



INVICTA HOUSE

2-4 ATKINSON STREET
MANCHESTER
M3 3HH

HENRY BOOT DEVELOPMENTS &
KE HOTELS

ENVIRONMENTAL STANDARDS
STATEMENT

ELEMENT SUSTAINABILITY
2017.034
APRIL 2017



ELEMENT
SUSTAINABILITY

INVICTA HOUSE, ATKINSON STREET MANCHESTER
ENVIRONMENTAL STANDARDS STATEMENT

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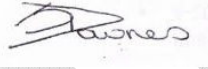
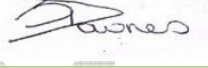
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Author(s)		Laurie Wills Director	18 th April 2017
		Stacey Downes Sustainability Consultant	18 th April 2017
Reviewed by		Stacey Downes Sustainability Consultant	18 th April 2017
Approved by		Laurie Wills Director	18 th April 2017



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phone: 01829 733 444

email: hello@elementsustainability.co.uk

www: www.elementsustainability.co.uk

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Appendix A –BREEAM Pre-Assessment (Other building - Hotel)

Appendix B – SBEM Data

1. INTRODUCTION

Element Sustainability has been commissioned by KE Hotels to review the sustainability performance of the proposed hotel development at Atkinson Street (Invicta House), Manchester.

The purpose of this Statement is to summarise the relevant policy background and requirements of Manchester City Council (hereafter referred to as the Council) and demonstrate the ways in which KE Hotels have addressed these aims through their proposals, ensuring all practicable measures have been taken in order to deliver a sustainable development at this site.

This statement reviews the sustainable design features of the proposed development at the site. The potential BREEAM UK New Construction 2014 rating which will be achieved for the hotel will also be reviewed. Details of the design attributes, specifications and characteristics of the scheme are appraised in order to demonstrate how the proposals contribute to sustainable development in Manchester and seek to mitigate the environmental impacts of the scheme.



2. POLICY REVIEW

This section reviews the planning policy requirements and sustainability targets that are relevant to this scheme.

National Planning Policy

In addition to the local planning policies, the National Planning Policy Framework (NPPF) 2012 is a material consideration. Published on 27th March 2012, it replaces all previous PPSs and PPGs.

The NPPF states that the planning system should play an active role in guiding development to sustainable solutions. There are three dimensions to sustainable development, as stated within the NPPF: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

- An economic role – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
- A social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and
- An environmental role – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

These roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives of people and communities. Therefore, to achieve sustainable development, economic, social and environmental gains should be sought jointly and simultaneously through the planning system.

Pursuing sustainable development requires careful attention to viability and costs in plan-making and decision-taking. To ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing, standards, infrastructure contributions or other requirements should, when taking account of the normal cost of development and mitigation, enable the development to be deliverable.

At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development - for decision-taking this means approving development proposals that accord with the development plan without delay.

Local Planning Policy

Manchester Core Strategy -

Manchester's Core Strategy (CS) was adopted on 11th July 2012 and is the key Development Plan Document in the Local Development Framework (LDF).

CS Policy DM 1 - Development Management requires all development to have regard to a number of development principles, including the following which relate to BREEAM (Building Research Establishment Environmental Assessment Method) ratings and Code for Sustainable Homes (Code) ratings:

Subject to scheme viability, developers will be required to demonstrate that new non-domestic developments will include the application of the BREEAM standards.



CS Policy EN 4 - Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development requires all development to follow the principle of the Energy Hierarchy, being designed:

1. To reduce the need for energy through design features that provide passive heating, natural lighting and cooling;
2. To reduce the need for energy through energy efficient features such as improved insulation and glazing; and,
3. To meet residual energy requirements through the use of low or zero carbon energy generating technologies.

CS Policy EN6 - Target Framework For CO₂ Reductions From Low or Zero Carbon Energy Supplies requires applications for residential development of 10 or more units and all other development over 1,000m² to meet, as a minimum, the targets shown in the tables below, unless unviable.

Table 2.1 – Policy EN6 CO₂ Emissions Reduction Targets; Non-Domestic

Target	% Minimum requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible, a 15% increase on Part L 2010
Target 2: Electricity Intense buildings (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO ₂ /m ²))	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

The proposed scheme is located within a Target 2: Electricity Intense Buildings. The emission reductions targeted within policy EN6 relate to Building Regulation Part L1A 2010 (for new build developments).

The 2013 revision to Part L of the Building Regulations was a key milestone towards the government's (now delayed) target for zero-carbon buildings. Following a long consultation period, new (carbon dioxide) emission rate targets were published in November 2013, as follows:

- A 6% improvement on the 2010 Part L targets for housing on aggregate which means there is flexibility across different types of homes; and,
- Additionally, the new target for non-domestic buildings is a 9% improvement on the 2010 Part L targets on aggregate.

Domestic and non-domestic buildings are therefore achieving a 6% or 9% emission reduction over Part L 2010 emission rate criteria by virtue of simply complying with the current regulatory standards. As a consequence of this reduction in emission rates required by current building regulations (Part L 2013), the revised Policy EN6 target CO₂ emission reductions for non-domestic developments equate to 9% beyond Part L 2013 compliance.

Guide to Development in Manchester, Supplementary Planning Document -

The Core Strategy requires that all new developments should accord with the design guidance set out in the Supplementary Planning Documents (SPD). The Guide to Development in Manchester SPD was adopted on 11th April 2007 and supports and enhances the ongoing shaping of the City by providing a set of reasoned principles which will guide developers, designers and residents. These principles include a number of environmental standards, including:



- High standards of energy efficiency; and
- Non-domestic developments should achieve a BREEAM rating of at least Very Good;

Regulatory Framework

Building Regulations, Part L - Conservation of Fuel and Power sets the compliance standards for energy demand and carbon dioxide emissions from buildings. Guidance on how to meet the requirements of this regulation is provided within a number of approved documents. The relevant document is referenced below:

Approved Document L2A addresses the conservation of fuel and power in new non-domestic buildings. The proposed development will be registered against Building Regulations, Part L (2013) which requires all newly constructed buildings to comply with the 5 criteria set out in Approved Document L2A:

- I. Achievement of an acceptable Building CO₂ Emission Rate. i.e. the BER is less than the TER (target emission rate for a notional building);
- II. Limits on design flexibility – including U-values, air permeability, air handling plant efficiency, duct leakage, insulation, lighting system efficiency;
- III. Limiting solar gains in summer;
- IV. Construction quality and commissioning - The BER must be recalculated as constructed; and
- V. Provision of information - Information must be provided to the building operator.

BREEAM

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's leading and most widely used environmental assessment method for buildings.

BREEAM UK New Construction scheme is a performance based assessment method and certification scheme for new non-domestic buildings.

The primary aim of BREEAM UK New Construction is to mitigate the life cycle impact of new buildings on the environment in a robust and cost effective manner. This is achieved through integration and the use of the scheme by clients and their project team at key stages in the design and construction process.

