ARUP

Sheffield City Council Capital Delivery Fund

Stocksbridge Towns Fund Community Hub

Addressing Core Planning Strategies CS64 & 65

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Ove Arup & Partners Limited
3 St Paul's Place
Norfolk Street
Sheffield S1 2JE
United Kingdom
arup.com

ARUP

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		Name	Amber Walker Alex May	Andrew McDowell	Andrew McDowell
		Signature	[redacted]		
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			Prepared by	**Checked by**	**Approved by**
		Name	Amber Walker Alex May	Andrew McDowell	Andrew McDowell
		Signature	[redacted]		
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1. Introduction

This report is a response to planning conditions CS64 and CS65 that target sustainability, adaptation, and a reduction in carbon. This particular response relates to the new Community Hub that is a mixed office, library, and retail development in Stocksbridge, that will provide an attractive work and leisure space for the local area. In summary, the project team consider that the proposed development meets the planning requirements of CS64 and CS65 as outlined in this report.

2. Policy CS64: Climate Change, Resources and Sustainable Design of Developments

This policy requires all new buildings and conversions of existing buildings to be designed to reduce emissions of greenhouse gases and function in a changing climate.

2.1 Development Requirements

All developments will be required to:

2.1.1 Achieve a high standard of energy efficiency

Heating and cooling energy will be reduced by high performing building fabric and detailing to the extension to reduce heat transfer and ensure low infiltration rates by;

- Minimising conductive thermal transmittance (low U-values)
- Minimising thermal radiative transmittance (low G-values in glazing)
- Maximising visible light transmittance (in glazing)

Element	Modelled U value (W/m^2K)	G value
Roof	0.15	-
Ground Floor	0.15	-
Walls	0.15	-
Extension Windows (inc framing)	1.4	0.35
External Doors	1.6	-
Infiltration	3 $m^3/hr/m^2$@50Pa	

Fabric performance has been selected to improve upon the ambitious targets set in the newer Part L 2021 and infiltration has been set based on a good quality air tight construction. Despite these improvements, supplementary Solar PV will be fitted to the building to further improve the Part L performance of the building and offset the in-use electricity consumption.

Efficient building services will be installed to further reduce the in-use electricity consumption and operational carbon of the building. All heating and cooling technologies will be electrically fuelled, therefore considered as a net zero carbon ready building – as the grid decarbonises the building will also trend towards net zero in operation.

Electric lighting energy usage will be reduced by utilising new high efficiency LED fittings and maximising the penetration of natural daylight into the occupied spaces using tall, glazed panels. The lighting within the perimeter zones will be linked with daylighting control to minimise the energy consumption from electric lighting.

The development will maximise energy recovery via heat recovery devices in the ventilation plant where possible, along with the use of 3 pipe refrigerant heating and cooling systems; where heat and coolth can be redistributed within the building to create an efficient energy balance. Instant electric hot water generation will be used to reduced standing losses compared to a central domestic or local storage hot water system.

The new central ventilation and refrigerant systems shall be demand led to reduce energy consumption when not useful or beneficial.

2.1.2 Make the best use of solar energy, passive heating and cooling, natural light, and natural ventilation; and

The new building will be fitted with large windows where appropriate to maximise daylighting to reduce the reliance on synthetic light, this will be balanced against an increase in cooling generated by too much solar gain.

Glare must also be considered to avoid an uncomfortable visual environment and blinds will form part of the tenant fit-out works to allow occupants to adapt their environment to suit their needs.

Owing to sensitive nature to external noise of the spaces within the building (library and office space) and the sensitive noise receptors behind the building, mainly the residential properties, passive/natural ventilation is unlikely to be feasible to manage noise disturbance into the building and to the adjacent receptors. On this basis, it is proposed that high efficiency mechanical ventilation and cooling are provided to these areas, with demand let systems to minimise energy consumption. Plant will be selected so that breakout noise is kept within the limits dictated in the Planning conditions.

2.1.3 Minimise the impact on existing renewable energy installations, and produce renewable energy to compensate for any loss in generation from existing installations as a result of the development.

