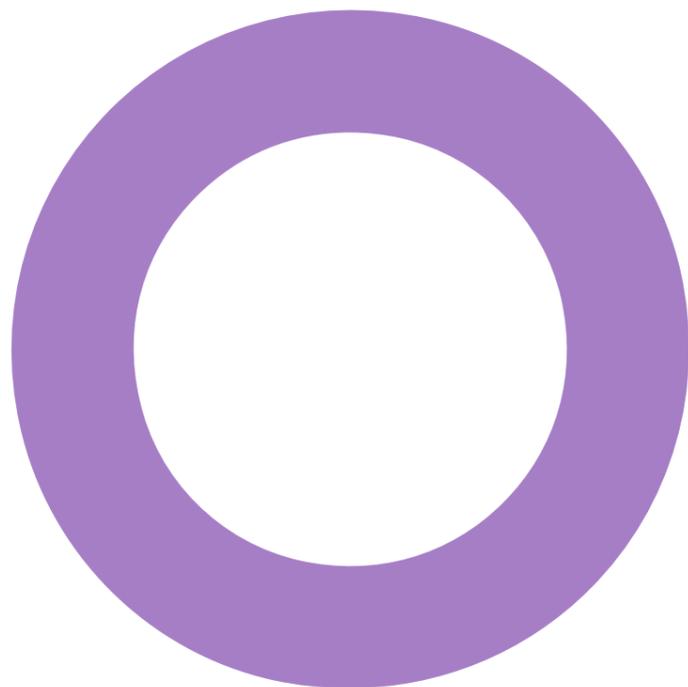


**Elmsbrook Local Centre.
Bicester.
A2Dominion Developments Ltd.**

SUSTAINABILITY
SUSTAINABILITY & ENERGY STATEMENT

REVISION 07 - 07.10.2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
01	04.03.2019	Draft for comment	PK/JT	RG	PK
02	13.03.2019	BREEAM Pre-assessment update	JT	RG	TK
03	22.03.2019	Barton Wilmore Comments	JT	RG	TK
04	29.05.2019	Update following DT Meeting	JT	RG	JF
05	03.06.2019	Update following comments from BW	RG	JF	JF
06	26.09.2019	Update following comments from Council	JT	RG	KC
07	07.10.2019	Update for phased development	JT	RG	KC

This document has been prepared for A2Dominion Developments Ltd. only and solely for the purposes expressly defined herein. We owe no duty of care to any third parties in respect of its content. Therefore, unless expressly agreed by us in signed writing, we hereby exclude all liability to third parties, including liability for negligence, save only for liabilities that cannot be so excluded by operation of applicable law. The consequences of climate change and the effects of future changes in climatic conditions cannot be accurately predicted. This report has been based solely on the specific design assumptions and criteria stated herein.

Project number: 31/03180

Document reference: REP-3103180-08-JT-20191007-Sustainability & Energy Statement-Rev07

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Executive summary

This sustainability & energy statement has been produced in support of the planning application for the development of a new Elmsbrook Local Centre. Full permission is sought for Local Centre Community floorspace (Use Class D1 with ancillary A1/A3), with a total GIA of 552 sqm, and 16 residential units (use class C3) with associated access, servicing, landscaping and parking. Outline consent is sought for Local Centre Retail, Community or Commercial Floorspace (flexible Use Class A1/A2/A3/A4/A5/B1/D1).

This report covers the energy strategy for the Northern building. The energy strategy for the Southern part of the development will be developed as the design progresses. Both building will target True Zero Carbon.

Energy & Sustainability Targets

The main energy and sustainability targets for the project are:

- Compliance with Part L2A of Building Regulations 2013.
- The Cherwell Local Plan 2011-2031
 - Policy ESD 1: Mitigating and Adapting to Climate Change
 - Policy ESD 2: Energy Hierarchy and Allowable Solutions
 - Policy ESD 3: Sustainable Construction (including BREEAM 'Very Good')
 - Policy ESD 4: Decentralised Energy Systems
 - Policy ESD 5: Renewable Energy (including provision of on-site renewables where feasible)
- Policy Bicester 1: North West Bicester Eco-Town - Achieve True Zero Carbon.

Strategy

The proposed strategy to reduce carbon emission follows the energy hierarchy in order of priority:

1. Passive design measures – effective façade design to maximise daylighting and high fabric performance,
2. Active design measures – High efficiency lighting and HVAC systems and adequate controls.
3. Low & Zero Carbon (LZC) Technology – Air source heat pumps (ASHP), Photovoltaic (PV) panels and the existing CHP-powered Energy Centre.

Low and zero carbon (LZC) technologies

Policy ESD 5 requires all new non-residential developments to carry out an LZC technology feasibility assessment (Section 2.5 of this report) and to incorporate on-site renewable technologies where feasible.

Air source heat pumps (ASHP) and photovoltaic (PV) panels have been identified as the most appropriate technologies for the scheme.

A PV array is proposed to be installed on appropriate unshaded, south-facing roof area, and the scheme will be connected to the existing Energy Centre powered primarily by a Combined Heat & Power (CHP) engine. Additionally, the proposed design incorporates high efficiency VRF ASHP to provide some additional space heating and cooling in the non-residential spaces with high demand.

Results

The proposed scheme achieves an average reduction in regulated carbon emissions of **14%** on the North building through the exemplar design alone, namely the use of passive design measures, active design measures, and a connection to the existing Energy Centre on site. With onsite PV the proposed scheme achieves a **55%** reduction in total carbon emissions (regulated and unregulated) when compared to a Part L Baseline. An additional 24.67 tonnes of CO₂ will need to be offset via offsite methods to achieve True Zero Carbon. A2Dominion are committed to achieving this target and will develop an offset solution as the design progresses to achieve this target.

Future improvements to the Energy Centre have been evaluated. These scenarios include the replacement of the existing CHP Energy Centre with ASHPs and a replacement Energy Centre powered by waste heat from power stations. These scenarios have been informed by SAP 10 and future carbon usage predictions and show

how the scheme's carbon performance will continue to improve past True Zero Carbon. Figures 1 demonstrate the reduction in total carbon emissions for the various scenarios.

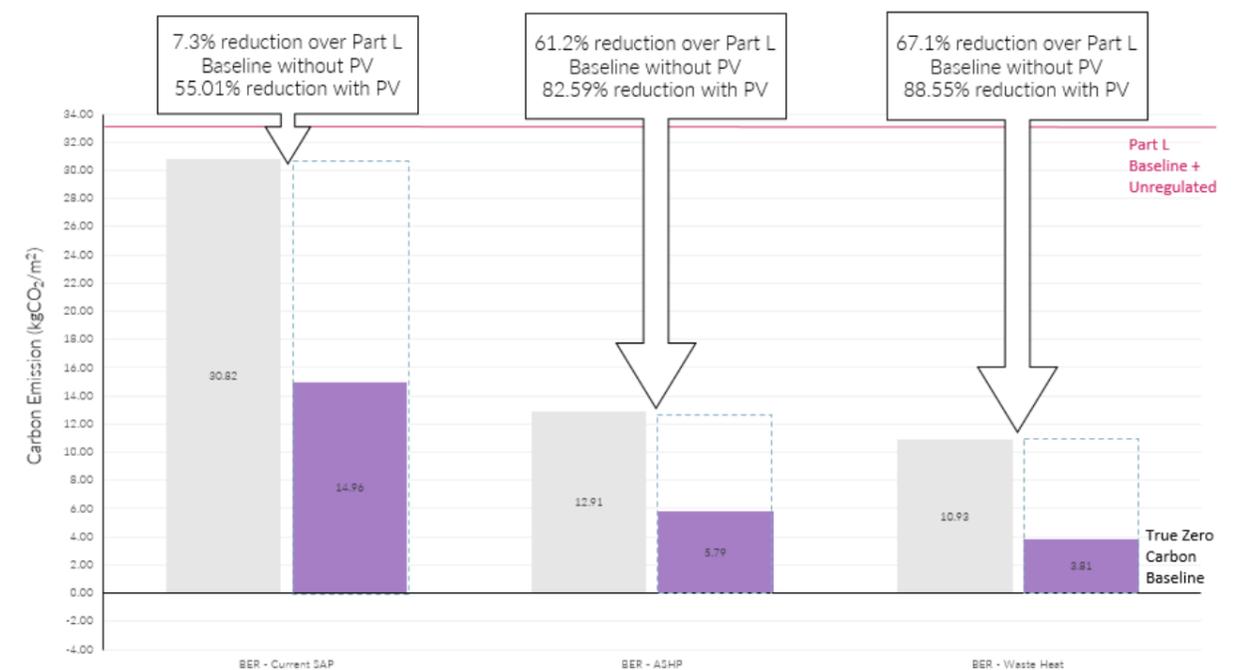


Figure 1: Changing total emissions due to a reduction in emission factors - North Building.

BREEAM

The BREEAM pre-assessment of the proposed Elmsbrook Local Centre under the assumed commercial usage indicates that a BREEAM Very Good rating is achievable.

1. Introduction.

This sustainability & energy statement has been produced in support of the planning application for the development of a new Local Centre. Full permission is sought for Local Centre Community floorspace (Use Class D1 with ancillary A1/A3), with a total GIA of 552 sqm, and 16 residential units (use class C3) with associated access, servicing, landscaping and parking. Outline consent is sought for Local Centre Retail, Community or Commercial Floorspace (flexible Use Class A1/A2/A3/A4/A5/B1/D1).

For the purpose of developing this energy strategy assumptions have been made on the predicted usage of these spaces. This has been performed to allow estimation of the carbon emissions and to develop an energy strategy that will best serve the site with a robust lifetime system. The reference scheme is as follows:

1. Community Centre: A mix of floorspace to be used as a community hall (Use Class D1) and floorspace to be used as a retail (Use Class A3), to be located adjacent to the community hall;

This report reviews the relevant regulatory and policy requirements and outlines the approach followed by the proposed scheme to comply with these requirements.



Figure 2: CGI of the Elmsbrook Local Centre Scheme (ADP 2019).

2. Regulatory and Policy Context.

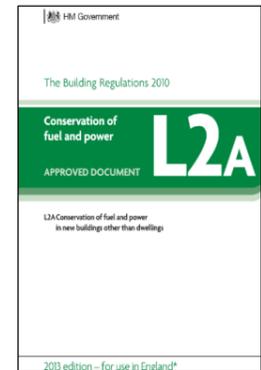
2.1 The Building Regulations

Approved Document Part L (2013)

Part L of the Building Regulations is the mechanism by which UK central government is driving reductions in the regulated CO₂ emissions from new buildings. It consists of 5 criteria (listed below). It is split into 2 documents for domestic and non-domestic developments. Each document addresses the same first three criteria, which are applicable in the design stage of a project:

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ▪ Criterion 1 – Achieving the Target CO₂ Emission Rate (TER) & Fabric Efficiency targets (TFEE) ▪ Criterion 2 – Limits on design flexibility ▪ Criterion 3 – Limiting the effects of solar gain in summer ▪ Criterion 4 – Building performance consistent with BER ▪ Criterion 5 – Providing information | } | <p>Design and Post Construction Stage</p>

<p>Post Const. Stage</p> |
|---|---|---|

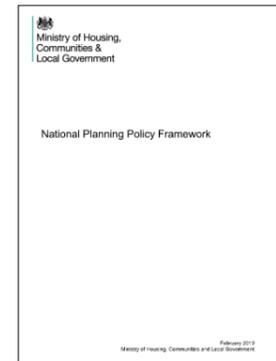


Part L1A is concerned with domestic buildings while Part L2A covers all non-domestic buildings.

2.2 The National Planning Policy Framework (February 2019)

The National Planning Policy Framework (NPPF) was originally published in March 2012 with the last revision being the 19th February 2019 and supersedes all Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) documents. The National Planning Policy Framework sets out the Government's economic, environmental and social planning policies for England. In combination, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.

It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.