The building's performance is assessed under a number of categories, including:

- Energy;
- Water;
- Transport;
- Materials;
- Land use and ecology;
- Pollution;
- Health and wellbeing; and
- Management.

Table 1.1 – BREEAM Rating Benchmarks

BREEAM Rating	% Score Required
Outstanding	≥ 85
Excellent	≥ 70
Very Good	≥ 55
Good	≥ 45
Pass	≥ 30



There are no minimum standards associated with the BREEAM Other Building 'Very Good' standard in terms of the building's energy and emission performance. The BREEAM rating benchmarks for BREEAM UK new construction projects assessed using the 2014 version of BREEAM are presented in Table 1.1.

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3. DEVELOPMENT PROPOSALS

The development site is located within the highly developed urban area of Manchester city centre (see Figure 3.1). The site currently comprises of a large office building known as Invicta House fronting on to Atkinson Street in the city centre of Manchester just off Deansgate.

The proposals include the demolition of the existing building with the retention of the Atkinson Street façade and secondary return only and the construction of a new nine storey hotel building behind the retained structure.

Figure 3.1 – Pre-Development Site



The proposed elevations and site layout are presented in Figures 3.2 to 3.7. The proposed accommodation schedule is as follows:

Table 3.1 – Accommodation Schedule

Accommodation Schedule	
Hotel Guest Rooms	
First Floor	20 bedrooms
Second Floor	20 bedrooms
Third Floor	19 bedrooms
Fourth Floor	19 bedrooms
Fifth Floor	19 bedrooms
Sixth Floor	18 bedrooms
Seventh Floor	18 bedrooms
Eight Floor	12 bedrooms
Front and Back of House Areas	Total = 145no. Guestrooms
Mezzanine Floor	Front of House/Back of House
Ground Floor	Front of House
Basement	Front of House/Back of House



Figure 3.2 - Development Proposals (Ground Floor Layout)



Figure 3.3 - Development Proposals (Typical First and Second Floor Layouts)



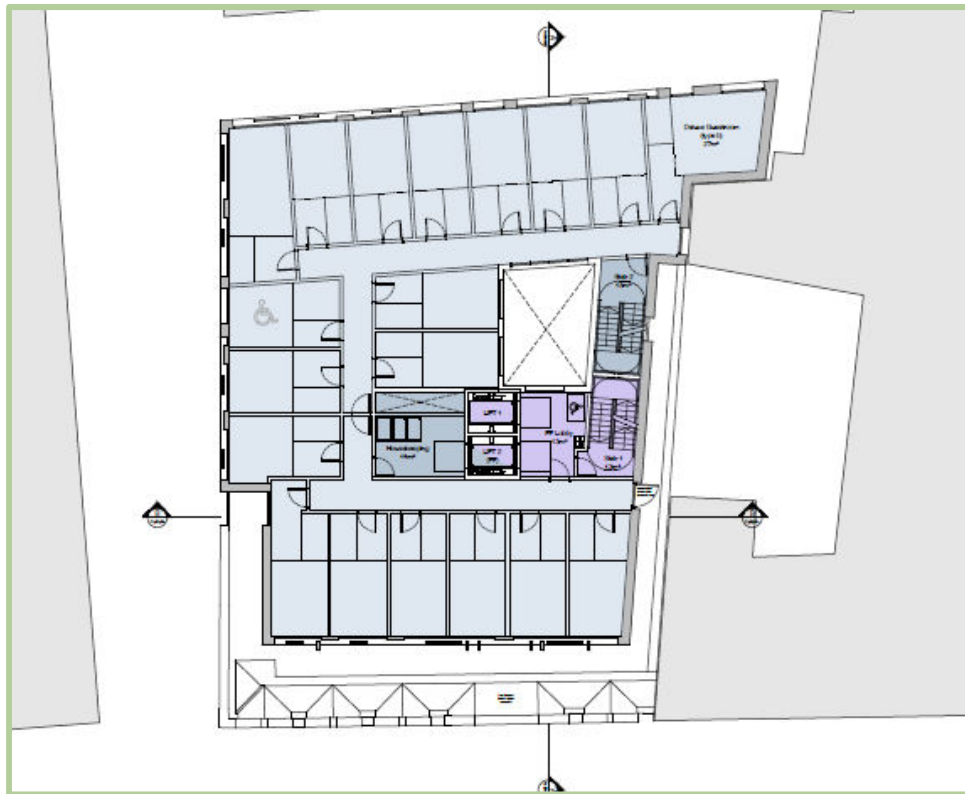
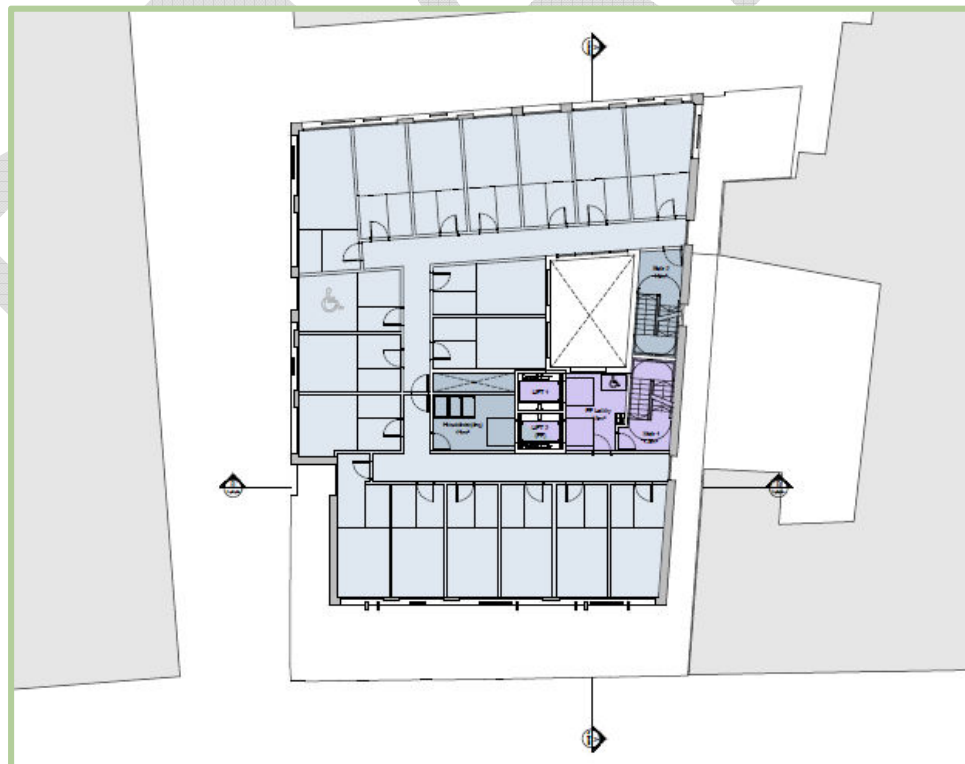
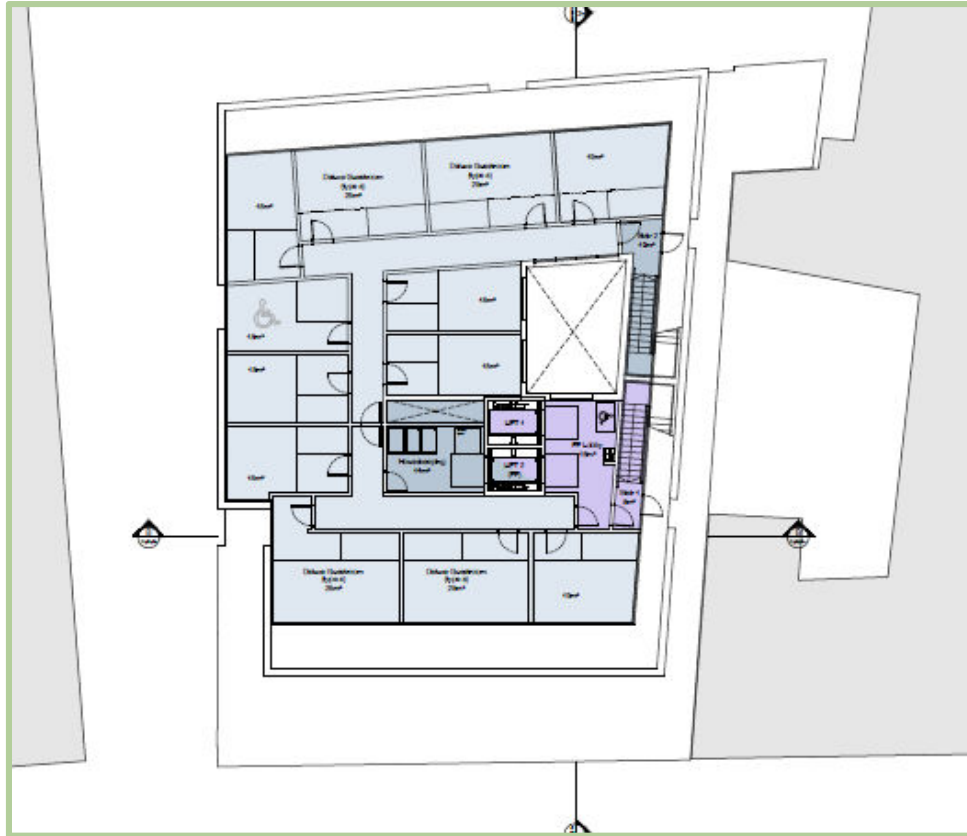
Figure 3.4 - Development Proposals (Third to Fifth Floor Layout)*Figure 3.5 - Development Proposals (Sixth and Seventh Floor Layout)*

