building services consulting engineers

ENERGY EFFICIENCY & SUSTAINABILITY STATEMENT

London Road Newark

230028-BEC-XX-XX-RP-Z-0001
Revision: P04

design • consultancy • sustainability

SUITABILITY	REVISION	DATE	REASON FOR ISSUE	AUTHOR	CHK'D
S0	P01	28/07/23	For planning	SM	MM
S0	P02	11/09/23	For planning	SM	MF
S0	P03	19/10/23	Revised For planning	SM	MF
S0	P04	05/01/24	Updated for revised layout	SM	MF

Introduction and Executive Summary

Introduction

This report has been written by Built Environment Consulting (BEC) on behalf of Bildurn properties Ltd to identify the design ethos for energy efficiency and sustainability for the re-development of the former Lilly and Stone School site, London Road, Newark. The development will convert the site into a low energy sustainable residential development consisting of the conversion of four existing listed buildings into new residential apartments with the addition of 35 sustainable new build houses subject to a detailed planning application and a further 67 new dwellings subject to an outline application

The objective of this statement is to demonstrate the developer's ambition for energy efficiency, sustainability and carbon reduction and to present the opportunity for low and zero carbon renewable technologies across the site.

The report is based on current Building Regulations Part L 2021 plus amendments and puts emphasis on the energy hierarchy to produce highly efficient low energy, low carbon buildings.

The new building regulations produce highly efficient buildings with a circa 30% reduction in $C0_2$ compared to the old regulations. This coupled with the new build dwellings potential to accommodate renewable technologies means this development is capable of providing highly efficient, low carbon dwellings.

Executive Summary

The existing site compromises of the former Lilley and Stone old school buildings and grounds. The proposed site strategy is to return the existing three heritage school buildings and convert them into residential apartments blocks, refurbish a caretakers cottage into a dwelling and will also be complemented by the addition a new housing development on the former school playing fields.

The overall design strategy for the site is to follow the energy hierarchy and utilise passive design strategies with low and zero carbon technologies wherever appropriate whilst adopting a fabric first design approach.

The new build houses are design with energy efficiency in mind and will be enhanced by the utilization of system 4 MVHR rather than simple intermittent extract fans only.

By re-utilising the existing building fabric of the school buildings for the outer shell of the refurbished residential blocks the scheme consists of building fabric upgrades, primarily (U-values, air permeability, and thermal bridging).

As part of these conversions there will also be a considerable enhancement to the M&E services (heating, hot water, ventilation and lighting). The approach is to make the building and its M&E services intrinsically efficient and exceed the carbon reductions that are often achieved by providing a 'standard' Building Regulations Compliant building.

Renewable technologies to supplement the reliance on mains energy such as, Photovoltaics (PV), Combined Heat & Power (CHP), Air Source Heat Pumps (ASHP), Ground Sources Heat Pumps (GSHP), Biomass and Wind turbines have all been considered for the site. It has been determined through analysis of proposed use and existing site conditions that a combination of Air Source Heat Pumps and PV are the most effective solution for the site.

Existing Site

The Existing site

The existing site is the former Lilley and Stone school site consisting of listed buildings and old school facilities. The site is located off London Road, Newark and occupies a central location in Newark.

The proposal is to reutilise the existing school buildings with historical and local significance and convert them into residential apartment blocks which will also be complemented by the addition of a new low carbon energy efficient housing development on the old school playing fields.

The site has been unused and derelict for many years. The proposed scheme will maximise previously developed land in the heart of the town and restore a historic site and secure the sites long term use.