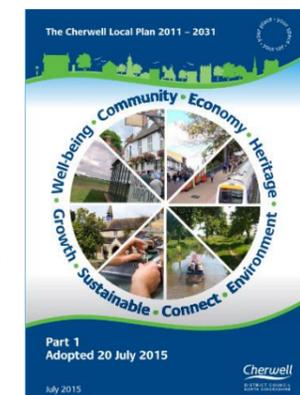
2.3 Local Policies and Supplementary Planning Documents

The Cherwell Local Plan 2011-2031 (adopted 20 July 2015)

The Local Plan contains a number of strategic policies aimed at helping build sustainable communities and ensure sustainable development. These include:

- Policy ESD 1: Mitigating and Adapting to Climate Change
- Policy ESD 2: Energy Hierarchy and Allowable Solutions
- Policy ESD 3: Sustainable Construction
- Policy ESD 4: Decentralised Energy Systems
- Policy ESD 5: Renewable Energy

The aforementioned policies include the expectation that all new non-residential developments will meet BREEAM 'Very Good' (ESD 3) and the provision of on-site renewable energy where it has been deemed deliverable and viable (ESD 5).



Additionally, the proposed development is located within the development area covered by **Policy Bicester 1: North West Bicester Eco-Town**. This policy outlines the requirements that new developments in the area need to meet, which include:

- New non-residential buildings will be BREEAM Very Good with the capability of achieving BREEAM Excellent.
- High quality exemplary development and design standards including zero carbon development.

The North-West Bicester SPD, adopted February 2016, expands upon Policy Bicester 1 of the Cherwell Local Plan and provides further detail to the policy. The SPD states that all full and outline applications will need to be supported with an energy strategy and comply with the definition of “True Zero Carbon”.

3. Appraisal.

This section reviews the approach followed by the proposed scheme in relation to policies ESD 1 to 5 of The Cherwell Local Plan.

3.1 Policy ESD 1: Mitigating and Adapting to Climate Change

The BREEAM pre-assessment currently targets the *Wst 05: Adaptation to climate change* credit, which focuses on encouraging measures to mitigate the impact of extreme weather conditions arising from climate change.

The landscape masterplan will incorporate a series of green spaces that will contribute to limit the effects of the development on the microclimate.

In addition to this, passive design measures will be implemented as highlighted in the Section 3.2 below.

3.2 Policy ESD 2: Energy Hierarchy and Allowable Solutions

The strategic approach to the design of the development follows the Energy Hierarchy, which is widely accepted as the most effective way of reducing energy consumption and carbon emissions. This ‘fabric first’ approach aims to reduce energy demand in the first instance by passive design measures, followed by incorporating efficient systems, before considering the integration of low and zero carbon energy sources.

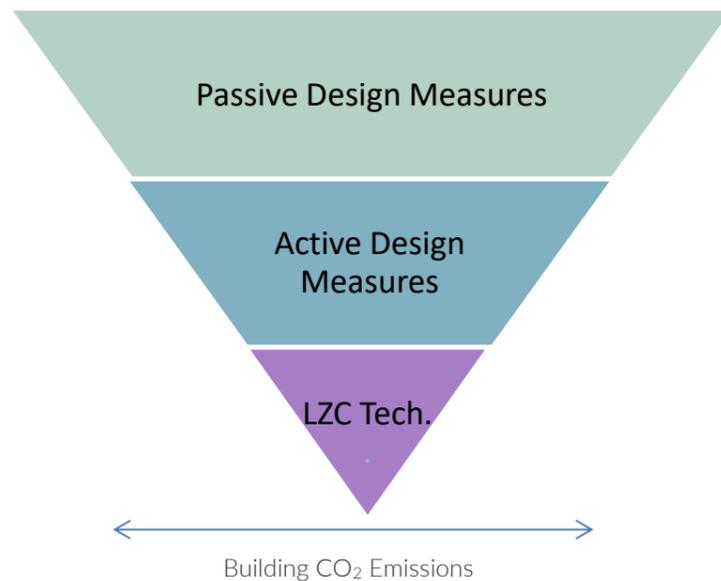


Figure 3 below shows an estimated energy split in the different areas based on initial compliance calculations.

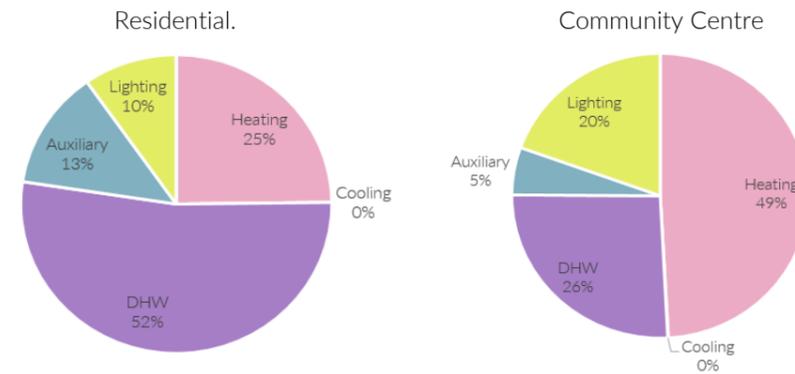


Figure 3: Estimated energy split in the residential, retail, community centre and nursery areas.

Passive design measures

Passive design measures are those which reduce the demand for energy within buildings, without consuming energy in the process. These are the most effective and robust measures for reducing CO₂ emissions as the performance of the solutions, for example greater wall insulation, is unlikely to deteriorate significantly with time, or be subject to change by future property owners. In this sense, we can be confident that the benefits of the measures will continue at a similar level for the duration of their installation.

Appropriate façade design such as efficient glazing ratios and passive solar shading has been pursued to ensure that adequate daylighting is provided, reduce the lighting energy consumption, and that solar gain will be managed, minimising excessive gains in the summer and maximising beneficial gains in the colder months.

Part L1A 2013 of the Building Regulations for dwellings introduced criteria referred to as the ‘FEE’. The Fabric Energy Efficiency (FEE) is influenced by factors such as glazing proportion, solar energy, air leakage and thermal bridges.

The FEE accounts for the dwelling’s combined annual heating and cooling load. For reference the ‘Notional’ dwelling uses a glazing ratio of 25% (of the floor area). It should be noted that for FEE compliance, each dwelling does not need to comply on an individual basis, as the assessment can be aggregated over the whole building on an area weighted (average) basis.

For the purpose of this assessment, it has been assumed that all commercial units are occupied i.e. there is no heat lost through the floor of the first-floor apartments to the commercial spaces. If the commercial units were unoccupied for a large period of time it could increase the heat demand of the residential areas.

Good practice fabric performance will be specified to minimise heat losses in winter. Approved thermal bridging should be targeted for the residential construction. Proposed target U-values are shown in Table 1 below.

Fabric	
Solid Wall U-value	0.15 W/m ² .K
Floor U-value	0.12 W/m ² .K
Display Glazing (up to 3m on ground floor) U-value (including frame)	1.6 W/m ² .K
Non-display glazing, glazed doors, & curtain walling U-value (including frame)	1.3 W/m ² .K

Fabric	
Service Doors	1.4 W/m ² .K
Glazing G-value (Solar Transmittance)	0.4 (ground floor) 0.5 (upper floors)
Air Permeability - Community centre & Residential	3 m ³ /m ² .hr @50Pa

Table 1: Proposed target fabric performance.

Active design measures:

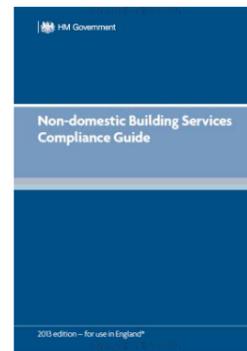
Energy efficiency measures are those which seek to service the demand for energy (i.e. the remaining demand after implementation of passive design measures) in the most efficient way. All works carried out to existing building services, and all new building services installed within the scheme will be required to comply with the 2013 version of the Non-domestic Building Services Compliance Guide.

This document details items such as minimum heating/cooling plant seasonal efficiencies, maximum ventilation specific fan powers, zoning and controls requirements etc. It is the responsibility of both the design team and contractor to ensure that the works proposed for the building are in compliance with this document.

High efficiency lighting fittings and appropriate controls will be specified throughout, to limit the lighting energy consumption.

High efficiency mechanical ventilation systems with heat recovery will also be specified to provide the required fresh air in an energy efficient manner while limiting heat losses.

At this stage of the design detailed mechanical specification has not yet been complete. The below table lists the minimum performance criteria of the proposed development:



Heating/Cooling	
Community Centre	VRF - SCOP 4.6 - SEER 6.9
Residential	District Heating for Radiators with programmer and TRVs- No Cooling
Ventilation	
Community Centre	Central Mechanical - SFP 1.6 W/(l/s) - Heat recovery >80%
Residential	Local MVHR - SFP 0.62 W/(l/s) - Heat recovery >93%
Lighting	
Luminaire efficacy (general lighting & display lighting)	High Efficiency LEDS >100 lm/W

Sensors Control	Presence/absence detection where appropriate
Daylight dimming	Where appropriate
DHW	
All units	District Heating

Table 2: Summary of proposed systems.

LZC technologies

The proposed design incorporates VRF ASHP to provide space heating and cooling to the high occupancy community centre spaces. Heating and DHW heating is provided via supply from the district energy system. PV panels will be installed on the roof to counteract the carbon emission through the scheme. Initial calculations have indicated that offsite measures will be required to achieve True Zero Carbon. Details of the low and zero carbon (LZC) technology appraisal are included in Section 3.5 of this report.

3.3 Policy ESD 3: Sustainable Construction

The building is currently being designed in accordance with BREEAM New Construction 2018 targeting a 'Very Good' rating.

As part of the current BREEAM pre-assessment for the Site the Principal Contractor is required to;

- Maximise resource efficiency.
- Reduce the quantity of waste sent to landfill.
- Implement a resource management plan which focuses on the waste hierarchy (reduce, reuse and recycle materials).
- Source materials from suppliers (where possible) with responsible sourcing accreditations, such as BES 6001 or ISO 14001, with the aim of reducing the embodied energy of these materials.
- Source all site timber in accordance with the UK Government Timber Procurement Policy so that it is legally harvested and traded timber.

The BREEAM credits currently targeted as part of the BREEAM pre-assessment can be seen in Figure 4.

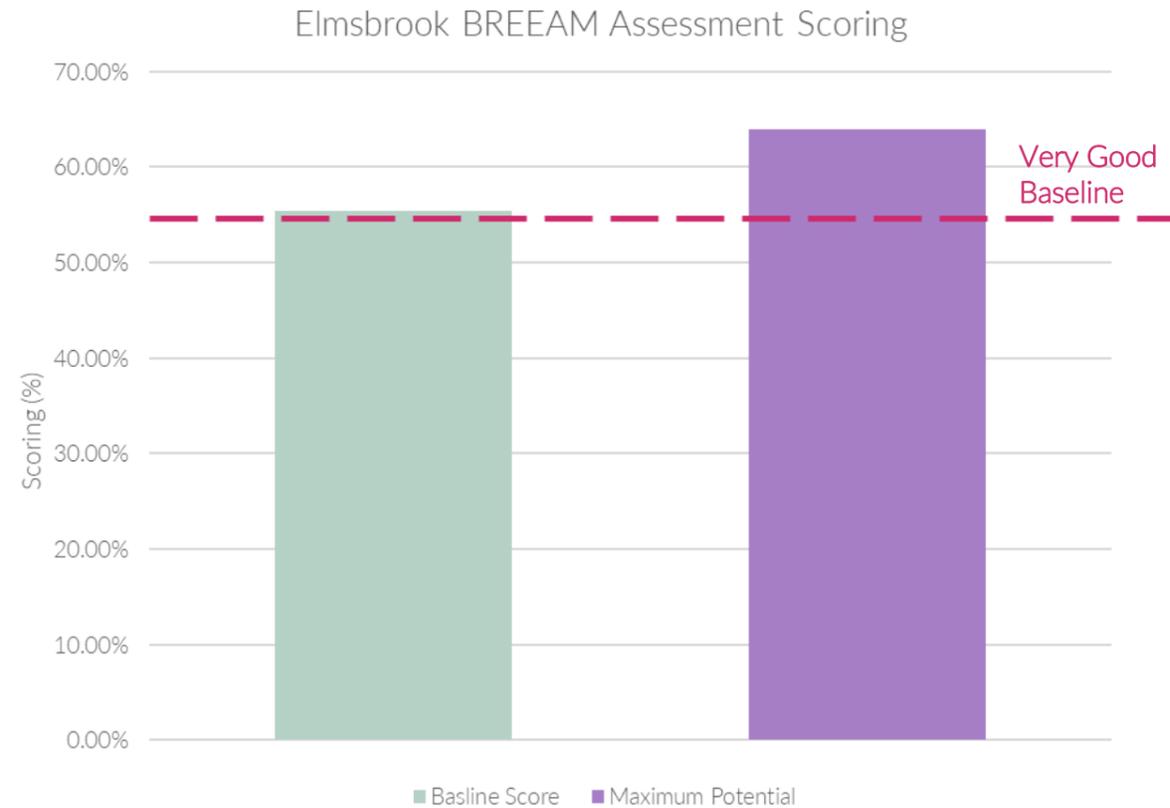


Figure 4: Current targeted BREEAM scoring.