Figure 3.6 - Development Elevations (Eight Floor Layout)*Figure 3.7 - Development Elevations (Atkinson Street Elevation)*

4. SUSTAINABILITY PERFORMANCE

This section provides an appraisal of the proposed hotel development's sustainability performance and details the specific approach, along with design features and specifications, which may contribute to reducing the environmental impact of the scheme. A BREEAM Pre-Assessment report has been completed to determine the feasible credits and potential rating for the development. This section details a potential solution to meet BREEAM 'Very Good' rating, and which also responds to the Council's current policies and examines the following categories:

- Energy efficiency;
- Renewable energy;
- Environmental design;
- Water management and weather resilience;
- Waste management;
- Construction management;
- Biodiversity; and,
- Waterways.

Sustainability Performance

The key specifications, site characteristics and design measures of the scheme are considered below. These will mitigate the environmental impact of the scheme throughout both the construction stage and the future occupation of the development.

Energy Demand and Carbon Dioxide Emission Reductions

In order to limit energy demand and carbon dioxide (CO₂) emissions from the operation of the hotel, the following design features will be integrated within the scheme (further details on the energy strategy can be found in Section 6).

General Principles -

- The hotel development will be specified to reduce the emission rate, with very good levels of fabric energy efficiency – significantly beyond the regulatory requirement;
- The approach to emissions reduction will be through a fabric led energy strategy plus efficient servicing, in accordance with the principles of the energy hierarchy;
- 100% low energy and/or LED internal lighting will be specified;
- The building will be specified with CHP backed up by high efficiency gas fired boilers providing both space and water heating duty;
- The proposed energy strategy will provide improvements in the energy performance of the building above national building regulations in relation to heating and cooling energy demand, primary energy consumption and carbon dioxide;
 - The energy strategy exceeds the BREEAM energy criteria to enable the BREEAM 'Very Good' rating to be achieved;



- o The proposed specification achieves a 10.5% emission rate reduction over the established notional building regulation (Part L2A, 2010) baseline;
- o The scheme will comply with building regulation Part L, 2A (2013) criteria; and,

Energy Monitoring -

- Energy metering systems to monitor operational energy consumption will enable the building managers to understand and reduce the energy use of the building.

External Lighting –

- All new external light fittings, where provided, within the construction zone will be dedicated low energy; and,
- External light fittings will be controlled through a time switch, or daylight sensor, to prevent operation during daylight hours.

Energy Efficient Transportation Systems -

- An analysis of the proposed transportation demand and usage patterns will determine the optimum number and size of lifts required. This would encourage the implementation of energy efficient and suitably sized systems.

Water Demand Management

The building will be designed to reduce mains/potable water consumption and will include water efficient devices and equipment.

- A water efficiency strategy will be determined for the site. This will include 'A' rated appliances;
- The buildings will be specified with efficient water fixtures and controls. This will result in a reduction in water consumption (litres/person/day); The mandatory minimum criteria for the BREEAM 'Very Good' rating will be achieved and a potential improvement targeted, which is a 25% improvement over the set BRE water consumption baseline; and,
- A water meter(s) on the mains water supply to the building will be specified to monitor and manage consumption to reduce the impacts of inefficiencies and leakage.

Resource Management and Pollution

Efficient Use of Land -

- The Atkinson House proposals include the redevelopment of an existing developed site. The proposals comprise the demolition of the existing Invicta House building with the exception of the façade and secondary return only.

Pollution Control -

- During the construction phase Pollution Prevention Guidance (PPG) will be adhered to in respect to Air (dust pollution) and water (ground and surface) pollution;
- Insulating materials that have a low embodied environmental impact relative to its thermal properties will be specified throughout the development to reduce the construction phase impact of this scheme upon climate change.



Reduction of Night Time Light Pollution -

- The external lighting strategy will be designed to reduce unnecessary light pollution through effective design, energy consumption and nuisance to neighbouring properties.

Reduction of Noise Pollution -

- Measures to reduce the likelihood of disturbance arising as a result of noise from fixed installations on the development.

