

Energy and Sustainability Statement

Shall Do Crown Street

12-18 Crown Street
Reading
RG1 2SE



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Executive Summary

Executive Summary

This Energy and Sustainability Statement has been written to demonstrate the measures incorporated into the design of 12-18 Crown Street, Reading (the Proposed Development) for the conversion from hotel accommodation to 44 no. residential units.

The energy strategy for the Proposed Development has been developed by following the national energy hierarchy and the inclusion of energy efficiency measures has been discussed to minimise on-site energy use compared to a building regulation compliant design, including high efficiency gas heating and energy efficient lighting and appliances.

There are a couple of options for space heating and hot water which have been considered for the Proposed Development:

- Option 1 ('Lean'): Using high efficiency Individual Combination Boilers for each unit
- Option 2 ('Clean'): Using high efficiency Communal Gas Boilers

Although individual gas boilers (Option 1) could offer greater improvements over the baseline, it is proposed that the communal heating strategy ('Option 2') is implemented as there are high efficiency communal gas boilers currently in place in the existing building and this strategy aligns with Reading BC planning policy CC4 ('Decentralised Energy') and 'future proofs' the building for future changes in energy generation.

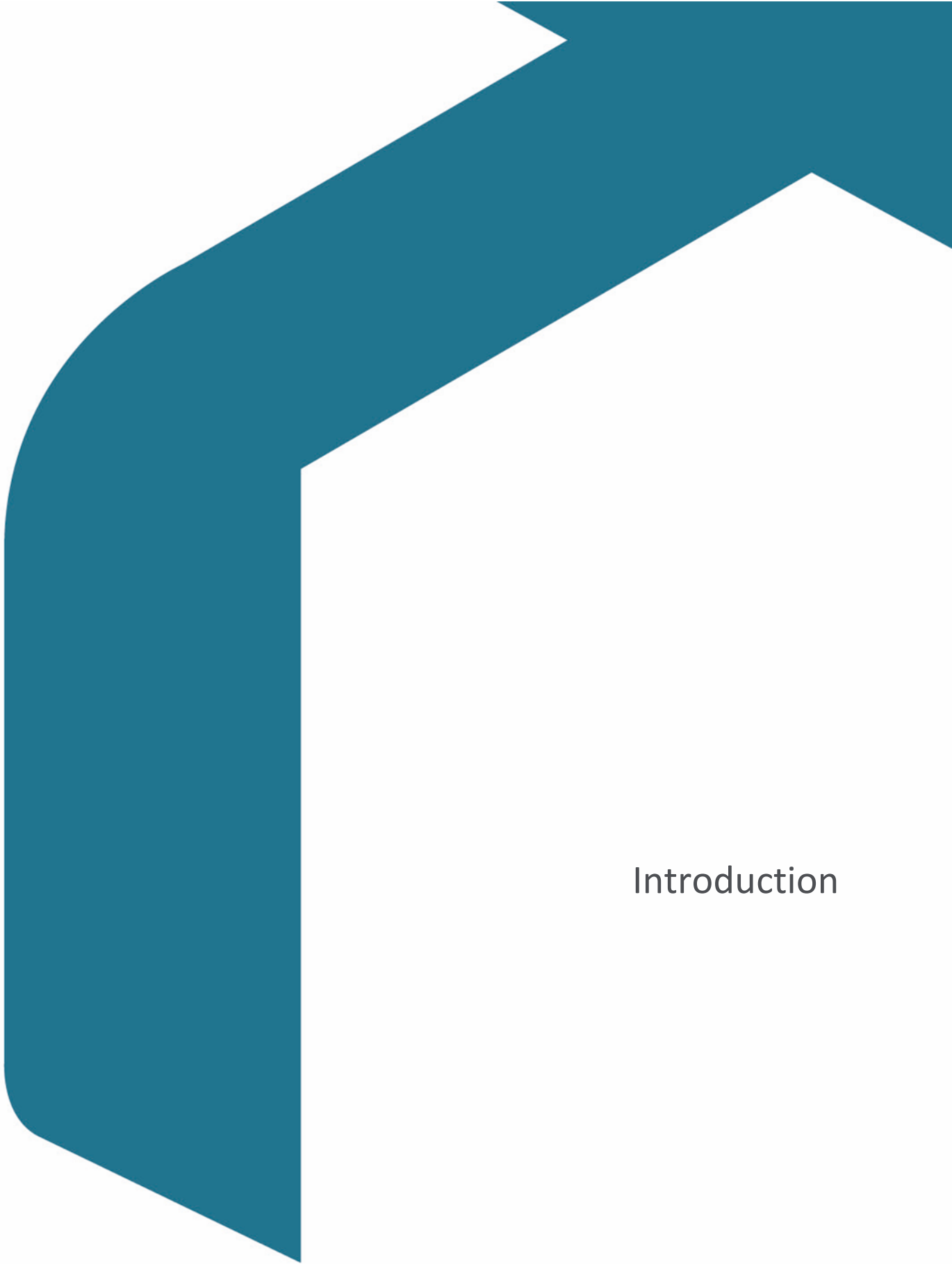
Regulated carbon dioxide savings from each stage of the energy hierarchy for domestic buildings		
	Regulated carbon dioxide savings	
	Tonnes per year	% Improvement over Baseline
Baseline	61.42	
Lean	49.16	19.97%
Clean	56.39	8.2%

Table 1 - Summary of regulated carbon dioxide savings

Proposed Energy Strategy

- Passive and active design measures
- Efficient lighting design to reduce power consumption and;
- Efficient water fittings to reduce indoor water demand.
- High efficiency communal gas boilers to provide space heating and hot water through:

In addition, this report assesses the Proposed Development in relation to wider Sustainability requirements relating to Reading Borough local planning policy.



Introduction

1.0 Introduction

This Energy and Sustainability Statement has been written by SRE on behalf of Shall Do Crown Street (the Client) for the residential development at 12-18 Crown Street, Reading (the Proposed Development) to address the general planning policy requirements for the change-of-use conversion of a hotel accommodation (C1 building) to residential units (C3 building). The Proposed Development will seek to deliver lower energy and water use, lower carbon emissions and lower operational costs than an equivalent Building Regulations compliant design.

The statement compares the predicted actual building energy requirement with a Building Regulations compliant design, outlines passive and active design measures specific to this site to address the relevant planning policy requirements.

The Proposed Development at 12-18 Crown Street is a an existing four-storey hotel that is to be converted into residential accommodation providing 44 no. units. No planned upgrades are required or due to be made to the external fabric of the building as part of the conversion which primarily entails solely the reworking of the internal layouts of the Proposed Development and general refurbishment.

Further information and the site layout drawing can be found in Appendix A.

