

THE SEAM

Barnsley Digital Campus
Phase 1

Active Travel Hub
Stage 2 report
January 2022

BDP.



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Barnsley Digital Campus
Phase 1

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Stage 2 report
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1.0 Introduction

1.1 Project Overview

In May 2020 Barnsley Metropolitan Borough Council (BMC) appointed a consultant team to prepare a new Development Blueprint for the site known as 'The Seam, Barnsley's Digital Campus'. The multi-disciplinary team was led by BDP in conjunction with Fore Consulting, Hydrock, BE Group and Warrington Martin. The site is a 4.5 ha parcel of land located within Barnsley town centre, immediately adjacent to the Transport Interchange.

The Digital Campus is home to DMC01, recently refurbished DMC02 and Barnsley College's new Scitech Digital Innovation hub. These buildings bring together digital and tech focused people, businesses, research and skills, enabling collaboration and innovation through a growing digital eco-system that operates on a regional, National and International level.

The Seam is a values driven concept, that brings together the 'soft' infrastructure of programmes, projects and support with the 'hard' infrastructure of an exciting urban village environment that provides a testbed for new ideas and technologies. All activity and development will be aligned to the Campus values:

- Building pathways – a place of possibilities
- Trailblazing
- For Barnsley, not only for business
- A dynamic digital ecosystem
- Putting people first

The Development Blueprint aims to transform the physical environment of this growing Digital Campus with opportunities to create a highly sustainable live-work neighbourhood in the heart of the town, connected by smart infrastructure, high quality public realm and a testbed for technology led innovation in retail, Internet of Things, low / zero carbon and active travel.

The Blueprint provides a flexible plot-based plan for the site ensuring wider strategic objectives of BMC and its stakeholders are met, and development is brought forward in line with key infrastructure and phasing requirements.

The Development Blueprint outlines the development principles including:

- The range and mix of land uses considered appropriate
- Design constraints (such as heights, massing, and preservation of key views),
- Alignment with the site-wide strategies for sustainability, smart technology, transport, utilities, and drainage
- The delivery of enhanced public realm, including a central greenspace and pedestrian and cycle connections through the campus.
- Intended phasing of the development

In October 2021 a multi-disciplinary team comprising of BDP and Arcadis with development consultants Aspinall Verdi were appointed to prepare concept designs for Phase 1, comprising of:

- Multi-Storey Car Park to RIBA Stage 2
- Active Travel Hub to RIBA Stage 2
- Public Realm to RIBA Stage 3
- Feasibility studies for development plots 1 and 2
- Road and services infrastructure to support the above

This Stage 2 report contains work carried out during RIBA Stages 1 and 2, and includes concept design proposals for the Active Travel Hub.