Materials -

This development will contribute towards making more efficient use of non-renewable material resources and to reducing the lifecycle impact of materials used in construction. This is demonstrated by the selection of:

- Materials with a low environmental impact throughout their lifecycle will be specified. The BRE's Green Guide to specification will be consulted to optimise the material selection and their associated environmental performance and life cycle impact;
- Hard landscaping and boundary protection elements with a low environmental impact throughout their lifecycle will be specified. The BRE's Green Guide to specification will be consulted to optimise the material selection to reduce the environmental impacts;
- The current proposals for the development indicate that the front façade and secondary return only are to be retained and re-used, this demonstrates early consideration into resource efficiency;
- All timber used on the project will be responsibly sourced in accordance with the UK Government's Timber Procurement Policy (FSC sourced timber, for example);
- Materials will be selected which have a low environmental impact throughout their life cycle;
- Suppliers and manufacturers who operate Environmental Management Systems will be prioritised;
- Responsible sourcing of materials will be managed by the contractor. All timber used within the development will be responsibly sourced, verified by the FSC or PEFC standard; and,
- Consideration will be given to local sourcing of construction materials where feasible.

Designing for Robustness –

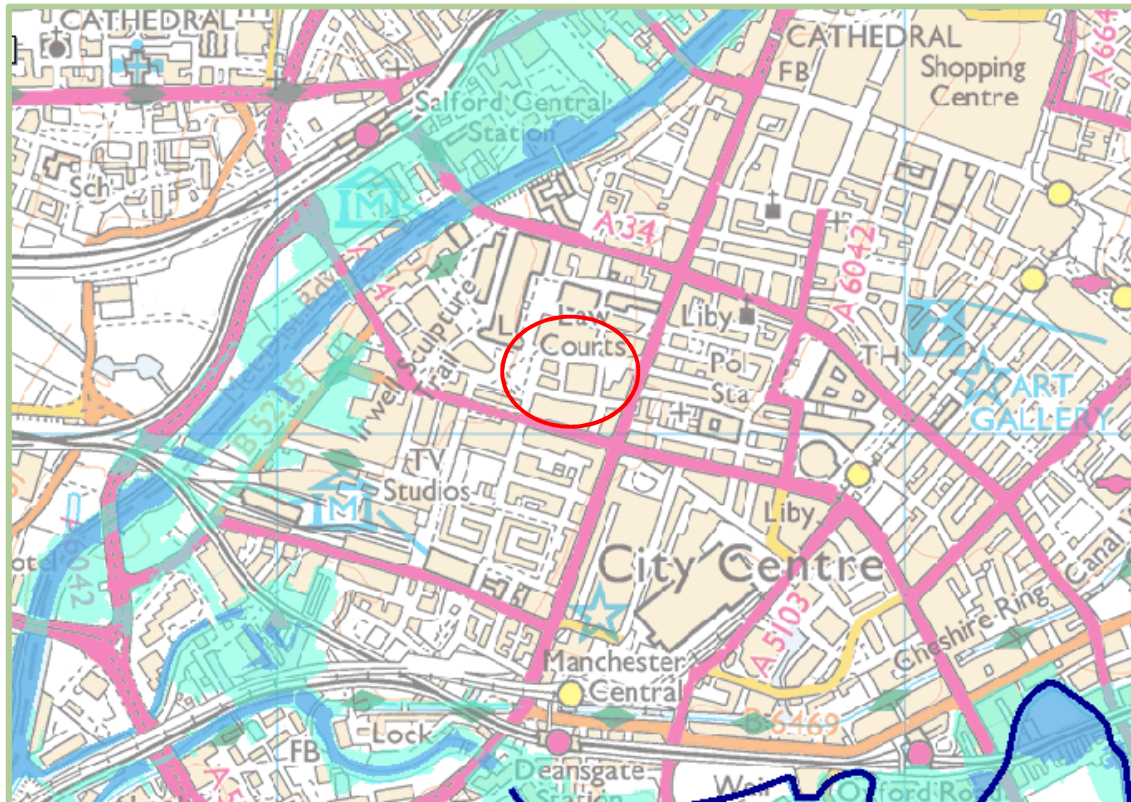
- Adequate protection will be provided for exposed elements of the building and landscaped areas, therefore minimising the frequency of replacement materials; and,
- Measures to limit material degradation due to environmental factors will be specified.

*Surface Water Management**Flood Risk -*

- The development site is located within Flood Risk Zone 1 (low annual probability of flooding). This is based upon current Environment Agency flood maps, as shown in Figure 4.1 below: and,
- A site-specific Flood Risk Assessment will be completed to demonstrating that the development proposals are consistent with the requirements of the NPPF and the site will not be at significant risk of flooding, or increase the flood risk to others.



Figure 4.1 – Flood Risk Map



On Site Surface Water Management -

- The existing drainage system for the building will be utilised with relevant additions to facilitate the new design;
- The plan area of the proposed development will remain as per the existing building footprint resulting in no increase in the impermeable surfacing of the site. The drainage strategy will ensure that the peak rate of run-off from the site to the watercourses (natural or municipal) will be no greater for the developed site than it was for the pre-development site. This will comply with the 1-year and 100-year return period events; and,
- The development will not adversely impact upon the risk of groundwater flooding or underlying groundwater quality.

Waste Management

Construction Waste -

Prior to commencement of the construction phase, a construction resource management plan (RMP) will be produced by the developer to limit the on and off site environmental impacts of construction. The waste management strategy will also include the following:

- Procedures to reduce construction waste related to on-site construction and off site manufacture/fabrication;
- A pre-demolition audit of the existing buildings, structures or hard surfaces will be completed to maximise the recovery of material from demolition for subsequent high grade/value applications; and,
- Diverting non-hazardous construction (on-site and dedicated off-site manufacture/fabrication), demolition and excavation waste (where applicable) generated by the project from landfill will be as follows;
 - o At least 80% by weight (70% by volume) of non-hazardous construction waste from sites will be diverted from landfill;



- o At least 90% by weight (80% by volume) of non-hazardous demolition arising from sites will be diverted from landfill;

Operational Waste -

- Provision of suitable space and facilities to allow for segregation and storage of operational recyclable waste volumes generated by the building occupant(s) and activities will optimise recycling rates; and,
- A waste management strategy has been developed, ensuring that adequate sized bin storage area(s) will be provided, access for collection personnel and vehicles has been established and other aspects of waste management is designed into the development at an early stage of the design.

Health and Wellbeing

To enable the building users of this development to experience an enhanced quality of life within hotel building, the following measures will be delivered at the proposed development:

Visual Comfort -

- Internal and external lighting levels, zoning and controls will be specified in accordance with the relevant CIBSE Guides/British standards. This will reduce energy consumption and ensure lighting is turned off when not required;
- Internal lighting will be zoned to allow for occupant control; and,
- The external lighting strategy will be designed to reduce unnecessary light pollution, energy consumption and nuisance to neighbouring properties.

Thermal Comfort -

- Thermal modelling will be carried out to appropriate standards;
- Projected climate change scenario(s) will be considered as part of the thermal model; and,
- The thermal modelling analysis will inform the temperature control strategy for the building and its users.

Safety and Security -

- The security needs of the site must be understood and incorporated into the design and layout of the scheme. A Suitably Qualified Security Specialist (SQSS) will be consulted at the design stage and their recommendations incorporated into the specification.