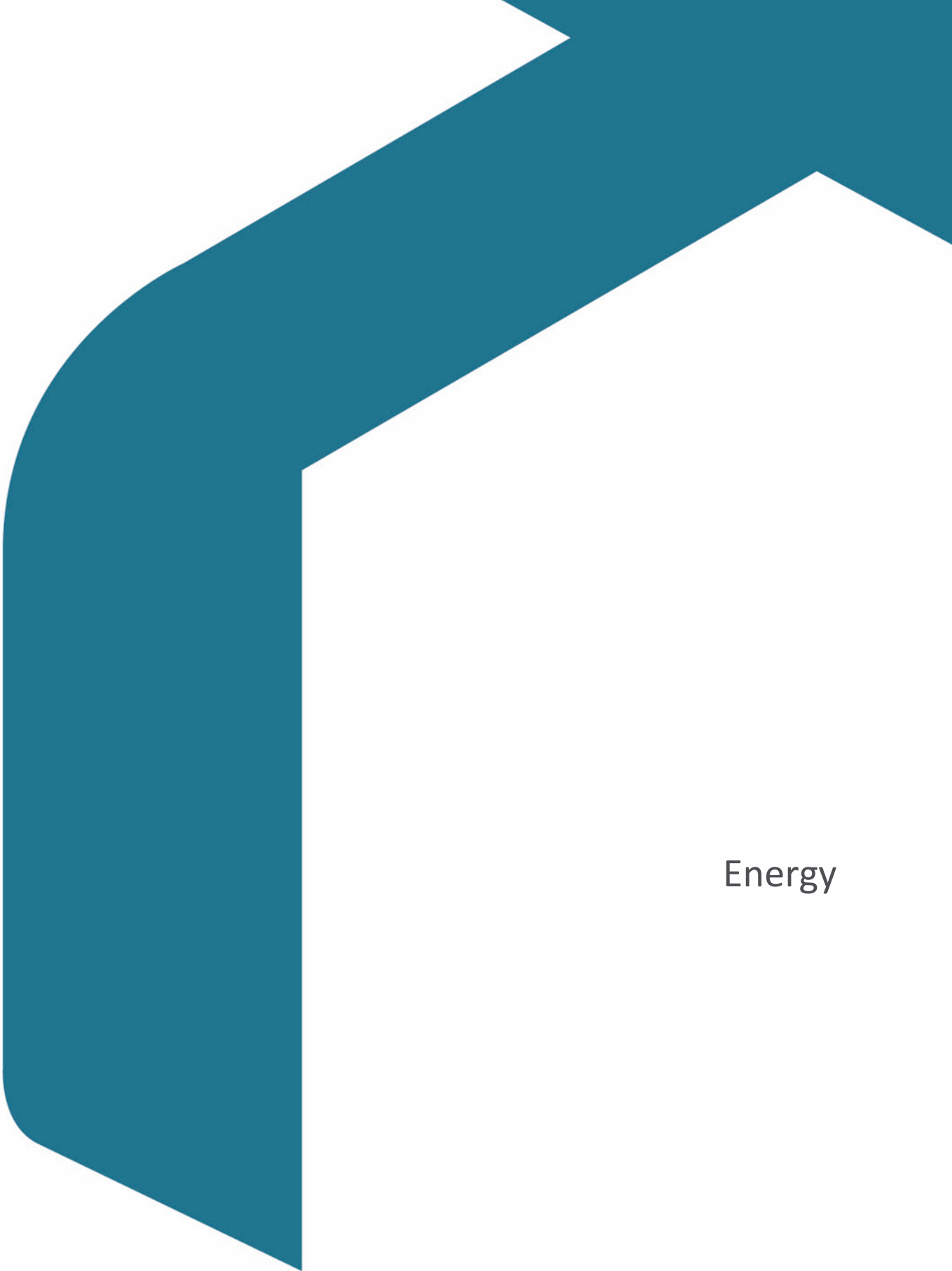
1.1 Planning Policy

Planning Policy	Requirement
Reading Borough Local Plan	<u>Policy CC2: Sustainable Design and Construction</u> The design of new buildings and the redevelopment and refurbishment of existing buildings and site layouts should use energy, water, minerals, materials and other natural resources appropriately, efficiently and with care and take account of the effects of climate change.
	<u>Policy CC3: Adaptation to Climate Change</u> All developments will demonstrate how they have been designed to incorporate measures to adapt to climate change.
	<u>Policy CC4: Decentralised Energy</u> In meeting the sustainability requirements of this plan, developments of the sizes set out below shall demonstrate how consideration has been given to securing energy for the development from a decentralised energy source. Any development of more than 20 dwellings and/ or non-residential development of over 1,000 sq m shall consider the inclusion of decentralised energy provision, within the site, unless it can be demonstrated that the scheme is not suitable, feasible or viable for this form of energy provision. Where there is existing decentralised energy provision present within the vicinity of an application site, further developments of 10 dwellings or more or non-residential development of 1,000 sq m or more will be expected to link into the existing decentralised energy network or demonstrate why this is not feasible.

Table 2 - Summary of planning policy requirements

The Proposed Development will meet the requirements as set out in Reading Borough Council's Local Plan and the measures outlined within this policy will be incorporated into the building design where possible.

Carbon Emissions offset has been calculated using SAP 2012 carbon factors, as the new version of Building Regulations (SAP 10) has yet to be formally introduced.

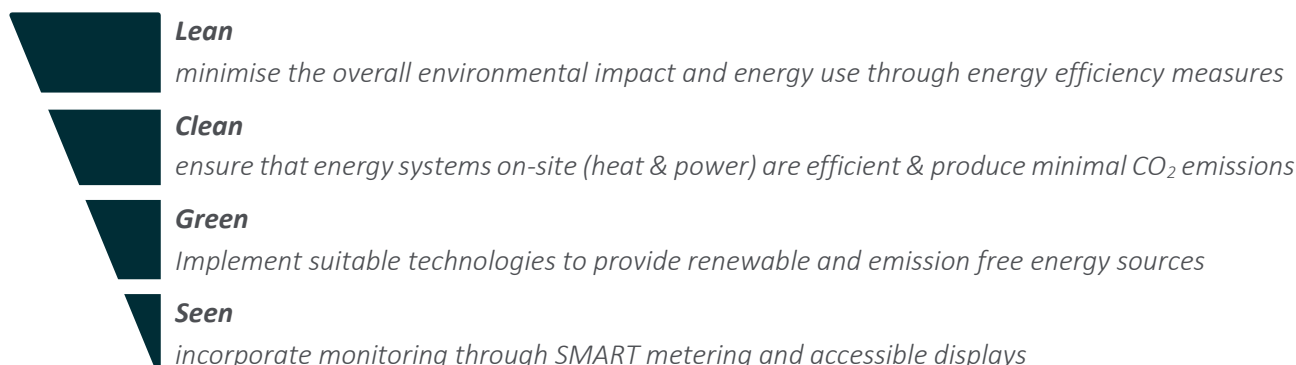


Energy

2.0 Energy

2.1 Method

The energy strategy design follows national policy guidance¹ and seeks to be:



The CO₂ Conversion Factors (Table 3) have been taken from Building Regulations 2013:

	CO ₂ Conversion Factor (kgCO ₂ /kWh)
Electricity (mains)	0.519
Electricity (offset)	-0.519
Gas (mains)	0.216
Heating Oil	0.298
Wood Pellets	0.039
Woodchip	0.016

Table 3 - CO₂ conversion factors by energy source

The energy modelling has been calculated using SAP 2012 software in accordance with Building Regulations 2013 Part L1B – change of use/existing buildings.