The fully fitted Community Centre has potential to achieve a good margin of safety over the Very Good rating score with some flexibility to select from the additional credits currently under review. The pre-assessment has been carried out under the BREEAM New Construction 2018 scheme.

3.4 Policy ESD 4: Decentralised Energy Systems

The Energy Centre at Elmsbrook was opened in 2016 and provides heat to the existing development, powered primarily by a Combined Heat and Power (CHP). Data received from the centre's operator SSE confirms that in the 12 months between December 2017 to November 2018, the Energy Centre generated 491,300kWh of electricity and 1,550,900kWh of heat. This translates in to a carbon emission factor of 0.205kgCO₂/kWh of heat using the current Building Regulations Part L (2013) carbon factors for gas and electricity, and 0.273kgCO₂/kWh of heat using the new SAP10 carbon factors that are expected to be applicable for residential developments following the next release of Building Regulations Part L.

It is proposed to connect the new development to the existing Energy Centre at Elmsbrook, however the decarbonisation of the UK's electrical grid means that the true carbon savings of utilising CHP technology are declining. Flexibility and adaptability of the heating and power sources will therefore be incorporated to enable the scheme to react to the energy market's changing financial and carbon profile over its lifespan.

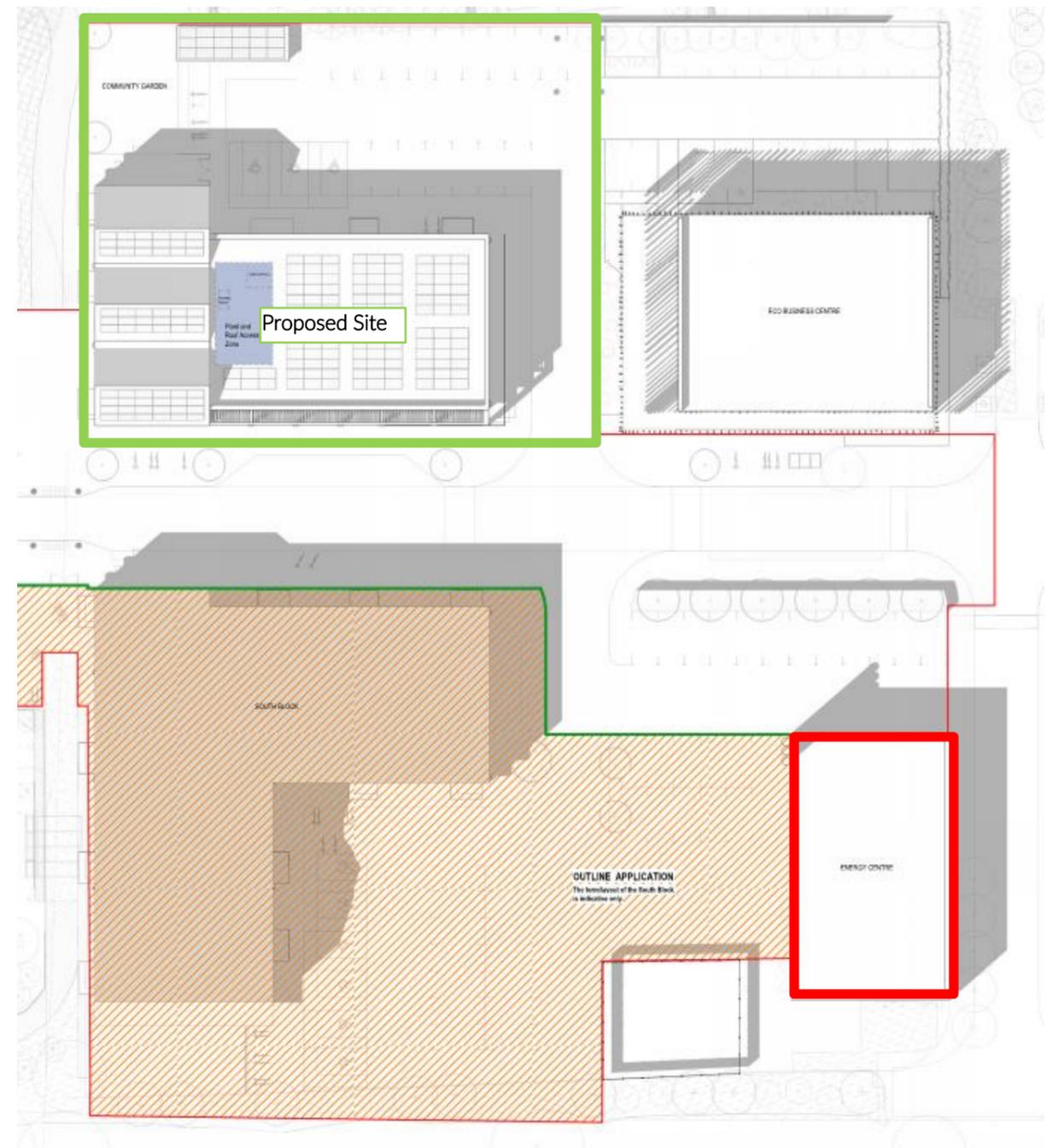


Figure 5: Energy Centre location relative to proposed site.

3.5 Policy ESD 5: Renewable Energy

The table below summarises the low and zero carbon (LZC) technology feasibility study that has been carried out, and identifies the local existing Energy Centre, air source heat pumps (ASHP) and photovoltaic (PV) panels as the most appropriate technologies for the Elmsbrook Local Centre scheme. Appendix 2 highlights the proposed roof layout showing the proposed space for PV and Roof plant (including ASHP).

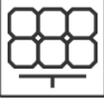
Technology	Maintenance	Security and reliability of supply	Risk of regulatory and planning issues	System cost per kW (peak)	Impact upon internal/external layout	To be considered further?
Small/Large Scale Wind Turbines 	Medium (Annual Checks)	Low (difficult to accurately predict yield)	High (Visual impact is a concern, as is noise and flicker from the blades)	Medium-High	Medium-High. Free-standing turbines not located in close proximity to occupied areas.	X NO: Due to visual and noise impacts, space requirements and intermittency of output
Solar Photovoltaics (PV) 	Low (Annual cleaning, inverter replacement every 15 years)	High (fairly stable yield)	Low	Low	Low - especially if incorporated on an inclined, south-facing roof.	✓ YES: There are suitable inclined and flat roof areas that would be suitable for PV panels to be installed.
Solar Thermal (SHW) 	Low (Annual cleaning, replacement of anti-freeze every 5-10 years)	High (fairly stable yield)	Low	Low	Low - especially if incorporated on an inclined, south-facing roof.	X NO: The base heating load is primarily delivered by the energy centre, reducing the suitability and viability of this technology.
Biomass Heating (Wood Fuelled) 	High (Compared to gas boilers) Ash removal, fuel delivery, storage and protection	Low (Long term fuel supply arrangement recommended)	Medium (Air quality impact assesment may be required)	Low	High - Weather-protected fuel storage area required, adjacent to plant room. Accessibility for deliveries also important	X NO: Similarly to solar thermal panels, this technology would typically target the base heatload of the development which is currently delivered by the energy centre. Potential issues with air quality, complexity and cost of maintenance, fuel storage space requirements and fuel supply security also reduce the appeal of biomass.
Ground Source Heat Pumps (GSHP) 	Low (Pumps and controls need maintenance as for general heating system)	High (Grid electricity required for operation)	Low	High (including test borehole and associated groundworks)	Medium - Small plant space requirement however flow/return temperature laces limitations on heat emitter type/size	? NO: GSHP could provide low carbon heating and cooling, however an extensive ground area would be required to install boreholes, and the cost and programme implications are substantially greater than ASHP which has been identified as a preferred option to provide low carbon heating and cooling.
Air Source Heat Pumps (ASHP) 	Medium (As for typical cooling system)	Medium - Grid electricity required for operation, however least efficient in peak winter conditions.	Low	Medium	Medium - Noise implication needs to be considered. External plant space required.	✓ YES: ASHP are a suitable solution to provide space heating and cooling (with VRF systems) through air-to-water heat pumps, however the scheme would need to be kept deperate from the energy centre, due to differing operating temperatures.
Water Source Heat Pumps (WSHP) 	Low (Pumps and controls need maintenance as for general heating system)	High (Grid electricity required for operation)	Low	Medium	Medium - Small plant space requirement however flow/return temperature laces limitations on heat emitter type/size	X NO: Due to location
Tidal/Hydro Power 	Medium (Annual Checks)	Low (difficult to accurately predict yield)	High	High	High - site Low - building	X NO: Due to location
District Energy 	High (Compared to gas boilers).	High	Low	Medium	Low - typically connections made in parallel with secondary system.	✓ YES: There is an existing energy centre locally to the proposed Elmsbrook scheme currently serving existing buildings on the site that would be suitable to connect to.
Combined Heat and Power (CHP) 	High (Compared to gas boilers). Would need to be outsourced	High (But placed additional electric and gas load on the building to operate)	Medium (Air quality impact assesment may be required)	Medium	Medium - larger than equivalent boiler of same rating	X NO: The base heating load is primarily delivered by the energy centre, reducing the suitability and viability of this technology.

Table 3: LZC appraisal.

4. Methodology.

Calculations demonstrating the energy requirements and associated CO₂ emissions for the residential section of the proposed development have been calculated using 'Standard Assessment Procedure' (SAP). This modelling has been completed using initial drawing provided by ADP Architects. Approved Thermal Bridging has been targeted for all dwellings.

The energy calculations for the Commercial portion of the proposed development has been based on the assumed usage criteria as listed in Section 1 of this report. L2A compliant thermal modelling software (IES-VE 2018) has been used to simulate the assumed commercial units.

The appraisals within this strategy should not be understood as a predictive assessment of likely future energy requirements or otherwise. Occupants may operate their systems differently, and / or the weather may be different from the assumptions made by Part L approved calculation methods, leading to differing energy requirements.

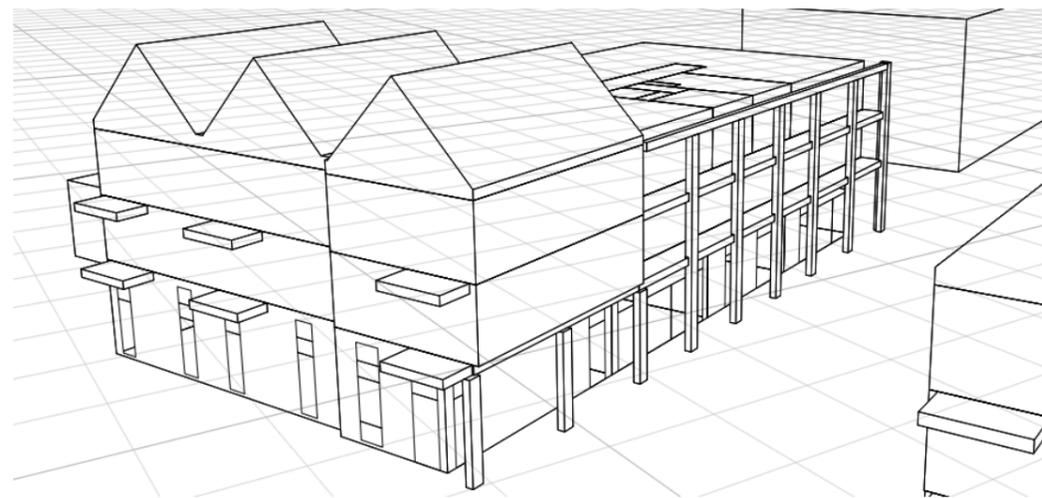


Figure 6: West elevation - Commercial units IES model.