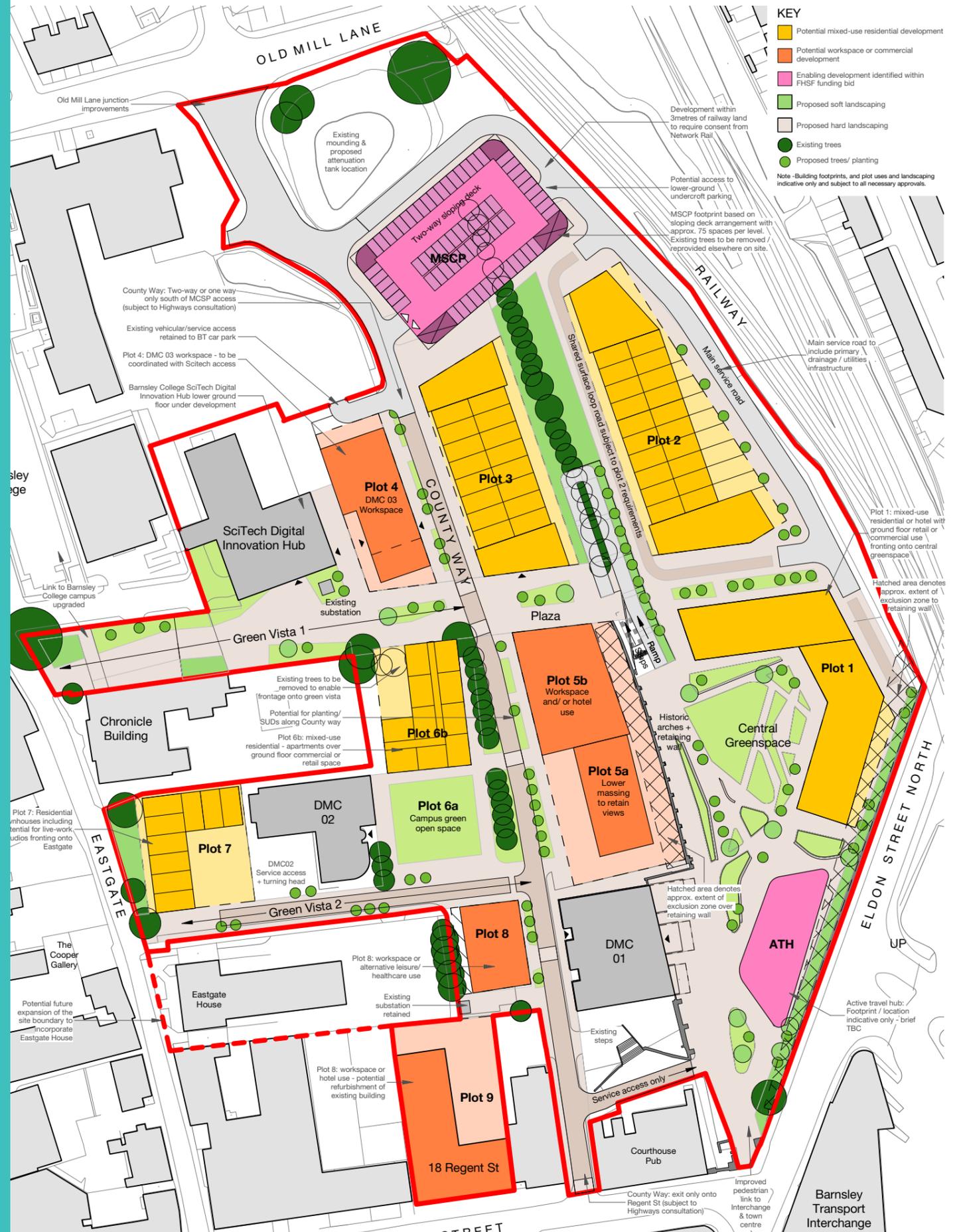


Figure 1.1: The Seam Development Blueprint - Illustrative Layout



01.
PUTTING PEOPLE FIRST



02.
BUILDING PATHWAYS -
A PLACE OF POSSIBILITIES



03.
TRAILBLAZING



04.
FOR BARNLSLEY -
NOT ONLY FOR
BUSINESS



05.
A DYNAMIC DIGITAL
ECOSYSTEM

Figure 1.2: Illustrative view looking North along the Seam public realm, and Diagram of The Seam Core Values

Figure 1.3: Aerial visualisation of The Seam Development Blueprint master plan

2.0 Site Context

2.1 Site Description

The Seam site is bounded by Regent Street to the south, Eastgate to the west, Old Mill Lane to the north and a combination of the railway line and Eldon Street North to the east. The site was formerly referred to as the 'Courthouse' site - divided into upper and lower Courthouse (above and below the existing central retaining wall). Due to an extensive level change of circa 7m from east to west, the site has been developed as a series of platforms and slopes. The majority of the site is covered by surface level car parking with several commercial buildings present to the south and west of the site. The phase 1 site is 2.5ha.

Located at the heart of the town centre, immediately adjacent to the Transport Interchange, the site is bounded by Regent Street to the south, Eastgate to the west, Old Mill Lane to the north and a combination of the railway line and Eldon Street North to the east. The site forms an important physical link between the town centre and the Barnsley College campus, offering opportunities to connect students and education facilities with the wider town.