Management

In order to minimise the impact of the development during construction and operation whilst providing a safe place to occupy, the proposals include for the following provision:

Construction Site Impacts -

- The principal contractor will register with the Considerate Contractors Scheme before work commences on site, this demonstrates consideration for the surrounding area and environment relating to site activities;
- The principal contractor will demonstrate sound environmental practices (ISO 14001); and,
- Site related impacts will be monitored and reported to ensure ongoing compliance during the Construction, Handover and Close Out stages and to improve awareness and understanding for future projects. Construction site impacts will be minimised as follows:



- o Monitor, report and set targets for carbon dioxide or energy arising from site activities;
- o Monitor, report and set targets for water consumption arising from site activities; and,
- o Monitor and record data from the transport movements and impacts resulting from delivery of construction materials to site and construction waste from site.

Commissioning and Handover -

- Schedule of commissioning including optimal timescales and appropriate testing and commissioning of all building services systems and building fabric in line with best practice;
- Inspecting, testing, identifying and rectifying defects via an appropriate method; and,
- Provision of a non-technical Building User Guide and user/operator training timed appropriately around handover.

Aftercare -

- Seasonal commissioning activities may be completed over a minimum of a 12 month period, once the building becomes substantially occupied; and,
- A commitment to carrying out a post occupancy evaluation one year after initial building occupation to review the building performance will also be employed. This will ensure the building operates as efficiently as possible.

Site Ecology

Selection and Ecological Value of the Site –

- The scheme is on a previously developed site, this represents an efficient use of land;
- The land within the construction zone is of low ecological value; and,
- It is proposed that there will be no negative change in the ecological value of the site resulting in a neutral impact from pre-development to post-development.

Transport and Access

The developer has commissioned Mode Transport Planning to prepare a Transport Assessment of the proposed scheme. The report concludes that the Atkinson Street (Invicta House) site is a highly sustainable location in terms of transport connections with basic facilities all within easy walking distance of the site.

Transport Links -

There is a very good level of public transport. Bus, Metrolink, Metroshuttle bus and rail can all be used to easily access the site.

- o Cycling - Cycle links to adjacent communities are located in all directions surrounding the proposed development site.
- o Bus and Metroshuttle - There are bus stops located approximately 100m to the west of the site on Byrom Street, this bus stop is served by the Metroshuttle only. Additional bus stops are located on Deansgate to the north east of the site, and Quay Street to the south west of the site which are served by Metroshuttle services 1 and 2 and other city centre services connecting the site to the wider region.



- Metrolink - The closest Metrolink station to the proposed hotel is approximately 500m to the east, at St Peters Square, from here, frequent services to Piccadilly, the Etihad Campus, East Didsbury, Eccles, Altrincham and Bury are accessible.
 - Rail - The proposed site is located within close proximity to a number of railway stations, these are as follows: Salford Central (800m), Deansgate (600m), Manchester Victoria (1.2km), Manchester Oxford Road (1km) and Manchester Piccadilly (1.6km). Victoria railway station predominantly serves regional services to destinations in north England including Rochdale, Leeds, Newcastle, Wigan, Blackpool, and Liverpool. Piccadilly Railway Station provides regular rail connections to South Manchester, Cheshire suburbs and Inter City links to London, the Midlands, South West, North Wales and the North West / Scotland.
 - Pedestrian Access - Safe pedestrian access to all public transport modes is provided for via the existing pedestrian footways surrounding the site. There are footpaths on both sides of Deansgate, Atkinson Street and Hardman Street/Byrom Street with signalised crossing points.
- The site is well located in close proximity to a range of local amenities, be it in the immediate vicinity, walking distance or via established public transport links;
 - No vehicle parking provision will be provided as part of the development proposals; and,
 - Secure cycle storage will be provided in accordance with Manchester City Council standards, at one space for every ten bedrooms.

Framework Travel Plan -

A Travel Plan has been produced by Mode Transport Planning to inform the building users of the range of travel options available, thereby encouraging the reduction of reliance on forms of travel that have the highest environmental impact;

- This plan seeks to promote existing transport routes, complement the sustainable location of the site and meet the needs of future building users; and,
- Cycle storage will be provided at a ground floor location for the hotel staff and visitors. Cycle parking provision accords with the Council's minimum standards.

Local Amenity Access -

- Building users are able to walk to local amenities and shops; and,
- The site benefits from very good links to local amenity space and recreational facilities. Hardman Square is approximately 230m, St John's Gardens is approximately 270m away and the River Irwell is approximately 550m from the site.

Disability Access -

- Disabled access provision within the scheme itself will be in accordance with Building Regulation, Part M criteria as far as possible; and,
- Lift access will be provided within the hotel building to all floors.



5. BREEAM ASSESSMENT

A BREEAM UK New Construction 2014 Pre-Assessment report has been prepared by a qualified BREEAM Assessor. This is to determine the feasible credits and potential BREEAM rating for the Atkinson Street (Invicta House) development and demonstrates a commitment to the principles of good construction, design and sustainability.

BREEAM New Construction Assessment Classification

The BREEAM assessment methodology applicable to this hotel development is the BREEAM 2014 New Construction because only element to be retained of the existing building is the front façade and the secondary return only. A new build structure is to be constructed to accommodate the proposed hotel.

Potential BREEAM Score and Rating

The BREEAM Pre-Assessment (presented in the Appendix A of this Statement) shows that the building is expected to perform as follows:

- Indicative building BREEAM score = **58.0% (minimum required = 55% for BREEAM Very Good)**
- Indicative BREEAM rating = Potential for **BREEAM 'Very Good' rating.**

Working alongside the qualified BREEAM assessor, the technical design team has reviewed the individual credit criteria and award of credits within the Pre-Assessment in order to optimise the building's BREEAM performance.

In reviewing and assessing the feasibility of the BREEAM credit award and the overall BREEAM performance of this scheme, financial viability has been considered along with constraints arising from the nature of the proposed development site and location. All credits allocated within this BREEAM Pre-Assessment will require further technical verification and additional feasibility assessment during the formal Design Stage and Post Construction BREEAM assessment.



6. ENERGY STRATEGY

This section details the proposed design strategies that have been adopted by the project team in the design of the hotel building to minimise primary energy consumption and carbon dioxide emissions. This report details the outcomes of analysis and calculations performed for a number of energy efficiency measures that have been considered for the development and details the resulting energy strategy which incorporates an enhanced fabric solution combined with efficient servicing provision and renewable energy generation are presented below.

Build Fabric and Thermal Performance

The standard measurement of heat transfer through a given building material or construction type is the U value ($\text{W/m}^2\text{K}$). The lower the U-value, the more slowly heat transfers and is lost out of a building. In buildings heat loss generally occurs through the following main areas and elements of the construction:

- Ground Floor;
- External Walls;
- Roofs;
- Doors and windows;
- Thermal bridging (heat loss through construction joints); and
- Uncontrolled ventilation.