Listed School Building

Proposed Masterplan

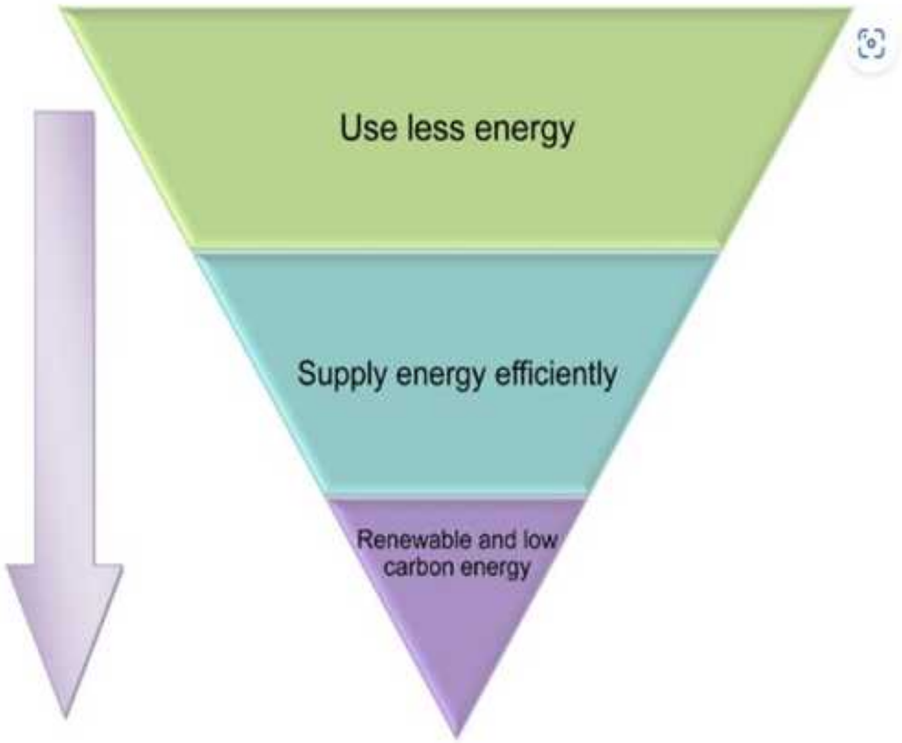
Energy Hierarchy and Approach

Energy Hierarchy

The Energy Hierarchy is a classification of energy options, to assist progress towards a more sustainable energy system that has been adopted nationally by the government and local authorities. It has an ethos to design using a fabric first approach (BE LEAN) where high levels of insulation recue the need for energy use, service the building efficiently (BE CLEAN) ensures that service installations use energy efficiently and cleanly by reducing carbon emissions. Then introduce energy generating renewable technologies (BE GREEN) to produce onsite renewable energy to supplement and reduce the reliance on mains electricity energy.

This fabric first approach ensures inefficient buildings are not compensated for by highly efficient services and/or via an off-set using renewables. By adopting the BE LEAN, BE CLEAN, BE GREEN approach the development aim to deliver buildings with less energy demand and reduced operational carbon.

BE LEAN – take step to reduce energy consumption through improved fabric efficiency and low energy use lighting
BE CLEAN – Seek to maximise efficiency of delivery of space heating requirements, such as communal boilers or district heat networks
BE GREEN – Generate heat and electrical energy on-site and renewably to further reduce the developments carbon impact



Residential Conversions Proposals

Overview - Existing Buildings

The site contains 4no existing buildings covered by a Grade II listing & curtilage listed. Three of these heritage assets will be refurbished and converted to residential apartments with an existing cottage to be refurbished also. The ambition is to sensitively upgrade the thermal efficiency whilst maintaining the character and appearance of these buildings. Full compliance with current legislation will not be possible and balance will need to be agreed between intervention and performance.

Residential Conversions Proposals

The development objective is to reduce energy consumption and carbon emissions from the proposed development. A 'fabric first' approach is to be adopted, then focusing on low carbon M&E services. The introduction of renewable technologies, such as roof mounted PVs or externally sited Air Source Heat Pumps are not deemed to be appropriate to these buildings.

Building Fabric

Reducing heat loss and improving energy efficiency is key to reducing energy use and emissions. This brings long term consistent benefits, as efficiencies are intrinsic to the building fabric, need no on-going maintenance, and are unlikely to degrade.

It is proposed that the thermal elements of the existing buildings shall be improved and where possible be reasonably brought up to date in accordance with the Building Regulations Approved document Part L limiting U values for existing elements. Due to the nature of the buildings it may not be feasible to fully achieve the limiting U values in all areas.