The notional building provides the energy baseline and is the exact size and shape of the Proposed Development but is based on existing and notional U-values and heating specifications outlined in Approved Document L and the Domestic Building Services Compliance Guide.

	CO ₂ emissions (t/yr)
Baseline	61.42

Table 4 - Baseline CO₂ emissions

¹ GLA Energy Hierarchy

2.2 Unregulated Energy

The unregulated Energy use within a development is the energy used within the Proposed Development which is not calculated within Building Regulations compliance modelling. This includes auxiliary equipment such as computers, device charging, cooking etc. A summary of this energy use and related CO₂ emission is given below.

	kWh/year	tonnesCO ₂ /year
Unregulated energy	75,758	46.4

Table 5 - Unregulated energy use

The above figure does not change throughout the application of the Energy Hierarchy, and can therefore be applied to all elements of the modelling undertaken to gain a clear representation of the total energy use (and CO₂ emissions) of the Proposed Development as detailed in section 2.1.

2.3 LEAN – Demand Reduction

The Lean scenario can achieve a 19.97% reduction in CO₂ emissions, by installing high efficiency individual gas combination boilers, improved heating controls and energy efficient lighting. There is no proposed change to the building fabric as no works are being undertaken on these elements as part of the reworking of the internal layouts of the Proposed Development.

	CO ₂ emissions (t/yr)	Improvement
Baseline	61.42	-
Lean	49.16	19.97%

Table 6 - Lean CO₂ emissions and improvement over Baseline

2.3.1 Passive Design Measures

The building is positioned within the existing site to maximise the usable space, both for the building and the associated external spaces. It is recommended that glazed areas of the building have shading provided through internal curtains or blinds.

The building orientation and design will maximise natural light and positive solar gains with glazing on the South, East and West elevations. Glazing on the south elevation will be most beneficial for solar gain in winter.

As mentioned above, there are no planned upgrades to the fabric of the building as part of the reworking of the internal layouts. The U-values of the building are provided within Table 7.

Element	Actual (U-value)
External Walls	0.35
Ground Floor	0.37
Flat Roof	0.25
Windows / Glazed Doors	2.0
Air Tightness @ 50 N/m ²	15 (m ³ /hr/m ²)
Thermal Bridge	Not Applicable

Table 7 - Fabric energy efficiencies

The overall building should have a medium thermal mass as the construction is load-bearing masonry. A medium thermal mass will provide a high energy efficiency and limit overheating during the summer months.

A number of energy conservation measures will be incorporated by the Client to reduce the overall energy load for the Proposed Development. This is in-line with Policy CC3, the energy hierarchy and general national 'Best Practice' guidance for delivering energy efficient buildings.

2.3.2 Active Design Measures

The Proposed Development will utilise 100% low energy/LED lighting in excess of Building Regulation requirements. All external lighting will be positioned to avoid excessive light pollution and be supported by PIR/daylight sensor and time controls with a maximum lamp capacity of 150W (LED equivalent) for essential security lighting.

The proposed Option 1 for heating includes the installation of individual high efficiency gas combination boilers in all units to provide heating and hot water as part of the 'Lean' measures. Time, temperature and optimum start/stop controls will be installed as a minimum to allow the control of individual zones/rooms throughout the building. Although this approach can provide significant savings over the baseline, with the 'Future Homes Standard' promoting the non-use of individual gas boilers from 2025, it would be seen as a regressive decision in the medium term.

Careful consideration needs to be given to the specification of ventilation systems to ensure moisture is removed and ventilation standards are met to ensure a healthy standard of internal air.

Standard extract ventilation or decentralised mechanical ventilation (Appendix Q rated) from wet rooms and kitchens is provided to all units to aid moisture removal, with passive trickle ventilation and openable windows providing fresh air and Part F purge ventilation.

2.3.3 Cooling

The cooling hierarchy has been used to ensure that the existing building design has been optimised to reduce the cooling load for the Proposed Development. As such, active cooling has not been proposed for the Proposed Development.

Cooling Hierarchy	Potential Design Measures
Minimising internal heat generation through energy efficient design	All primary pipework to be insulated, therefore there will be low system losses. Hot water cylinders will have low standing losses for the residential units. Low energy lighting throughout.
Reducing the amount of heat entering the building in summer	Internal blinds are to be provided to minimize solar gain.
Use of thermal mass and high ceilings to manage the heat within the building	Thermal mass is anticipated to be medium and will balance the provision of high energy efficiency and limiting overheating during the summer months.
Passive Ventilation	Openable windows will be provided to all rooms.
Mechanical Ventilation	Standard extract ventilation will be provided to all wet rooms

Table 8 - Design measures following the cooling hierarchy

2.4 CLEAN – Heating Infrastructure

Communal Systems

The existing building has fairly new high efficiency communal gas boilers in place to provide heating and hot water. Retaining the use of the present communal gas boilers ('Option 2') is proposed as an alternative approach to individual gas boilers ('Option 1') for the Proposed Development to provide heating and hot water, with CCL charging system linked to the use of communal heating, programmers and TRVs installed as a minimum to allow the control of individual zones/rooms throughout the building.

By retaining the existing communal heating system and installing individual heating controls in addition to the use of energy efficient lighting, this will allow the Proposed Development to achieve an 8.2% improvement over the energy Baseline.

The communal heating strategy is the preferred strategy due to the fact that there are already high efficiency communal gas boilers in place, it aligns with Reading BC planning policy CC4 ('Decentralised Energy') and future proofs the building for future changes in energy generation.

	CO ₂ emissions (t/yr)	Improvement
Baseline	61.42	-
Clean	56.39	8.2%

Table 9 - Clean CO₂ emissions and improvement over Baseline

There are currently no proposals for a heat network nearby the site. Therefore, at present, connection to a district heating system is not feasible. However, the retention of a communal 'wet' system would allow the Proposed Development to connect to a new district heating network in the future.

The use of CHP has been considered as not suitable for a scheme of this size as the proposed residential units do not have sufficient space heating and hot water demand for a CHP system to run efficiently. It should also be considered that a communal CHP scheme would need to be managed and operated by an Energy Services Company (ESCO). This would add cost to the operating system and may lead to an increased cost to residents, making the technology less economically feasible than the other options.

2.5 GREEN – Low Carbon and Renewable Energy

The addition of 'Green' technologies can provide a further reduction in CO₂ emissions, but due to the retention of the present building layout and design they have not been deemed proposed as part of this change of use.

2.6 SEEN – In-use monitoring

It is recommended that the Proposed Development will be supplied with Smart Meters (where available from the utility supplier) and a building energy management system (BEMS) along with associated internal energy displays. This will further improve energy efficiency by allowing the residents to observe their energy use in 'real time' and manage it more effectively.

2.7 Conclusions

The Proposed Development will deliver passive and active energy demand reduction measures in order to reduce energy demand and associated CO₂ emissions resulting from the Proposed Development's operation below Building Regulations Part L baseline compliant levels.