The proposals include for the retention and re-use of the existing façade structure at the site with the remainder of the development being entirely new build. Consequently, it will be assessed under building regulation L2A as a new building. The proposed enhanced material specification that will be incorporated to limit heat loss and ensure efficient operation is compared to the minimum Approved Document ADL2A criteria in Table 6.1.

Table 6.1 – Target Fabric Specification; Invicta House

Construction Element	Proposed Specification	ADL2A Fabric Parameters
Ground Floor	$U=0.22 \text{ W/m}^2\text{K}$	$0.25 \text{ W/m}^2\text{K}$
Wall	$U=0.21 \text{ W/m}^2\text{K}$	$0.35 \text{ W/m}^2\text{K}$
Glazed Elements	$U=1.5 \text{ W/m}^2\text{K}$	$2.2 \text{ W/m}^2\text{K}$
Roof	$U=0.15 \text{ W/m}^2\text{K}$	$0.35 \text{ W/m}^2\text{K}$

Mechanical and Electrical Services

The proposed mechanical and electrical specification that will be incorporated to ensure efficient servicing of the building is presented in Table 6.2.

Table 6.2 – Mechanical and Electrical

System	Proposed Specification
Ventilation	Mechanical Ventilation with Heat Recovery
Lighting	LED
Space & Water Heating	CHP & (91% Efficient) Gas Fired Boiler



This specification will provide the following benefits:

- **High performance thermal insulation** will ensure low U-values for all heat loss elements. Thermally efficient glazing and opaque panels within the façade system will minimise heat loss through the building's thermal envelope;
- **Thermally efficient, 'A' rated, double glazed windows** will be specified with argon gas fill and low emissivity coatings to limit heat loss through the pane. Thermal breaks will be incorporated within the frame to further limit heat loss. The glazing g value will be specified to optimise beneficial solar gains but limit the propensity for the building to overheat.
- **Uncontrolled ventilation will be minimised** in order to reduce heat losses and provide high levels of occupant comfort;
- **Cold bridging will be reduced** (so far as reasonably practicable within this existing building) including the provision of insulation to limit heat transfer;
- **Thermal mass** (associated with concrete frame constructions such as is proposed for Invicta House) helps stabilise the internal temperature and provides a largely self-regulating environment, reducing the risk of overheating and the need for mechanical cooling in summer. Furthermore, this daily cycle of absorbing and releasing heat continues on a year-round basis and can reduce the energy needed to keep a building warm during the heating season. This works through the ability of thermal mass to capture and recycle heat solar and incidental heat gains;
- **Mechanical ventilation with heat recovery (MVHR)** will be specified throughout the building (with the exception of WC and kitchens) to maintain a healthy environment and further reduce the heat losses and the energy demand of the building. The proposed MVHR system recovers heat from the extracted stale air from the building by using a counter flow heat exchanger which 'pre-heats' cool incoming, fresh air. The outgoing and incoming air pass next to each other, but do not mix;
- **LED lighting** is highly efficient. An estimated energy efficiency of up to 90% when compared to traditional lighting and conventional light bulbs. This means that about c.90% of the electrical energy is converted to light, rather than wasted heat as in conventional bulbs; and,
- **Efficient Form** buildings such as the Invicta House Hotel, both in terms of the building materials required and the ongoing heat energy demand, results in relatively low areas of external heat loss elements associated with such layouts which enhance the energy efficiency of the building and guarantees reduced energy demand throughout its operation.

Low and Zero Carbon Feasibility

To ensure the selection of the most appropriate solution, a number of renewable and low carbon energy technologies have been considered for this site, including:

- Solar Hot Water,
- Photovoltaics (PV),
- Wind,
- Biomass heating, and
- CHP.

When selecting an appropriate technology for a development, it is important to consider the energy demand profiles and end use as well as the site-specific location and physical constraints. A review of the development proposals and site location concludes that only one of these renewable and low carbon options will be progressed for this scheme, as



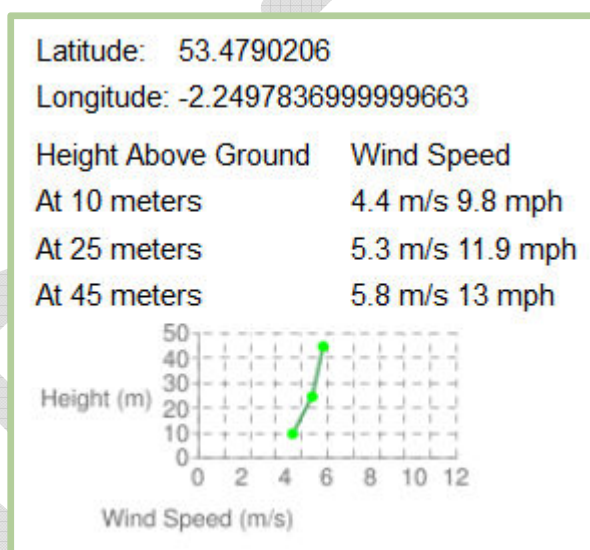
detailed below. Decentralised energy has also been considered as part of the solution to meeting the emissions reduction targets.

Solar Hot Water utilises the energy in sunlight and diffuse daylight to heat water for use in buildings. The main component of any solar water heating system is the collector, which absorbs the radiant energy of the sun and converts it to heat energy. This technology is not considered to be a feasible option for this site because, although the roof space would enable this technology to be installed, these solar thermal technologies can only make a relatively limited contribution to reducing the building's energy demand and carbon dioxide emissions – insufficient to meet the emissions reduction target without additional technologies.

Photovoltaics (PV) Photovoltaic (PV) panels harness solar thermal energy and convert it into electricity which can then be used within a building. The panels may be orientated in a southerly direction in tilted arrays upon the flat roof area of the building extension, thereby enabling this technology to operate efficiently. This technology is therefore a technically feasible option for this development.

Wind Turbines are considered unsuitable for this site due to a poor wind resource. In order to operate efficiently a wind speed of at least 6m/s is typically required. The NOABL wind speed database records a wind speed of approximately 4.8m/s at 10m above ground level for this site (post code M3 3HH) as presented in Figure 6.1.

Figure 6.1 - Wind Speed Data; Invicta House, 2-4 Atkinson St., Manchester



Biomass heating would be capable of delivering the target CO₂ emission reductions, but are inappropriate for this development due to the necessity for a large capacity fuel store and access that cannot be accommodated on this site. The ongoing maintenance and fuelling requirement for such systems and high NO_x emissions from this technology also preclude this from further consideration.

Decentralised energy generation has also been considered, as follows:

Combined Heat and Power (CHP) is effectively an on-site mini power plant providing both electrical power and thermal heat. It is an energy efficiency and low carbon measure rather than a renewable energy technology. A CHP system operates by burning a primary fuel (normally natural gas) by use of either a reciprocating engine or turbine, which in turn drives an alternator to generate electrical power. The heat emitted by the engine and exhaust gases is recovered and used to heat the building or to provide hot water.

