	0.7221	0.9209	0.9773	0.9901	(86)
MIT	19.7125	19.9104	20.1945	20.5636	20.8364	20.9647	20.9930	20.9886	20.9101	20.5637	20.0801	19.6776	(87)
Th 2	19.8934	19.8952	19.8969	19.9050	19.9065	19.9136	19.9136	19.9149	19.9109	19.9065	19.9035	19.9003	(88)
util rest of house	0.9846	0.9718	0.9445	0.8660	0.7121	0.4985	0.3305	0.3744	0.6355	0.8904	0.9693	0.9870	(89)
MIT 2	18.4275	18.6779	19.0332	19.4805	19.7757	19.8945	19.9114	19.9111	19.8538	19.4929	18.9007	18.3882	(90)
Living area fraction									fLA = Living area / (4) =			0.5278	(91)
MIT	19.1057	19.3284	19.6461	20.0521	20.3355	20.4593	20.4822	20.4798	20.4113	20.0581	19.5231	19.0687	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1057	19.3284	19.6461	20.0521	20.3355	20.4593	20.4822	20.4798	20.4113	20.0581	19.5231	19.0687	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9812	0.9676	0.9410	0.8706	0.7371	0.5445	0.3859	0.4322	0.6775	0.8953	0.9659	0.9840	(94)
Useful gains	543.7744	606.3227	640.0340	651.9471	585.3913	428.6861	290.8241	303.8567	441.6535	525.8837	526.9372	524.3035	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1140.6946	1109.6370	1009.2452	849.0847	656.4535	442.1735	292.9734	307.4635	477.6238	718.9823	947.3647	1137.5978	(97)
Space heating kWh	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98a)
Space heating requirement - total per year (kWh/year)												2154.5025	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2154.5025	
Space heating per m2											(98c) / (4) =	34.4886	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	481.1578	366.4433	297.6091	153.7802	57.2809	0.0000	0.0000	0.0000	0.0000	155.6504	327.9608	494.3564	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1824	195.8699	208.8673	185.6354	181.2722	164.7904	163.7449	169.4721	170.4609	188.3283	198.0874	219.0413	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.5907	85.2731	84.6751	83.4655	81.6690	79.8000	79.8000	79.8000	79.8000	83.4604	85.0078	85.6663	(217)
Fuel for water heating, kWh/month	258.4186	229.6973	246.6692	222.4098	221.9595	206.5043	205.1941	212.3710	213.6101	225.6498	233.0228	255.6913	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.0879	15.3130	13.7877	10.1014	7.8026	6.3748	7.1178	9.2520	12.0175	15.7676	17.8094	19.6184	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-48.9640	-64.7111	-87.3040	-92.0050	-94.4009	-86.5279	-85.4921	-82.9938	-77.9826	-70.9767	-52.2902	-42.8641	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-42.5044	-87.1563	-169.2222	-248.5833	-323.4825	-323.1087	-319.2440	-272.5718	-202.9191	-122.5976	-56.0550	-33.7791	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year

Space heating fuel - main system 1	2334.2389	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)

Efficiency of water heater	79.8000	
Water heating fuel used	2731.1977	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	154.0501	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-3087.7363	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2217.7504	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2334.2389	0.2100	490.1902	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2731.1977	0.2100	573.5515	(264)
Space and water heating			1063.7417	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	154.0501	0.1443	22.2342	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-886.5124	0.1360	-120.5277	
PV Unit electricity exported	-2201.2239	0.1266	-278.6034	
Total			-399.1311	(269)
Total CO2, kg/year			698.7740	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2334.2389	1.1300	2637.6899	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2731.1977	1.1300	3086.2534	(278)
Space and water heating			5723.9434	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	154.0501	1.5338	236.2871	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-886.5124	1.5025	-1332.0282	
PV Unit electricity exported	-2201.2239	0.4646	-1022.7326	
Total			-2354.7608	(283)
Total Primary energy kWh/year			3735.5704	(286)
Target Primary Energy Rate (TPER)			59.8000	(287)

Full SAP Calculation Printout

elmhurst energy

Property Reference	PR11278 - Caretaker Dwelling	Issued on Date	19/01/2024
Assessment Reference	001 - Be Green	Prop Type Ref	
Property	Caretakers Dwelling, Central Mosque, Manzil Way, Oxford, Oxfordshire, OX4 1DJ		

SAP Rating	79 C	DER	5.58	TER	11.19
Environmental	96 A	% DER < TER			50.13
CO_2 Emissions (t/year)	0.32	DFEE	37.65	TFEE	43.12
Compliance Check	See BREL	% DFEE < TFEE			12.70
% DPER < TPER	1.76	DPER	58.75	TPER	59.80

Assessor Details	Mr. Iraj Maghounaki	Assessor ID	V571-0001
Client			

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	62.4700 (1b)	x	2.4000 (2b)	=	149.9280	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 62.4700						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	149.9280	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1334	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3834	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2971	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491	(22b)
Effective ac	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
HG Door			1.9100	1.2000	2.2920			(26a)
Windows (Uw = 1.20)			11.5800	1.1450	13.2595			(27)
Heat Loss Floor			62.4700	0.1200	7.4964	110.0000	6871.7000	(28a)
External Walls	60.6700	13.4900	47.1800	0.1700	8.0206	140.0000	6605.2000	(29a)
Plane Roof	62.4700		62.4700	0.1200	7.4964	9.0000	562.2300	(30)
Total net area of external elements Aum(A, m2)			185.6100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.5649			(33)
Party Walls			21.5300	0.0000	0.0000	20.0000	430.6000	(32)
Internal Walls			61.2000			9.0000	550.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	15020.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		240.4439	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5100	0.0170	0.1787
E3 Sill	9.6000	0.0200	0.1920
E4 Jamb	20.4000	0.0160	0.3264
E5 Ground floor (normal)	25.2800	0.0620	1.5674
E10 Eaves (insulation at ceiling level)	14.9300	0.0670	1.0003
E12 Gable (insulation at ceiling level)	10.3500	0.0550	0.5693