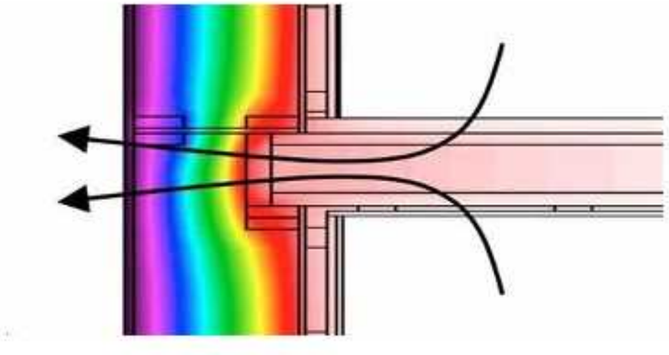
The below outlines the currently proposed alterations to building fabric:-

Roof – Additional insulation to be added

External perimeter Walls – To be lined with insulation to enhance the existing thermal efficiency.

Suspended floors - additional insulation to be added. Solid floors will require improvement works that are deemed too invasive an detrimental to the existing buildings.

Windows – original windows will be retained where possible with thermally efficient secondary glazing facing London road
New Windows shall be double glazed.



Thermal bridging junction example

Thermal Bridging

Thermal bridges, also known as cold bridges, are weak points (or areas) in the building envelope, usually where building elements connect and allow heat to pass through more easily. Opportunity on existing heritage buildings to improve thermal bridging may be limited.

As much as 30% of heat can be lost through thermal bridges on a dwelling. The new building regulations have put more emphasis on this element of building, as a result dwellings built under the new regulations are more efficient.

Enhancing thermal bridging will further energy savings, as the junctions between materials will be more thermally efficient than the minimum Building regulations standard.

Residential Conversions Proposals

Ventilation

The ventilation strategy for none main road facing rooms are to be based upon ADF system 3; openable windows with trickle vents augmented with an energy efficient low carbon fan which is designed to provide continuous trickle background extract ventilation to the dwelling, with a manual boost function. This system will maintain a healthy environment with high air quality, and low carbon emissions. Using this system can help negate overheating as part of an overall overheating strategy, and offer a significant improvement to the buildings energy efficiency over relying on ventilation through traditional openable windows only.

The ventilation strategy for rooms directly facing London Road are to be based upon ADF system 4 MVHR as the windows will be secondary glazed therefore not readily openable. This will maintain a healthy environment with high air quality, and lower carbon emissions. The system offers an excellent solution for air quality and energy efficiency for dwellings and usually employed for high end domestic properties meaning that the apartments supplied with full MVHR will benefit from excellent air quality and energy efficiency which is an enhancement over other developments of this type.

The SFP of all ventilation systems shall be in accordance with Part L requirements.

Heating

Heating shall be provided via gas boilers with intelligent heating controls. We have as part of the feasibility looked at a number of alternative heating system types, such as air source heat pumps and ground source heat pumps which would produce a lower operational energy consumption.

However, as the building is being converted, the building fabric and air permeability may not be optimal and benefit from technologies such as heat pumps. It is important to consider that this is an older building and whilst as part of the conversation the buildings overall thermal efficiency will be improved, we have determined that utilising the existing gas heating system will be the most suitable solution to provide a comfortable building.

Hot Water

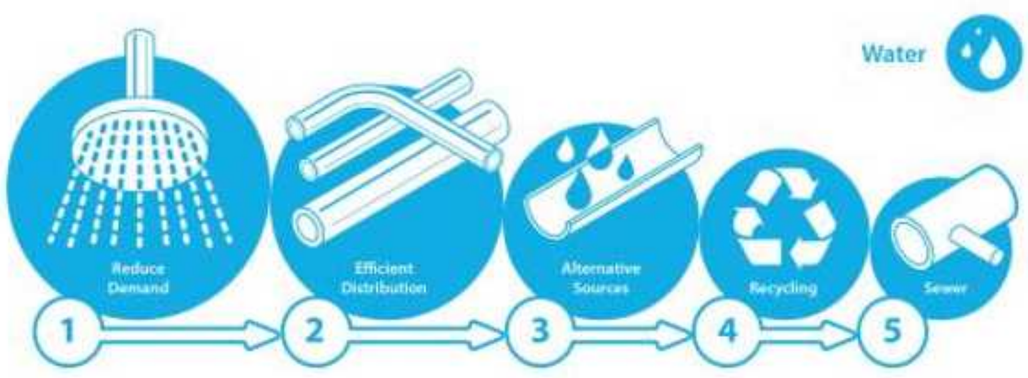
The hot water shall be provided by a fully insulated hot water cylinder heated via the gas boiler with back up immersion. As the site strategy is to retain the existing gas supply to these building this will be the most suitable solution for providing hot water generation within the converted buildings.