The site was formerly referred to as the 'Courthouse campus' and is divided into two main plateaus – commonly referred to as Upper and Lower Courthouse (above and below the existing central retaining wall, a remnant of the Victorian railway infrastructure). The retaining wall tapers out towards the northern end of the site where the level change is formed by a steep bank with dense trees and shrubs. There is a significant level change across the site from east to west, and this offers long views across the Dearne Valley towards the east.

The site is currently home to the two flagship Digital Media Centre developments: DMC 01 and DMC 02 (formerly the Core). The Barnsley College Scitech Digital Innovation Hub also lies within the site boundary, demonstrating the collaborative nature of the Digital Campus environment.

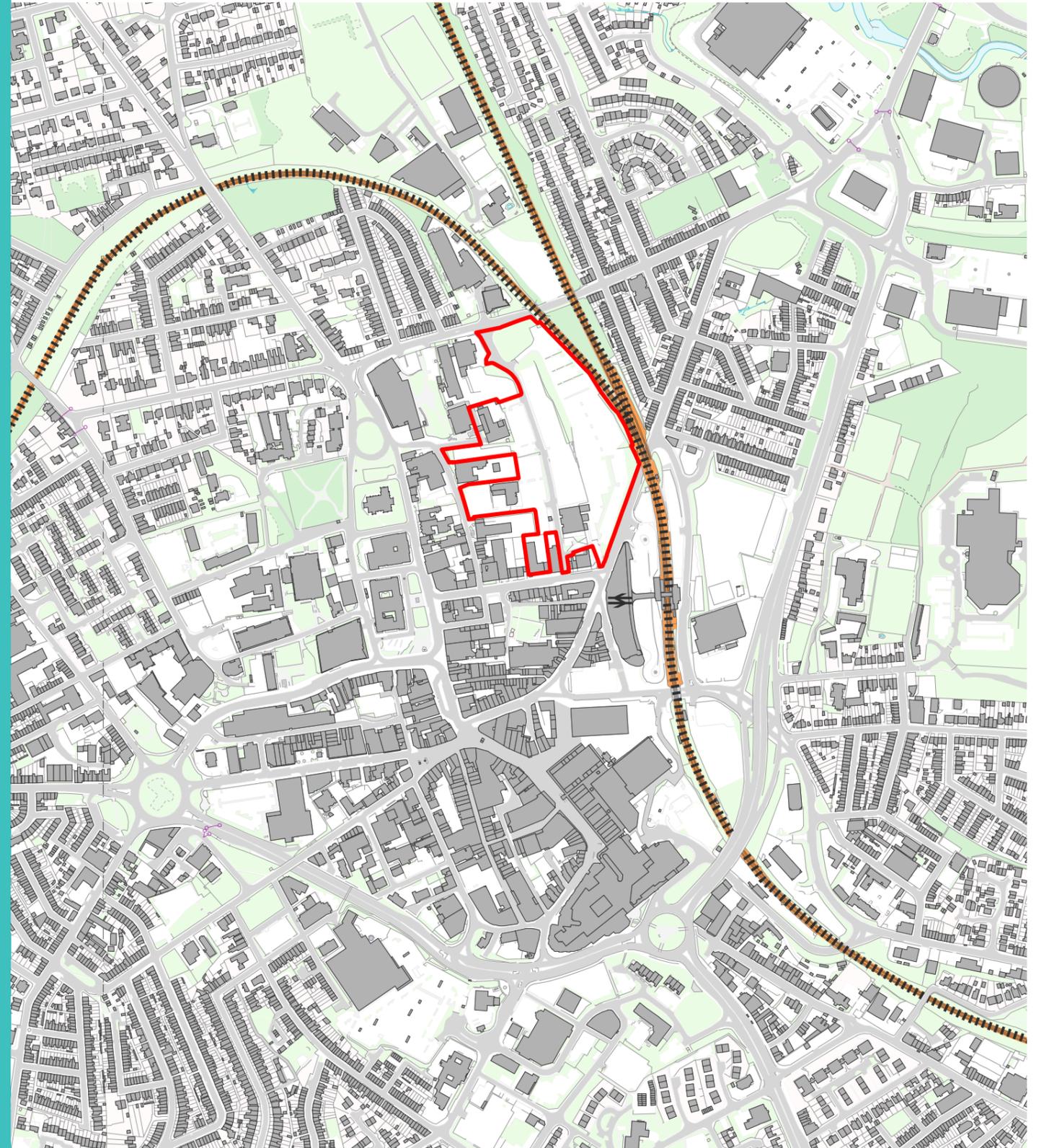


Figure 2.1: Barnsley plan showing The Seam site boundary

2.2 Phase 1 Site

The Phase 1 site is predominantly used as surface car parking operated by BMBC, with the primary access off Old Mill Lane and County Way. Towards the northern end there are a number of mature trees sited in between the car parking bays. Immediately adjacent to the eastern edge of the Lower Courthouse runs the Network Rail Wakefield-Sheffield railway line, beyond which lies expansive views over the Dearne Valley. A second masonry retaining wall forms the boundary to the south eastern edge of the site, fronting onto Eldon Street North.

The Active Travel Hub plot is located to the southern end of Phase 1, in a prominent position adjacent to the pedestrian gateway to The Seam and directly opposite the DMC01 building. The plot is located to form a focal point and destination at the gateway to the 'Digital Campus'. In the Development Blueprint this plot was identified as a suitable location for the ATH due to its proximity to the Interchange and the likely low-rise (1 or 2 storey) massing, which would allow the building to act as a 'pavilion' within the landscaping and ensure that eastward views from DMC01 will to be maintained. Distant views of the site also demonstrated

that a building of this scale would not impede views of the landmark DMC01 building. The plot is adjacent to the Eldon Street North retaining wall. There is a 'no build' exclusion zone adjacent to the retaining wall which will be subject to further surveys and site investigations during the next stage in the design process.



Figure 2.2: Photograph of existing site looking North from the corner of Regent St and Eldon St