The proposed development incorporates PV renewable electricity generation which will be used to reduce the building grid electric demand and the use of high efficiency refrigerant systems for heating will further reduce the heating energy consumption and resultant carbon generation of the building.

2.2 Sustainability Requirements

All new buildings and conversions of existing buildings must be designed to use resources sustainably. This includes, but is not limited to:

2.2.1 Minimising water consumption and maximising water re-cycling;

Sanitaryware will be supplied with flow regulators to regulate and reduce water consumption. WCs will be dual flush and have low water consumption.

Installation of a comprehensive water metering system and leak detection shall be provided to identify system leaks which otherwise may go unnoticed.

Water supply pipework to new toilet areas shall incorporate sanitary shut off valves linked to occupancy sensors to shut off the water supply when unoccupied to prevent taps and WCs being left running.

Due to the limited space available, rain water recycling has not been incorporated into the scheme and funding diverted to Solar PV and high efficiency systems instead.

2.2.2 Re-using existing buildings and vacant floors wherever possible;

The existing Library and St Luke's Charity shop buildings which partially cover the site will be fully demolished to make way for the development. A review and statement of the pros and cons for demolition vs retention was made from all disciplines and presented to the client. Following this, the client decided to proceed with the demolition approach.

2.2.3 Designing buildings flexibly from the outset to allow a wide variety of possible future uses;

The building design is mixed use, with library, office and retail spaces. The office use (or similar) on the first and second floor accommodation is a constraint of the project, as higher occupancy of fire risk uses would fundamentally change the form of the building and introduce a number of life safety systems that have been excluded from the scheme (such as sprinklers). However, the ground floor has a flexible use space (Class E) associated with it and the ground floor café could be repurposed for a number of other uses.

Other building uses may be precluded by the current acoustic performance of the façade and the impact this may have on neighbouring residential properties.

2.2.4 Using sustainable materials wherever possible and making the most sustainable use of other materials;

Once the overall approach to the building and the architectural intent had been agreed, structural options were considered in terms of layout and grid positions as well as materiality, with the embodied carbon of each option reviewed.

Following an initial review, the main floor options considered were precast hollowcore planks, cross-laminated timber (CLT) with a concrete topping, and metal deck with concrete. Different grid options were considered for each floor material to appraise the embodied carbon. External impacts were considered, for example the fire and acoustic impacts of CLT were found to be minor given size and use of the building.

From this review, an approx. 7.8x5.9m grid option was chosen, as this presented an efficient solution with lower embodied carbon compared to longer span options, without significantly compromising the architectural intent. The precast hollowcore floor was chosen due to cost constraints with CLT, as the following next most sustainable option given the building specific assessment.

In terms of the steel frame, primary cellular beams were decided to be the most efficient solution with integration to services. Using reclaimed steel sections is being considered through the current design phase for use in columns, tie beams, and trimming steel. A target percentage of reuse will be agreed and incorporated in the steel specification.

With an existing building on site, circular economy principles should be considered in recovery and reuse of materials wherever possible. Currently there is a lack of information of what the structural form of the building includes, however a pre-demolition audit will be developed alongside a demolition subcontractor. From this, reusable and recoverable materials should be incorporated into the design where appropriate, and surplus materials passed into the wider reuse economy where use on site is not viable or appropriate.

The use of recycled aggregate in concrete elements should also be considered prior to construction, particularly from reuse of materials from the existing building as stated above. Our research indicates:

- Typically recycled aggregates constitute up to only 20% of a structural concrete mix.
- The process of crushing concrete to create aggregate can generate up to 50% fines. These fines cannot be used in the concrete and must go to landfill.
- The source of the recycled aggregate at the time of the building construction cannot be predicted and a contingency mix specification is likely to be required to compensate for irregular supply.
- Concrete batching plants local to the site may not have the facilities to store and use recycled aggregates.

Discussions should be held with the Contractor’s supply chain to establish the economic viability of using secondary aggregates on this project.