E16 Corner (normal)	4.8000	0.0400	0.1920	
E18 Party wall between dwellings	4.8000	0.0440	0.2112	
P1 Party wall - Ground floor	8.9700	0.0430	0.3857	
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.0400	0.3588	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				4.9817 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	43.5466 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.2886	28.1507	28.0156	27.3809	27.2621	26.7093	26.7093	26.6069	26.9222	27.2621	27.5023	27.7535	(38)
Heat transfer coeff	71.8353	71.6974	71.5622	70.9275	70.8087	70.2559	70.2559	70.1535	70.4688	70.8087	71.0490	71.3002	(39)
Average = Sum(39)m / 12 =												70.9269	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1499	1.1477	1.1455	1.1354	1.1335	1.1246	1.1246	1.1230	1.1280	1.1335	1.1373	1.1414	(40)
HLP (average)												1.1354	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy												2.0505	(42)
Hot water usage for mixer showers	58.6004	57.7198	56.4365	53.9812	52.1692	50.1485	48.9999	50.2735	51.6696	53.8392	56.3472	58.3759	(42a)
Hot water usage for baths	25.3233	24.9472	24.4176	23.4411	22.7099	21.8991	21.4612	21.9871	22.5597	23.4273	24.4239	25.2377	(42b)
Hot water usage for other uses	35.6296	34.3340	33.0383	31.7427	30.4471	29.1515	29.1515	30.4471	31.7427	33.0383	34.3340	35.6296	(42c)
Average daily hot water use (litres/day)												109.8969	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.5533	117.0010	113.8924	109.1650	105.3262	101.1991	99.6126	102.7077	105.9720	110.3048	115.1051	119.2432	(44)
Energy conte	189.3432	166.6078	175.0484	149.4414	141.7893	124.4361	120.4728	127.1736	130.6741	149.6826	163.9883	186.7060	(45)
Energy content (annual)											Total = Sum(45)m =	1825.3637	
Distribution loss (46)m = 0.15 x (45)m	28.4015	24.9912	26.2573	22.4162	21.2684	18.6654	18.0709	19.0760	19.6011	22.4524	24.5982	28.0059	(46)
Water storage loss:													
Store volume												300.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0115	(51)
Volume factor from Table 2a												0.7368	(52)
Temperature factor from Table 2b												0.5400	(53)
Enter (49) or (54) in (55)												1.3784	(55)
Total storage loss	42.7290	38.5939	42.7290	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(56)
If cylinder contains dedicated solar storage	42.7290	38.5939	42.7290	41.3506	42.7290	41.3506	42.7290	42.7290	41.3506	42.7290	41.3506	42.7290	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(64)
								Total per year (kWh/year) = Sum(64)m =				2602.3590	(64)
12Total per year (kWh/year)												2602	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							0.0000	(64a)
Heat gains from water heating, kWh/month	115.7497	103.0812	110.9967	100.7794	99.9381	92.4651	92.8503	95.0783	94.5392	102.5626	105.6162	114.8728	(65)

---

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.5456	100.2469	90.5456	93.5637	90.5456	93.5637	90.5456	90.5456	93.5637	90.5456	93.5637	90.5456	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.1306	180.9894	176.3052	166.3332	153.7454	141.9145	134.0108	132.1520	136.8362	146.8082	159.3960	171.2269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	(71)
Water heating gains (Table 5)	155.5776	153.3946	149.1891	139.9713	134.3253	128.4238	124.7988	127.7934	131.3045	137.8529	146.6892	154.3990	(72)
Total internal gains	482.0118	491.3890	472.7980	456.6264	435.3744	417.6602	403.1133	404.2491	415.4625	431.9647	456.4071	472.9295	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	2.4000	11.2829	0.6300	0.8000	0.7700	9.4580 (75)
Southeast	4.9800	36.7938	0.6300	0.8000	0.7700	63.9983 (77)
Northwest	4.2000	11.2829	0.6300	0.8000	0.7700	16.5514 (81)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	90.0076	161.9556	244.5421	341.4629	417.5746	429.9976	408.1370	348.9934	277.7339	185.1826	109.3817	76.0097	(83)
Total gains	572.0195	653.3445	717.3401	798.0894	852.9489	847.6577	811.2503	753.2425	693.1964	617.1474	565.7888	548.9393	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	58.0825	58.1942	58.3041	58.8258	58.9245	59.3882	59.3882	59.4748	59.2087	58.9245	58.7252	58.5184	
alpha	4.8722	4.8796	4.8869	4.9217	4.9283	4.9592	4.9592	4.9650	4.9472	4.9283	4.9150	4.9012	
util living area	0.9856	0.9720	0.9427	0.8598	0.7093	0.5195	0.3791	0.4248	0.6602	0.8956	0.9713	0.9881	(86)
MIT	19.8749	20.0808	20.3599	20.6948	20.9051	20.9834	20.9971	20.9951	20.9492	20.6739	20.2231	19.8383	(87)
Th 2	19.9603	19.9621	19.9638	19.9720	19.9736	19.9808	19.9808	19.9821	19.9780	19.9736	19.9705	19.9672	(88)
util rest of house	0.9814	0.9641	0.9267	0.8244	0.6490	0.4414	0.2923	0.3327	0.5778	0.8601	0.9618	0.9845	(89)
MIT 2	18.6807	18.9399	19.2849	19.6820	19.9000	19.9720	19.9799	19.9805	19.9468	19.6708	19.1277	18.6396	(90)
Living area fraction									fLA = Living area / (4) =			0.5278	(91)
MIT	19.3110	19.5420	19.8522	20.2165	20.4305	20.5058	20.5168	20.5160	20.4758	20.2002	19.7058	19.2723	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3110	19.5420	19.8522	20.2165	20.4305	20.5058	20.5168	20.5160	20.4758	20.2002	19.7058	19.2723	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9781	0.9602	0.9247	0.8335	0.6768	0.4822	0.3381	0.3813	0.6193	0.8688	0.9587	0.9815	(94)
Useful gains	559.4818	627.3557	663.3019	665.1999	577.3070	408.7014	274.3219	287.2192	429.2775	536.1892	542.4487	538.7668	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1078.3155	1049.7942	955.5168	802.6524	618.1931	414.9176	275.1766	288.7485	449.2980	679.7785	895.6307	1074.6539	(97)
Space heating kWh	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98a)
Space heating requirement - total per year (kWh/year)												1776.5052	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1776.5052	
Space heating per m2											(98c) / (4) =	28.4377	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	219.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	386.0122	283.8787	217.4079	98.9657	30.4192	0.0000	0.0000	0.0000	0.0000	106.8304	254.2911	398.7000	(98)
Space heating efficiency (main heating system 1)	219.3000	219.3000	219.3000	219.3000	219.3000	0.0000	0.0000	0.0000	0.0000	219.3000	219.3000	219.3000	(210)
Space heating fuel (main heating system)	176.0202	129.4476	99.1372	45.1280	13.8711	0.0000	0.0000	0.0000	0.0000	48.7143	115.9558	181.8057	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

Water heating

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Water heating requirement	255.3346	226.2129	241.0398	213.3040	207.7807	188.2987	186.4642	193.1650	194.5367	215.6740	227.8509	252.6974	(64)
Efficiency of water heater												190.4000	(216)
(217)m	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	190.4000	(217)
Fuel for water heating, kWh/month	134.1043	118.8093	126.5965	112.0294	109.1285	98.8964	97.9329	101.4522	102.1726	113.2741	119.6696	132.7192	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	25.2898	20.2884	18.2675	13.3836	10.3378	8.4461	9.4305	12.2582	15.9221	20.8907	23.5960	25.9927	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year

Space heating fuel - main system 1	810.0799	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	190.4000	
Water heating fuel used	1366.7852	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	204.1035	(232)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000	(233)
Wind generation	0.0000	(234)

Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2380.9686	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	810.0799	0.1563	126.6240	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1366.7852	0.1407	192.3374	(264)
Space and water heating			318.9614	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	204.1035	0.1443	29.4584	(268)
Total CO2, kg/year			348.4198	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.5800	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	810.0799	1.5787	1278.8555	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1366.7852	1.5203	2077.9672	(278)
Space and water heating			3356.8227	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	204.1035	1.5338	313.0607	(282)
Total Primary energy kWh/year			3669.8834	(286)
Dwelling Primary energy Rate (DPER)			58.7500	(287)

