



The Havebury Housing Partnership

PROPOSED DEVELOPMENT AT LAND SOUTH OF BRICK LANE, MEPAL

Energy and Sustainability Statement





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1 EXECUTIVE SUMMARY

WSP has been instructed by The Havebury Housing Partnership to undertake an Energy & Sustainability Strategy to support the planning application of the Proposed Development at land off Brick Lane and Sutton Road in Mepal, East Cambridgeshire.

Full planning permission is sought for the construction of 55 new dwellings, parking, new access road and associated services.

Energy and Carbon Targets

Multiple layers of energy and carbon requirements apply to the development at a national and local level, each of which requires different targets to be met.

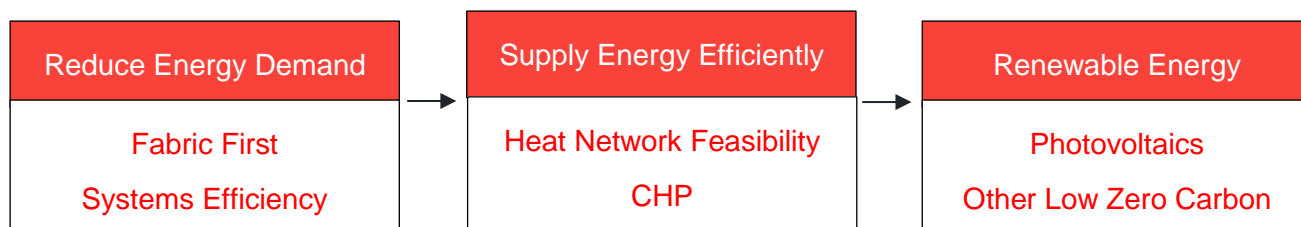
The implications of the relevant targets for the proposed development can be summarised as follows:

- All developments must meet the prevailing Building Regulations requirements. The development will be brought forward under Part L 2013 (with 2016 amendments) and this has been used as the basis of this energy statement.
- The Planning Application Validation Checklist states that Renewable Energy and Water Consumption Assessments are required for all developments which consist of 10 or more dwellings.
- Policy ENV 4 of the current East Cambridgeshire Local Plan (adopted April 2015) requires all residential developments of five or more homes to achieve Code for Sustainable Homes (CfSH) level 4. This requirement is reiterated within the Design Guide Supplementary Planning Document. Since the adoption of the local plan, the CfSH scheme has become defunct and is no longer applicable.
- Policy LP22 of the proposed Local Plan also states that design matters should have regard for the Design Guide Supplementary Planning Document. In addition, Policy LP23 states that dwellings should achieve no more than 110 litres of water per person per day.

Energy Statement

The Energy Statement has been structured in accordance with the energy hierarchy:

Figure 1 - Energy Hierarchy



The proposals for the scheme have been developed in accordance with the desire to achieve an energy efficient and sustainable development. Further design development will determine the exact specification and fabric values of construction materials used and an element of flexibility is required at this stage.

Reduce Energy Demand

The dwellings will be designed to achieve optimum energy performance and will incorporate the following design features:

- Exceeding the minimum fabric requirements of Part L1A (2013) of the Building Regulations.
- All dwellings will include 100% low energy lighting.
- All dwellings will be designed for natural ventilation.
- All dwellings will be served with individual high efficiency gas boilers for Space Heating and Domestic Hot Water.

Supply Energy Efficiently

- **Combined Heat and Power** - Gas-fired CHP units are *not recommended* as they are high carbon and not viable for this scheme.

District Heating Network – proposal beyond the framework – It is generally considered that District Heating is only suitable for developments with a heat density over 30 kWh/m², and hence unviable for the lower densities on this site. However, we are aware District Heating for low-density villages is being experimented across the UK. A cost-efficiency study can be undertaken to estimate feasibility, relying on the experience of the nearby village of Swaffham Prior, similar in size and density to Mepal, which after receiving multiple grants is constructing a village-wide heat network system during 2020-2021, with 200m boreholes extracting renewable heat using heat pumps from the underground water reservoir. To enable future-proofing of the development, the design may be altered to allow easy construction and implementation of such a heat network system in the future.

This proposal, beyond the scope of the new development to encompass the entire village, has *not* been included in modelling or calculation for this report and is only a recommendation for strategic approach for a village regeneration through sustainable expansion.

Renewable Energy

Apart from district heating network using ground/water source heat pump, other renewable technology found viable is Photovoltaic Panels.

- **Photovoltaics Systems – design ready for implementation**

Photovoltaics has been identified as a viable technology for the development, however the implementation on the rooftops of the proposed new dwellings should be considered on a case-by-case basis, subject to building orientation and viability.

Energy & carbon: Results

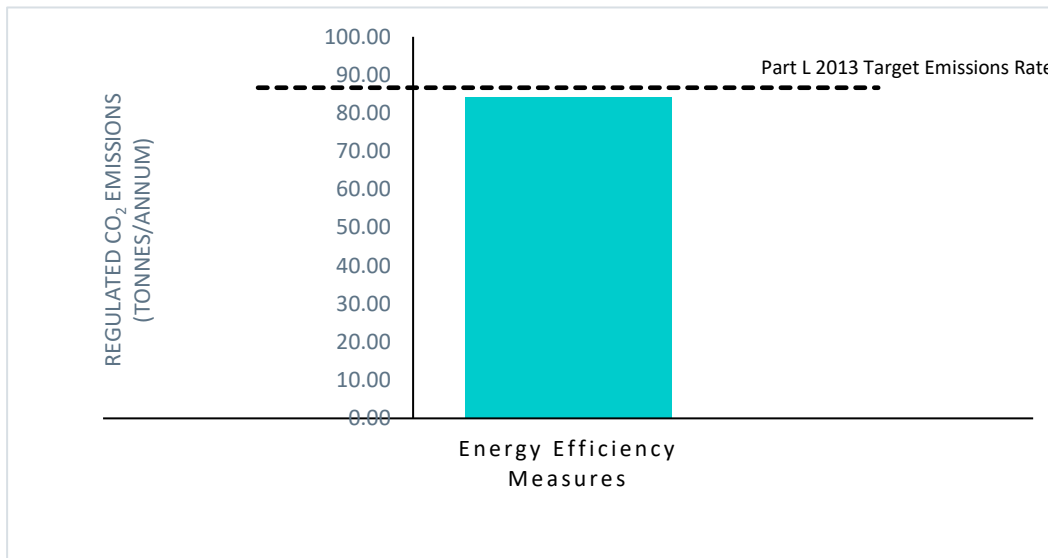
Whilst the exact design and specification is still under development, it can be seen that the local policy requirements and national Building Regulation can be met by applying fabric first approach to tighten dwelling design, together with high efficiency gas boilers.

Accredited Design SAP 2012 software was used to determine the regulated carbon emissions for a sample of typical houses and bungalows in the new development. The results were then extrapolated across the whole development to assess the total baseline carbon emissions, the

carbon emissions after the application of energy efficiency measures and the carbon emissions after the application of low and zero carbon technologies. The results are shown in Table 1 below.

Table 1 - Carbon emissions reductions based on fabric improvement and photovoltaics

	Part L 2013 Target Emissions Rate (TER)	Building Emissions Rate (BER)	Unregulated Emissions
Annual Carbon Emissions (T CO ₂)	86.66	84.30	79.23



With fabric improvements and efficient gas boilers, averaged over all 55 no. dwellings, the overall Building Emissions Rate (BER) is **2.72% lower** than the Target Emissions Rate (TER).

Water Use Statement

Policy ENV 4 of the current East Cambridgeshire Local Plan (adopted April 2015) requires all residential developments of five or more homes to achieve Code for Sustainable Homes (CfSH) level 4. Since the adoption of this document, the CfSH scheme has become defunct and is no longer applicable. However, under the mandatory requirements for Levels 3 and 4 of CfSH, the water consumption performance of a typical development unit must be equivalent to a maximum of 105 litres of water per person per day.

Therefore, the target of 105 l/p/d is set for the Proposed development to comply with Policy ENV 4 of the current East Cambridgeshire Local Plan and CfSH levels 3/4.

The proposed water strategy achieves a total 104.1l/p/d for a typical dwelling, allowing the Proposed Development to meet and further exceed the required target of 105 l/p/d.