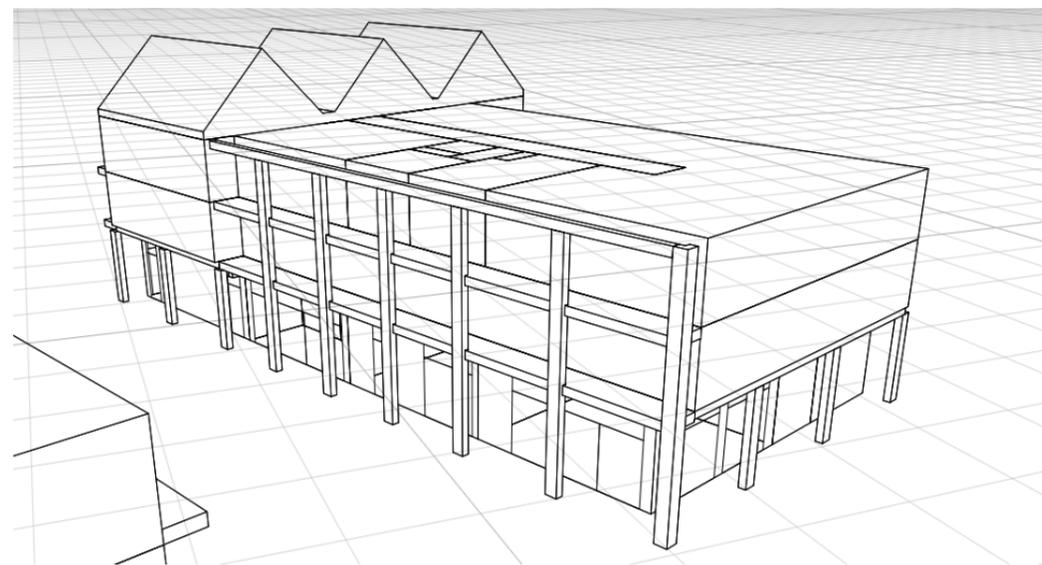


Figure 7: South East elevation - Commercial Units IES Model.

True Zero Carbon

The North West Bicester SPD (Feb 2016) defines "True Zero Carbon" as "over a year the net carbon dioxide emissions from all energy use within buildings on the eco-town development as a whole are zero or below. It excludes embodied carbon and emissions from transport but includes all buildings – not just houses but also commercial and public sector buildings". This energy strategy has been developed to target both the regulated (heating, cooling, hot water, fans, pumps, and lighting) and unregulated (equipment, cooking, IT, etc.) loads. To achieve "True Zero Carbon" both the regulated and unregulated loads must be offset.

For the residential elements the unregulated loads have been estimated using the BRE Domestic Energy Model (BREDEM) methodology for calculating the energy use and fuel requirements of dwellings based on their characteristics. Using this calculation method, it was estimated that the average energy consumption associated with unregulated loads is 35 kWh/m².

For the assumed commercial unit, while unregulated loads are not included in the standard Part L carbon emission calculations, an indicative value for unregulated loads is given by the Part L software. For the purpose of this energy strategy, and in the absence of more accurate data, the equipment loads reported in the Part L simulations have been used in order to estimate the unregulated loads of the development.

5. Initial compliance results.

Passive and Active design measures

The initial energy analysis shows that a combination of the proposed passive design measures and active design measures, discussed in Section 3.2, will contribute towards reducing the carbon emission past the limits of Part L of the Building Regulations.

It is important to note that in this scenario, the carbon emission reductions due to connection to the Energy Centre are minimal. A significant portion of the carbon reductions are a product of the fundamental passive design measures with high efficiency systems.

Table 4 demonstrates that compliance with Part L is achieved for all areas and quantifies that significant reductions in the carbon emissions can be achieved through these design measures and connection to the Energy Centre.

	Baseline	Proposed Design with Gas boilers + Heat Pumps		Proposed Design with connect to Energy Centre + Heat Pumps	
	TER (kgCO ₂ /m ²)	BER/DER (kgCO ₂ /m ²)	Percentage Reduction (%)	BER/DER (kgCO ₂ /m ²)	Percentage Reduction (%)
Community Centre	19.7	16.3	17.26%	15.8	19.80%
Residential North Building	16.04	15.97	0.44%	14.43	10.04%
Total North Building	17.35	16.09	7.26%	14.92	13.99%

Table 4: Summary of Part L compliance and carbon reduction.

Figure 10 and 11 demonstrate the overall reduction in carbon emission of each building.

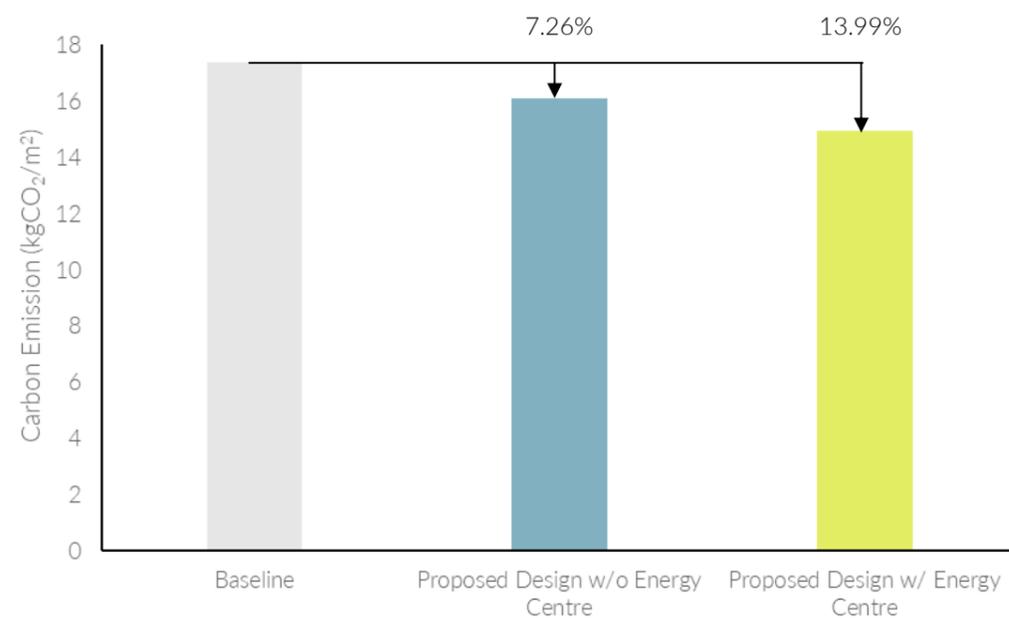


Figure 8: Reduction of carbon reduction through proposed design.

An area weighted calculation was conducted to evaluate the fabric performance of the proposed development dwellings. Generally, achieving the Fabric Energy Efficiency (FEE) results in the building fabric performance going beyond the minimum targets defined in Part L.

The Fabric Energy Efficiency (FEE) is an approximate 0.8% improvement over the Target Fabric Energy Efficiency (TFEE). Approved thermal bridging will be targeted during construction.

Achieving True Zero Carbon: PV

To offset the carbon emission of the regulated and unregulated loads, PV was identified as the most suitable LZC technology given the size and availability of inclined and flat roofs present on site and the potentially high electrical load.

Table 5 demonstrates the area of PV that would be required to off-set the on-site regulated and unregulated Carbon emissions. The PV area has been calculated assuming a panel efficiency of 0.32 kWp/panel and a solar irradiance of 900 kWh/kWp. The exact area will need to be qualified by a certified PV installer.

Area - North Building	Regulated Emissions (kgCO ₂ /m ²)	Unregulated Emissions (kgCO ₂ /m ²)	Total Emissions (kgCO ₂ /m ²)	kWp	Estimated PV area (m ²)
Community Centre	15.8	11.82	27.62	35	180
Residential North Building	14.43	18.17	32.60	75	370
Total North Building	14.92	15.90	30.82	110	550

Table 5: PV area to achieve True Zero Carbon - North Building.

Initial drawings provided by the architect (Appendix 2) demonstrate that the roof design has been optimised to allow for maximum PV deployment. Approximately 280 m² has been assumed as available for PV deployment. With onsite PV the proposed scheme achieves a 55.01% reduction in total carbon emissions (regulated and unregulated) when compared to a Part L Baseline. The area of PV required to achieve True Zero Carbon is greater than the estimated available roof area, an additional 270m² of PV would be required but there is no

capacity for this onsite. An additional 24.67 tonnes of CO₂ will need to be offset via offsite methods to achieve True Zero Carbon. A2Dominion are committed to achieving this target and will develop an offset solution as the design progresses to achieve this target.

6. Future Usage.

This energy strategy is developed in such a way to allow for future flexibility such as decarbonisation of the UK grid and potential changes to the local Energy Centre. It is difficult to predict how the Energy Centre will improve over time as technology improves and alternative heat sources are considered. To demonstrate the impact of potential improvements to the Energy Centre, two carbon emission scenarios were evaluated.

Assuming that the current CHP powered Energy Centre will be reaching the end of its 15-20 year lifespan in 2035, carbon emission factor predictions for 2035 and SAP 10 emission factors were evaluated. The two future scenarios evaluated consisted of: a replacement Energy Centre using Air Source Heat Pumps (ASHP), and a replacement Energy Centre powered by energy from waste.

Fuel	Current emissions factors (kgCO ₂ /kWh)	SAP 10/Assumed emission factor (kgCO ₂ /kWh)
Electricity	0.516	0.233
Gas - mains	0.216	0.210
Energy Centre	0.205	0.273
Energy Centre - ASHP	-	0.071 (Source: SAP 10 & FES)
Energy from Waste	-	0.026 (Source: SAP 10)

Table 6: Changing carbon emission factors.

Figure 9 shows the total emission for the site in response to different emission factor scenarios. As further decarbonisation of the grid occurs the carbon emissions of the site will reduce. Improvements to the Energy Centre's carbon emission factor will have significant effects on the performance of the proposed scheme. This highlights how the scheme can continue to surpass a True Zero Carbon baseline with a robust energy strategy that will continue to deliver exemplar energy performance.

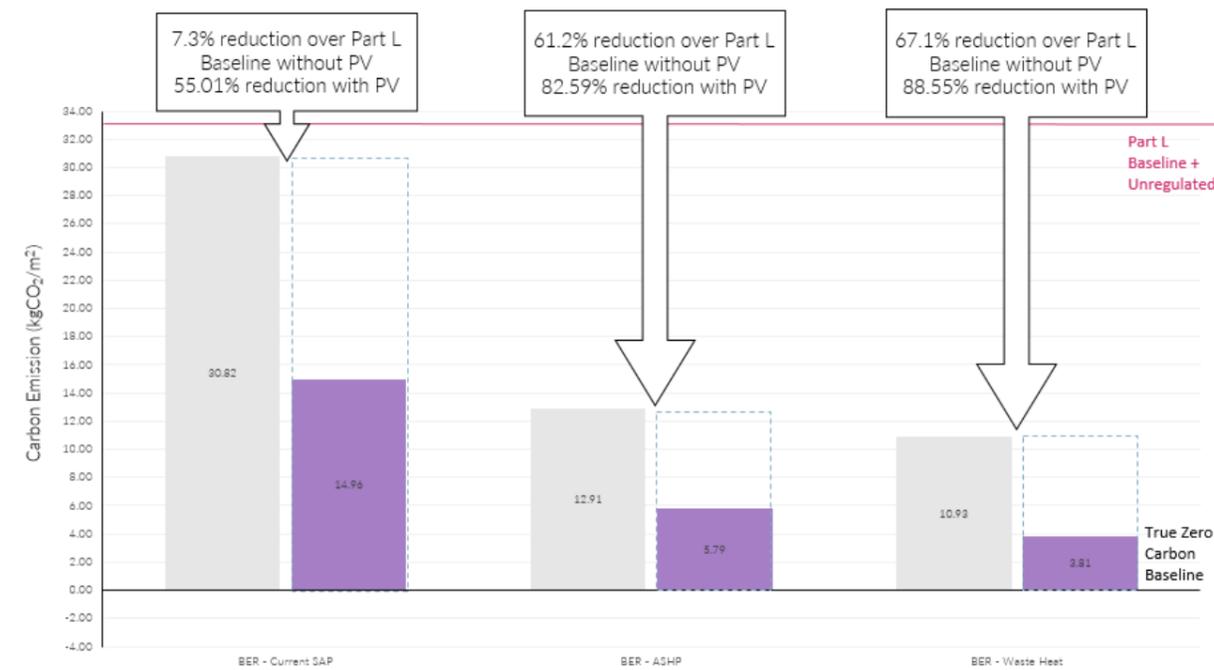


Figure 9: Changing total emissions due to a reduction in emission factors.