SAP 10 WORKSHEET FOR New Build (As Designed)   (Version 10.2, February 2022)
CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

		Area (m2)			Storey height (m)			Volume (m3)	
Ground floor		62.4700	(1b)	x	2.4000	(2b)	=	149.9280	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.4700								(4)
Dwelling volume					(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		=	149.9280	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	2 * 10 =	20.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1334	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3834	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2971	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3788	0.3714	0.3640	0.3268	0.3194	0.2823	0.2823	0.2748	0.2971	0.3194	0.3343	0.3491	(22b)
Effective ac	0.5718	0.5690	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5559	0.5609	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Semi-glazed door			1.9100	1.0000	1.9100			(26a)
TER Opening Type (Uw = 1.20)			11.5800	1.1450	13.2595			(27)
Heat Loss Floor			62.4700	0.1300	8.1211			(28a)
External Walls	60.6700	13.4900	47.1800	0.1800	8.4924			(29a)
Plane Roof	62.4700		62.4700	0.1100	6.8717			(30)

Total net area of external elements Aum(A, m2)	185.6100			(31)
Fabric heat loss, W/K = Sum (A x U)		(26)...(30) + (32) =	38.6547	(33)
Party Walls	21.5300	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 240.4439 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5100	0.0500	0.5255
E3 Sill	9.6000	0.0500	0.4800
E4 Jamb	20.4000	0.0500	1.0200
E5 Ground floor (normal)	25.2800	0.1600	4.0448
E10 Eaves (insulation at ceiling level)	14.9300	0.0600	0.8958
E12 Gable (insulation at ceiling level)	10.3500	0.0600	0.6210
E16 Corner (normal)	4.8000	0.0900	0.4320
E18 Party wall between dwellings	4.8000	0.0600	0.2880
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		10.1011	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	48.7558	(37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.2886	28.1507	28.0156	27.3809	27.2621	26.7093	26.7093	26.6069	26.9222	27.2621	27.5023	27.7535	(38)
Heat transfer coeff	77.0445	76.9066	76.7714	76.1367	76.0179	75.4651	75.4651	75.3627	75.6780	76.0179	76.2582	76.5094	(39)
Average = Sum(39)m / 12 =												76.1361	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2333	1.2311	1.2289	1.2188	1.2169	1.2080	1.2080	1.2064	1.2114	1.2169	1.2207	1.2247	(40)
HLP (average)												1.2188	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0505 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	58.6004	57.7198	56.4365	53.9812	52.1692	50.1485	48.9999	50.2735	51.6696	53.8392	56.3472	58.3759	(42a)
Hot water usage for baths	25.3233	24.9472	24.4176	23.4411	22.7099	21.8991	21.4612	21.9871	22.5597	23.4273	24.4239	25.2377	(42b)
Hot water usage for other uses	35.6296	34.3340	33.0383	31.7427	30.4471	29.1515	29.1515	30.4471	31.7427	33.0383	34.3340	35.6296	(42c)
Average daily hot water use (litres/day)												109.8969	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.5533	117.0010	113.8924	109.1650	105.3262	101.1991	99.6126	102.7077	105.9720	110.3048	115.1051	119.2432	(44)
Energy conte	189.3432	166.6078	175.0484	149.4414	141.7893	124.4361	120.4728	127.1736	130.6741	149.6826	163.9883	186.7060	(45)
Energy content (annual)											Total = Sum(45)m =	1825.3637	
Distribution loss (46)m = 0.15 x (45)m	28.4015	24.9912	26.2573	22.4162	21.2684	18.6654	18.0709	19.0760	19.6011	22.4524	24.5982	28.0059	(46)

Water storage loss:

Store volume	300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	2.1127	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	1.1409	(55)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	247.9720	219.5629	233.6773	206.1790	200.4181	181.1737	179.1016	185.8024	187.4116	208.3114	220.7259	245.3348	(62)
WWHRS	-26.7897	-23.6930	-24.8099	-20.5436	-19.1459	-16.3833	-15.3567	-16.3303	-16.9508	-19.9831	-22.6384	-26.2936	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	221.1824	195.8699	208.8673	185.6354	181.2722	164.7904	163.7449	169.4721	170.4609	188.3283	198.0874	219.0413	(64)
									Total per year (kWh/year) = Sum(64)m =			2266.7524	(64)
12Total per year (kWh/year)												2267	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							0.0000	(64a)
Heat gains from water heating, kWh/month	109.8597	97.7611	105.1067	95.0793	94.0480	86.7651	86.9603	89.1883	88.8392	96.6725	99.9162	108.9828	(65)

---

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	102.5270	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	91.8657	101.7084	91.8657	94.9279	91.8657	94.9279	91.8657	91.8657	94.9279	91.8657	94.9279	91.8657	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.1306	180.9894	176.3052	166.3332	153.7454	141.9145	134.0108	132.1520	136.8362	146.8082	159.3960	171.2269	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	33.2527	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	-82.0216	(71)
Water heating gains (Table 5)	147.6608	145.4779	141.2724	132.0546	126.4086	120.5070	116.8821	119.8767	123.3878	129.9362	138.7725	146.4823	(72)
Total internal gains	475.4152	484.9338	466.2014	450.0738	428.7777	411.1075	396.5167	397.6525	408.9099	425.3681	449.8545	466.3329	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W

		W/m2	or Table 6b	or Table 6c	Table 6d		
Northeast	2.4000	11.2829	0.6300	0.7000	0.7700	8.2757	(75)
Southeast	4.9800	36.7938	0.6300	0.7000	0.7700	55.9985	(77)
Northwest	4.2000	11.2829	0.6300	0.7000	0.7700	14.4825	(81)