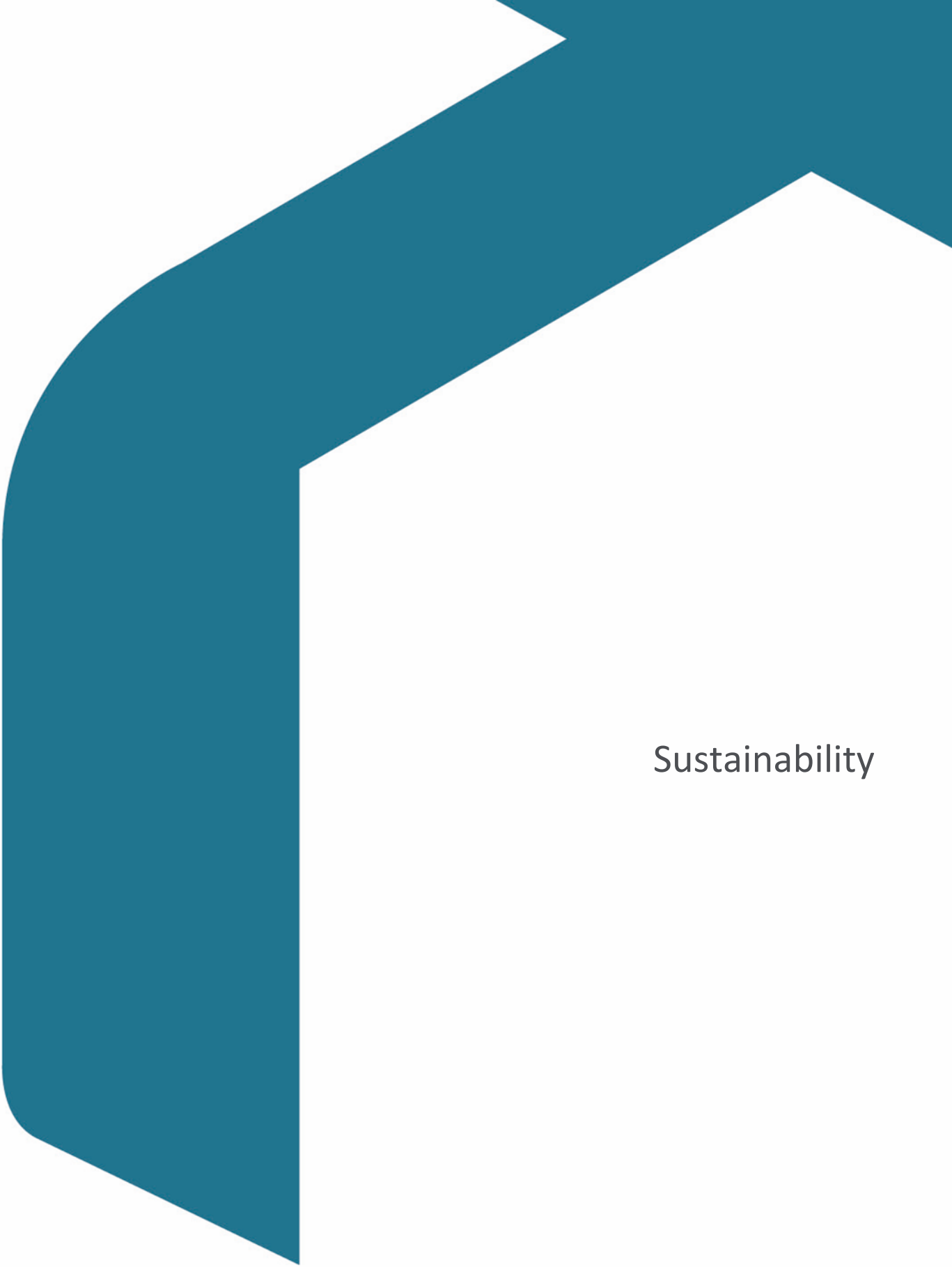
The calculations undertaken demonstrate that the Proposed Development can successfully exceed Baseline emissions by 8.2% through the use of a 'Clean' communal gas boiler heating system (Option 2).

	CO ₂ emissions (t/yr)	Improvement over baseline
Baseline	61.42	-
Clean	56.39	8.2%

Table 10 - Summary of CO₂ emissions, incremental improvement and improvement over Baseline

In delivering this Clean energy strategy, the Proposed Development provides:

- Passive and active design measures
- Efficient lighting design to reduce power consumption
- Efficient water fittings to reduce indoor water demand
- High efficiency communal gas boilers to provide space heating and hot water

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Sustainability

3.0 Sustainability

The World Commission on Environment and Development (WCED) report: Our Common Future, describes Sustainable Development as development that:

“meets the needs of the present without compromising the ability of future generations to meet their own needs.”

3.1 Pollution

Air

The Proposed Development will aim to limit its contribution to local air pollution by installing low NO_x gas boilers.

The Proposed Development is within a medium NO_x emissions area as defined by the UK NO_x emissions map, see Figure 1 below.

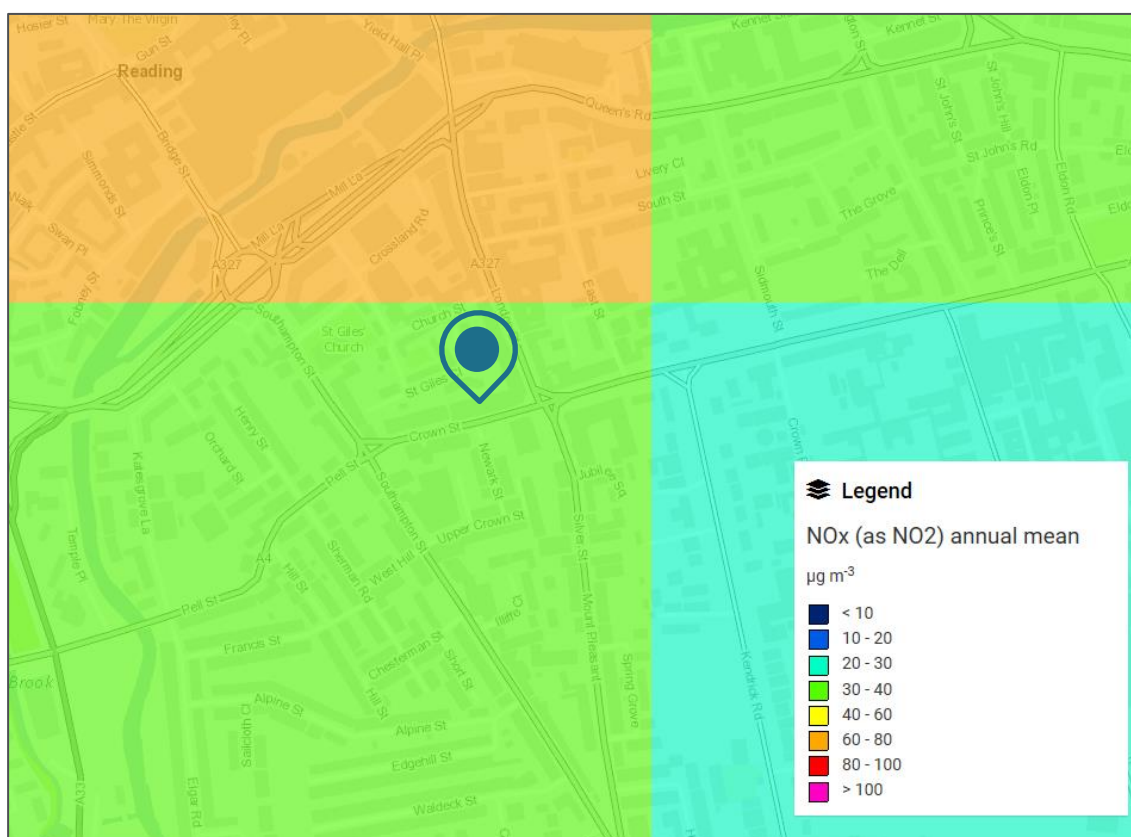


Figure 1 - UK Air Pollution Map showing pollution from Nitrogen Oxides as NO₂ (<https://naei.beis.gov.uk/emissionsapp/>)