The viability of CHP is dependent upon the building base load requirements for both heat and power. Buildings with high heat demands and constant power demands (such as hotel and/or leisure complexes) are ideal for CHP technology. The energy demand profile for the proposed hotel development lends itself to this technology due to the constant and significant hot water demand.

The scheme will be specified with an on-site communal heating network consisting of a centralised gas combined heat and power (CHP) system and gas fired back up boilers which will serve the water heating requirements of the



development. To allow for future connection to local heat networks that may arise in the area, provision will however be made to enable the distribution system within the residential building to be linked directly into a heat main.

Proposed Low Carbon Energy Solution

It is therefore proposed that, although there are a number of potentially technically feasible solutions, CHP and photovoltaic arrays will be progressed as the low and zero carbon solutions for the hotel. These are discussed in more detail below.

Combined Heat and Power (CHP) –

The building will be specified with 100% gas fired boilers with the CHP as an additional heat source, which when running will mean a portion of the installed boilers will not operate.

The hotel has a significant, constant hot water demand and therefore an ideal energy profile for this technology. CHP systems function at optimum efficiency when operating for long periods of time, for this reason it is best to size according to the building base load. The CHP system will be sized to operate at maximum output under normal running conditions, rather than modulating the output to match the load profile. This is achieved through the provision of a large thermal store which acts as a static load on the system, allowing the CHP to run at full output to 'charge' the store, enabling optimal sizing of the CHP plant. Running the CHP at maximum output in this manner maximises the conversion efficiency and improves the emissions profile as NOx emissions per unit output are at the lowest at full load.

A pre-insulated distribution network provides hot water throughout the building and individual heat interface units within each dwelling enable occupants to draw off heat energy as required to deliver space and water heating within their rooms.

Photovoltaic Array –

PV arrays are relatively straightforward to install, benefit from low maintenance costs and will reduce the operational cost of the building. The use of PV in general would provide the following benefits:

- Reducing the building electrical energy demand;
- Simple installation and commissioning;
- Low maintenance; and
- Reliable, proven technology

Proposed System Details -

It is proposed that PV panels be shallow mounted in arrays tilted at c.10° and orientated due south in order to optimise the installed capacity of the system to meet the net carbon dioxide emissions and also the on-site renewable energy provision.

- The energy assessment is based upon the specification of 42m² PV modules. An array of this capacity may be accommodated within the available roof area without over shading.

This energy strategy is aligned with principles of Energy Hierarchy which seeks to avoid emission targets being achieved solely through 'bolting on' of renewable energy solutions. PV arrays will be more fully reviewed in the following Energy Demand Calculation section to demonstrate how these may contribute to meeting the planning policy emissions reduction target (i.e. 10% building emission rate reduction beyond Part L2A, 2010) for this site.

Land use -

- There are no land use issues associated with PV technology at this site.



Local Planning Issues -

- There are no planning policy issues associated with this technology. PV is covered under permitted development for existing dwellings and encouraged at all tiers of planning policy.

Feed in Tariff and Payback -

- This size of array may be eligible to claim the generation tariff, index linked and fixed for 25 years plus the export tariff based upon the metered value of the electricity exported.
- The typical payback period is around 9 years for installations such as this.

Noise Issues -

- PV is silent in operation.

Whole life cost and lifecycle impact -

- Current installed costs for PV are approximately £1,500 / kWp installed.
- Additional costs throughout the system's 30 year lifecycle are limited to:
 - Cleaning of the arrays;
 - Potential vandal damage to the arrays; and,
 - Replacement of the DC / AC inverter unit which typically have a lifespan of around 10 years.
- Energy payback estimates for rooftop PV systems are between 4 to 2 years for systems using current multi-crystalline, silicon PV modules.
- Financial payback is estimated to be around seven years.
- With energy paybacks of 2 to 4 years and assumed life expectancies of 30 years, 87% to 97% of the energy that PV systems generate will be 'clean' zero carbon energy.

Emissions Performance Calculations

In order to demonstrate the environmental benefits associated with the energy demand and emission reductions at the site, approved Simplified Building Energy Model (SBEM) software (TAS v9.2.1) has been used to generate representative energy demand models for the building. Assessments have been completed against the building regulation Part L2A 2010 and 2013 criteria in order to accurately reflect the emission performance of the building as required by local planning policy guidance as well as the BREEAM New Construction 2014 energy credit criteria.

Appendix A of the Manchester Core Strategy provides details of the approach to determining compliance with Policy EN6. These explanatory notes serve as a guide to assist in completing an energy statement. Accordingly, this energy assessment includes the following calculation procedure:

1. Set out the projected future energy demand of the development, including the regulated emissions under Part L i.e. those associated with 'fixed' M&E plant such as space heating, ventilation, hot water and fixed lighting;
2. Calculate the equivalent annual carbon emissions from the completed development;
3. Apply the appropriate carbon emissions reduction target¹;
4. Apply the energy hierarchy in order to identify opportunities for carbon emissions reductions through design and specification of the development; and,

¹ It has been determined that Target Area 2: Electricity Intense Buildings (i.e. a 10% BER:TER reduction beyond Part L2A (2010)) is the appropriate emissions reduction target for this development



5. Set out the carbon savings achieved by the proposed measures.

The SBEM calculation results which respond to the requirements of CS Policy EN6 are presented in the following sections:

Regulated Energy Demand and Emission Calculations

Part L2A of the Building Regulations is applicable to check compliance in regard to CO₂ emissions and the overall energy performance of the building. Building Regulation ADL2A establishes a notional Target Emission Rate baseline in terms of regulated energy demand and associated carbon dioxide emission rate for new non-domestic buildings. This baseline includes a specification that reflects the current prevailing building regulations.

The CO₂ emissions reduction target for developments in this location is 10% (i.e. Target Area 2). Based upon the representative SBEM data, the estimated emissions (relative to the notional building's baseline Target Emission Rate) including the proposed enhanced material and servicing specification are presented in Table 6.3.

Table 6.3 – Calculated Emission Rate Reduction

	Emission Rate (kgCO ₂ /m ² /year)	Emissions Reduction (%)
Baseline	55.3	n/a
Fabric + Efficient Servicing	50.1	9.4
Fabric, Efficient Servicing + PV	49.5	10.5

The developer has sought to prioritise a fabric led solution to minimising the development's energy demand and reducing the associated regulated carbon dioxide emissions from the hotel scheme. The proposed specifications improve significantly upon the required standards of Building Regulation L2A. The benefits of the enhanced material specification are augmented by the proposed high efficiency servicing of the building plus renewable energy generation (PV). As detailed below, this solution is aligned with the principles of the Energy Hierarchy.