Residential Conversions Proposals

Water Usage

Fixtures and fittings to be selected to comply with the building Regulations Part G following the water efficiency hierarchy by reducing demand and efficient distribution throughout each property.

Fixtures and Fittings for this project are to be selected to comply with Buildings regulations Part G, where these are not achieved compliance is to be achieved by the installation of flow restrictors devices

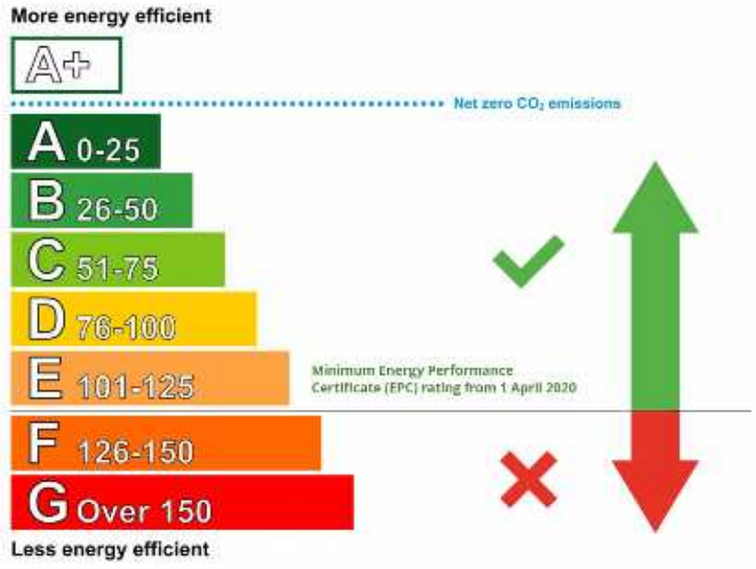


Lighting

All artificial lighting throughout shall be LED throughout to minimise energy consumption. Any landlord areas shall be provided with LED lighting and automatic lighting controls.

Energy Efficiency

Each dwelling shall be targeted to be significantly more efficient and as low carbon as possible. Listed buildings do not usually require EPC ratings. The intent is still to provide excellent fabric efficiencies and low carbon building services to provide energy efficient homes. Limiting factors due to the conversion of the existing building will limit what is achievable in relation to Part L compliance however they will still achieve a significant increase in performance than is currently achievable and provide a comfortable and efficient home to live in and will outperform comparable older properties.



New Housing Proposals

Overview - New Build Dwellings

The site will deliver 35no new build dwelling houses in the detailed application and a further 67 in an outline application across the site. These are arranged mainly as semi-detached and short terraces of townhouses.

New Build Housing approach

The objective is to reduce energy consumption and carbon emissions from the proposed development. A 'fabric first' approach is to be adopted providing high levels of insulation to reduce energy demand in the walls, roof, windows and ground floor, then focusing on low carbon M&E installations. Renewables provide potential enhancement to the developments to reduce carbon emissions and energy usage.

Building Fabric

Reducing heat loss and improving energy efficiency is key to reducing energy use and carbon emissions. It is proposed that new thermal elements shall be in accordance with Part L. This standard represents a big step forward on previous national regulations therefore this development will benefit hugely from these regulation changes and provide the area with new highly efficient low carbon housing. This brings long term consistent benefits, as efficiencies are intrinsic to the building fabric, need no on-going maintenance, and are unlikely to degrade.