Noise

The Proposed Development is a change-of-use conversion from providing existing hotel accommodation, to residential accommodation, and is unlikely to produce any greater noise pollution that was generated during the operation of the previous building.

The existing building provides limited car parking. Therefore, residents and visitors will be encouraged to use public transport or cycle rather than using personal vehicles which may contribute to the general noise pollution in the area.

Light

The design, layout and function of the site for practical use has been considered while trying to maximise internal daylight levels. Therefore, all occupied spaces have windows to provide natural daylight, and light-coloured curtains or roller blinds will be provided to enable glare control and privacy.

Light pollution will be minimised where possible through the careful specification and positioning of external lighting around the Proposed Development, ensuring minimal light pollution from the site. Special attention will be given to security lighting (where fitted) to ensure it is appropriately focussed and controlled.

All external space lighting will be provided through low energy fittings, with security lighting being PIR and daylight/timer controlled.

3.2 Flood Risk

The site is located within Flood Zone 1, with a low probability of flooding. The site has a very low risk of flooding from rivers and seas (Figure 2). However, the site is bounded by areas of low-high risk of flooding from surface water immediately south of the site along Crown St, to the east of the site along London Street, to the west of the site along Southampton Street, and to further north of the site along Mill Lane (Figure 3).

There will be no change to the impermeable area of the site, since the Proposed Development is a change-of-use conversion, with no changes made to the building fabric or infrastructure.

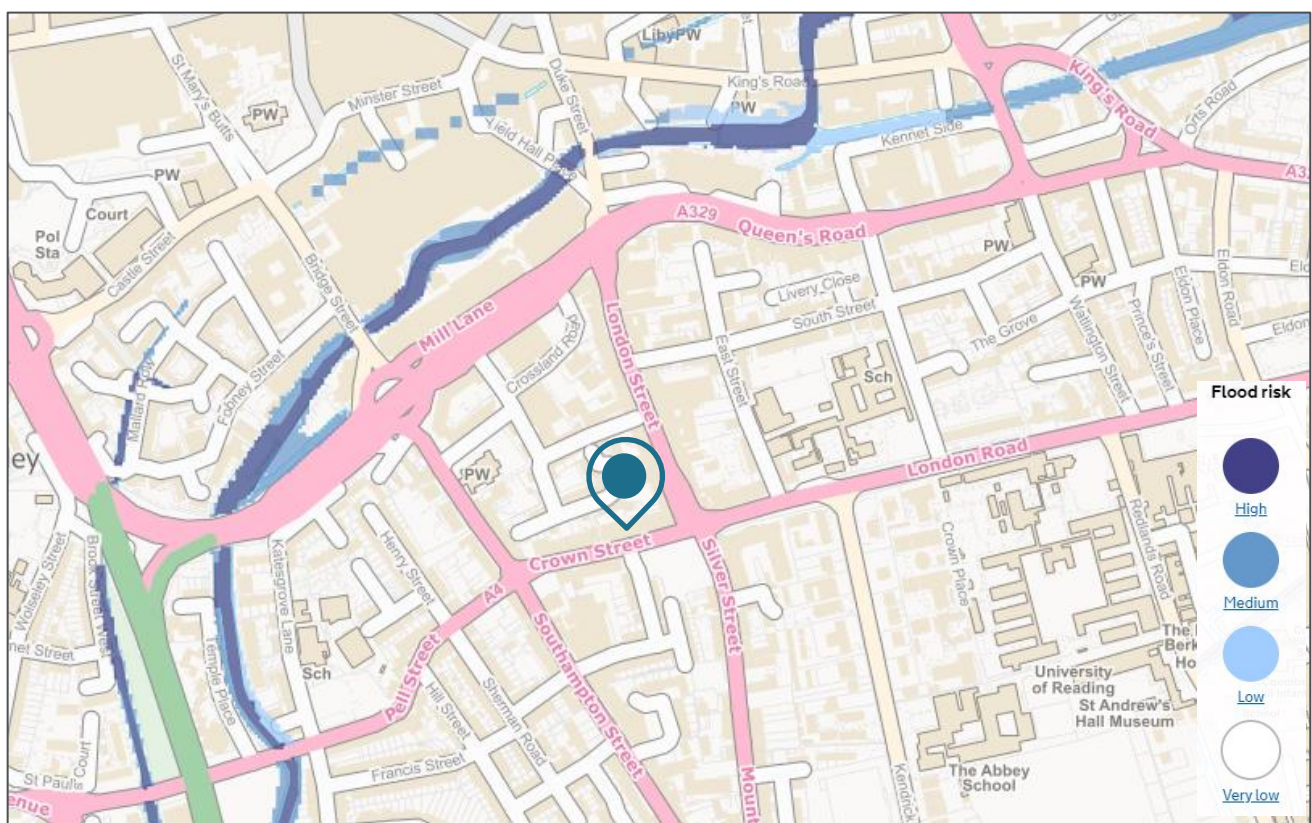


Figure 2 - Flood map showing risk of flooding from rivers or the sea (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>)