7. Conclusion.

The design strategy has been developed in line with the Energy Hierarchy focussing first on passive design measure to provide effective and stable carbon reductions. Through the use of exemplar design including high performance building fabric elements, passive solar shading, and optimised glazing ratios, significant reductions in the carbon emissions can be achieved. High efficiency systems will also be specified to further increase the carbon emission reduction. The combined carbon reduction of the active and passive design measures equates to a significant **14%** reduction in the regulated loads when compared to a Part L compliant building.

A Low and Zero Carbon Technology evaluation was completed for the site which identifies ASHP, PV and connection to the existing Energy Centre as the most suitable strategy to serve the energy needs of the site.

Through the use of a roof mounted PV array, the overall carbon emission reduction, including regulated and unregulated loads, will be further increased to **55%** when compared to a Part L compliant building. An additional 24.67 tonnes of CO₂ will need to be offset via offsite methods to achieve True Zero Carbon. A2Dominion are committed to achieving this target and will develop an offset solution as the design progresses to achieve this target.

Future energy developments have been considered in Section 6. Using the future carbon emission factors of SAP 10 and the predicted decarbonisation of the UK electricity grid, two potential emission scenarios were evaluated. These scenarios demonstrate that the scale of the carbon emission offset can be increased with improvements to the Energy Centre and through the decarbonisation process.

Appendix 1 – BREEAM Pre-Assessment

New Construction 2018 BREEAM Tracker - Design Stage pre-assessment

Other Non- residential institution

JOB TITLE: Elmsbrook Local Centre

Community Centre

JOB CODE: EELC2

DRAFT



LEGEND			no.	Revision	date	Current achievable score			55.37	
	Mandatory credits for Excellent rating		A	Update from Workshop 05.12.18	10.12.18	Achievable + review credits			63.95	
	Action by Architect ADP		B	Planning update DRAFT						
	Action by Structural /Civil Eng.					pass			30	
	Action by M & E Consultant HL					good			45	
	Action by Client /Project Manager					very good			55	
	A2D					excellent			70	
	Action by Ecologist					outstanding			85	
	Action by Acoustic Consultant									
	Action by BREEAM Assessor ADP									
	Action by Main Contractor									
Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
MANAGEMENT										
Man 01	Project brief and design: Project delivery planning Criteria 1 - 3	A2D	2	Stage 2 requirement. Target First credit: Stakeholder consultation - Project delivery: Document demonstrating project team roles and responsibilities and scope of appointment	One credit is awarded where prior to completion of Concept Design the project delivery stakeholders have met to identify roles and responsibilities for key stages of the project delivery The project team demonstrates how the project delivery stakeholder contributions and outcomes of consultation has influenced the project brief, project execution plan, communication strategy and concept design. Note: Includes input from Principle Contractor.	1	1	0.52380952	1	
	Project brief and design: Stakeholder consultation Criteria 4 - 7	A2D	1/2	Stakeholder consultation - Consultation plan & programme required. Consultation report and demonstration of how consultation informed the design.	One credit is awarded where prior to completion of Concept Design all relevant third party stakeholders have been consulted, covering the BREEAM minimum content Consultation feedback is given to stakeholders prior to completion of detailed design.	1	0	0	1	
	Project brief and design: BREEAM AP 8. Pre-requisite	A2D	2	Pre-requisite Stage 2 requirement BREEAM target to be set early in design process	The project team, including client agree strategic performance targets.	No credits pre-requisite only			X	
	Project brief and design: BREEAM AP First credit: Criteria 9	A2D	2	Stage 2 requirement Appoint BREEAM AP	One credit is awarded where BREEAM AP appointed to maximise the overall performance against BREEAM through Concept Stage AP to monitor progress against targets.	1	0	0	0	X

Credit		Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
	Project brief and design: BREEAM AP Second credit: Criteria 10-11	A2D	Retain BREEAM AP through Stage 3	3	Criteria 8 & 9 met. One credit is awarded where BREEAM AP appointed to maximise the overall performance against BREEAM through Developed Design AP to monitor progress against targets and provide feedback. Identify risks and opportunities. Monitor and co-ordinate evidence	1	0	0	0	X
Man 02	Life cycle cost and service life planning: Elemental life cycle cost (LCC) Criteria 1 - 3	QS	Stage 2 requirement. LCC required Elemental life cycle cost plan	2	Two credits are awarded where evidence provided demonstrates that an elemental Life Cycle Cost (LCC) analysis has been carried out, at RIBA workstages 2 together with any design option appraisals, in line with PD 15686:2008.	2	0	0	0	X
	Life cycle cost and service life planning: Component level LCC Plan Criteria 4-5	QS	Component level life cycle cost plan Examples of how the LCC analysis has influenced the building design and systems	4	One credit is awarded where evidence provided demonstrates that a component level (LCC) plan has been developed during RIBA workstages 4 in line with PD 15686:2008 including where relevant; a. Envelope b. Services c. Finishes d. External space	1	0	0	0	X
	Life cycle cost and service life planning: Capital cost reporting Criteria 6	A2D	Cost per m2 to be provided. BREEAM reporting tool - £/m2 Facilitates BRE data collection	3	One credit is awarded where evidence provided demonstrates that the capital cost for the buildings has been reported via the BREEAM Assessment Scoring and Reporting tool	1	1	0.52380952	1	
Man 03	Responsible construction practices: 1. Pre-requisite	Main Contractor	Documentation to demonstrate compliant timber procurement	4	All timber and timber based products used on the project is 'Legally harvested and traded timber'	No credits pre-requisite only				
	Responsible construction practices: Environmental management 2. N/A Criteria 3-4	Main Contractor	Principle Contractor & Demolition Contractor to hold EMS Pollution prevention policies to be implemented.	4	One credit is awarded all parties who manage the construction site - Principle Contractor, Demolition Contractor, hold EMS: ISO 14001 or BS 8555:2016 (Phase audits 1-4) Implement best practice pollution prevention - PPG6	1	1	0.52380952	1	
	Responsible construction practices: BREEAM AP (site) 5. Pre-requisite	A2D	BREEAM target to be included in Contract Documents	3	The client and contractor formally agree BREEAM performance target.	No credits pre-requisite only				
	Responsible construction practices: BREEAM AP (site) Criteria 6	Main Contractor	BREEAM AP to be appointed for the Construction, Handover and Close out Stages.	4	One credit is awarded where a BREEAM AP is appointed to assist in maintaining or improving on Design Stage targets and maximise BREEAM performance through Stages 5 & 6 AP to monitor progress against targets and provide feedback. Identify risks and opportunities. Monitor and co-ordinate evidence	1	0	0	0	X

Credit		Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
	Responsible construction practices: Responsible construction management Criteria 7-9	Main Contractor	Main Contractor to implement responsible construction management procedures. Table 4.1 - Meet items identified for one credit. Meet 6 additional items for second credit.	4	One credit is awarded where the Contractor meets set criteria: - to evaluate risks, plans and implements actions to minimise the risks: Vehicle movement, Pollution management, Tidiness, Health and wellbeing and Security process. -to provide training, awareness and feedback - to monitor and report on incidents Second credit is awarded where first credit + 6 additional items from list are met.	2	2	1.04761905	2	
	Responsible construction practices: Monitoring of construction site impacts Criteria 10-18	Main Contractor	Specification confirming that Main Contractor to monitor energy and water.	4	One credit is awarded where the Main Contractor sets targets, monitors & reduces site impacts -energy & water use.	1	1	0.52380952	1	
	Responsible construction practices: Monitoring of construction site impacts Criteria 19-22	Main Contractor	Specification confirming that Main Contractor to monitor transport for materials and waste.	4	One credit is awarded where the Main Contractor sets targets, monitors & reduces site impacts -transport for materials to site and waste from site..	1	1	0.52380952	1	
Man 04 first credit	Commissioning and handover: Commissioning and testing schedule and responsibilities Criteria 1 - 5	HL	Appointment of commissioning monitor and specification setting out commissioning scope and standards within services specification	3	One credit is awarded for providing a commissioning and testing schedule and defining responsibilities. Commissioning in line with specific standards An appropriate project team member is appointed to monitor and programme pre-commissioning, commissioning, testing and re-commissioning where necessary	1	1	0.52380952	1	
	Commissioning and handover: Design and preparation Criteria 6-7	HL	Appointment of specialist commissioning manager and specification setting out commissioning scope and standards Client appoints independent commissioning agent.	3	One credit is awarded for appointing a specialist commissioning manager where the building has complex building services and systems. Their responsibilities include undertaking design reviews, inputting commissioning programme and overseeing commissioning	1	1	0.52380952	1	
	Commissioning and handover: Testing and inspecting building fabric Criteria 8-10	Main Contractor	Specification including requirement for thermographic survey and air tightness test	3	The commissioning and testing schedule and responsibilities credit is achieved One credit is awarded for commissioning and testing of the integrity of the building fabric, including continuity of insulation, avoidance of thermal bridging and air leakage paths Any defects are to be rectified prior to handover	1	1	0.52380952	1	

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
1 credit	Commissioning and handover: Handover Criteria 11-12	Main Contractor	Provision of separate Building User Guides and training schedules for - Building users - Facility Managers	4	One credit is awarded on the provision of two building guides that cover information relevant to the building users with a separate technical user guide for the building manager. In addition a training schedules are prepared for building occupiers and for facilities managers performance of the building.	1	1	0.52380952	1	
Man 05	Aftercare: Aftercare support Criteria 1 - 2	Main Contractor	Specification setting out scope of aftercare Commitment to carry out monitoring by Contractor (links to seasonal commissioning)	3	One credit is awarded where there is a contract in place to provide aftercare support including on site support, training and helpline. In addition collection and monitoring of data over a year with adjustment of systems where necessary.	1	1	0.52380952	1	
	Aftercare: Commissioning implementation Criteria 3	HL	Specification setting out scope of seasonal commissioning	3	One credit is awarded where seasonal commissioning is carried out	1	1	0.52380952	1	
	Aftercare: Post Occupancy Evaluation and information dissemination Criteria 4 - 7	A2D	Appointment of third party to carry out POE with schedule of responsibilities	3	One credit is awarded where the client makes a commitment to - carry out a POE one year after occupation carried out by an independent third party . The client commits funds to pay for POE in advance through appointment of third party to undertake POE.	1	1	0.52380952	1	
TOTAL					21	14	7.33	7.86		
HEALTH AND WELLBEING										
Hea 01	Visual comfort: Control of glare from sunlight Criteria 1 - 3	ADP	Identify areas at risk of glare. Demonstrate glare is designed out or controlled in these areas.	2	One credit is awarded where: - areas at risk of glare are identified, glare control assessment. - the potential for disabling glare has been designed out and developed in line with the lighting strategy to avoid increased use of lighting and maximise daylight.	1	1	0.82352941	1	
	Visual comfort: Daylighting Criteria 4	HL ADP	Daylight calculations to be carried out to demonstrate compliance. Note: Exercise space & kitchen and communal areas are included in daylight assessment	2	Daylight factors - Table 5.1 & Table 5.2 1 credit: All occupied spaces - 80% of area has average daylight factor 2% + meets Table 5.2 a (uniformity/ min point) or b (view sky) + c (room depth). OR Illuminance criteria Table 5.4 - 80% area achieves 300 lux for 2000hrs/year + minimum worst point - 90 lux for 2000 hrs/year.	1	1	0.82352941	1	
	Visual comfort: View out Criteria 5-7	ADP	Community Centre - Office /Reception?	2	One credit is awarded where: 95% of the floor area in 95% of spaces has an adequate view out View out - 8m from relevant area - 20% of wall area to be glazed. Buildings with any occupied internal rooms where close work is undertaken will not meet criteria. Meeting rooms can be excluded.	1	1	0.82352941	1	