Air Tightness

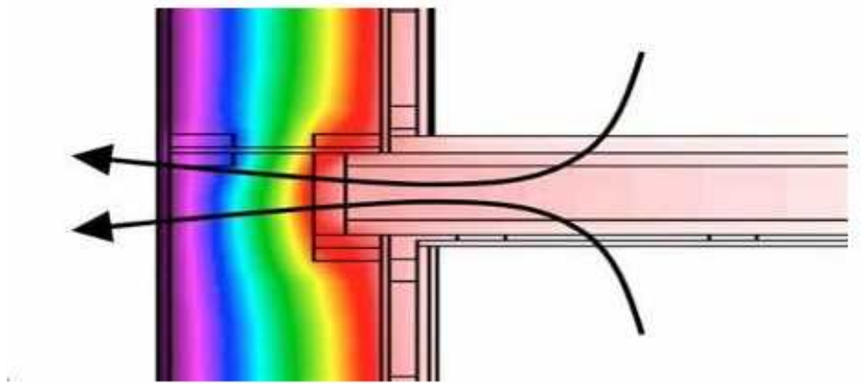
Producing buildings with good air tightness will reduce the energy required to heat the buildings therefore lower the overall carbon required to heat the home. The new build proposals will provide new buildings with excellent air tightness.

Thermal Bridging

As much as 30% of heat can be lost through thermal bridges on a dwelling. Thermal bridges, also known as cold bridges, are weak points (or areas) in the building envelope, usually where building elements connect and allow heat to pass through more easily.

The new building regulations have put greater emphasis on this element of building design and construction, as a result dwellings built under the new regulations are more efficient.

Controlling thermal bridging will further energy savings, as the junctions between materials will be more thermally efficient than the minimum Building regulations standard



New Housing Proposals

Ventilation

The ventilation strategy is to be based upon Approved Document F system 4 mechanical ventilation with heat recovery (MVHR), openable to provide purge ventilation. This will maintain a healthy environment with high air quality, and lower carbon emissions. Using this system can help negate overheating as part of an overall overheating strategy. The system offers an excellent solution for air quality and energy efficiency for dwellings and this strategy is usually employed for high end domestic properties. The housing supplied with full MVHR will benefit from excellent air quality and energy efficiency above what is usually provided for standard homes.

The Specific Fan Power (SFP) of the ventilation system shall be in accordance with Part L requirements

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Heating

Heating to each dwelling shall be provided via air to water air source heat pumps (ASHP) with a high coefficient of performance to provide efficient low carbon heating. This system can feed either wall mounted radiators or wet underfloor heating systems. Using electrical power to run the air source heat pumps allows the development to benefit from the rapid decarbonisation of the UKs electricity grid making the new homes that utilise this technology low carbon and efficient new homes. These homes will considerably outperform any existing older housing as they can use the excellent efficiency of heat pump technology

Hot Water

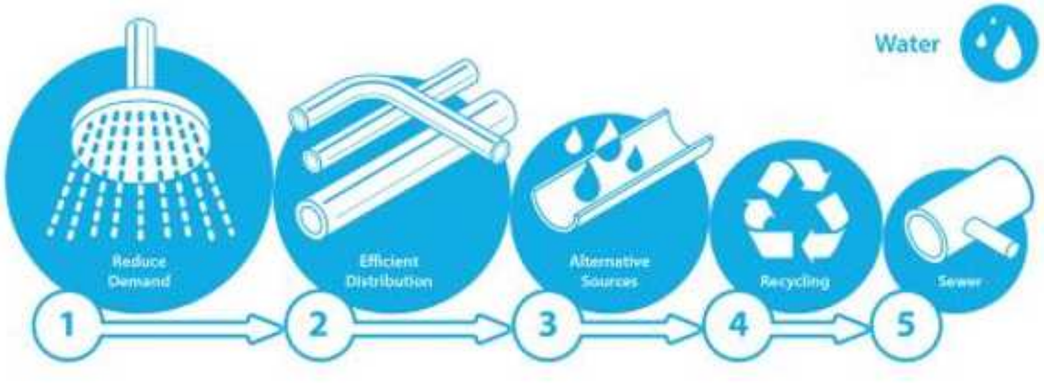
The hot water shall be provided by the air source heat pump located at individual dwellings and fully insulated hot water cylinder. Being able to heat the hot water via the air source heat pumps means the residents benefit from the decarbonised electrical power from the grid

New Housing Proposals

Water Usage

Fixtures and fittings to be selected to comply with the building Regulations Part G following the water efficiency hierarchy by reducing demand and efficient distribution throughout each property.