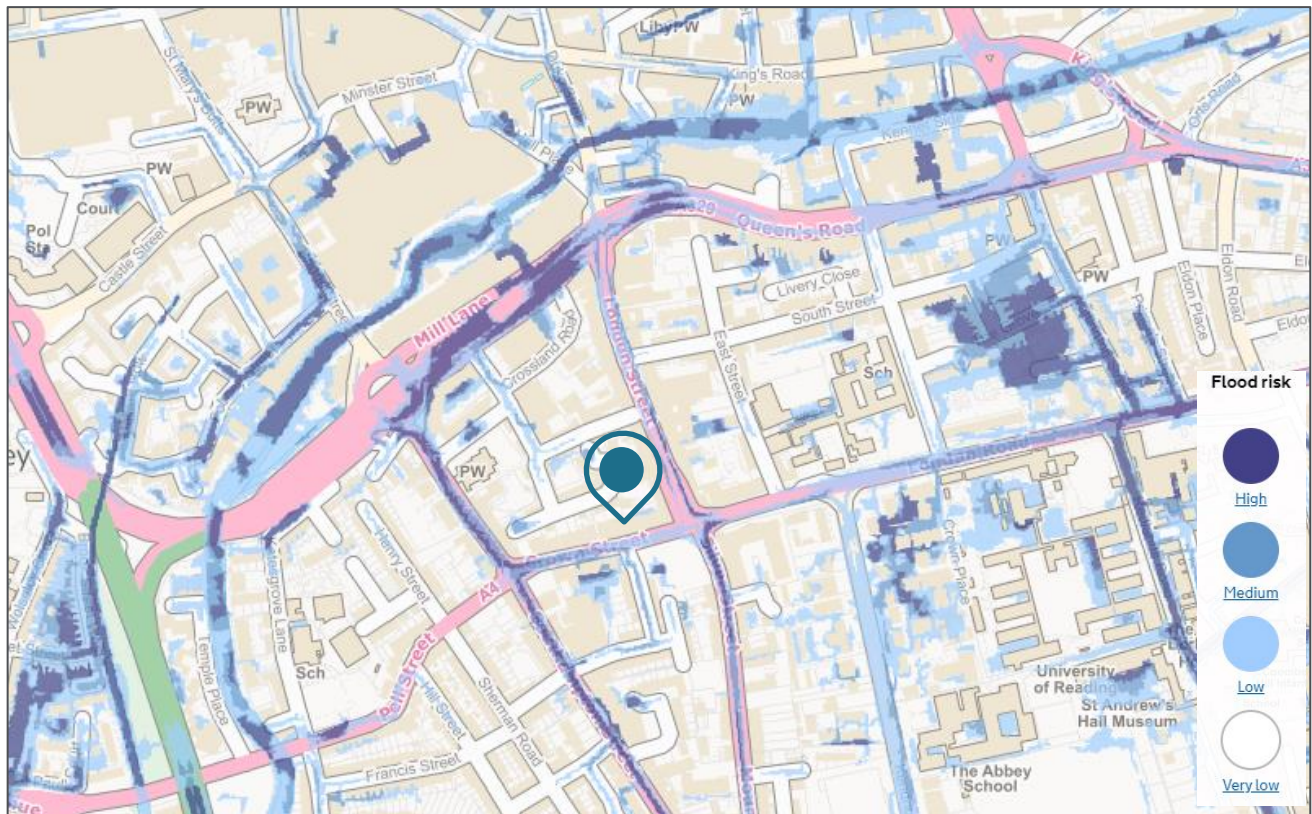


Figure 3 - Flood map showing risk of flooding from surface water (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map>)

3.3 Transport

Public Transport

The site has multiple bus stops in the surrounding area, with several on Southampton Street and London Street (A327) offering a number of services across Reading, connecting the site with Reading Town Centre, Whitley Wood, and Worton Grange.

The nearest train station is Reading Station which is located approximately 1.12km away from the Proposed Development, offering services to London Waterloo, London Paddington, Oxford, Basingstoke, and the wider national rail network.

Parking

The existing building provides limited car parking, and it is unlikely that the Proposed Development will include any additional parking. The limited on-site parking will also promote the use of public transport and cycling by residents and visitors.

Electric Vehicle Charging

Electric vehicle (EV) charging points are not currently being considered as part of the Proposed Development, but it is recommended that they are considered for the existing car parking spaces. However, there are a number of existing public EV charging points in the vicinity of the Proposed Development that can be used by visitors, with the nearest publicly available charging station located 480m away on East Street, RG1 4QU.

Cycle Storage

It is recommended that the Proposed Development provides an internal cycle storage area for residents, which will be suitably secure, covered and lit to encourage the use of a bicycle to travel, rather than vehicles.

Cycle Rental

Reading Borough Council has a bike hire scheme in place – ReadyBike. Cyclists can sign up as members or register online for occasional users to use the bikes. The bikes can then be parked at any available docking station throughout the town. This way, residents and visitors are able to cycle and travel in the local area without needing to own a bicycle.

3.4 Biodiversity

Biodiversity is generally considered to be the variety of life forms within a certain ecosystem. The Proposed Development is a change-of-use conversion to the existing building, hence will not include any significant landscaping.

3.5 Resource efficiency

Construction Phase Waste Management

The Proposed Development will aim to minimise the waste produced from the site during the refurbishment phase.

A comprehensive Resource Management Plan will be implemented from the outset of site works and will follow the principles of the waste hierarchy. Targets have been set in relation to volume of construction waste and diversion from landfill.

The construction waste generated as part of the redevelopment will be segregated and monitored as per best practice, with suitable materials being recycled as part of this process, either to be reused on site or introduced back into the supply chain through recycling by a Licensed Contractor, therefore minimising the amount of waste being disposed of in landfill sites.

Reusing materials on site will reduce the embodied energy of the development through the reuse of the energy that exists in that material. Transportation of new material to the site will be minimised, reducing the CO₂ emissions associated with transportation and material manufacture.

Where waste will need to be disposed of, this will be done in line with the Waste Hierarchy, with as much as practicable being recycled, and the remainder being dealt with through a specialist waste recycling contractor. Nominal construction waste should be sent to landfill or for incineration unless this is unavoidable due to the materials found on the existing site.

Resource Management

Policies will be put in place for management of site impacts such as air and water pollution in line with industry best practice. Monitoring and reporting on carbon emissions and water use from site related activities will take place in line with national benchmarks.

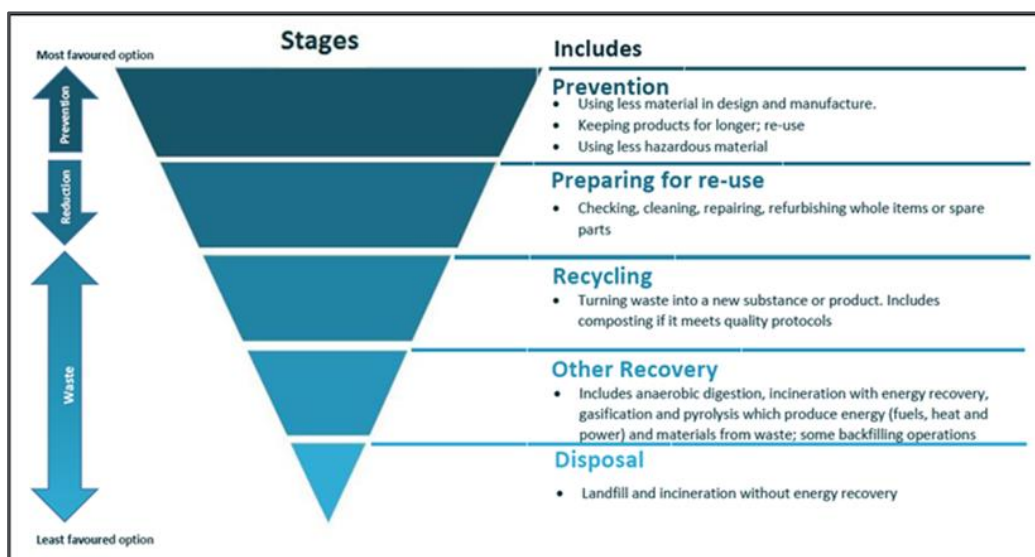


Figure 4 - The waste hierarchy

It is recommended that the overall management of the construction waste is monitored through the Considerate Constructors Scheme as part of Best Practice Site Management.