Sustainability Statement

The Proposed Development will aim to meet the highest levels of sustainability throughout the scheme and meet all local relevant policy requirements in this area. This document outlines how the scheme aims to meet local policy for ensuring sustainability, whilst exploring how it can go further.

The objectives of the Sustainability Statement are focused on reviewing the applicable requirements set by the Building Regulations and East Cambridgeshire Local Plan (Adopted April 2015) and propose strategies to meet the development's sustainability and water conservation targets.

The following key issues have been the drivers behind the development of the masterplan, and are the areas focused upon, each explaining policies addressed:

- Transport

The proposed development would be in accordance with the aims and objectives of Local and National Transport Planning Policy and would not have a severe impact on the local transport network.

- Flood risk

The site is designated as Flood Zone 1, according to the Environment Agency's website, and therefore flood risk is low. Water attenuation through roofs and gardens have been calculated for the different drainage zones.

- Ecology / Biodiversity

The site is not covered by any statutory or non- statutory wildlife site designation, and does not occur particularly close to any statutory designated site. Surveys have been conducted according to regulations to assess local fauna and flora for integration with landscape planning.

- Land contamination

No potential on or off-site source of contamination were identified. Chemical analyses on soils undertaken to date indicate that the concentrations of contaminants are not considered to pose a risk to structures and services within the proposed development scheme.

- Noise

Noise affecting the development has been assessed in accordance with relevant standards and guidance. The design of the development is considered to be acceptable subject to the adoption of acoustically upgraded glazing and ventilation and acoustic screening around gardens in a small number of areas.

- Air pollution

Based on the Air Quality Assessment the air quality impacts from the Proposed Development during the construction and operational phase would be "Not Significant".

- Materials and construction waste

During construction, waste can be minimised with a site waste management plan setting out procedures. Where possible material, including aggregate can be reused on-site. The approach for materials procurement would take into account the hierarchy of reclaimed or reused, recycled and lastly new materials.

- Operational waste management

Operational waste will be collected from individual dwellings at a set time in a conventional manner. Waste bins quantity, capacity and location are set by the 'RECAP Waste Management Design Guide' as instructed in the Local Plan.

2 PROJECT BACKGROUND

The Proposed Development is located at the land south of Brick lane, in the village of Mepal, East Cambridgeshire, 5km west of the City of Ely, and 23km north of the City of Cambridge.

On a former agricultural plot, adjacent to the village boundary, the Proposed Development consists of 55No. residential dwellings including 10 bungalows and 45 houses.

Full planning permission is sought for the construction of 55 new dwellings, parking, new access road and associated services.

Figure 2 - East Cambridgeshire with Mepal indicated with red mark (Left), village of Mepal with plot of proposed development marked in blue (Right)

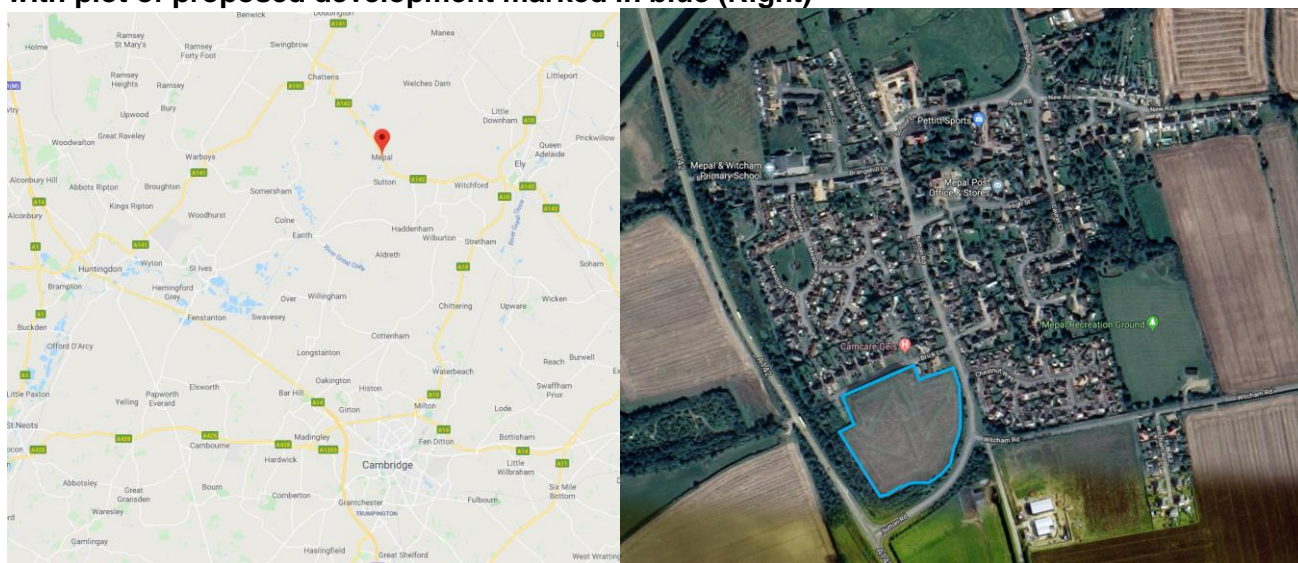


Table 2 - Schedule of Accommodation

Type	Number
2-Bed Bungalow	5
3-Bed Bungalow	5
1-Bed House	6
2-Bed House	17
3-Bed House	16
4-Bed House	5
5-Bed House	1
Total	55

3 POLICY CONTEXT

In terms of energy, relevant policy applies at both a local and national level.

3.1 BUILDING REGULATIONS (PART L)

All new buildings constructed in England and Wales must meet the minimum requirements of the UK Building Regulations. Specifically, with regards to energy and carbon compliance, all buildings must meet the building regulations Part L 'Target Emission Rate' (TER) requirements for the Part L revision which is current at the time of initial construction works. The requirements of Part L1a: 2013 will apply to the site known as land south of Brick Lane, Mepal.

Building Regulations are set to become more stringent in 2020, increasing the reduction of CO₂ emissions required. New homes are expected to be between 20%-31% better, by demanding increase in fabric standard (thermal insulation and glazing), better heating equipment, waste water heat recovery system and photovoltaic panels.

3.2 EAST CAMBRIDGESHIRE LOCAL PLAN (2015)

The East Cambridgeshire Local Plan was adopted in April 2015, with the key policy relating to energy being:

Policy ENV 4: Energy and water efficiency and renewable energy in construction requires that all new development should aim for reduced or zero carbon in accordance with the zero-carbon hierarchy:

1. Maximising energy efficiency
2. Incorporating renewable or low carbon energy sources on-site

The policy requires implementation of The Code for Sustainable Homes (CSH), but this code has been defunct since 2016. In accordance with best practice of sustainable design for new homes, incorporating thermally insulated fabric and improved glazing with efficient gas boilers, a significant reduction of emissions is achieved.

3.3 LOCAL POLICY RESPONSE

Policy	Description	Summary	Scheme response
East Cambridgeshire Local Plan (Adopted April 2015)			
ENV 4	Energy and water Efficiency and renewable energy in construction	<ul style="list-style-type: none"> — All proposals for new development should aim for reduced or zero carbon development in accordance with the zero-carbon hierarchy: first maximising energy efficiency and then incorporating renewable or low carbon energy sources on-site as far as practicable. — Developments of 5 or more homes are required to achieve Code for Sustainable Homes Level 4 (Levels 3/4: Equivalent to 90-105 litres of water per person per day.) 	<ul style="list-style-type: none"> — The development will achieve a substantial reduction in CO₂ emissions, above part L requirements. — There is no district heating network in the area. A village experimental heat network is suggested for a feasibility study, as well as a future ready design to accommodate such a network in the future. — Combined Heat and Power (CHP) is not feasible for the development due to the low and intermittent energy demand. — The proposed water strategy achieves a total 104.1l/p/d for a typical dwelling, allowing the Proposed Development to meet and further exceed the required target of 105 l/p/d.
ENV 6	Renewable energy development	<ul style="list-style-type: none"> — Proposals for renewable energy and associated infrastructure will be supported, unless their wider environmental, social and economic benefits would be outweighed by significant adverse effects that cannot be remediated and made acceptable. 	<ul style="list-style-type: none"> — The development will accommodate future photovoltaic systems on suitable roofs, in terms of shading, orientation and tilt.