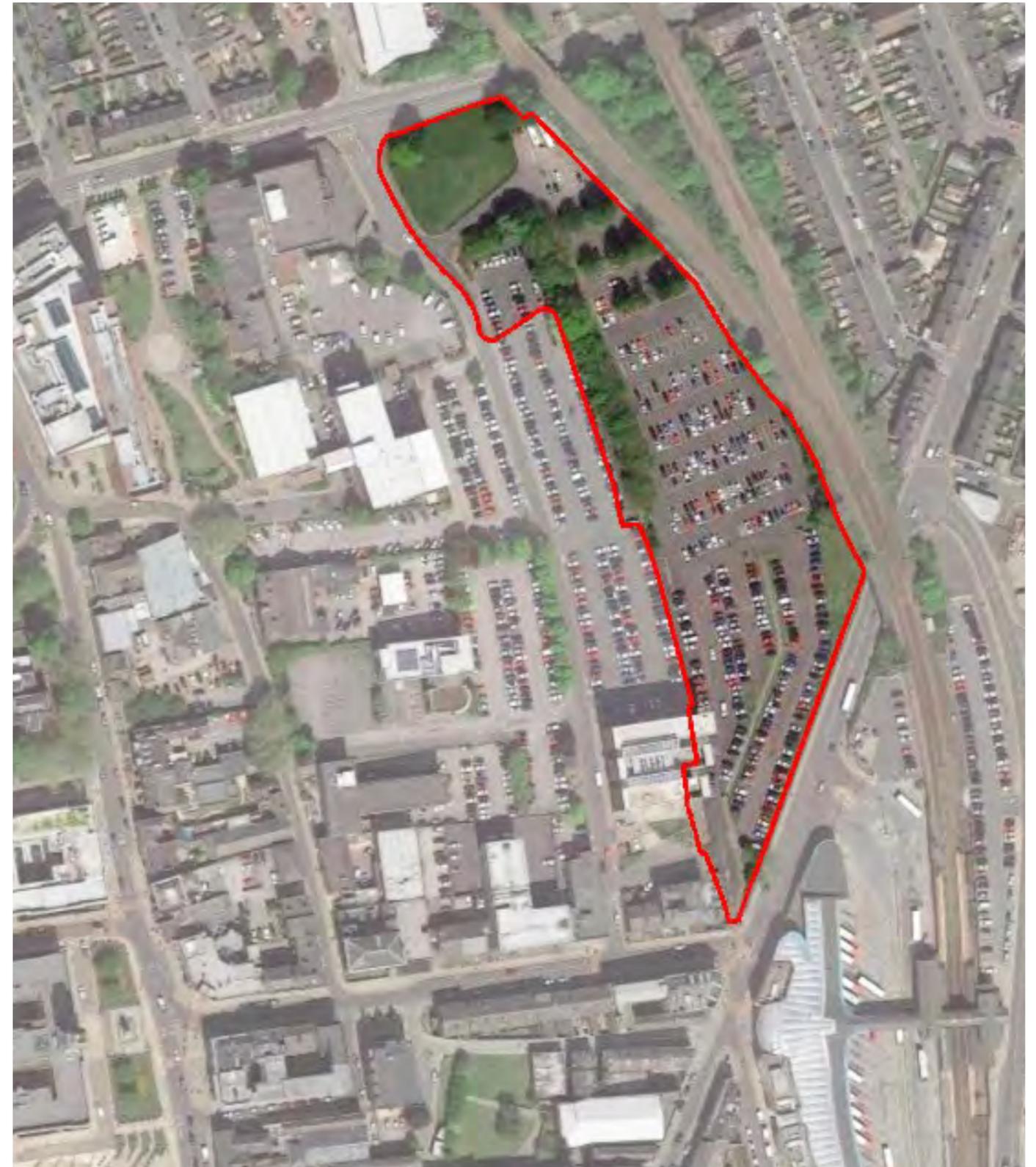


Figure 2.2: The Seam Phase 1 site boundary

3.0 Brief Development

3.1 Project Brief

The primary function of the Active Travel Hub is to provide cycle storage, but the facility is to be designed to accommodate a range of uses fronting onto the central greenspace including cafe, cycle hire / repair, retail and cycle workshop space.

The ATH will be an important facility and in a very prominent location on the site. It is recognised that the building should be high quality design to set the scene for the development.

A series of workshops have been held with BMBC stakeholders between November 2021 and January 2022 to establish the brief. During this time BDP explored initial adjacency studies and organisational options in an attempt to 'tease out' the required facilities, spatial and building requirements.