Credit		Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
	Visual comfort: Internal and external lighting levels, zoning and control Criteria 8-14	HL	Specification and lighting layout drawings demonstrating lighting in line with CIBSE requirements with zoning to meet BREEAM requirements. Note: Dimmers to be fitted for Exemplary credit - see Innovation section below.	3	One credit is awarded where all internal and external lighting, where relevant, is specified in accordance with the appropriate maintained illuminance levels (in lux) recommended by SLL Code for Lighting. Areas with computer screens to meet LG7 External lighting to BS5489 & BS EN 12464-2:2014 In addition lighting is zoned to allow manual occupant control - see specific space criteria. Fluorescent lamps have high frequency ballast	1	1	0.82352941	1		
Hea 02	Indoor air quality: indoor air quality plan (IAQ) 1. Pre-requisite	HL	Indoor air quality plan to be provided	3	One credit is awarded where: - An indoor air quality plan has been produced considering: removal, dilution and control of contaminant sources, procedures for pre-occupancy flush out, 3rd party testing and analysis	No credits pre-requisite only					
	Indoor air quality: Ventilation Criteria 2	HL	Provide details of ventilation provision	3	One credit is awarded where: - Fresh air is provided in accordance with relevant standard - Ventilation pathways are designed to minimise ingress & build up of pollutants - HVAC to incorporate filtration- BS EN 13779:2007 . Filters IDA2 - Carbon dioxide sensors in areas with large or unpredictable occupancy - Demonstrate adequate cross ventilation achieved.	1	1	0.82352941	1		
	Indoor air quality: Emissions from construction products Criteria 3-4	ADP	Specified materials/ performance spec to comply with VOC compliance requirements	3	Up to two credits are awarded where evidence provided demonstrates that the emissions of VOCs and other substances from key internal finishes and fittings comply with best practice levels	2	2	1.64705882	2		
	Indoor air quality: Volatile Organic Compounds testing Criteria 5-10	Main Contractor	Main Contractor to carry out testing to demonstrate that emissions are in line with BREEAM requirements	4	One credit is awarded where Formaldehyde and VOC concentration is measured post construction but pre-occupancy and are in line with best practice levels	1	0	0	0		
Hea 04	Thermal comfort: Thermal modelling Criteria 1 - 4	HL	Thermal modelling study and confirmation that performance is in line with the relevant standards	3	One credit is awarded where thermal comfort levels in occupied spaces are assessed at design stage to evaluate appropriate servicing options, and appropriate thermal comfort levels are achieved. Thermal modelling is carried out in accordance with CIBSE AM11 to meet performance requirements as CIBSE Guide A or other relevant industry standard	1	1	0.82352941	1		
	Thermal comfort: Design for future thermal comfort Criteria 5 - 8	HL	Thermal comfort study with summary of further measures to be incorporated as relevant to future proof for climate change.	3	One credit is awarded where thermal comfort modelling is carried out for projected climate change environment and comfort criteria are met. Where future climate change comfort cannot be met the design team can confirm additional future measures which can be installed at a later date to achieve comfort conditions. Criteria 1 - 4 are to be met	1	1	0.82352941	1		
	Thermal comfort: Zoning and controls Criteria 9 - 11	HL	Specification including controls strategy for both heating and cooling Design layout	3	One credit is awarded where thermal modelling has informed the zoning and controls for the heating and cooling system. Occupant control to be provided. Criteria 1 - 4 are to be met	1	1	0.82352941	1		

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
Hea 05	Acoustic performance	Acoustic consultant	2	Design to meet Section 7 BS8233:2014 - Sound insulation - Internal indoor ambient noise level - Room acoustics -reverberation & sound absorption Acoustic Design Stage advice required to ensure targets are met but not a BREEAM pre-requisite Appoint acoustician to carry out pre-completion acoustic testing	Up to three credits are awarded where the building can achieve appropriate levels for: - sound insulation, - indoor ambient noise level - room acoustics A suitably qualified acoustician carries out pre-completion testing with remedial work carried out as necessary. Three credits can be awarded if an acoustic consultant is appointed to design bespoke set of performance standards.	3	2	1.64705882	3	
Hea 06	Security: Security of site and building Criteria 1 - 3	A2D	2	Security Needs Assessment to be carried out by a suitably qualified security specialist - RIBA Stage2. Provide drawings with security measures incorporated	One credit is awarded where a suitably qualified security consultant carries out a Security needs Assessment at RIBA workstage 2, and the final design incorporates the recommendations of the consultant. The SQSS develops security controls and recommendations to be incorporated into the final building.	1	0	0	0	
Hea 07	Safe and healthy surroundings: Safe access Criteria 1-6	ADP/ ADPL	2	Specific criteria for safe access to be met including: Footpaths -separate from vehicle access. Cycle access direct to cycle stands Provision for deliveries Note: Cycle paths to storage not provided	One credit is awarded where external areas meet criteria for safe access by pedestrian and cyclists.	1	0	0	0	
	Safe and healthy surroundings: Outside space Criteria 7	ADP/ ADPL	2	Provide layout showing outside amenity space for building users including staff.	One credit is awarded where outside space is provided for building users.	1	1	0.82	1	
TOTAL					17	13	10.71	11.53		

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
ENERGY										
Ene 01	Reduction of energy use and carbon emissions: Energy performance	HL	Energy Performance Ratio based on: BRUKL Output document from thermal modelling Energy demand and energy consumption for the actual building should be improved compared to the notional building	2	Up to 12 credits are available where evidence provided demonstrates an improvement in the energy efficiency of the buildings fabric and services and therefore achieves lower building operational related CO ₂ emissions	9	4	3.04761905	4	
	Reduction of energy use and carbon emissions: Prediction of operational energy consumption 2. Pre-requisite	ALL	Operational energy performance workshop -provide evidence that workshop held prior to Concept Stage.	2/3	Design team to hold workshop focusing on operational energy performance	No credits pre-requisite only				X
	Reduction of energy use and carbon emissions: Prediction of operational energy consumption Criteria 3-5	HL	Energy modelling in accordance with BREEAM methodology to be carried out.	3	Four credits are awarded for undertaking additional modelling during design and PC to generate operational energy consumption figures. Report targets by end use, design assumptions and input data with explanation. Risk assessment to identify risks to be monitored and managed through construction and commissioning. Consider: - Weather -Operating hours for systems - Occupancy hours - Management factors	4	0	0	0	X
Ene 02 1 credit	Energy monitoring: Sub-metering of substantial energy uses Criteria 1 - 3	HL	Layouts and specification indicating location and function of metering. 90% of energy use to be assigned to end-use categories in accordance with TM39: Space heating, DHW, Humidification, Cooling, Ventilation, Pumps, Lighting, Small power, Renewables, Controls, Other .	3	One credit is awarded where there is provision of direct sub-metering of substantive energy uses within the building which are connected or have the potential to be connected to a BMS or other type of automated control device	1	1	0.76190476	1	
	Energy monitoring: Sub-metering of high energy load and tenancy areas Criteria 4-5	HL	Metering of above by function area or department.	3	One credit is awarded where sub-metering of energy use by tenancy/ building function is installed within the building	1	0	0	0	X
Ene 03	External lighting	HL	Specification/ confirmation of efficacy of external lighting and details of controls to light fittings	3	One credit is awarded where energy efficient external luminaires are specified (70lm/cw). All light fittings controlled for the presence of daylight and areas of intermittent traffic to have presence detection.	1	1	0.76190476	1	

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
Ene 04	Low carbon design: Passive design Criteria 1 - 4	HL & ADP	Stage 2 requirement Passive design analysis and demonstration of how measures are integrated into the design and reduce energy use Model with BRUKL output to test options - see BREEAM guidance methodology, quantifying the energy &/or carbon reduction	2	One credit can be awarded where Thermal comfort Hea 04 is met and passive design analysis has been carried out which influences the design approach at stage 2. Passive design measures are to reduce heating, cooling and lighting use. Quantify the reduction in energy demand and CO2 emissions resulting from passive design measures	1	0	0	1	
	Low carbon design: Free cooling Criteria 5-8	HL	Carry out free cooling analysis as part of passive design analysis.	2	One credit is available where the building utilises a free cooling strategy and the passive design analysis credit is achieved. Building is naturally ventilated or uses free cooling strategies.	1	0	0	0	
	Low carbon design: Low zero carbon feasibility study Criteria 9-12	HL	Stage 2 requirement. Feasibility report carried out at RIBA stage 2 in accordance with compliance requirements Are the LZC's determined by the site wide provision - any specific to Local Centre?	2	One credit where a feasibility study considering local low or zero carbon technologies has been carried out and results implemented. Quantify the reduction of CO2 &/or energy use .	1	1	0.76190476	1	
Ene 08	Energy efficient equipment	A2D	Unregulated energy use to be calculated. Identify systems that use significant proportion of energy Demonstrate a meaningful reduction in energy use through the specification of the items that use the most energy. Domestic-scale appliances to be energy efficient- Fridges/freezers to be A+ Washing Machines A++ Dishwashers A+	3	Two credits are available where evidence demonstrates that the building's unregulated energy use is calculated and procurement of energy efficient equipment is used within the building which has a demonstrable reduction in energy use	2	0	0	0	
Note: Ene 06 Lifts excluded					TOTAL	21	7	5.33	6.10	
TRANSPORT										
Tra 01	Transport assessment and travel plan Criteria 1-5	A2D	Stage 2 requirement - site specific Transport Assessment. Provide addendum to existing Hyder TA (2014 compliant) to pick up additional 2018 criteria - amenities & public transport Accessibility Index. Travel Plan to be developed from the Transport Assessment - existing TP to be reviewed. Demonstrate implementation.	2	Two credits are awarded for development of site specific Travel Plan. TP to incorporate assessment of amenities and calculation of Accessibility index. TP measures to be implemented.	2	2	1.66666667	2	

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
Tra 02	Sustainable transport measures Criteria 1-3	A2D	Travel plan must be provided (criteria Tra 01 3-5). Review achievable measures. Public Transport -AI 2.96 (Bus 15min intervals) Note: Item 6 -11 is Stage 1 requirement.	2	Assess the sustainable transport measures. Points score related to each item.	10	6	5	8	
TOTAL					12	8	6.67	8.33		
WATER										
Wat 01 1 credit	Water Consumption	ADP	Specification for low water use sanitary fittings - wc's, taps, urinals, showers, baths. Other - Dishwashers & washing machines. Additional credits for rain water or greywater harvesting.	3	Up to five credits can be awarded on the basis of the predicted potable water consumption for sanitary use within the building including dishwashers and washing machines, greywater and rainwater harvesting for sanitary use.	5	3	2.625	3	
Wat 02 criteria 1	Water monitoring Criteria 1-6	HL	Pulsed water meter for connection to BMS	3	One credit is awarded where a water meter with a pulsed output will be installed on the mains supply to each building/ unit, with sub meters fitted where water consuming plant uses 10% of water demand	1	1	0.875	1	
Wat 03	Water leak detection: Leak detection system Criteria 1-2	HL	Existing supply routes to be assessed - may not be achievable for all refurbished areas. Specification and layouts demonstrating leak detection	3	One credit is awarded where a leak detection system is specified or installed on the buildings water supply	1	1	0.875	1	
	Water leak detection: Flow control devices Criteria 3	HL	Specification and layout drawings indicating sanitary supply shut off	3	One additional credit is awarded where water is controlled to WC facilities	1	1	0.875	1	
TOTAL					8	6	5.25	5.25		