Policy	Description	Summary	Scheme response
ENV 2	Design – (Waste Management)	<ul style="list-style-type: none"> — Comply with the RECAP Waste Management Design Guide Supplementary Planning Document- the Council will encourage innovative solutions to minimising and handling waste and recycling on development sites. 	<ul style="list-style-type: none"> — External bin storage and collection points have been designated — Each unit will be provided with sufficient external waste storage in the form of one green ‘garden and food waste’ bin and one blue ‘recycling bin’ — Each unit will be provided with sufficient internal waste storage in the form of an integrated recycling bin within a kitchen unit — The road network within the site has been designed to ensure waste collection vehicles can serve all units on the site effectively

Policy	Description	Summary	Scheme response
ENV 7	Biodiversity and geology	<ul style="list-style-type: none"> — Protect the biodiversity and geological value of land and buildings and minimise harm to or loss of environmental features, such as trees, hedgerows, woodland, wetland and ponds. — Provide appropriate mitigation measures, reinstatement or replacement of features and/or compensatory work that will enhance or recreate habitats on or off site where harm to environmental features and habitat is unavoidable; and — Maximise opportunities for creation, restoration, enhancement and connection of natural habitats as an integral part of development proposals. 	<ul style="list-style-type: none"> — The tree belt in the southwest of the Site is to be retained and, therefore, the development should not result in a significance adverse impact on foraging bats. — Existing boundary hedgerows and tree belt will, where possible, be retained, protected, enhanced and kept free of artificial lighting after dark. — Landscaping of peripheral areas of the Site will seek to enhance biodiversity by native planting. — Bat and/ or bird boxes could be incorporated into new buildings—particularly those that face the retained tree belt in the southwest sector of the Site. — The clearance of any cover vegetation will be considered to take place outside the bird breeding season, in the period September-February, or immediately after a check by an experienced ornithologist that verifies nesting bird absence from the Site.

Policy	Description	Summary	Scheme response
ENV 8	Flood risk	<ul style="list-style-type: none"> — All developments and re-developments should contribute to an overall flood risk reduction and new development should normally be located in Flood Risk Zone 1 — New development must demonstrate that appropriate surface water drainage arrangements for dealing with surface water run-off can be accommodated within the site — SuDS may be incorporated within the Flood Risk Assessment. 	<p>As confirmed in the Flood Risk Assessment:</p> <ul style="list-style-type: none"> — The development is situated in flood zone 1, an area with a low probability of flooding — The proposed drainage strategy for the scheme includes provision for SuDs Features (pipes and manholes, gullies, ditches, control structures, permeable paving and swales) — A Surface Water Management plan is proposed — The preliminary drainage calculations show that the water for the 1 in 100-year storm with 40% climate change can be contained within the designed drainage system
ENV 9	Pollution	<ul style="list-style-type: none"> — All development proposals should minimise, and where possible, reduce all emissions and other forms of pollution, including light and noise pollution, and ensure no deterioration in air and water quality. — Development proposals where there is a risk of pollution should include a Pollution Management Plan which includes details of the identified risks and the proposed control measures. 	<ul style="list-style-type: none"> — Air quality impacts from the Proposed Development during the construction and operational phase would be “Not Significant”. — Each residential unit will include an individual low NO_x boiler with an emissions rating of <40mg/kWh, and no centralised combustion or energy plant is proposed.

Policy	Description	Summary	Scheme response
COM 7	Transport impact	<ul style="list-style-type: none"> Development should be designed to reduce the need to travel, particularly by car, and should promote sustainable forms of transport appropriate to its particular location. Opportunities should be maximized for increase in permeability and connectivity to existing networks. 	<ul style="list-style-type: none"> No capacity issues at the junctions assessed with the addition of development traffic. The development is considered unlikely to have a detrimental impact on local highway safety. A Construction Management Plan has been proposed to help manage traffic movements during the construction period. Cycle parking provision The development will be served via a new road access (built to CCC standards) formed from the existing Brick Lane and new footpaths to site boundaries

4 ENERGY & CARBON: BASELINE CARBON EMISSIONS

The first stage of the energy assessment is to establish the baseline site energy demand and CO₂ emissions based on accredited SAP/ software for the residential areas.

NHER Plan Assessor [6.2.3] SAP software was used to establish the baseline regulated carbon emissions and unregulated carbon emissions. The results for the sample dwellings were then extrapolated to calculate the baseline carbon emissions and energy demand for the dwellings across the whole development.

Table 3 summarises sample of models considered.

Table 3 - Summary of SAP models created

Type	Description	Multiplier
1	1 Bedroom House	6
2	2 Bedroom House	17
3	3 Bedroom House	16
4	4 Bedroom House	5
5	5 Bedroom House	1
6	2 Bedroom Bungalow	10

In order to calculate the baseline carbon emissions, a 'notional' fabric performance has been assumed. These are described in the table below.

Table 4 - Fabric performance notional and backstop values

Element	Notional Fabric Performance	Fabric Performance – Backstop Values
External Wall U-value (W/m ² K)	0.18	0.30
Party wall U-value (W/m ² K)	0.00	0.20
Ground floor U-value (W/m ² K)	0.13	0.25
Roof U-value (W/m ² K)	0.13	0.20
Glazing U-value (W/m ² K)	1.40	2.00
Glazing G-value	0.63	-
Air permeability (m ³ /hr.m ² @ 50 Pa)	5.0	10.0
Thermal Mass (kJ/m ² K)	250 (medium)	-

5 ENERGY & CARBON: REDUCE ENERGY DEMAND

The first step to achieving Building Regulations compliance and the targets outlined previously is to reduce energy demand. The measures associated with reducing demand can be termed as 'Energy Efficiency Measures'. The Proposed Development will incorporate a number of relevant energy conservation measures; the benefits of which are discussed below. Further detailed design development will assess the exact specification and fabric values used in construction materials. In line with the energy hierarchy, a "fabric first" approach is to be utilised before consideration of on-site renewable energy generation.

In summary the following measures will be included:

- Good levels of air tightness
- High performance building fabric
- High performance glazing
- 100% low energy lighting
- Natural ventilation
- High efficiency gas boilers

5.1 BUILDING FABRIC

The current proposals for the building fabric performance for the Proposed Development are summarised in Table 5. Further opportunities to improve upon these will be considered at the detailed design stage.

Table 5 - Fabric performance targets

Element	Notional Fabric Performance	Suggested Improvements Above Notional
External Wall U-value (W/m ² K)	0.18	0.13
Party wall U-value (W/m ² K)	-	
Ground floor U-value (W/m ² K)	0.13	
Roof U-value (W/m ² K)	0.13	
Glazing U-value (W/m ² K)	1.4	1.2
Glazing G-value	0.63	
Air permeability (m ³ /hr.m ² @ 50 Pa)	5	4.5
Thermal Mass (kJ/m ² K)	250 (Medium)	
Average Thermal Bridging (W/m ² K)	Approved SAP figures	Calculated

5.2 GAS BOILERS IMPROVEMENT

For the individual gas boilers serving as main heating equipment to supply space heating as well as domestic hot water, the following specifications are suggested:

Table 6 - Gas Boiler Specifications

Type	Combi	Weather or load compensator	Yes
Automatic Ignition	Yes	Burner control	Modulating
Controls	Programmer, thermostat and TRVs	Heat recovery system	FGHRS
Interlock	Yes	Efficiency	91%

5.3 CARBON EMISSIONS REDUCTION

Based upon the energy efficiency measures outlined, and excluding the contribution of low or zero carbon technologies the following total carbon emissions are calculated in Table 7.

The carbon emissions for the development are shown to be lower than the minimum requirements of the Building Regulations.

This is achieved via improved building fabric and high efficiency gas boilers.

Table 7 - Be Lean: Carbon emissions after the application of energy efficiency measures

	Regulated Emissions (T CO ₂)	Unregulated Emissions (T CO ₂)	% Reduction in Regulated Carbon Emissions
Building Regulations Part L 2013 Compliant Development	86.66	79.23	
After energy demand reduction	84.30	79.23	2.72%

6 ENERGY & CARBON: SUPPLY ENERGY EFFICIENTLY

After consumption has been reduced through the application of energy efficiency measures, the next step is to consider low carbon technologies in order to provide further reduction in carbon dioxide emissions.

The following low carbon technologies have been investigated for the Proposed Development.