Materials

The Proposed Development is to use high quality, low impact materials in order to minimise the overall impact on the environment as far as possible.

All timber materials for finishing elements will be sourced from FSC and/or PEFC sources and all other materials sourced from suppliers who have an accredited Environmental Management System (EMS) (ISO14001, BS8555 or BES6001) for the extraction and process stages of the material manufacturing, ensuring that any environmental impact caused by the building materials is analysed and mitigated where possible.

All timber and timber-based products used on-site will be legally sourced with appropriate Chain of Custody certification to confirm this.

As standard industry best-practice, all insulation on the site will have an Ozone Depletion Potential (ODP) of zero, and a Global Warming Potential (GWP) of <5, further minimising the Proposed Developments effect on global Climate Change.

Water

Areas of the South East of England has been declared areas of 'serious water stress'. Water is a vital resource and efficient usage should be encouraged in all new buildings.

The Proposed Development aims to significantly reduce mains water use through a combination of efficiency measures, including the use of fittings with a low capacity or flow restrictors to reduce water use and PIR sensors linked to water shut-off valves to reduce the chances of water waste.

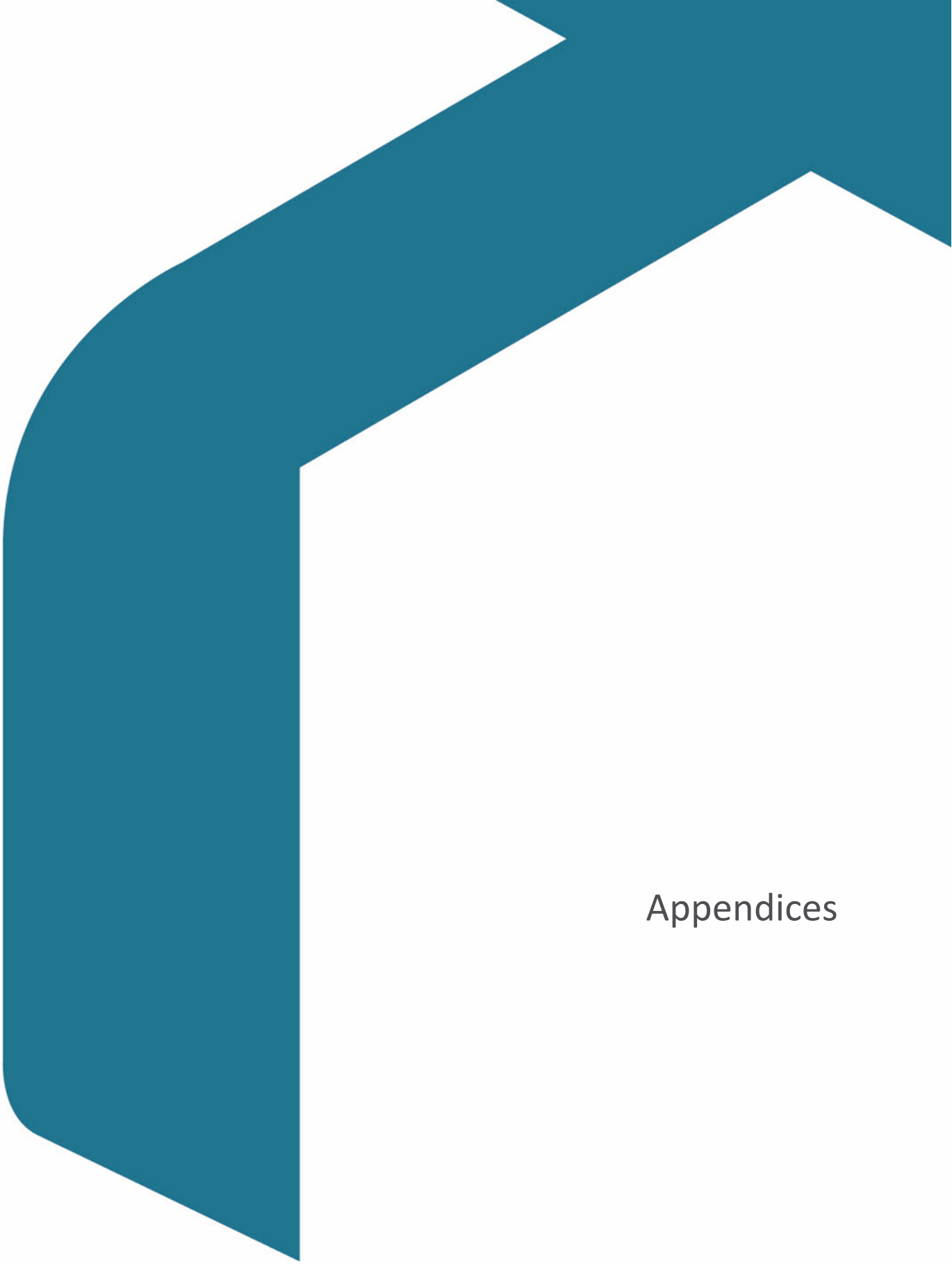
Internal water use will be reduced and an indicative specification has been given below that can be implemented for the Proposed Development to reduce water use to 110 litres per person per day:

- WCs: 3.75 litre effective flush volume
- Hand wash basin taps: 5 litres/min
- Kitchenette taps: 6 litres/min
- Showers: 6 litres/min
- Baths: 140 litres
- Domestic sized dishwashers (if installed) 12 litres/cycle