Solar gains	78.7567	141.7111	213.9744	298.7801	365.3778	376.2479	357.1199	305.3692	243.0172	162.0348	95.7090	66.5085	(83)
Total gains	554.1719	626.6449	680.1758	748.8539	794.1555	787.3554	753.6366	703.0217	651.9270	587.4029	545.5634	532.8414	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	54.1553	54.2524	54.3479	54.8010	54.8866	55.2887	55.2887	55.3638	55.1332	54.8866	54.7137	54.5341	
alpha	4.6104	4.6168	4.6232	4.6534	4.6591	4.6859	4.6859	4.6909	4.6755	4.6591	4.6476	4.6356	
util living area	0.9882	0.9782	0.9574	0.8966	0.7723	0.5878	0.4352	0.4839	0.7221	0.9209	0.9773	0.9901	(86)
MIT	19.7125	19.9104	20.1945	20.5636	20.8364	20.9647	20.9930	20.9886	20.9101	20.5637	20.0801	19.6776	(87)
Th 2	19.8934	19.8952	19.8969	19.9050	19.9065	19.9136	19.9136	19.9149	19.9109	19.9065	19.9035	19.9003	(88)
util rest of house	0.9846	0.9718	0.9445	0.8660	0.7121	0.4985	0.3305	0.3744	0.6355	0.8904	0.9693	0.9870	(89)
MIT 2	18.4275	18.6779	19.0332	19.4805	19.7757	19.8945	19.9114	19.9111	19.8538	19.4929	18.9007	18.3882	(90)
Living area fraction									fLA = Living area / (4) =			0.5278	(91)
MIT	19.1057	19.3284	19.6461	20.0521	20.3355	20.4593	20.4822	20.4798	20.4113	20.0581	19.5231	19.0687	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1057	19.3284	19.6461	20.0521	20.3355	20.4593	20.4822	20.4798	20.4113	20.0581	19.5231	19.0687	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9812	0.9676	0.9410	0.8706	0.7371	0.5445	0.3859	0.4322	0.6775	0.8953	0.9659	0.9840	(94)
Useful gains	543.7744	606.3227	640.0340	651.9471	585.3913	428.6861	290.8241	303.8567	441.6535	525.8837	526.9372	524.3035	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1140.6946	1109.6370	1009.2452	849.0847	656.4535	442.1735	292.9734	307.4635	477.6238	718.9823	947.3647	1137.5978	(97)
Space heating kWh	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98a)
Space heating requirement - total per year (kWh/year)												2154.5025	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2154.5025	
Space heating per m2											(98c) / (4) =	34.4886	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.3000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	444.1087	338.2272	274.6932	141.9391	52.8703	0.0000	0.0000	0.0000	0.0000	143.6654	302.7078	456.2910	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	481.1578	366.4433	297.6091	153.7802	57.2809	0.0000	0.0000	0.0000	0.0000	155.6504	327.9608	494.3564	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	221.1824	195.8699	208.8673	185.6354	181.2722	164.7904	163.7449	169.4721	170.4609	188.3283	198.0874	219.0413	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.5907	85.2731	84.6751	83.4655	81.6690	79.8000	79.8000	79.8000	79.8000	83.4604	85.0078	85.6663	(217)
Fuel for water heating, kWh/month	258.4186	229.6973	246.6692	222.4098	221.9595	206.5043	205.1941	212.3710	213.6101	225.6498	233.0228	255.6913	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	19.0879	15.3130	13.7877	10.1014	7.8026	6.3748	7.1178	9.2520	12.0175	15.7676	17.8094	19.6184	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-48.9640	-64.7111	-87.3040	-92.0050	-94.4009	-86.5279	-85.4921	-82.9938	-77.9826	-70.9767	-52.2902	-42.8641	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-42.5044	-87.1563	-169.2222	-248.5833	-323.4825	-323.1087	-319.2440	-272.5718	-202.9191	-122.5976	-56.0550	-33.7791	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)

Annual totals kWh/year

Space heating fuel - main system 1	2334.2389	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)

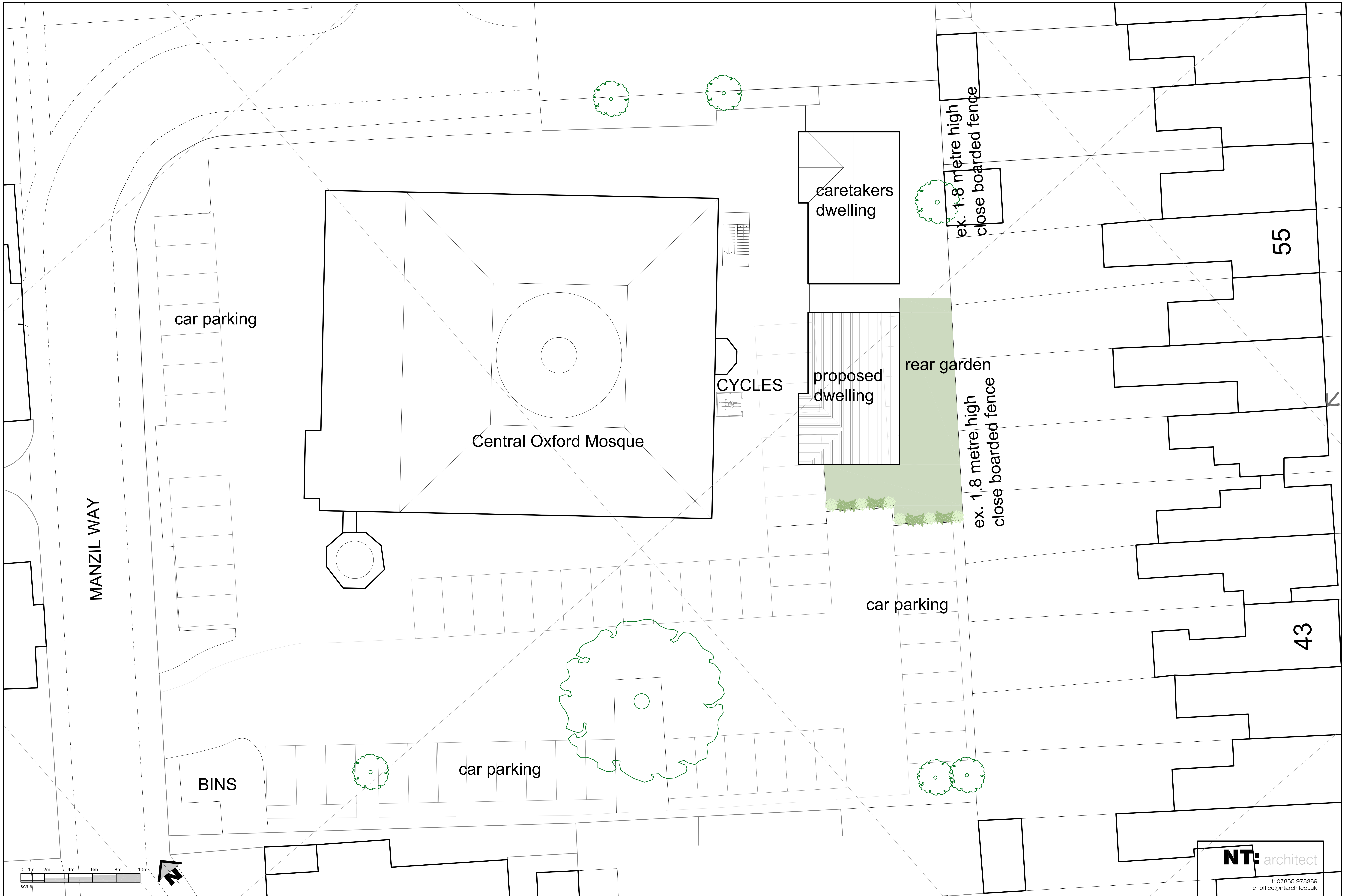
Efficiency of water heater		79.8000	
Water heating fuel used		2731.1977	(219)
Space cooling fuel		0.0000	(221)
Electricity for pumps and fans:			
Total electricity for the above, kWh/year		86.0000	(231)
Electricity for lighting (calculated in Appendix L)		154.0501	(232)
Energy saving/generation technologies (Appendices M ,N and Q)			
PV generation		-3087.7363	(233)
Wind generation		0.0000	(234)
Hydro-electric generation (Appendix N)		0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)		0.0000	(235)
Appendix Q - special features			
Energy saved or generated		-0.0000	(236)
Energy used		0.0000	(237)
Total delivered energy for all uses		2217.7504	(238)