- Combined Heat and Power (CHP)
- District heating network

6.1 COMBINED HEAT AND POWER (CHP)

On the basis that the development cannot be supplied directly from a district heating network, in line with the energy hierarchy we have considered the use of a CHP led heating system. As a primarily residential development, domestic hot water consumption is likely to make up a significant proportion of the total heat demand, which provides an ideal baseline heat load for the use of CHP.

Gas-CHP units are now not recommended for new developments due to the overall CO₂ emissions increase when compared to individual gas-fired boilers, due to the decarbonisation of the electrical system. In December 2016 the government consulted on the updating of the underlying assumptions used in the SAP assessments; these included the reduction in the carbon intensity of the electrical grid.

A CHP unit has not been suggested for inclusion as alternative options have been considered as being more practical, cost effective and beneficial in the long term as CO₂ emissions from CHP are expected to exceed that of a gas boiler and mains electricity over the lifetime of an installation.

6.2 DISTRICT HEATING NETWORK

Taking advantage of the development location on the boundary of the village with existing dwellings adjacent, a District Heating scheme can be sought to serve the new development as well as the rest of the village. A similar programme being developed in the same council, at the nearby village of Swaffham Prior (see <https://heatingswaffhamprior.co.uk/>), similar in size to Mepal, can be studied. In Swaffham Prior they received multiple grants, totalling around one million pounds, from Waste & Resources Action Programme (WRAP) and Heat Network Improvement Programme (HNIP) to layout a scheme and perform feasibility studies for a village-wide heat network providing space heating and hot water from a central 'Energy Centre' by Heat Pump using underground water at 200m below ground as heat source. In Swaffham Prior, the initial benchmark for implementation was the consent and approval to connect to the network by at least 180 homes. Given Mepal's existing 440 households, with the addition of 55 dwelling of the new development, it deems the development of such a project in Mepal may be feasible subject to further study.

Figure 5 - Perryfields, Dorset District Heating Scheme(left) and details from Swaffham Prior, East Cambridgeshire plans (right)



It is worth noting that the reasons to implement such a plan is not only energy efficiency, which is very high (expected to be 70-80% in comparison to individual household boilers), but also tackling fuel poverty and dependency on oil or gas for heating, and a high expected cost-efficiency (6-7% return). Moreover, with the high investment needed (£2.5-3 million), a wider discussion in context of the regeneration of the entire village is needed.

7 ENERGY & CARBON: RENEWABLE ENERGY TECHNOLOGIES

Renewable Energy Technologies are those listed below which can provide a source of energy on-site that is not primarily based on the consumption of fossil fuels or grid electricity and/or utilises a heat source that is renewable such as ground source and solar thermal systems.

- Wind Power
- Biomass Heating
- Heat Pumps for Heating and/or Cooling
- Solar Thermal Hot Water Heating
- Photovoltaic Panels

We have evaluated a number of renewable energy technologies and outlined how they may be applied to the development.

7.1 WIND POWER



Harnessing the kinetic energy of wind can provide a renewable source of on-site electricity generation. Wind turbines need to be positioned where a frequent and steady source of wind is available that is not too turbulent or uneven in direction. Typically, wind turbines are positioned on the roof of buildings that are significantly higher than their surroundings and or located in open areas where there is minimum disruption to prevailing winds.

Stand-alone systems are subject to national planning restrictions whilst roof mounted systems are generally not recommended due to poor performance and available wind resource in built up areas.

7.2 BIOMASS HEATING



Biomass heating has environmental impacts from transport and fuel combustion which makes it less desirable in Air Quality Management Areas (AQMA's). A review of the potential impact on air quality from increased wood fuelled biomass use in London has been carried out by AEA Energy & Environment, and was published in December 2007. The assessment indicates that potentially increasing the contribution from small-scale wood fuelled biomass combustion may lead to a substantial increase in nitrogen dioxide and particulate matter concentrations.

However, there are several technologies such as ceramic filters, electrostatic precipitators or bag filters which can all be used to significantly reduce the emissions to air and have successfully been used on biomass systems located within AQMA's

Solid biomass relies on a reliable fuel supply which must be delivered and stored on site. Sites using biomass solutions therefore require good access routes both of which are viable on this site.

Biomass boilers also have weekly maintenance requirements and relatively high fuel costs compared to gas.

On the basis that high maintenance and care is likely to be needed, biomass boilers are not proposed for the Brick Lane site development.

7.3 GROUND / WATER / AIR SOURCE HEAT PUMPS



Heat pumps use electricity to turn low grade heat to a higher temperature typically suitable for providing heating and domestic hot water. They work most effectively when the source temperature (whether that is external air, the ground, or a large body of water) is at a relatively high temperature while the required output temperature is relatively low, i.e. between 35°C and 45°C. Some heat pumps can also be reversed to provide cooling.

Heat pumps produce no emissions at point of use and so do not have an impact on air quality in the locality. Additionally, their carbon emissions will reduce in line with the existing and expected decarbonisation of the national grid.

Heat pumps are measured by their coefficient of performance (CoP); that is the ratio of input electricity to the output of heat. Air source heat pumps (ASHPs) generally operate between a CoP of 2.5 and 3, while a good ground or water source heat pump (GSHP / WSHP) may operate between 3.5 – 4.5. These CoPs vary considerably depending on the local source temperatures and the building heat distribution system.

This technology operates most effectively when used to provide space heating via very low temperature systems such as underfloor heating or low temperature radiators. If higher temperatures are required, the CoP reduces. As ground temperatures are stable year-round, GSHPs provide a consistent level of performance throughout the year. Whereas the coefficient of performance of air source heat pumps is directly related to the air temperature. This means the CoP of an ASHP drops in the winter, when demand is greatest but rises in the summer when heating is not normally required.

Site conditions could be assessed after Swaffham Prior Borehole Testing results are published in December 2019. After that publication, and with specific feasibility study for Mepal and Brick Lane Development, this approach could be determined.

7.4 SOLAR THERMAL



Solar thermal generation involves capturing solar radiant heat to preheat or heat domestic hot water.

Correctly located and orientated, solar thermal systems can meet a proportion of a building's domestic hot water dependent on the expected demand profile and available space for locating ST collectors.

A solar thermal system is able to work well alongside a number of different heating solutions including gas boilers or heat pumps, though the majority of the benefit would be during the summer months.

On the basis of only domestic hot water consumption, solar thermal is less favourable than photovoltaics for the extraction of solar energy, and would compete for roof space with photovoltaics (PV) and have limited emissions impact due to there being minimal domestic hot water demand during the summer months when it is most effective. Therefore, this technology is not proposed for the Brick Lane, Mepal site development.

7.5 PHOTOVOLTAIC PANELS



The feasibility of providing photovoltaic (PV) panels has been assessed based upon estimated energy production (kWh) from the installed location along with manufacturers cost data to enable a life cycle cost analysis to be undertaken. Panels correctly oriented, maintained and not obscured by shading can be expected to provide in the region of 867kWh/kWp in Cambridge.

Therefore, Solar PV panels located on the top roof areas can be used to provide electricity generation which can contribute to the Local Authority Targets.

Photovoltaics has been identified as a viable technology for the development, however the implementation on the rooftops of the proposed new dwellings should be considered on a case-by-case basis, subject to building orientation and viability.

7.6 SUITABILITY APPRAISAL

All renewable energy technologies which may be considered feasible for the scheme have been assessed and summarised in Table 8-2.

Table 11 - Renewable technology suitability appraisal

Technology		Appraisal
Wind		Potentially suitable, but not selected
Biomass		Potentially suitable, but not selected
Heat Pumps	Air Source	Potentially suitable, but not selected
	Ground Source	Potentially suitable at this site and recommended for further study
	Water Source	Potentially suitable at this site and recommended for further study
Solar Thermal		Potentially suitable, but not selected
Photovoltaic Panels		Potentially suitable at this site

7.7 CARBON EMISSIONS REDUCTION

All renewable energy technologies which may be considered feasible for the scheme have been assessed, the outcomes of which are summarised above. From that exercise, it was concluded that to pass Building Regulations and Local Plan requirements, fabric improvements are suggested, together with procurement of efficient gas boilers.

Village-wide District Heat Network is suggested for consideration as a future scheme and as part of a village regeneration programme. Photovoltaic systems are found suitable to provide energy on-site on appropriate rooftops.