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
MATERIALS										
Mat 01	Environmental impacts from construction products Building LCA Criteria 4 Concept Stage Criteria 5 Technical Design	ADP/BA	Carry out LCA at Concept Stage and Technical Design. IMPACT compliant LCA tools - One Click or eTool required. Submit to BRE prior to planning application is made Note: Use of BREEAM simplified LCA tool restricts number of achievable credits to one credit.	2 4	Superstructure (frame, upper floors, roof, stairs, external walls, windows and doors, internal walls and partitions): Up to 6 credits are awarded where opportunities for reducing environmental impacts are identified at Concept Stage and/or Technical Design Stage. Concept stage: - LCA (life cycle assessment) option appraisal of 2-4 significantly different options . Integrate LCA options appraisal into decision making process -record. Technical Design: - Carry out LCA option appraisal of 2-3 design options (based on the selected Concept Design option)	6	0	0	0	X
	Environmental impacts from construction products Building LCA Criteria 6&7 Substructure & hard landscaping	Arch/BA	Carry out LCA at Concept Stage. Not achievable with BREEAM simplified LCA tool	2 4	One credit is awarded for LCA option appraisal of 6 substructure or hard landscape options at Concept Stage.	1	0	0	0	X
Mat 02	Environmental impacts from construction products -EPD	ADP	Provide details of products with EPD.	3	One credit is awarded where construction products with EPD (Environmental Product Declaration). 20 EPD points required to achieve credit based on completion of calculator tool.	1	0	0	0	X
Mat 03 criteria 1	Responsible sourcing of materials: Criteria 1 Pre-requisite	All	Specification to include timber procurement criteria.	4	All timber and timber based products used on the project is 'Legally harvested and traded timber'	No credits pre-requisite only				
	Responsible sourcing of materials: Enabling sustainable procurement Criteria 2	A2D	Provided Sustainable procurement plan Include timber procurement as pre-requisite.	1/2	One credit is awarded where a sustainable procurement plan is in place prior to Concept Design for use by the Design Team to guide specification of sustainable construction products.	1	1	1.07142857	1	

Credit		Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
	Responsible sourcing of materials Criteria 3	All	Complete ADP materials template and provide relevant up to date EMS certification for specified materials or include requirements in performance spec. Responsible sourcing includes: Superstructure - Frame, Upper floors, roof, Stairs & ramps, External walls, Windows & external doors, Internal walls & partitions. Internal finishes - Wall, floor (including stairs) & ceiling finishes + Internal doors Substructure - Foundations, GF construction Hard landscape - Road, paths paving etc.	4	Up to three credits are awarded where evidence provided demonstrates materials used in structural and non-structural elements are responsibly sourced. Recognised certified source for materials in the following elements: structure primary & secondary/ floors including finishes/ roof/ ext & internal walls/ substructure/doors and windows/ ceiling/ building services/internal finishes/hard landscape. 1 credit - Superstructure 10% 2 credits-Superstructure + Internal finishes, substructure & hard landscaping 20% 3 credits-Superstructure + Internal finishes, substructure & hard landscaping 30%	3	1	1.07142857	2	
Mat 05	Designing for durability and resilience	ADP	Assessment of material degradation requires high level of input. Drawings/ specification noting details and location of durability methods in vulnerable areas. Adequate robust measures to be incorporated to meet BREEAM requirements Environmental factors and material degradation must be considered in selection of materials.	3	One credit is awarded where evidence provided demonstrates that protection is given to vulnerable parts of the building such as areas exposed to high pedestrian traffic, vehicular and trolley movements and potential for malicious damage In addition the relevant building elements incorporate appropriate design and specification measures to limit material degradation due to environmental factors - materials to be appropriate quality/durability. Include convenient access to roof and facade for cleaning and maintenance. Design to prevent water damage, ingress and ponding.	1	0	0	1	
Mat 06	Material efficiency	All	Assessment of material efficiency requires high level of input at all stages of design and construction. Report demonstrating how materials are optimised	1	One credit is awarded where evidence provided demonstrates that opportunities have been identified and appropriate measures investigated and implemented to optimise the use of materials in building design, procurement, construction, maintenance and end of life. This is carried out by the design team at each of the following RIBA stages: preparation and brief, concept design, developed design, technical design and construction	1	0	0	0	
TOTAL						14	2	2.14	4.29	
WASTE										
Wst 01	Construction waste management: Pre-	Main Contractor	Demolition not applicable	2	One credit is awarded for pre-demolition audit. Concept Stage - determine if refurbishment is feasible	N/A				
	Construction waste management: Construction resource efficiency Criteria 3-4	Main Contractor	Main Contractor to provide Resource management Plan (RMP) identifying targets for waste generation	4	Up to 3 credits where evidence provided demonstrates that the amount of non hazardous construction waste generated on site by the development is the same as or better than good or best practice levels.	3	1	0.66666667	1	
	Construction waste management: Diversion from landfill Criteria 5-6	Main Contractor	Main Contractor to provide Resource management Plan (RMP) including targets for recycling.	4	One credit is available where a significant majority of non hazardous construction waste generated by the development will be diverted from landfill and reused or recycled	1	1	0.66666667	1	

Credit		Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
Wst 02	Recycled aggregates	Struct Eng	Data for Wst 02 calculator required: Identify aggregate uses and quantity for each use and type Identify source and distance	3	One credit is awarded where significant use of crushed aggregate, crushed masonry or alternative aggregates (manufactured from recycled materials) are specified . Distance to source is factored in assessment.	1	0	0	0	X
Wst 03	Operational waste	ADP	Provide drawings/ specification noting details and location of storage facility. Note: Food waste - make provision for food waste storage as BREEAM guidance.	2	One credit is awarded where a clearly labelled, central, dedicated storage space is provided for the storage of the building's recyclable waste streams: 2m2 provided for every 1000m2 of NIA + further 2m2/1000m2 where catering is provided Where consistent large volumes of waste are produced an appropriate waste reduction vessel is provided as part of a waste management strategy.	1	1	0.66666667	1	
Wst 05	Adaption to climate change	ADP HL	Stage 2 requirement. Climate change adaption strategy Risk assessment and mitigation for structural, fabric, services and renewables & their resilience to extreme weather.	2	One credit is awarded where a climate change adaptation strategy is developed for structural, fabric , building services and renewables systems by the end of Concept Stage. A resilience risk assessment is to be produced over its projected life cycle from expected extreme weather conditions arising from climate change and where feasible mitigate against these impacts.	1	1	0.66666667	1	
Wst 06	Design for disassembly and functional adaptability Criteria 1-2 recommendations Criteria 3-5 implementation	ADP HL Struct Eng	Stage 2 requirement. Functional adaptability and disassembly strategy and implementation plan report Includes facilitating changes to plant. Potential second credit - further review at Stage 4	2 4	One credit is awarded where a building specific functional adaption strategy study has been undertaken by RIBA stage 2 which includes recommendations for measures to be incorporated to facilitate future adaptation and review ease of disassembly. Develop recommendations that facilitate disassembly and functional adaption. Second credit awarded for review at Technical Design on implementation of Stage 2 recommendations and update. Produce building adaptability and disassembly guide.	2	1	0.66666667	2	
TOTAL						9	5	3.33	4.00	

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
LAND USE & ECOLOGY										
LE 01	Site selection: previously occupied land Criteria 1	ADP	Confirm 75% land for new build is previously developed. Provide existing and proposed site layout as evidence.	2	75% of building footprint and hard landscaping re-using previously developed land	1	0	0	0	X
	Site selection: contaminated land Criteria 2 - 3	Struct Eng	Review when report completed. Report confirming that the land is contaminated with confirmation of remedial works required	2	One credits is awarded where the client is re-using contaminated land with remedial steps to decontaminate or mitigate	1	0	0	0	X
LE 02	Identifying and understanding the risks and opportunities for the project: Criteria 1-2 Pre-requisite	A2D	Determine assessment route. BREEAM Ecological Risk Evaluation Checklist (not required if Ecologist appointed) Note: Route 2 has potential to achieve greater number of credits than Route 1. All UK & EU ecological legislation is complied with	2	Route 1 - Ecologist not appointed - max 1 of 2 credits Route 2 - Ecologist appointed - max 2 of 2 credits Determined by use of BREEAM Ecological Risk Evaluation Checklist	No credits pre-requisite only				
	Identifying and understanding the risks and opportunities for the project: Survey and evaluation Criteria 3 - Route 1 or Criteria 4-6 Route 2	A2D A2D Ecologist	Route 1- Complete BREEAM Ecological Risk Evaluation Checklist Route 2 Appoint ecologist Ecologist to survey site and provide evaluation. Note: For sites previously cleared the site's ecological value is based on desktop information. Note: Criteria 7-10 must be met for one credit under Route 1 & two credits under route 2.	1/2	One credit is awarded for survey and evaluation of site. Route 1 BREEAM Ecological Risk Evaluation Checklist Route 2 Ecologist appointed to survey the site to establish: - Current and potential ecological value - Direct and indirect risks to ecological value - Potential for enhancement of value of site and zone of influence. Data shared with team to inform site preparation, design and construction works.	2	2	2	2	
	Identifying and understanding the risks and opportunities for the project: Determining the ecological outcomes Criteria 7-10	Ecologist	Stage 2 requirement Determine the ecological outcomes for the site appropriate to the scale and type of development. Ecologist to liaise with team to identify optimal ecological outcome for the site	2	Second credit is awarded (Route 2 only) Identify and consider ecological outcome for the site in accordance with hierarchy of action: - Avoidance - Protection - Reduce negative impacts - On site compensation - Enhancement Implement the ecological outcomes.					

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
LE 03	Managing negative impacts on ecology Criteria 1-2 Pre-requisite Criteria 3-5	All	Evidence of planning, liaison and implementation. Programming of works can have negative impact on ecology - limit the disruption to ecology and wildlife through advance consideration and planning-avoid, protect, reduce, compensate.	2	Pre- requisite LE02 achieved & compliance with Ecological legislation. Planning, liaison, implementation and data One credit is awarded where evidence provided demonstrates: - Roles and responsibilities defined, allocated and implemented - Site preparation and construction works planned early to optimise benefits - Implemented solutions and measures agreed during site preparation and construction works.	1	1	1	1	
	Managing negative impacts on ecology Criteria 6 - Route 1 or Criteria 7 -Route 2	All Ecologist	Route 1 - one credit - no overall ecological loss Route 2 - two credits - no overall ecological loss Route 2 -one credit - Limited ecological loss	2	Manage negative impacts based on the hierarchy of action: - Avoid - Protect - Reduce impact - On site compensation - Enhance	2	1	1	2	
LE 04	Change and enhancement of ecological value Criteria 1-2 Pre-Requisite Criteria 3-4 -Route 1 or Criteria 5 -Route 2	All Ecologist	Route 1 - liaise with local ecological groups with expertise to recommend enhancement appropriate to site. Route 2 -enhance ecological value of site in accordance with ecologists recommendations	2	Pre-requisite LE03 has been achieved & compliance with Ecological legislation. Route 1 - One credit is awarded for enhancing ecology based on recommendations from recognised local ecological expertise. Collate data for local environmental records. Route 2 - one credit is awarded for implements ecological enhancements on site or within the zone of influence	1	1	1	1	
	Change and enhancement of ecological value Criteria 6 - Route 2	Ecologist Landscape	Review potential to enhance site ecology	2	Up to three credits are awarded related to the change in the Ecological value. Enhance bio-diversity (species and habitats) on the development site or within the zone of influence.	3	1	1	2	
LE 05	Long term ecology management and maintenance Criteria 1-2 Pre-requisite Criteria 3-5	All Ecologist	Monitor & report on ecological outcomes at Design and Construction stage Establish arrangements for on-going management of landscape & habitats. Maintain ecological value of site and any ecological recommendations.	4	Pre-requisite compliance with Ecological legislation. Planning, liaison, data, monitoring and review management and maintenance to secure on-going monitoring, management and maintenance of the ecological features and habitats. Project team collaborate to monitor and review implementation of ecological measures and develop management and maintenance solutions. BUG to include Ecology and Biodiversity section	1	1	1	1	
	Long term ecology management and maintenance: LE Management Plan Criteria 6-7	Ecologist	Route 2 only - Ecologist appointed Provision of Landscape and Ecology Management Plan	4	Route 2 only One credit is awarded where a five year Landscape and Ecology Management Plan is provided to BS42020:2013 by Ecologist.	1	1	1	1	
TOTAL					13	8	8	10.00		