Fixtures and Fittings for this project are to be selected to comply with Buildings regulations Part G, where these are not achieved compliance is to be achieved by the installation of flow restrictors devices



Electric Vehicle Chargers

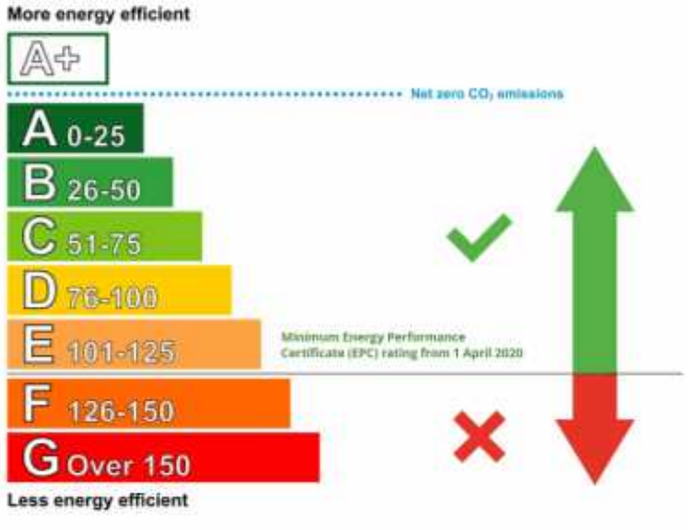
Building Regulations have focussed on EV vehicle charging as a method of encouraging alternatives to fossil fuels. All the new properties will be provided with individual EV chargers across the site..

Lighting

All artificial lighting throughout shall be LED throughout to minimise energy consumption.

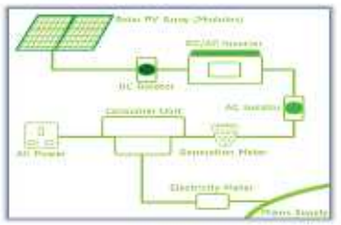
Energy Efficiency

Each dwelling shall be targeted as an Energy Performance Certificate (EPC) rating of a B as a minimum. Utilising excellent fabric efficiencies and low carbon building services to provide energy efficient homes. Limiting factors due to the conversion of the existing building may limit what is achievable.



Low & Zero Carbon Technologies

Photovoltaics (PV)



As part of this feasibility study, BEC have reviewed the use of Solar PV to supplement the electrical demand and determined that this technology is viable for this development and will provide an excellent option for additional low carbon renewable technologies. For this to be most effective, a south/west facing roof should be utilised.

Air Source Heat Pumps (ASHP)

As part of this feasibility study, BEC have reviewed the use of Air Source Heat Pumps (ASHP) and determined that this technology is viable for this development and will provide an excellent option for additional renewable technologies. The utilisation of ASHP's for individual housing will reduce the site gas load and provide a low energy controllable heating solution to individual dwelling.

Combined Heat & Power

As part of this feasibility study, BEC have reviewed the use of Combined Heat & Power (CHP) and determined that this technology is not a viable solution for this development. There is an insufficient heating baseload available within the buildings to make CHP a viable financial and energy efficient solution. Micro CHPs have also been considered but are thought to contribute to poor air quality in areas were used and have therefore also been discounted for this development.

Biomass

As part of this feasibility study, BEC have reviewed the use of Biomass boilers and determined that this technology is not a viable solution for this development. A Biomass installation is not a viable as there is insufficient storage area for wood chip or pellets, lorry deliveries of wood chip would be an unwelcome introduction to the roads. Biomass boilers require a higher flue height than traditional solutions for safe gaseous and particle emissions, also requiring a chimney. This would be an unsightly presence in a suburban area with Listed Building in close proximity.

Ground Source Heat Pumps

As part of this feasibility study, BEC have reviewed the use of Ground Source Heat Pumps (GSHP) and determined that this technology is not a viable solution for this development. Ground source heat pumps are only a viable solution when there is sufficient ground space to install a sufficient number of boreholes and pipework to provide the amount of heating required to meet the demand of the dwellings. This development would require a significant number of boreholes would be required for this development which isn't available in a developed area.

Wind

As part of this feasibility study, BEC have reviewed the use of Wind Turbines and determined that this technology is not a viable solution for this development due wind shadowing by surrounding trees and buildings and the impact on visibility and amenity of locating a turbine in close proximity to the town centre.

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