8 WATER USE

One of the most pressing issues that all new developments must take into account is the management of water and ensuring a sustainable supply and efficient usage. This is especially important in East Cambridgeshire where rainfall averages less than 50mm per month; with the east of England in general enjoying the lowest rainfall in the country. Between 1981 and 2010 the Mepal Weather Station recorded average annual rainfall of 573.9mm compared to a UK average of 1154.0mm.

Water usage mitigation strategy is proposed to follow the following hierarchy:

1. The first step is to reduce the demand for water. This could include using low or dual flush taps, tap flow restrictions, bath size limitations etc. Education can also play a major part to this to encourage less waste along with accessible metering points in order for residents to keep track of usage.
2. The second step is the installation and use of rainwater harvesting, though for larger developments such as this, the release of surface run-off also needs to be considered in order to not affect the local water table/courses. The converse of this is that this technology can help reduce the impact of flooding.
3. The last step is to re-use waste water in the domestic property for a secondary purpose e.g. flushing of WCs or watering of external plants (which together account for 37% of domestic water usage). It is worth keeping in mind that although all water is supplied to a domestic property is of 'drinking water' quality, typically less than 5% is used for that purpose.



Rainwater harvesting in its simplest form involves collecting water from roof tops and re-using them within the building for non-potable water applications. The volume of water collected within a system is dependent on a number of factors and can be calculated from the following formula:

- $\text{Roof area (m}^2\text{)} \times \text{drainage area (0.9 for steep roof and 0.4 for a flat one)} \times \text{filter efficiency (typically 0.9)} \times \text{annual rainfall (574mm)} = \text{Amount you can collect in a year in litres}$
- Depending on the type of roof, rainwater harvesting can collect between 200 and 450 litres of water per year per m²

However, there is a relatively long pay-back period associated with the installation of rainwater harvesting systems on individual dwellings. So, whilst effective in reducing water usage they are not often economically viable for the building occupant. Also, rainwater harvesting is often less suited to individual dwellings due to the high-water demand compared to available roof space.

The code for sustainable homes sets a limit for daily water usage per person, per day (this is against a UK average of 150 litres per person per day).

- Approved Document Part G – 125 litres
- CfSH Level 1 and 2 – 120 litres

- CfSH Level 3 and 4 – 105 litres
- CfSH Level 5 and 6 – 80 litres

Policy ENV 4 of the East Cambridgeshire Local Plan (adopted April 2015) requires all residential developments of 5 or more homes to achieve Code for Sustainable Homes (CfSH) level 4. Since the adoption of these document the CfSH scheme has become defunct and is no longer applicable. However, under the mandatory requirements for Levels 3 and 4 of CfSH, the water consumption performance of a typical development unit must be equivalent to 90-105 litres of water per person per day.

Therefore, the target of 105 l/p/d is set for the Proposed development to comply with Policy ENV 4 of the current East Cambridgeshire Local Plan and CfSH levels 3/4.

The severe water stress facing Cambridge requires this development to efficiently use, reuse and recycle water from the outset. An indicative specification for the installation of demand reduction systems is shown below, though depending on the final design and property types/occupancy this will be designed at a later stage by the M&E and/or architect. As shown below there is a wide range of performance across each category. High specification fixtures, fittings and appliances will be specified across the development.

The Government's national calculation methodology for assessing water efficiency in new dwellings will be used, allowing the development of proposed strategies. "*The Water Efficiency calculator for new dwellings*" is the methodology used in the Table 8 – Water Consumption of a proposed typical dwelling below.

Table 8 – Water Consumption of a proposed typical dwelling

Installation Type	Typical Performance Range in UK market	Proposed Performance*	Proposed Litres per person per day
WC Dual Flush (@ full volume)	3-6 litres	6 litres	8.76
WC Dual Flush (@ part volume)	3-6 litres	4 litres	11.84
Kitchen Taps	6-12 litres/minute	5 litres/minute	12.56
Other Taps	3-12 litres/minute	5 litres/minute	9.48
Bath (max capacity)	100-200 litres	150 litres	16.50
Shower	5-18 litres/minute	8 litres/minute	34.96
Washing Machine	4.5 – 14 litres/kg	8.14 litres/kg	17.09
Dishwasher	0.8 – 1.6 litres/place setting	0.9 litres/place setting	3.24
Total			104.1

*the performance figures above are based on fixtures that are available on the UK market

The proposed strategy achieves a total 104.1l/p/d for a typical dwelling, allowing the Proposed Development to meet and further exceed the required target of 105 l/p/d.

As the scheme develops, the way in which this water use limit will be met will have to be revised. Practical and physical locations will have to be taken into account and further investigations made on the viability of rainwater harvesting and space availability for water butts as well as other appropriate technologies such as grey water recycling, flow restrictors, leak detection and individual



water metering; the final measures installed will likely vary depending on property size, occupancy, and location.

9 SUSTAINABILITY STATEMENT

The purpose of this Sustainability Statement is to explain how the Proposed Development will address sustainable development issues, relevant policies and meet current best practice standards.

A sustainable approach is presented as the desired result for human development as well as the means with which to balance current and future social, economic and environmental needs. This is taken to mean:

“improving the quality of human life while living within the carrying capacity of supporting ecosystems”

(Caring for the Earth: A Strategy for Sustainable Living (Union of Conservation Scientists (IUCN), United Nations Environment Programme (UNEP) and World-Wide Fund for Nature (WWF))

The following key issues have been the drivers behind the development of the masterplan, and are the areas focused upon, each explaining policies addressed:

- Energy and CO₂ Emissions (addressed in more detail in the Energy section 5-8)
- Transport
- Flood risk
- Ecology
- Land Contamination
- Noise
- Air pollution
- Materials and Waste
- Operational Waste Management

9.1 ENERGY AND CO₂

The Proposed Development sets out to be low carbon and will achieve a reduction in carbon emissions of 2.72% over Building Regulations Part L 2013 baseline, incorporating high levels of fabric efficiency, good controls, efficient supply of energy and the use of renewable energy.

Renewable energy in the form of solar panels is being considered for application. Wind has been ruled out on practical considerations, and biomass and combined heat and power because they require a heat network, which is considered unviable here due to the low thermal demand density, and the fact that gas combined heat and power is now considered a high carbon technology due to the decarbonisation of the electrical system.

For further details please refer to the *Energy section of this report* (Section 5-8).

9.2 TRANSPORT

The location and form of the proposed access to the site from Brick Lane has been discussed with CCC highways and presented in the Transport Statement (TS).

According to the TS, the local amenities can be reached via a network of existing footways and cycleways and the existing bus stops provide adequate services between the site and Ely, Chatteris

and March including for workplace community trips. The junction with Brick Lane and Sutton Road is suitable for the increase in vehicle movements that this development would create. Also, a Construction Management Plan has been proposed to help manage traffic movements during the construction period.

Therefore, it is concluded that the proposed development would be in accordance with the aims and objectives of Local and National Transport Planning Policy and would not have a severe impact on the local transport network.

For further details please refer to the *Transport Statement - Land south of Brick Lane Mepal (September 2019)* by Richard Jackson Engineering Consultants.

9.3 FLOOD RISK

The development is situated in flood zone 1, an area with a low flood risk as confirmed in the Flood Risk Assessment. As the soil in this area does not lend itself to infiltration, it is proposed to discharge flows from the site to the existing ditch to the north of the site.

In order to meet the requirements of the Lead Local Flood Authority (LLFA) and Local Flood planning guidance and based on the UKSuDs greenfield runoff estimation tool, it is proposed to discharge from the site at 1 l/s as this is the lowest practicable discharge rate for the site.

It is also proposed to attenuate surface water flows from the residential roofs, private driveway and shared use areas within permeable paving and discharge into a traditional surface water sewer system.

Furthermore, it is proposed to attenuate plots 2-8 within permeable paving and then discharge direct to the ditch running adjacent.

As the main highway on the site cannot be surfaced with permeable paving, it is proposed to drain and attenuate the proposed adopted highway within oversized tank sewers located beneath the highways within the site.

The required surface water quality at the site will be achieved by the inclusion permeable paving across the site, a swale located to the north west of the site and also a downstream defender prior to discharging off site.

For further details please refer to the *49533 - Site Specific Flood Risk and SuDs Assessment - Land south of Brick Lane Mepal (September 2019)* by Richard Jackson Engineering Consultants.