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
POLLUTION										
Pol 01	Impact of refrigerants: pre-requisite Criteria 2	HL	Compliance to be specified	2	All systems must comply with the requirements of BS EN 378:2008 Parts 2 & 3 and where systems containing ammonia are used, the Institute of Refrigeration Ammonia Refrigeration Systems Code of Practice must be complied with	No credits pre-requisite only				
	Impact of refrigerants Criteria 3 - 5	HL	Clarify cooling requirement. Credits awarded by default if no refrigerant use. Specify refrigerant with DELC CO2 <1000kgCO2/KW cooling/heating capacity	2	Two credits are awarded where there are no refrigerants used in the building or Up to two credits are awarded where refrigerants have a Direct Effect Life Cycle CO2 (DEL CO2e) equivalent of 100kgCO2e/kW cooling capacity OR Where refrigerants have a GWP of 10 or less One credit is awarded where the DEL CO2e has an equivalent of 1000kgCO2e/kW cooling capacity	2	1	0.8	1	
	Impact of refrigerants Criteria 6 -7	HL	Credit awarded by default if no refrigerant use Leak detection to be specified or Hermetically sealed system (leakage< 3g/year).	2	One credit is awarded where there is no refrigerant in the building or One credit is awarded where hermetically sealed system or refrigerant leak detection and automatic pump down is provided	1	0	0	0	
Pol 02	NOx emissions Not applicable to projects connected to existing district heating systems.	HL	NOx emissions for CHP previously provided - 24.83 mg NOx/kWh. CHP -gas?	2	Two credit awarded for heating & Hot water from non-combustion systems. OR Up to two credits are available, depending on the dry NOx emissions from combustion plant for space heating and hot water at 0% excess O2: Gas 1 credit where dry NOx emissions are ≤27 mg/kWh; 2 credits where dry NOx emissions are ≤24 mg/kWh; Note: Alternative emission levels given for other fuels -see guidance	0	0	0	0	X
Pol 03	Surface water run off: flood risk Criteria 1 - 3	Civil Eng	Flood Risk Assessment Hyder 2015	2	Two credits are awarded where evidence provided demonstrates that the assessed development is situated in a flood zone that is defined as having a <u>low annual probability</u> of flooding, OR, One credit where the flood zone has a high or medium risk flooding and a FRA confirms that the site is appropriately flood resilient and resistant to all sources of flooding and the ground floor level is 600mm above the design flood level of the flood zone	2	2	1.6	2	

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
Surface water run off: drainage measures Criteria 4 -14	Civil Eng	Appropriate consultant to complete BREEAM Drainage report Details of SUDs with areas of hard areas, peak flow rates, rainfall intensity. Written confirmation of advice and approval from the relevant statutory body for the attenuation facilities	2	Pre-requisite: An appropriate consultant is appointed to demonstrate surface water run off measures Peak rate run-off: One credit is awarded where drainage measures are specified to ensure that peak rate of run-off meets: Brownfield-peak rate run-off 30% improvement for the developed site that for the pre-development site Greenfield -peak rate run-off no greater for the developed site that for the pre-development site Volume run-off: One credit is awarded where flooding of property will not occur in the event of the local drainage system failure Volume run-off no greater for the developed site that for the pre-development site	2	2	1.6	2	
Surface water run off: minimising watercourse pollution Criteria 15 - 22	Civil Eng	Details of appropriate facilities for drainage and pollution control	2	One credit is awarded where: No discharge from site for rainfall up to 5mm and Site treatment such as oil separators/interceptors or filtration, such as SUDS have been specified for areas at that are or could be a source of watercourse pollution	1	0	0	0	
Pol 04 Reduction of night time light pollution	HL	External lighting to be compliant with ILE guidance as BREEAM requirements	3	One credit is awarded where all external lighting can be automatically switched off between 2300hrs and 0700hrs. Safety and security lighting on during this period must meet reduced to lower lighting levels in line with Institution of Lighting Engineers (ILE) Guidance notes for the reduction of obtrusive light, 2011. Illuminated advertisements to meet ILP PLG05.	1	1	0.8	1	
Pol 05 Reduction of noise pollution	Acoustic consultant HL	Noise survey to BS7445 to be carried. Acoustician to advise on operational noise levels to meet criteria.	3	One credit is awarded where new sources of noise from the development do not give rise to likelihood of complaints from existing noise sensitive premises and amenity or wildlife areas that are within the locality of the site. Note: Noise level to be 5dB lower than background noise throughout the day and night.	1	1	0.8	1	
Total					10	7	5.60	5.60	

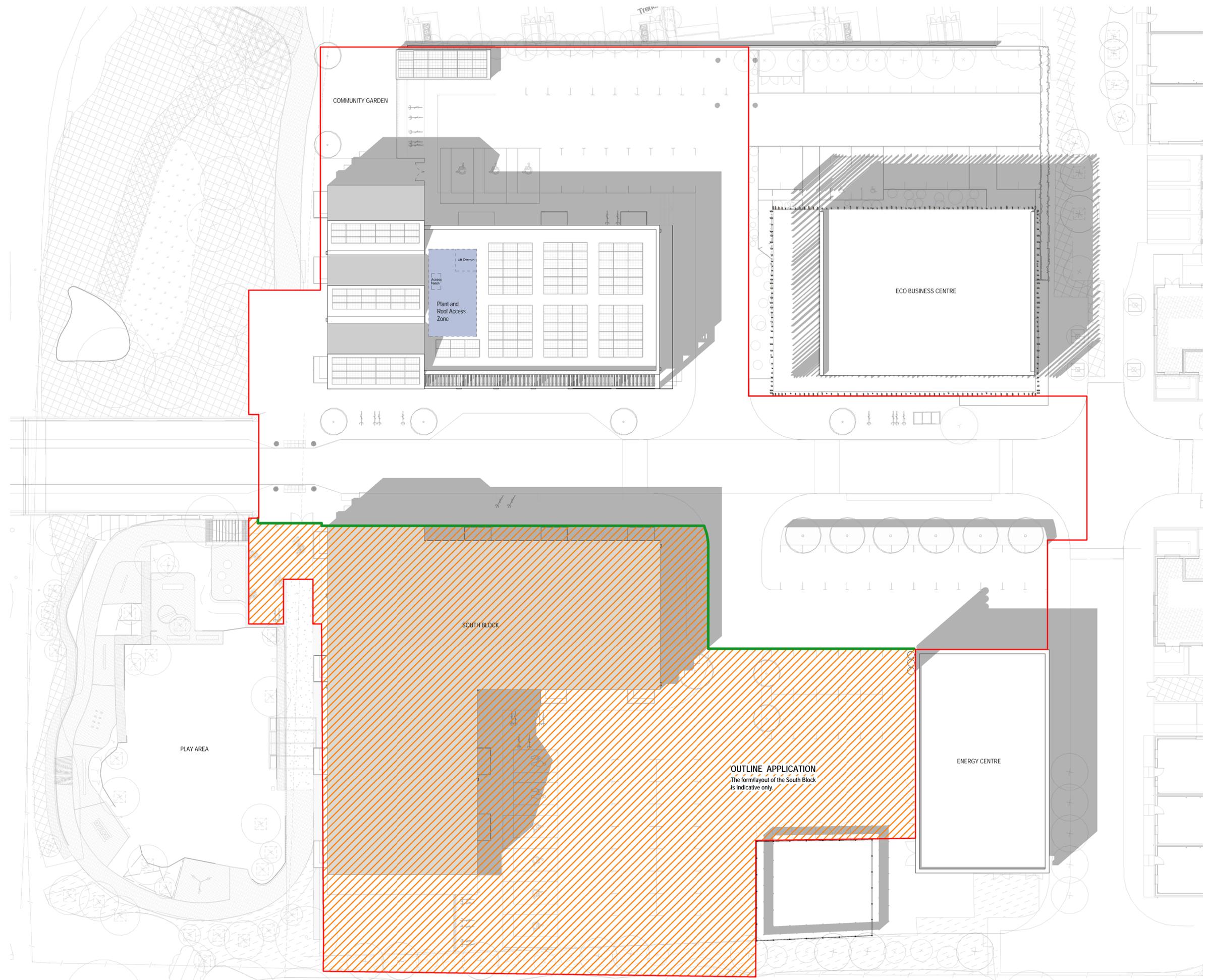
Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status	
INNOVATION CREDITS										
Man 03	Responsible construction practices: Criteria 23	Main Contractor	Achieve all items in Table 4.1	4	Meet responsible construction management criteria for: -Vehicle movement - Pollution management - Tidiness - Health and wellbeing - Security process.	1	1	1	1	
Hea 01	Visual comfort: Daylighting Criteria 14	HL		2	Meet higher daylight criteria - Tables 5.8 & 5.9	1	0	0	0	X
	Visual comfort: Internal and external lighting levels, zoning and control Criteria 15	HL	Provision of dimmers to manual controls	3	An exemplary credit is awarded if lighting in each zone can be manually dimmed by occupants down to 20% of the maximum light output using dimmer switches positioned in accessible locations. Dimming and control gear should avoid flicker and noise.	1	0	0	0	
Hea 02	Indoor air quality: Emissions from construction products Criteria 11	Main Contractor	Review products to meet improved criteria	3	Three product types meet improved emission rates - Table 5.12	1	0	0	0	
Hea 06	Security: Security of site and building	A2D	S by D or equal		A compliant risk based security scheme is used with independent verification	1	0	0	0	X
Ene 01	Reduction of energy use and carbon emissions:	HL	Achieve beyond net regulated carbon		EPR greater or equal to 0.9 & zero net CO2 emissions	2	0	0	0	
	Reduction of energy use and carbon emissions:	HL	Carbon negative		Up to 3 credits are awarded for a carbon negative building	3	0	0	0	
Wat 01	Water Consumption Criteria 7-8	ADP			Criteria 1-4 achieved + Water consumption achieves 65% improvement	1	0	0	0	X

Credit	Responsibility	Action/ Information provided	Job stage	Summary	Credits Available	Target credits	Weighted target credits	Credits for review	Status
Mat 01	Environmental impacts from construction	All		Option appraisal core services	1	0	0	0	X
	Criteria 10-14	All		LCA & LCC alignment	1	0	0	0	X
	Criteria 15-18	All		Third party verification	1	0	0	0	X
Mat 03	Responsible sourcing of materials Criteria 3	HL	Core building services Complete ADP Materials template and provide relevant up to date EMS certification for specified materials or include requirements in performance spec.	Scope of assessment to include -Core building services	1	0	0	0	
Wst 01	Construction waste management:	Main Contractor		Meet exemplary criteria for waste generation and diversion from landfill	1	0	0	0	X
Wst 02	Recycled aggregates	Main Contractor		Project sustainable aggregate point> 6	1	0	0	0	X
Wst 05	Adaption to climate change	Main Contractor	Potential to be reviewed.	An exemplary credit is awarded where all the credits listed in Table 10.11 are achieved.	1	0	0	0	X
LE02	Identifying and understanding the risks	Ecologist		Identify opportunities to integrate ecology with wider site-sustainability related activities-	1	0	0	0	X
Total Innovation Credits (THIS CAN BE NO MORE THAN 10)					10	1	1	1	
Total Score							55.37	63.95	

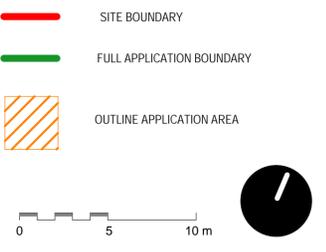
Appendix 2 – Roof Layout (ELC2-ADP-00-R1-DR-A-1003)

SITE BOUNDARY:
Please note the site boundary position identified on this drawing remains subject to confirmation from Land Registry / verification with the land owner's title deed. ADP take no responsibility for the reliability/accuracy of this survey information

OUTLINE APPLICATION NOTE:
The form and layout of the South Block are for indicative purposes only; the final layout, height, massing and design will be determined as Reserved Matters in accordance with the agreed outline parameters



OUTLINE APPLICATION
The form/layout of the South Block is indicative only.



REVISION	DATE	DESCRIPTION	ARCHITECT	PARTNER
S2 P 1	03.06.19	Planning Issue	ADP	
S2 P 2	03.10.19	Planning update to include full and outline application areas	ADP	

CHECK ALL DIMENSIONS AND VERIFY ON SITE. REPORT ANY ERRORS OR OMISSIONS

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JOB TITLE:
Elmsbrook Local Centre
North West Bicester
for A2Dominion

DRAWING TITLE:
ROOF PLAN

SCALE: 1 : 200	DRAWING SHEET SIZE: A1
JOB CODE: ELC2	DRAWING NUMBER: ADP-00-R1-DR-A-1003
REVISION: S2 P 2	

This line should measure 100mm along x and y axis when printed



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