12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2334.2389	0.2100	490.1902	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2731.1977	0.2100	573.5515	(264)
Space and water heating			1063.7417	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	154.0501	0.1443	22.2342	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-886.5124	0.1360	-120.5277	
PV Unit electricity exported	-2201.2239	0.1266	-278.6034	
Total			-399.1311	(269)
Total CO2, kg/year			698.7740	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2334.2389	1.1300	2637.6899	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2731.1977	1.1300	3086.2534	(278)
Space and water heating			5723.9434	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	154.0501	1.5338	236.2871	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-886.5124	1.5025	-1332.0282	
PV Unit electricity exported	-2201.2239	0.4646	-1022.7326	
Total			-2354.7608	(283)
Total Primary energy kWh/year			3735.5704	(286)
Target Primary Energy Rate (TPER)			59.8000	(287)



NT: architect
t: 07855 978389
e: office@ntarchitect.uk

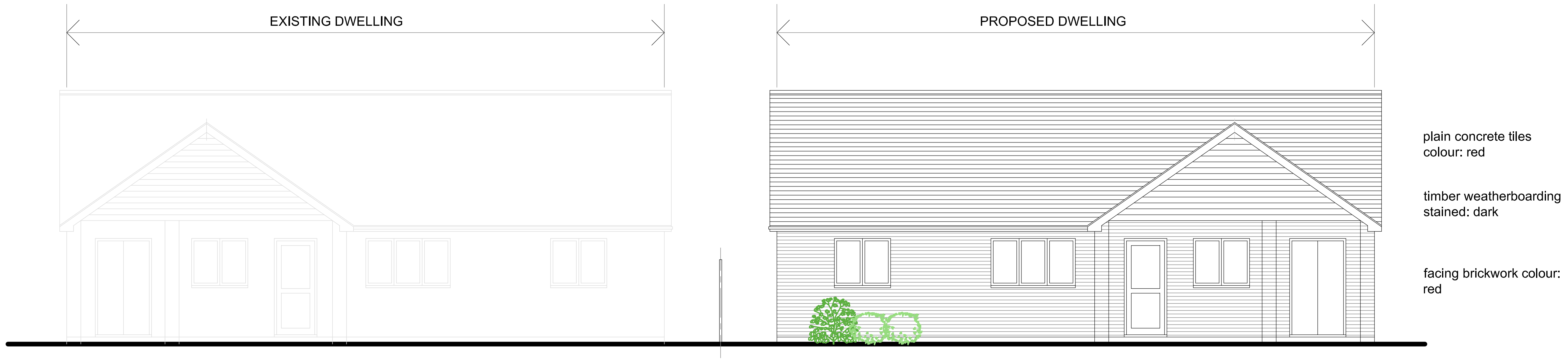
rev:

client:
OXFORD MOSQUE & ISLAMIC CULTURAL SOCIETY
MANZIL WAY
OXFORD
OXON. OX4 1DJ

project:
PROPOSED CARETAKERS DWELLING

drawing:
PROPOSED:
SITE PLAN

date: AUG 23
drawn: NT
scale: 1:200@A2
drawing no.: 23.57 - P1.02
rev:



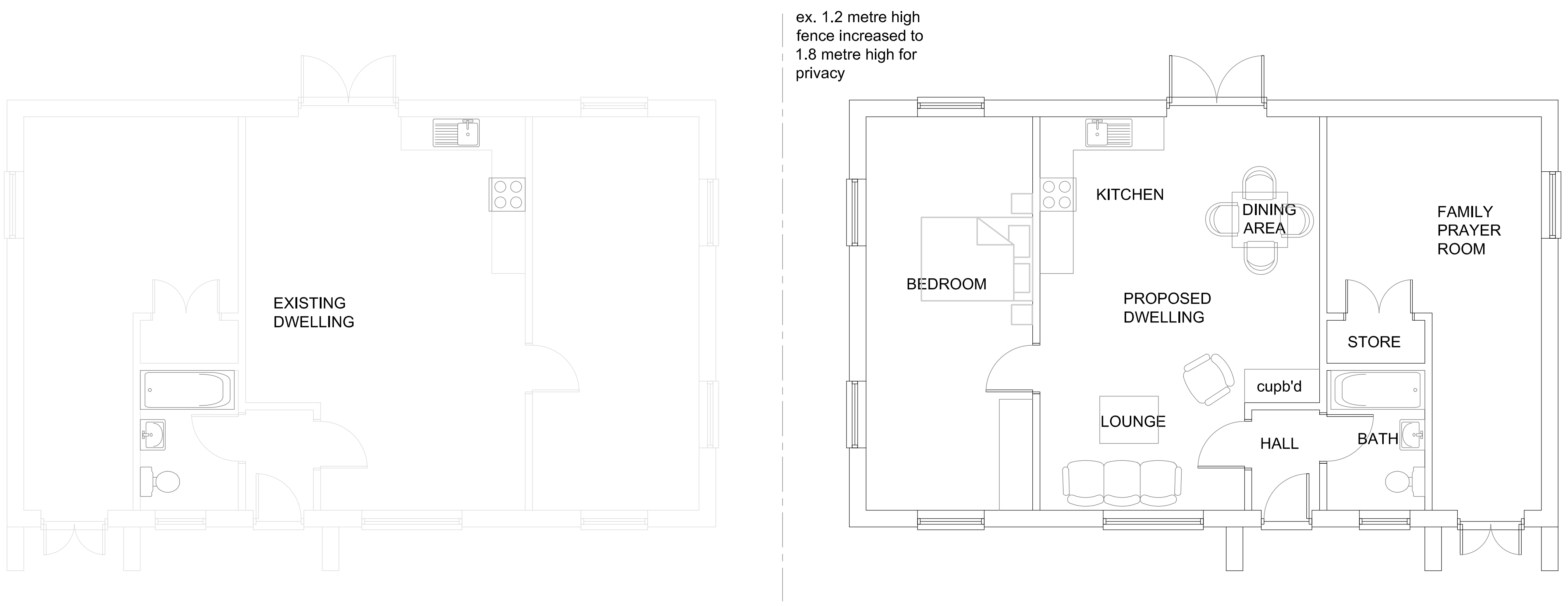
FRONT ELEVATION

SIDE ELEVATION

ROOF PLAN

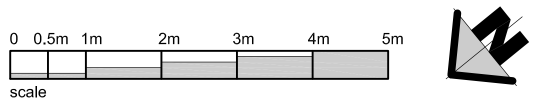
REAR ELEVATION

SIDE ELEVATION



GROUND FLOOR PLAN

NPPF REQUIREMENTS:	
1 BED 2 PERSON FLAT (1 STOREY):	62.5m²
DOUBLE BEDROOM: 14.9m² 2750mm wide built in wardrobe space: 1.1m²	
FLOOR TO CEILING: 2375mm	
BUILT IN STORAGE: GF: 0.8m² FF: (wardrobes: 1.2m²) TOTAL: 2.0m²	
BUILDING FOOTPRINT:	97.8m²
PRIVATE AMENITY: (excluding cycle, bin, path and parking provision):	
REAR GARDEN:	113.5m²



rev:

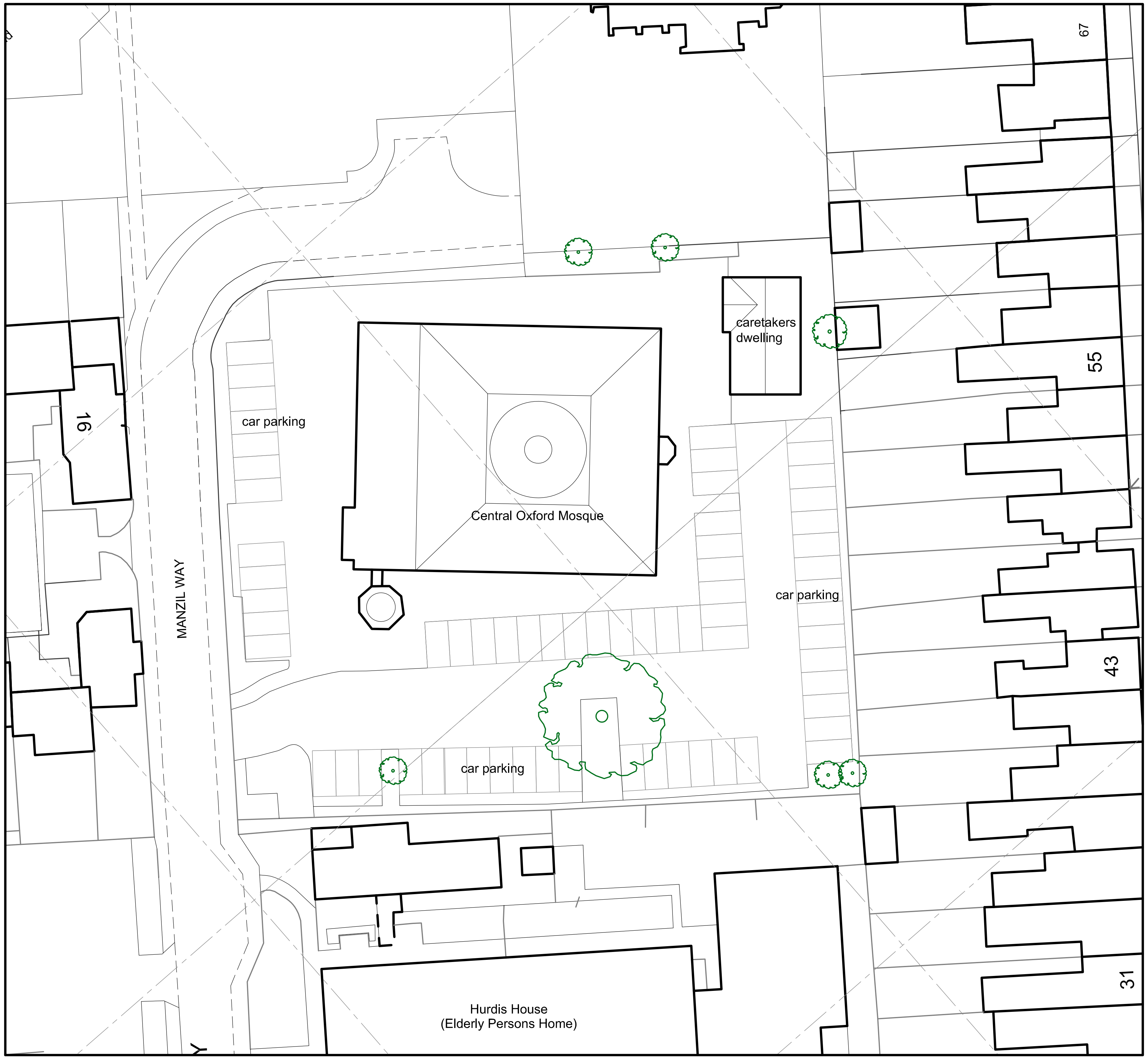
client:
OXFORD MOSQUE & ISLAMIC
CULTURAL SOCIETY
MANZIL WAY
OXFORD
OXON. OX4 1DJ

project:
PROPOSED CARETAKERS DWELLING

drawing:
PROPOSED:
FLOOR PLANS & ELEVATIONS

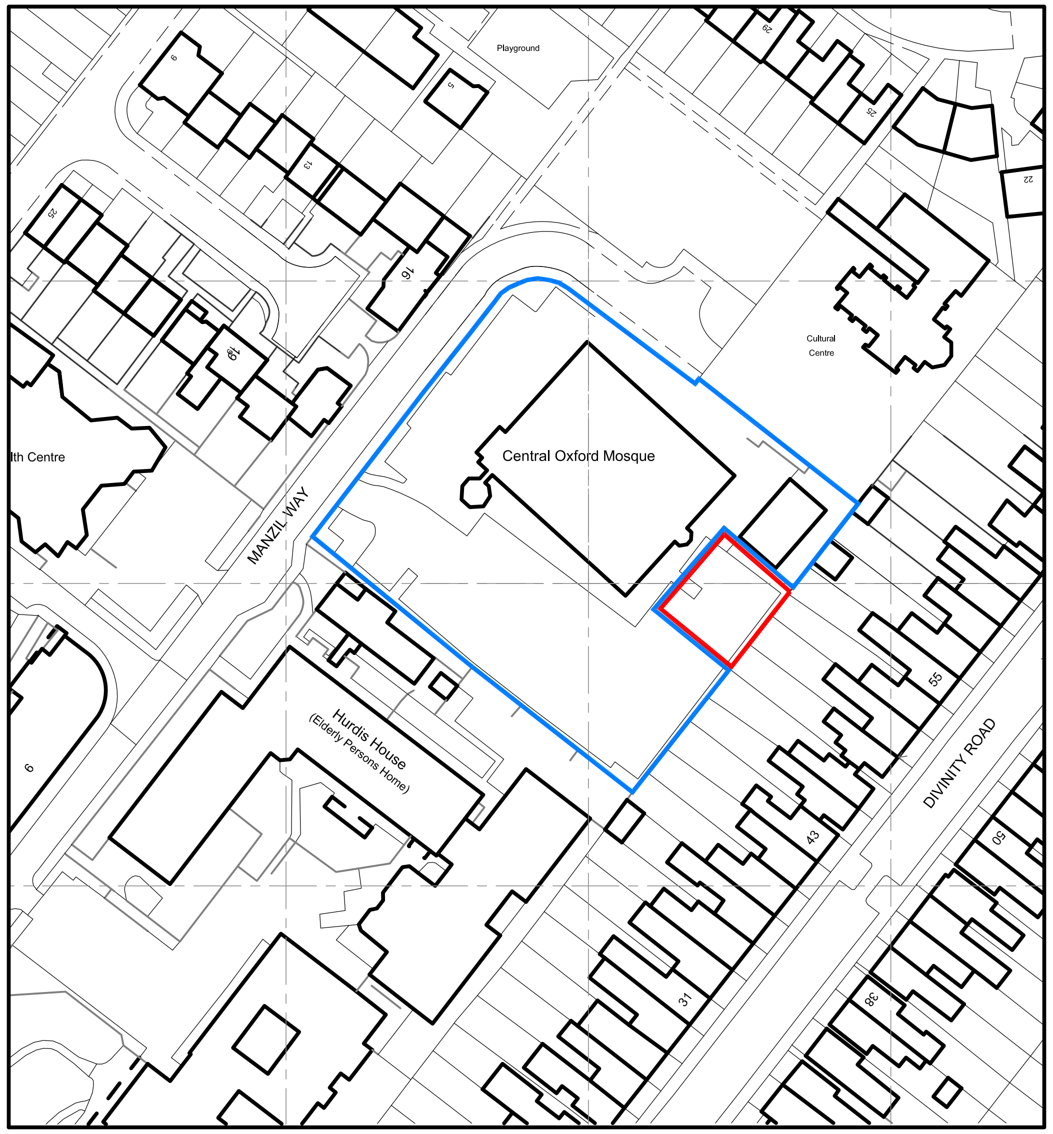
NT: architect
t: 07855 978389
e: office@ntarchitect.uk