9.4 ECOLOGY

The site is not covered by any statutory or non- statutory wild life site designation, and does not occur particularly close to any statutory designated site. Also, none of the boundary habitats were of particularly high nature conservation or biodiversity value and their ecological function could be replicated by new hedgerow and tree planting as necessary in the context of development planning.

The bat survey has verified that the Site (and mainly the northern boundary hedge) is not of particular importance for commuting or foraging bats, and the proposal to remove and replace the hedge as part of the development construction with a new access road and turning head should not result significant adverse impacts on the local bat population. The woodland in the southwest of the Site is to be retained and the development should not result in a significance adverse impact on foraging bats.

The following high-level ecological measures are proposed to protect and enhance the biodiversity in line with the NPFF:

- Existing boundary hedgerows should, where possible, be retained, protected, enhanced and kept free of artificial lighting after dark.
- Landscaping of peripheral areas of the Site should seek to enhance biodiversity by native planting.
- Bat and/ or bird boxes could be incorporated into new buildings- particularly those that face the retained tree belt in the southwest sector of the Site.
- The clearance of any cover vegetation should take place outside the bird breeding season, in the period September- February, or immediately after a check by an experienced ornithologist that verifies nesting bird absence from the Site

For further details please refer to the *AEL1581 - Preliminary Ecological Appraisal and Bat Activity Report - Land South of Brick Lane Mepal (September 2019)* by Applied Ecology Ltd.

9.5 LAND CONTAMINATION

No potential on or off-site source of contamination were identified. Several potential receptors of contamination were identified including residential end users, construction workers, flora, structures and services. As no potential sources of contamination were identified at the site there were considered to be no plausible potential pollutant linkages active at the site. The risk of contamination at the site is therefore considered to be negligible.

Also on the basis of the results of the chemical analyses on soils undertaken to date, the concentrations of contaminants are not considered to pose a risk to structures and services within the proposed development scheme.

For further details please refer to the *49533 - Ground Investigation Report - Land south of Brick Lane Mepal (March 2019)* and *49533 - Phase One Desk Study - Land south of Brick Lane Mepal (March 2019)* by Richard Jackson Engineering Consultants.

9.6 NOISE

Noise affecting the development has been assessed in accordance with relevant standards and guidance. The design of the development is considered to be acceptable subject to the adoption of acoustically upgraded glazing and ventilation and acoustic screening around gardens in a small number of areas.

For further details please refer to the *RP01-18894 (Rev 2) - Noise Assessment - Land south of Brick Lane Mepal (October 2019)* by Cass Allen Associates Ltd.

9.7 AIR POLLUTION

It is identified that there is a “Low to Medium Risk” of dust soiling impacts and “Negligible Risk” of increases in particulate matter concentrations that would affect human health due to construction activities. Also, each residential unit will have an individual low NO_x boiler with an emissions rating of <40mg/kWh, and no centralised combustion or energy plant is proposed.

Based on the Air Quality Assessment the air quality impacts from the Proposed Development during the construction and operational phase would be “Not Significant”.

With regards to the site suitability, future users of the Proposed Development are unlikely to experience concentrations above the Air Quality Objectives (AQOs), given the background concentrations of NO₂, PM₁₀ and PM_{2.5} in the vicinity of the Proposed development are expected to be well below the relevant AQOs.

For further details please refer to the *Air Quality Assessment - Land south of Brick Lane Mepal (October 2019)* by MLM Group.

9.8 MATERIALS AND CONSTRUCTION WASTE

During construction, waste can be minimised with a site waste management plan setting out procedures. Where possible material, including aggregate can be reused on-site. The materials selected for construction is proposed to be considered against the BRE's Green Guide Rating Specification and materials A and B rated should be preferred.

According to the “*External Materials and Boundary Treatments Plan*” provided by MWS Architectural Ltd the main proposed external materials for the development are brick, tiles, cladding and UPVC windows and doors.

In line with the waste hierarchy, when selecting materials, the preferred approach to be considered is:

- I. the use of reclaimed materials;
- II. the use of materials with higher levels of recycled content; and
- III. the use of new materials

Materials are to be sourced locally where feasible which will provide a number of benefits for the development. The financial and environmental cost of transportation will be greatly minimised, whilst adding value to the local community through economic and employment growth.

Environmental awareness training is proposed to be provided for all staff involved in construction, with the aim of reducing wastage on site through the correct storage and use of materials.

Where possible, ensure internal finishes are chosen to minimise their VOC (Volatile Organic Compound) content, leading to an improved indoor air quality for construction workers and users.

9.9 OPERATIONAL WASTE MANAGEMENT

Operational waste will be collected from individual dwellings at a set time in a conventional manner. Waste bins quantity, capacity and location was set by the RECAP (Cambridgeshire and Peterborough Waste Partnership) Waste Management Design Guide as instructed in the Local Plan.

Bin location is indicated in plan '355_BiN_01 (Rev A) – Refuse Bin Storage and Collection Point Plan (November 2019)'.

Each unit will be provided with sufficient external waste storage in the form of one green 'garden and food waste' bin and one blue 'recycling bin'. Furthermore, each unit will be provided with sufficient internal waste storage in the form of an integrated recycling bin within a kitchen unit.

The road network within the site has been designed to ensure waste collection vehicles can serve all units on the site effectively.

9.10 WATER USE

The target of 105 l/p/d is set for the Proposed development to comply with Policy ENV 4 of the current East Cambridgeshire Local Plan and CfSH levels 3/4.

The proposed water strategy achieves a total 104.1l/p/d for a typical dwelling, allowing the Proposed Development to meet and further exceed the required target of 105 l/p/d.

Regarding the installation of rainwater harvesting systems, there is a relatively long pay-back period when they are applied on individual dwellings. So, whilst effective in reducing water usage they are not often economically viable for the building occupant. Also, rainwater harvesting is often less suited to individual dwellings due to the high-water demand compared to available rood space.

On that basis the installation of rainwater harvesting systems is not proposed for the site development.

For further details please refer to the *next section (Section 9) of this report*.

9.11 SUSTAINABILITY STATEMENT – CONCLUSION

The proposed development is set to qualify on all relevant national and local policy regarding sustainability and environmental requirements.

10 RESULTS

The steps taken to pass national and local regulations concerning energy and sustainability are listed below:

10.1 ENERGY CONSERVATION AND ENERGY EFFICIENCY

Through the application of the measures identified in Section 6, the regulated carbon emissions are shown to be reduced to 84.30 TCO₂ per annum, using a 'Fabric First' approach and high efficiency gas boilers.

10.2 SUPPLY ENERGY EFFICIENTLY

The application of low carbon technologies has been explored; An ambitious plan for a village wide heat network is suggested but not accounted for.

Following on from this stage the regulated carbon emissions are unchanged at 84.30 TCO₂ per annum.

10.3 RENEWABLE TECHNOLOGY

The feasibility of a range of renewable technologies has been assessed in the context of the local policy target. Ground-source or water-source heat pumps are recommended for further studies. Design ready for photovoltaic systems is recommended on suitable rooftops on a case-by-case basis.

10.4 WATER USE

The proposed strategy achieves a total 104.1l/p/d for a typical dwelling, allowing the Proposed Development to meet and further exceed the required target of 105 l/p/d.

10.5 SUSTAINABILITY STRATEGY

The proposed development is set to qualify on all relevant national and local policy regarding sustainability and environmental requirements.