Cement replacements were not considered beneficial due to the latest updates to thinking surrounding cement replacement use, such as GGBS, from the Institution of Structural Engineers. Here it is exposed how high use on a given project is proven to not reduce global emissions due to this being a constrained fully utilised resource from the steel industry which would be used elsewhere. This means the resource should be approached with caution and was not included when making options comparisons.

Design for deconstruction should be considered throughout the following design stage, with actions such as hard-stamping steel members, avoiding welding, retention of as built information and producing a deconstruction plan prior to handover stage, detailing the size and type of members so value can be estimated prior to demolition.

The embodied carbon of MEP systems are not widely reported by manufacturers to date and therefore it is not practical at present to determine how much recycled material may be included in the building services infrastructure. There is currently no plan to reuse building services currently in the buildings being demolished but there should be opportunities to recycle components of the existing systems. Similarly, where possible, new building services will aim to reduce their embodied carbon by using eg. Lower embodied carbon refrigerant for heating and cooling systems.

2.2.5 Minimising waste and promoting recycling, during both construction and occupation.

Unfortunately, asbestos materials are known to be present in the damp-proofing of the building and therefore much of it is likely to be treated as contaminated waste with the appropriate disposal methods utilised. Further demolition surveys of the building may uncover further ACMs that require similar levels of care during disposal.

It is anticipated the contractor will implement a Site Waste Management plan. Materials arising from demolition will be specified to be recycled or re-used elsewhere in the project subject to compliance with the requirements of the appropriate specification. This is further explored within section 1.2.4.

2.2.6 Adaption to climate change

The Environment Agency anticipate gradual small-scale temperature rises and increase in solar radiation due to climate change which may affect building materials longevity and occupant comfort. To manage this, appropriate external wall build-ups and glazing will be specified along with robust detailing and specification of colour fast materials and sealants. Cooling and glazing systems will be sized to accommodate predicted increases in external temperature in the system predicted 15-20yr lifespan (2050 Medium 50% emission scenario).

’Environment Agency guidance for climate change allowances on rainfall have been updated, with the current rainfall climate allowance set at 40% for the Don and Rother management catchment.

Flows generated by up to 1 in 100-year storm events with 40% allowance for climate change should be managed within the site boundary with no property flooding and with the peak flow rate off site not exceeding the agreed rate. In accordance with SCC LLFA, the site will be designed to accommodate the 1 in 100 year storm event plus a 40% allowance for climate change’’.

Potential increases in wind speed and occurrence of high wind speed and driving rain as a result of climate change propose a risk of damage to building fabric and increased maintenance/replacement costs. To manage this the specification of new facade fittings will be designed for high winds and window details to be robust. Resilient louvre design with appropriate weather proofing classification will be specified.

The site is within flood risk zone 1. Most developments that are less than 1 hectare in flood zone 1 do not require a flood risk assessment.

3. CS65 Renewable Energy and Carbon Reduction

Inside the core strategy document, Policy CS65 details the requirements for Carbon Dioxide emissions in new developments. For all significant developments the following are required:

a. *Provide a minimum of 10% of their predicted energy needs from decentralised and renewable or low carbon energy; and*

b. *Generate further renewable or low carbon energy or incorporate design measures sufficient to reduce the development's overall predicted carbon dioxide emissions by 20%. This would include the decentralised and renewable or low carbon energy required to satisfy (a).*

It should be noted that Section 5, pg 8, of the "Sheffield Development Framework Climate Change and Design, Supplementary Planning Document and Practice Guide" states;

Subparagraph (b) of policy CS65 requires a 20% carbon reduction for developments of 5 or more dwellings, or more than 500 m2 gross internal floor space. However, requiring a 20% reduction beyond that required by the new Building Regulations Part L would not normally be viable in the current economic climate for the majority of developments. Compliance with part (b) of Policy CS65 will, therefore, not be required for the duration of this Supplementary Planning Document."

Therefore the development does not need to comply with part (b) of Policy CS 65.

The proposed development intends to meet part (a) with approximately a 400m2 solar PV installation to reduce the building's reliance on the grid and to partially offset its carbon footprint. In addition, all building services including heating and cooling will be electrically fueled, such that their carbon footprint reduces with the decarbonization of the electrical grid infrastructure.