date: AUG 23
drawn: NT
scale: 1:100@A2
drawing no.: 23.57 - P2.01
rev:



BLOCK PLAN
SCALE: 1:500@A3

0 5m 10m 15m 20m 25m
scale



LOCATION PLAN
SCALE: 1:1250@A3

0 10m 20m 30m 40m 50m
scale

NT: architect
t: 07855 978389
e: office@ntarchitect.uk

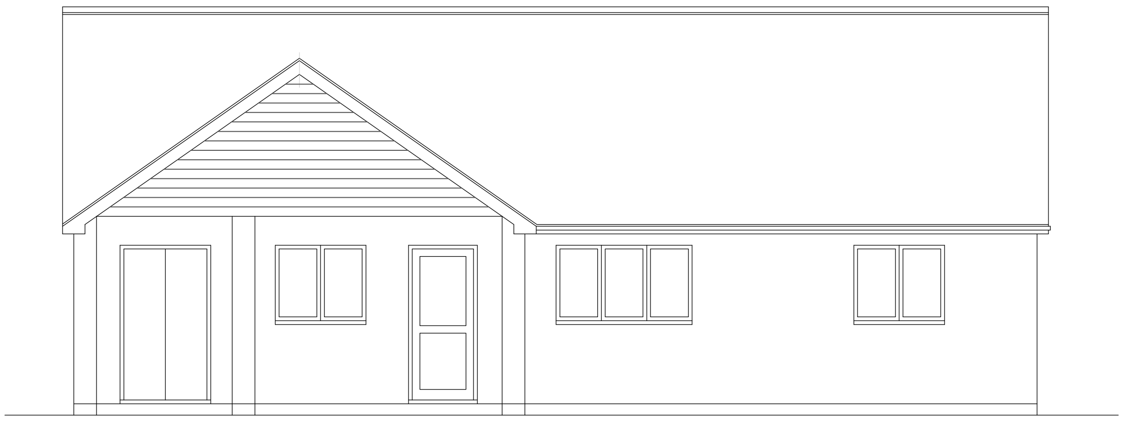
rev:

client:
OXFORD MOSQUE & ISLAMIC CULTURAL SOCIETY
MANZIL WAY
OXFORD
OXON. OX4 1DJ

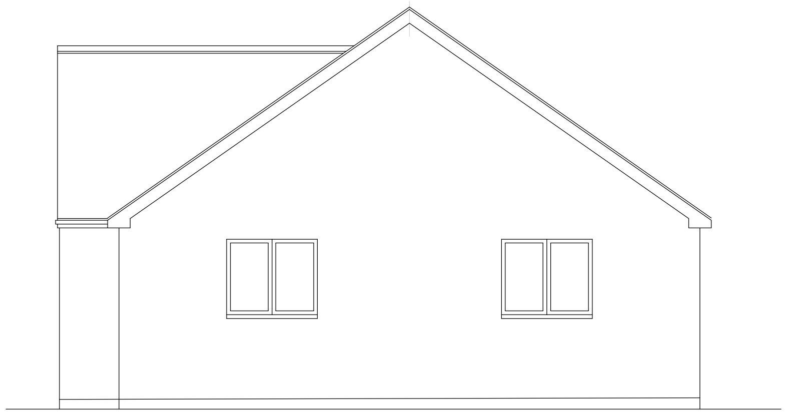
project:
PROPOSED CARETAKERS DWELLING

drawing:
EXISTING:
LOCATION & BLOCK PLANS

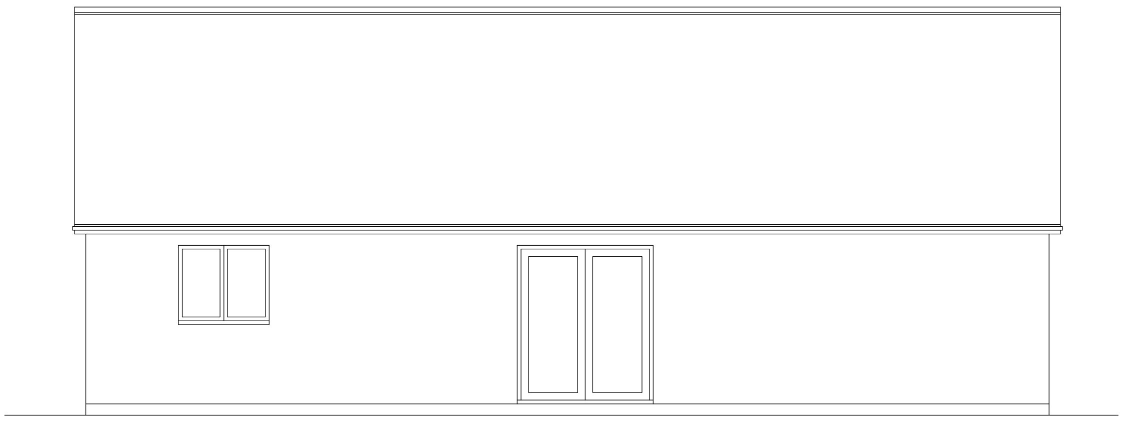
date: SEP 23
drawn: NT
scale: as noted
drawing no.: 23.57 - S1.01
rev:



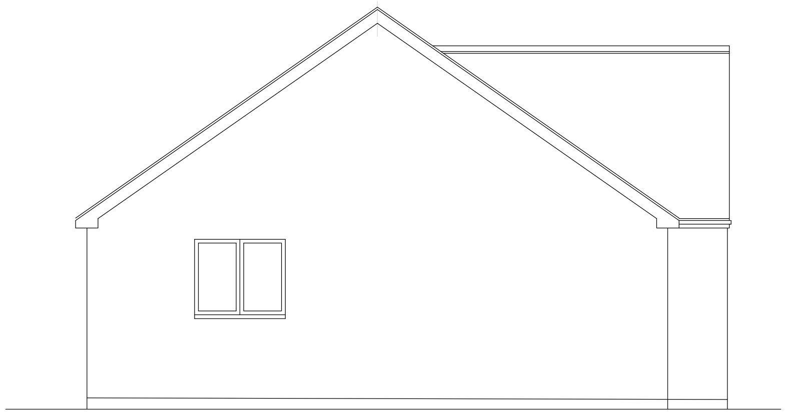
FRONT ELEVATION



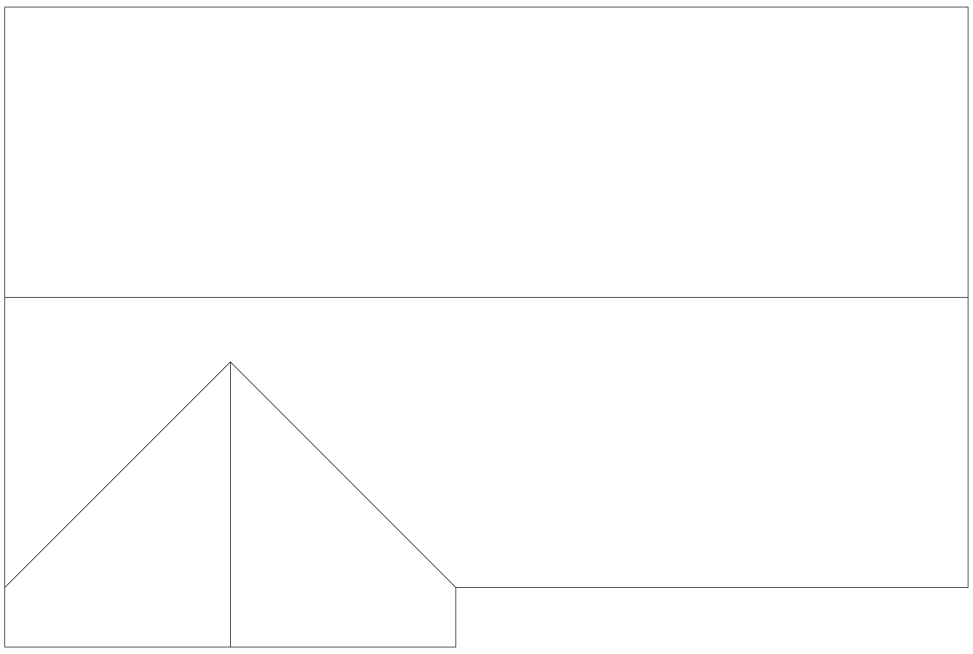
SIDE ELEVATION



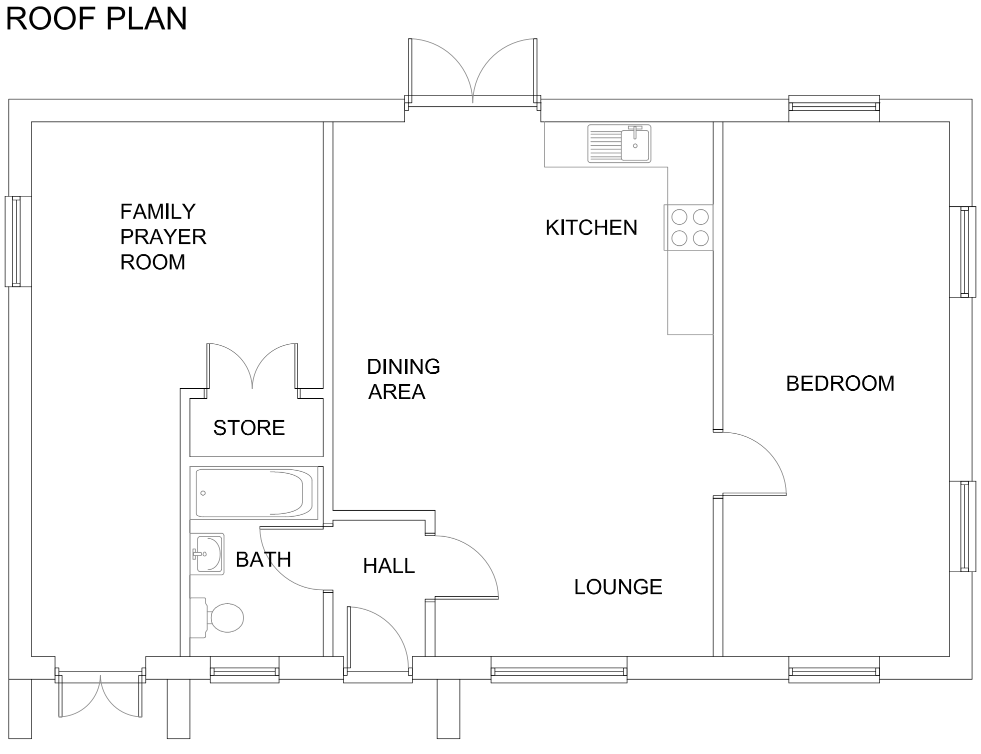
REAR ELEVATION



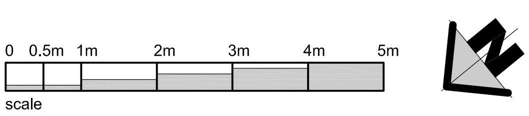
SIDE ELEVATION



ROOF PLAN



GROUND FLOOR PLAN



NT: architect

t: 07855 978389
e: office@ntarchitect.uk

rev:

client:
OXFORD MOSQUE & ISLAMIC
CULTURAL SOCIETY
MANZIL WAY
OXFORD
OXON. OX4 1DJ

project:
PROPOSED CARETAKERS DWELLING

drawing:
EXISTING:
FLOOR PLANS & ELEVATIONS

date:
AUG 23

drawn:
NT

scale:
1:100@A3

drawing no.:
23.57 - S2.01

rev:

breglobal

Job no: PR11278
Date: 19/01/2024
Assessor name: Iraj Maghounaki
Registration no: BRE400012
Development name: Appendix F of the Energy Statement

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

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

	House Type:	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7		Type 8		Type 9		Type 10	
	Description:	SAMPLE																			
Installation Type	Unit of measure	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		Dual																			
WC	Full flush volume	6	8.76		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
	Part flush volume	3	8.88		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	6	11.06		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Are both a Bath & Shower Present?		Bath & Shower																			
Bath	Capacity to overflow	155	17.05		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	8	34.96		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	6	13.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a washing machine been specified?		No																			
Washing Machine	Litres / kg		17.16		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a dishwasher been specified?		No																			
Dishwasher	Litres / place setting		4.50		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Has a waste disposal unit been specified?		No	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Water Softener	Litres / person / day	0	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Calculated Use			115.4		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Normalisation factor			0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91
Code for Sustainable Homes	Total Consumption		**105.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**
	Mandatory level		Level 3/4		-		-		-		-		-		-		-		-		-
Building Regulations 17.K	External use		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0
	Total Consumption		**110.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**
	17.K Compliance?		Yes		-		-		-		-		-		-		-		-		-