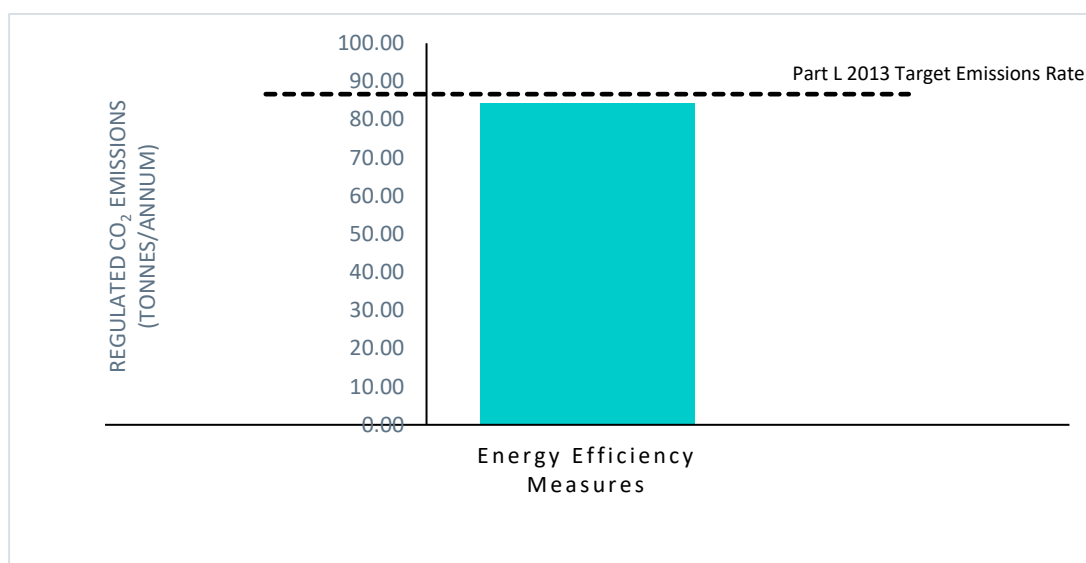
10.6 CONCLUSION

Through the utilisation of energy efficiency measures, the houses and bungalows in the Proposed Development will reduce overall carbon emissions against Building Regulations Part L 2013 by 2.72%. Further work will be undertaken at a later design stage to provide more detail on maximising energy efficiency measures and the required PV.

Sustainability strategy takes into account all local and national policy and the design is set to qualify for all requirements.

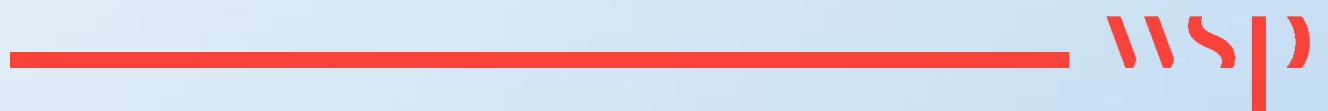
Table 9 - Carbon emissions reductions based on fabric improvement and photovoltaics

	Regulated Emissions (T CO ₂)	Unregulated Emissions (T CO ₂)	% Reduction in Regulated Emissions
Baseline: Part L 2013 of the Building Regulations Compliant Development	86.66	79.23	-
After energy demand reduction	84.30	79.23	2.72%



Appendix A

SAP OUTPUTS



Appendix A.1

AFTER ENERGY DEMAND REDUCTION



1 Bedroom House Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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

Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	Plots 29-32,37,38, x		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 18.49	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 17.29	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 17.29 < TER 18.49	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 32.7 < TFEE 41.9	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th colspan="2">Weighted average Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td>0.00 (max 0.20)</td><td>N/A</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.20 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average Highest		Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	0.00 (max 0.20)	N/A	Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.20 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
Element	Weighted average Highest																				
Wall	0.13 (max 0.30)	0.13 (max 0.70)																			
Party wall	0.00 (max 0.20)	N/A																			
Floor	0.13 (max 0.25)	0.13 (max 0.70)																			
Roof	0.13 (max 0.20)	0.13 (max 0.35)																			
Openings	1.20 (max 2.00)	1.20 (max 3.30)																			
Thermal bridging																					
How has the loss from thermal bridges been calculated?	Thermal bridging calculated from linear thermal transmittances for each junction	Authorised SAP Assessor																			
Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

URN: BrickLane-House-1bed version 1
NHER Plan Assessor version 6.3.4
SAP version 9.92

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	<p>Schedule of installed fixed internal lighting</p> <p>Standard lights = 0</p> <p>Low energy lights = 10</p> <p>Percentage of low energy lights = 100%</p> <p>Minimum = 75 %</p>	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	<p>Overheating risk (June) = Not significant (18.56°)</p> <p>Overheating risk (July) = Slight (20.64°)</p> <p>Overheating risk (August) = Slight (20.61°)</p> <p>Region = East Anglia</p> <p>Thermal mass parameter = 250.00</p> <p>Ventilation rate in hot weather = 4.00 ach</p> <p>Blinds/curtains = None</p>	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m³/(h.m²) at 50Pa)	<p>Design air permeability = 4.50</p> <p>Max air permeability = 10.00</p>	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	<p>The following walls have a U-value less than 0.15W/m²K:</p> <ul style="list-style-type: none"> • ExtWall Ground Floor (0.13) <p>The following party walls have a U-value less than 0.2W/m²K:</p> <ul style="list-style-type: none"> • ParWall Ground Floor (0.00) 	Authorised SAP Assessor	

2 Bedroom House Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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

Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	48/5 23,24,25, Mepal		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 21.08	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 20.46	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 20.46 < TER 21.08	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 49.1 < TFE 59.6	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th colspan="2">Weighted average Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td>0.00 (max 0.20)</td><td>N/A</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.11 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average Highest		Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	0.00 (max 0.20)	N/A	Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.11 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
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Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	<p>Schedule of installed fixed internal lighting</p> <p>Standard lights = 0</p> <p>Low energy lights = 10</p> <p>Percentage of low energy lights = 100%</p> <p>Minimum = 75 %</p>	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	<p>Overheating risk (June) = Not significant (17.89°)</p> <p>Overheating risk (July) = Not significant (19.99°)</p> <p>Overheating risk (August) = Not significant (19.94°)</p> <p>Region = East Anglia</p> <p>Thermal mass parameter = 250.00</p> <p>Ventilation rate in hot weather = 4.00 ach</p> <p>Blinds/curtains = None</p>	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m³/(h.m²) at 50Pa)	<p>Design air permeability = 4.50</p> <p>Max air permeability = 10.00</p>	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	<p>The following walls have a U-value less than 0.15W/m²K:</p> <ul style="list-style-type: none"> GF_Ext_Wall (0.13) FF_ExtWall (0.13) <p>The following party walls have a U-value less than 0.2W/m²K:</p> <ul style="list-style-type: none"> GF_Dwl_Wall (0.00) FF_Dwl_wall (0.00) <p>The following openings have a U-value less than 1.2W/m²K:</p> <ul style="list-style-type: none"> Solid door reference 7 (1.00) Solid door reference 8 (1.00) 	Authorised SAP Assessor	

3 Bedroom House Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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

Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	3 bed typ3 3 bed house 9,16,35,40, mepal		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 19.50	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 18.84	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 18.84 < TER 19.50	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 49.0 < TFE 60.5	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th colspan="2">Weighted average Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td colspan="2">(no party wall)</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.14 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average Highest		Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	(no party wall)		Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.14 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
Element	Weighted average Highest																				
Wall	0.13 (max 0.30)	0.13 (max 0.70)																			
Party wall	(no party wall)																				
Floor	0.13 (max 0.25)	0.13 (max 0.70)																			
Roof	0.13 (max 0.20)	0.13 (max 0.35)																			
Openings	1.14 (max 2.00)	1.20 (max 3.30)																			
Thermal bridging																					
How has the loss from thermal bridges been calculated?	Thermal bridging calculated from linear thermal transmittances for each junction	Authorised SAP Assessor																			
Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

URN: BrickLane-House-3bed version 1
NHER Plan Assessor version 6.3.4
SAP version 9.92

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	<p>Schedule of installed fixed internal lighting</p> <p>Standard lights = 0</p> <p>Low energy lights = 10</p> <p>Percentage of low energy lights = 100%</p> <p>Minimum = 75 %</p>	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	<p>Overheating risk (June) = Not significant (18.47°)</p> <p>Overheating risk (July) = Slight (20.53°)</p> <p>Overheating risk (August) = Not significant (20.41°)</p> <p>Region = East Anglia</p> <p>Thermal mass parameter = 250.00</p> <p>Ventilation rate in hot weather = 4.00 ach</p> <p>Blinds/curtains = None</p>	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m ³ /(h.m ²) at 50Pa)	<p>Design air permeability = 4.50</p> <p>Max air permeability = 10.00</p>	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	<p>The following walls have a U-value less than 0.15W/m²K:</p> <ul style="list-style-type: none"> • Wall 1 (0.13) <p>The following openings have a U-value less than 1.2W/m²K:</p> <ul style="list-style-type: none"> • Solid door reference 13 (1.00) • Solid door reference 14 (1.00) 	Authorised SAP Assessor	

4 Bedroom House Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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

Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	1, Mepal		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 19.08	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 19.01	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 19.01 < TER 19.08	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 51.9 < TFEE 61.5	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th colspan="2">Weighted average Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td colspan="2">(no party wall)</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.13 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average Highest		Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	(no party wall)		Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.13 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
Element	Weighted average Highest																				
Wall	0.13 (max 0.30)	0.13 (max 0.70)																			
Party wall	(no party wall)																				
Floor	0.13 (max 0.25)	0.13 (max 0.70)																			
Roof	0.13 (max 0.20)	0.13 (max 0.35)																			
Openings	1.13 (max 2.00)	1.20 (max 3.30)																			
Thermal bridging																					
How has the loss from thermal bridges been calculated?	Thermal bridging calculated from linear thermal transmittances for each junction	Authorised SAP Assessor																			
Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

URN: BrickLane-House-4bed version 1
NHER Plan Assessor version 6.3.4
SAP version 9.92

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	<p>Schedule of installed fixed internal lighting</p> <p>Standard lights = 0</p> <p>Low energy lights = 10</p> <p>Percentage of low energy lights = 100%</p> <p>Minimum = 75 %</p>	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	<p>Overheating risk (June) = Not significant (17.85°)</p> <p>Overheating risk (July) = Not significant (19.95°)</p> <p>Overheating risk (August) = Not significant (19.86°)</p> <p>Region = East Anglia</p> <p>Thermal mass parameter = 250.00</p> <p>Ventilation rate in hot weather = 4.00 ach</p> <p>Blinds/curtains = None</p>	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m ³ /(h.m ²) at 50Pa)	<p>Design air permeability = 4.50</p> <p>Max air permeability = 10.00</p>	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	<p>The following walls have a U-value less than 0.15W/m²K:</p> <ul style="list-style-type: none"> • ExtWall_GF (0.13) • ExtWall_FF (0.13) <p>The following openings have a U-value less than 1.2W/m²K:</p> <ul style="list-style-type: none"> • Solid door reference 11 (1.00) • Solid door reference 13 (1.00) • Solid door reference 10 (1.00) 	Authorised SAP Assessor	

5 Bedroom House Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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

Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	5 49, Mepal		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 17.62	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 17.49	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 17.49 < TER 17.62	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 49.1 < TFEE 58.5	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th colspan="2">Weighted average Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td colspan="2">(no party wall)</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.13 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average Highest		Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	(no party wall)		Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.13 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
Element	Weighted average Highest																				
Wall	0.13 (max 0.30)	0.13 (max 0.70)																			
Party wall	(no party wall)																				
Floor	0.13 (max 0.25)	0.13 (max 0.70)																			
Roof	0.13 (max 0.20)	0.13 (max 0.35)																			
Openings	1.13 (max 2.00)	1.20 (max 3.30)																			
Thermal bridging																					
How has the loss from thermal bridges been calculated?	Thermal bridging calculated from linear thermal transmittances for each junction	Authorised SAP Assessor																			
Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	Schedule of installed fixed internal lighting Standard lights = 0 Low energy lights = 10 Percentage of low energy lights = 100% Minimum = 75 %	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	Overheating risk (June) = Not significant (17.94°) Overheating risk (July) = Not significant (20.02°) Overheating risk (August) = Not significant (19.9°) Region = East Anglia Thermal mass parameter = 250.00 Ventilation rate in hot weather = 4.00 ach Blinds/curtains = None	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m ³ /(h.m ²) at 50Pa)	Design air permeability = 4.50 Max air permeability = 10.00	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	The following walls have a U-value less than 0.15W/m ² K: • ExtWall (0.13) The following openings have a U-value less than 1.2W/m ² K: • Solid door reference 10 (1.00) • Solid door reference 11 (1.00) • Solid door reference 12 (1.00)	Authorised SAP Assessor	

2 Bedroom Bungalow Report

L1A 2013 - Regulations Compliance Report

Design - Draft



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Assessor name	Mr Omer Raz	Assessor number	1
Client		Last modified	29/11/2019
Address	2 Bungalow 7,8,50,51, Mepal		

Check	Evidence	Produced by	OK?																		
Criterion 1: predicted carbon dioxide emission from proposed dwelling does not exceed the target																					
TER (kg CO ₂ /m ² .a)	Fuel = N/A Fuel factor = 1.00 TER = 21.13	Authorised SAP Assessor																			
DER for dwelling as designed (kg CO ₂ /m ² .a)	DER = 20.88	Authorised SAP Assessor																			
Are emissions from dwelling as designed less than or equal to the target?	DER 20.88 < TER 21.13	Authorised SAP Assessor	Passed																		
Is the fabric energy efficiency of the dwelling as designed less than or equal to the target?	DFEE 50.0 < TFEE 58.7	Authorised SAP Assessor	Passed																		
Criterion 2: the performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits																					
Fabric U-values																					
Are all U-values better than the design limits in Table 2?	<table><thead><tr><th>Element</th><th>Weighted average</th><th>Highest</th></tr></thead><tbody><tr><td>Wall</td><td>0.13 (max 0.30)</td><td>0.13 (max 0.70)</td></tr><tr><td>Party wall</td><td>0.00 (max 0.20)</td><td>N/A</td></tr><tr><td>Floor</td><td>0.13 (max 0.25)</td><td>0.13 (max 0.70)</td></tr><tr><td>Roof</td><td>0.13 (max 0.20)</td><td>0.13 (max 0.35)</td></tr><tr><td>Openings</td><td>1.13 (max 2.00)</td><td>1.20 (max 3.30)</td></tr></tbody></table>	Element	Weighted average	Highest	Wall	0.13 (max 0.30)	0.13 (max 0.70)	Party wall	0.00 (max 0.20)	N/A	Floor	0.13 (max 0.25)	0.13 (max 0.70)	Roof	0.13 (max 0.20)	0.13 (max 0.35)	Openings	1.13 (max 2.00)	1.20 (max 3.30)	Authorised SAP Assessor	Passed
Element	Weighted average	Highest																			
Wall	0.13 (max 0.30)	0.13 (max 0.70)																			
Party wall	0.00 (max 0.20)	N/A																			
Floor	0.13 (max 0.25)	0.13 (max 0.70)																			
Roof	0.13 (max 0.20)	0.13 (max 0.35)																			
Openings	1.13 (max 2.00)	1.20 (max 3.30)																			
Thermal bridging																					
How has the loss from thermal bridges been calculated?	Thermal bridging calculated from linear thermal transmittances for each junction	Authorised SAP Assessor																			
Heating and hot water systems																					
Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: Mains gas, Combi boiler x Data from manufacturer Efficiency = 91.00% 2009 SEDBUK Minimum = 88.00% Secondary heating system: None	Authorised SAP Assessor	Passed																		
Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	No hot water cylinder	Authorised SAP Assessor																			
Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: Programmer, room thermostat and TRVs Hot water control: No hot water cylinder Boiler interlock (main system 1)	Authorised SAP Assessor	Passed																		

URN: BrickLane-Bunga-2bed version 1
NHER Plan Assessor version 6.3.4
SAP version 9.92

Check	Evidence	Produced by	OK?
Fixed internal lighting			
Does fixed internal lighting comply with paragraphs 42 to 44?	Schedule of installed fixed internal lighting Standard lights = 0 Low energy lights = 10 Percentage of low energy lights = 100% Minimum = 75 %	Authorised SAP Assessor	Passed
Criterion 3: the dwelling has appropriate passive control measures to limit solar gains			
Does the dwelling have a strong tendency to high summertime temperatures?	Overheating risk (June) = Not significant (19.15°) Overheating risk (July) = Slight (21.19°) Overheating risk (August) = Slight (21.09°) Region = East Anglia Thermal mass parameter = 250.00 Ventilation rate in hot weather = 3.00 ach Blinds/curtains = None	Authorised SAP Assessor	Passed
Criterion 4: the performance of the dwelling, as designed, is consistent with the DER			
Design air permeability (m ³ /(h.m ²) at 50Pa)	Design air permeability = 4.50 Max air permeability = 10.00	Authorised SAP Assessor	Passed
Mechanical ventilation system Specific fan power (SFP)	Not applicable	Authorised SAP Assessor	
Have the key features of the design been included (or bettered) in practice?	The following walls have a U-value less than 0.15W/m ² K: • External Wall (0.13) The following party walls have a U-value less than 0.2W/m ² K: • Wall 1 (0.00) The following openings have a U-value less than 1.2W/m ² K: • Solid door reference 6 (1.00) • Solid door reference 7 (1.00)	Authorised SAP Assessor	



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