- Domestic sized washing machines (if installed) 40 litres/use

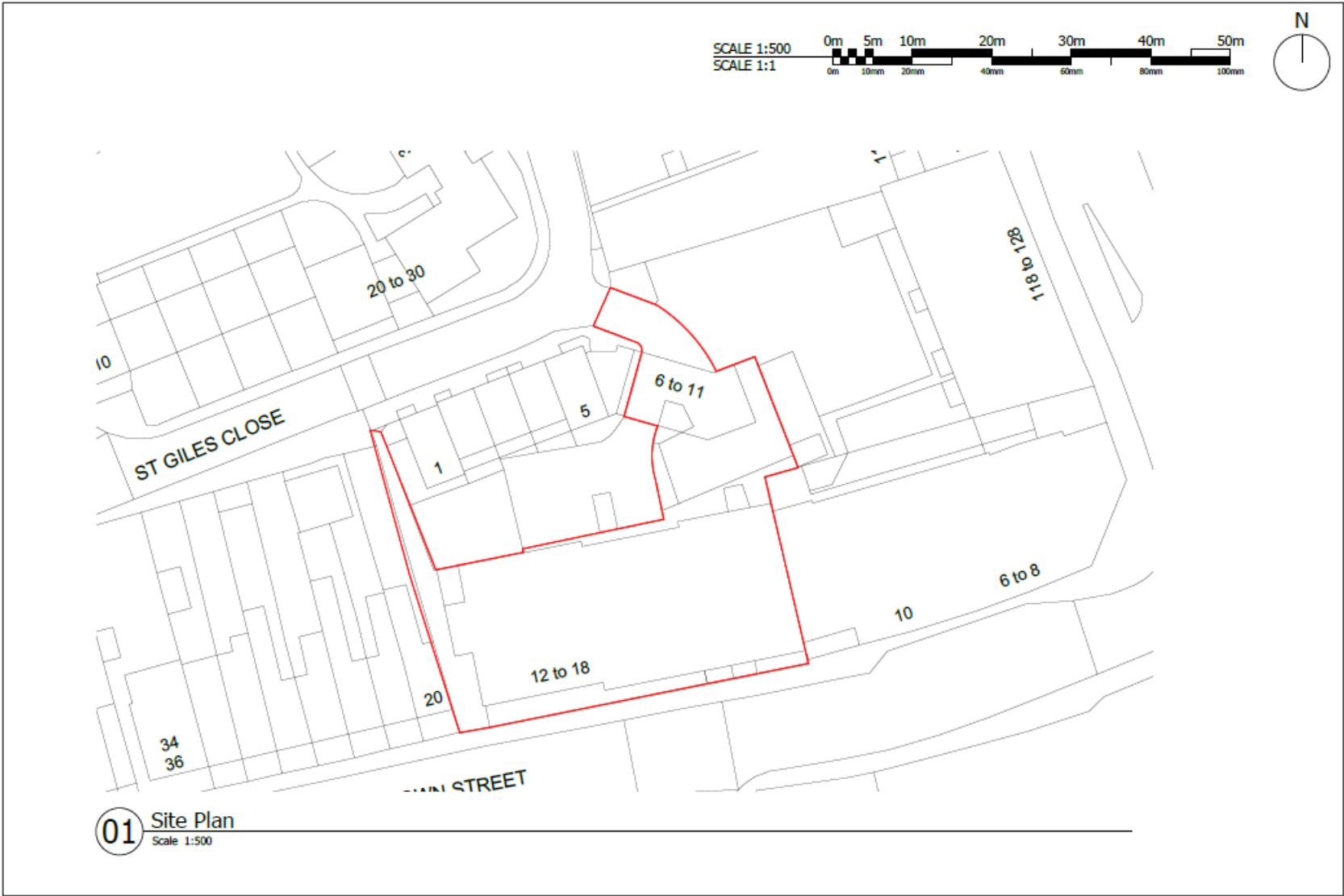
Sustainability Summary

The Proposed Development will address sustainability measures that will be implemented across the site, and relate to the site location, design and materials, construction processes and operational impacts therefore robustly showing compliance with all relevant planning policies.

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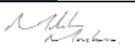
Appendices

Appendix A – Site Plan



Appendix B – SAP Summary Sheet

Option 1 – Individual Combi Gas Boilers

12-18 Crown Street, Reading																																																																																					
BReg: L1B 2013																																																																																					
Option	Unit	External Wall	Party Wall	Ground Floor	Flat Roof	Windows / Glazed Doors	Boiler	Delayed Start Thermostat	Weather / load Compensator	Secondary Heating	HW Cylinder	Renewables (PV)	Renewables (Area)	Mechanical Ventilation	Air Permeability	No local DER	Proposed DER																																																																				
Type	Plot No	U Value	U Value	U Value	U Value	U Value	Make	Y/N	Y/N	Y/N	(litres)	(kWp)	m ²	Type		kgCO ₂ /yr/m ²	kgCO ₂ /yr/m ²																																																																				
Ground Floor Flat (1B2P)	4	0.35	0	0.37	-	2.0	Gas Boiler	N	N	N	-	-	-	standard extract	Not tested	27.08	21.67																																																																				
Mid Floor Flat (2B4P)	12	0.35	0	-	-	2.0	Gas Boiler	N	N	N	-	-	-	standard extract	Not tested																																																																						
Mid Floor Flat (1B2P)	26	0.35	0	-	-	2.0	Gas Boiler	N	N	N	-	-	-	standard extract	Not tested																																																																						
Top Floor Flat (Studio)	42	0.35	0	-	0.25	2.0	Gas Boiler	N	N	N	-	-	-	standard extract	Not tested																																																																						
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Option 2 – Communal Gas Boilers



12-18 Crown Street, Reading

BREBS L1B 2013																	
Option	Unit	External Wall	Party Wall	Ground Floor	Flat Roof	Windows / Glazed Doors	Boiler	Delayed Start Thermostat	Weather / Load Compensator	Secondary Heating	HW Cylinder	Renewables (PV)	Renewables (Area)	Mechanical Ventilation	Air-Fermeability	No. of DER	Proposed DER
Type	Plot No	U Value	U Value	U Value	U Value	U Value	Make	Y/N	Y/N	Y/N	(litres)	(kWp)	m ²	Type		kgCO ₂ /yr/m ²	kgCO ₂ /yr/m ²
Ground Floor Flat (1B2P)	4	0.35	0	0.37	-	2.0	Communal Gas Boiler	N	N	N	-	-	-	standard extract	Not tested	27.08	24.86
Mid Floor Flat (2B4P)	12	0.35	0	-	-	2.0	Communal Gas Boiler	N	N	N	-	-	-	standard extract	Not tested		
Mid Floor Flat (1B2P)	26	0.35	0	-	-	2.0	Communal Gas Boiler	N	N	N	-	-	-	standard extract	Not tested		
Top Floor Flat (Studio)	42	0.35	0	-	0.25	2.0	Communal Gas Boiler	N	N	N	-	-	-	standard extract	Not tested		

Element	Proposed U Values	L1B Requirements	Description
External Wall SAP Wall Type 1	0.35	-	Cavity Wall - insulation unknown (As per SAP Appendix 5)
Party Wall SAP Wall Type 2	0.00	-	Assumed fully filled and sealed - Corridors to be heated (Based on SAP Appendix 5)
Ground Floor SAP Floor Type 1	0.37	-	As per SAP Appendix 5
External Flat Roof SAP Floor Type 1	0.25	-	Assumed Roof U-value from SAP Appendix 5
Windows / Glazed Doors	2.0	-	Double Glazed Window, Whole window U-value of 2.0 and g-value of 0.72 (As per SAP Appendix 5)
Construction Details (PSI values)	-	-	Non-standard Construction Details assumed - therefore psi-values not assessed
Boiler	-	-	Communal Gas Boiler
Controls	-	-	DCL charging system linked to the use of community heating, programmer and TRVs
Heating Emitters	-	-	Radiators
HW Cylinder	N	-	
Secondary Heating	N	-	
Mechanical Ventilation	Y	-	Standard extract from wet rooms
Lighting	-	-	100% Low Energy Lighting - CPL or LED
Renewables	-	-	No Renewables
Overheating	-	-	OVERHEATING RISK: Windows open half the time therefore security restrictors need to be fitted on glazing.
Notes	All u-values must meet or go beyond the requirements detailed above where the element is either NEW or REFURBISHED. Elements which are left unchanged have no minimum requirements		

Sign Off of details	Name	PP M Maclean	Date	09.07.2020	On behalf of the contractor/client:	Name		Date	
	Sign	(on behalf of SRE)				Sign			



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