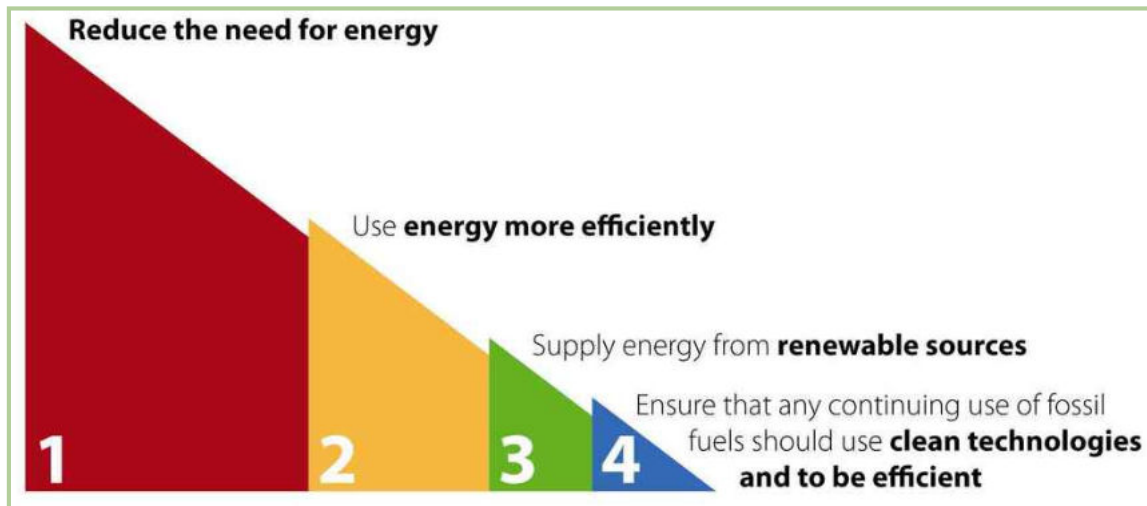
The emissions reductions for the scheme (based upon representative, Part L2a (2010) SBEM data) are calculated as 10.5%, in excess of those targeted by Core Strategy Policy EN6, Target Area 2.

Energy Hierarchy

As reviewed in the previous sections, the scheme will incorporate an improved material specification along with high quality design and refurbishment standards in order to improve the energy efficiency of the whole scheme. The construction, design and specification proposed for this scheme will deliver a building that are inherently efficient and cost effective during operation.

The Energy Hierarchy provides a framework to guide energy policy and decision making to achieve practical and cost effective carbon emission reductions. The hierarchy prioritises such demand-side activities to reduce wastage and improve efficiency (see Figure 6.1).



Figure 6.1 – The Energy Hierarchy**First Principle**

The building will be constructed with a material and design specification which exceeds minimum Building Regulation (ADL2A) standards and includes numerous efficiency measures designed to reduce heat losses and minimise energy demand. This 'fabric led' approach to minimising energy demand and associated carbon dioxide emissions through the performance of the thermal envelope is aligned with the first principle of the energy hierarchy which states that reduction in energy demand should be achieved initially by energy efficiency.

Second Principle

The following proposed measures will ensure that energy consumed by the building is used efficiently, as per the second principle of the Energy Hierarchy:

- Combined heat and power plant;
- Mechanical ventilation with heat recovery;
- 100% low energy and LED lighting provision; and,
- Sophisticated control systems for the space and water heating

Third Principle

The proposed 42m² photovoltaic array will generate zero carbon electricity for consumption within the building. This is aligned with the third principle of the Energy Hierarchy.

Fourth Principle

High efficiency, gas fired boiler will be sized to meet 100% of the heat load. The CHP will operate as an additional heat source, which when running will mean a portion of the installed boilers will not operate. This will ensure that fossil fuels consumed for this purpose will be burnt cleanly and efficiently in accordance with the fourth principle of the Energy Hierarchy.

The development proposals are therefore, aligned with the energy hierarchy promoted within the Manchester Guide to Development and Core Strategy.



7. CONCLUSION

This Statement has reviewed the environmental performance of the proposed development proposals for the Atkinson Street scheme in Manchester against national and local policies and details the potential BREEAM rating for the scheme. The material specification and servicing strategy for the scheme and the building (carbon dioxide) emission rates for the various uses throughout the development have also been reviewed.

Energy Performance -

- Minimising the impacts of climate change is a key element of the proposed design. The proposed energy strategy will incorporate an enhanced 'fabric led' material specification plus combined heat and power plant and high efficiency gas fired boilers and an element of renewable energy generation (PV), along with high quality design standards to improve the energy efficiency of the building.
- The building will be specified to achieve a 10.5% emission rate reduction over the calculated notional baseline for this existing building. This exceeds the requirements of adopted Core Strategy Policy EN6 (Target Area 2) through enhanced fabric plus efficient servicing and renewable energy generation.
- The development will be specified in accordance with the principles of the energy hierarchy, in line with the adopted Core Strategy Policy EN 4.
- These proposals will deliver a scheme that is inherently efficient and cost effective during operation and that accords with the adopted Core Strategy Policy EN 4, EN6 and the Supplementary Planning Document (SPD) criteria.

Environmental Performance -

- The key issues of Manchester City Council's Supplementary Planning Document (Environmental Standards) in accordance with the Core Strategy Policy DM 1 have been achieved by the proposals. These are as follows:
 - o The proposed development will be designed in accordance with the BREEAM criteria and achieve the required 'Very Good' rating. This represents 'advanced good practice' for new non-domestic buildings in the UK and as detailed in Section 4 and Section 5, the scheme is expected to perform well in all areas of the assessments.
 - o Internal water management will achieve a 25% improvement upon the BREEAM 2014 baseline case further reducing the developments internal water demand.
 - o The development site is located within Flood Zone 1 (low probability of flooding). The site drainage strategy will be designed to manage the surface water runoff to ensure that the peak rate and volume of surface water run-off will be no greater post-development than pre-development.
 - o Waste arising during construction and occupation/operation will be minimised. A site waste management plan will be adopted during construction. The hotel will be provided with waste facilities and a comprehensive waste management plan for the site will accord with the local authority recycling scheme. The provision of suitable space and facilities will allow the hotel to segregate and store operational recyclable waste.
 - o Construction site management procedures will minimise adverse impacts on the environment and control pollution generated during the construction phase. These include a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling of materials. A commitment will be made to minimise waste and pollution.
 - o The proposals will ensure that there is no negative change of site ecology from pre-developed to post-development.



- o In accordance with the BREEAM criteria materials are proposed to be responsibly sourced, materials with low environmental impact will be selected and local suppliers will be prioritised. In combination this procurement strategy will minimise and conserve energy associated with transportation and waste generation.

Furthermore, the proposals accord with the aims of the National Planning Policy Framework, as follows:

- The proposals include the redevelopment of an existing site retaining the front façade and secondary return. This represents a very efficient use of land.
- Construction practices that minimise adverse impacts on the environment will be adhered to including a waste management strategy to reduce the quantity of waste generated, and to increase re-use and recycling, a commitment will be made to minimise waste and pollution; and
- Exceeding the regulatory compliance criteria the scheme will assist in mitigating the impact of climate change.

In conclusion, the proposals reviewed within this statement for the scheme at Atkinson Street (Invicta House), Manchester will deliver an efficient and sustainable scheme, providing a quality development that accords with the guidance provided within the Manchester City Councils adopted planning policies.