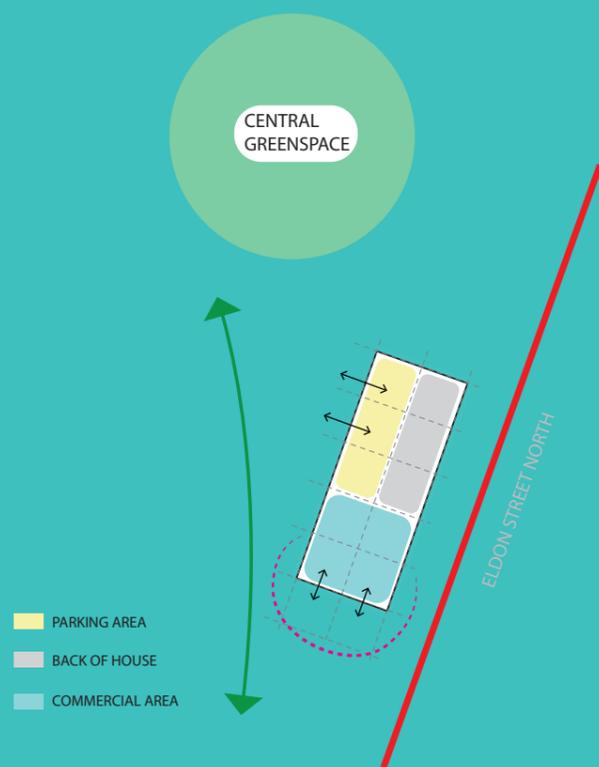


Figure 3.1: Initial concept diagram showing the 3 areas of use

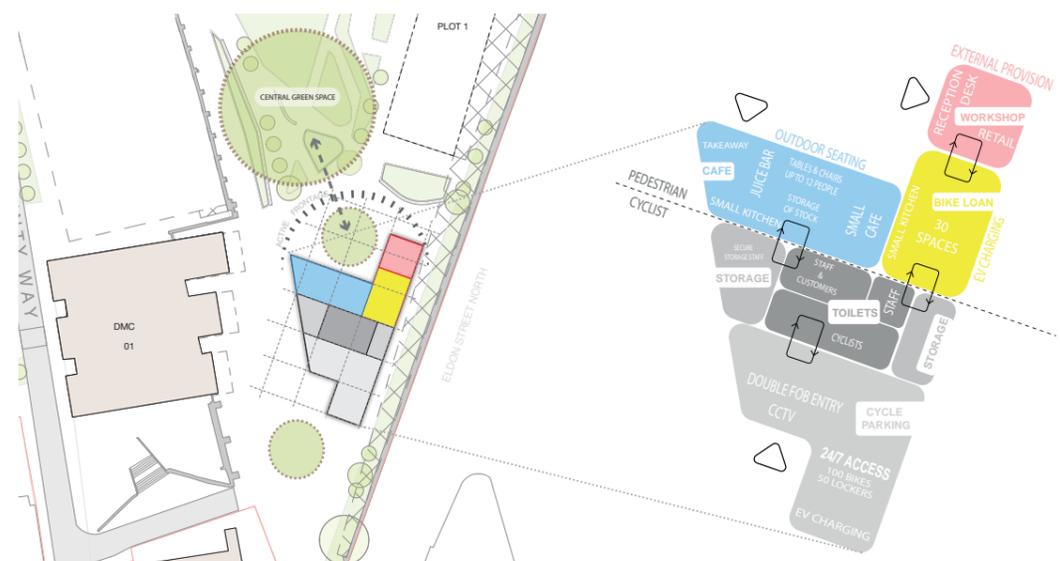
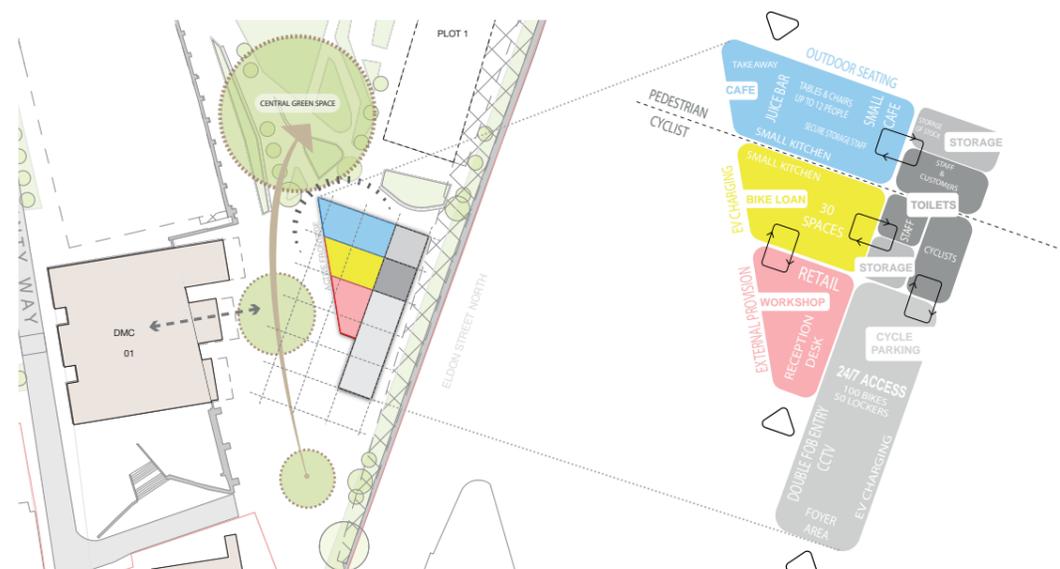
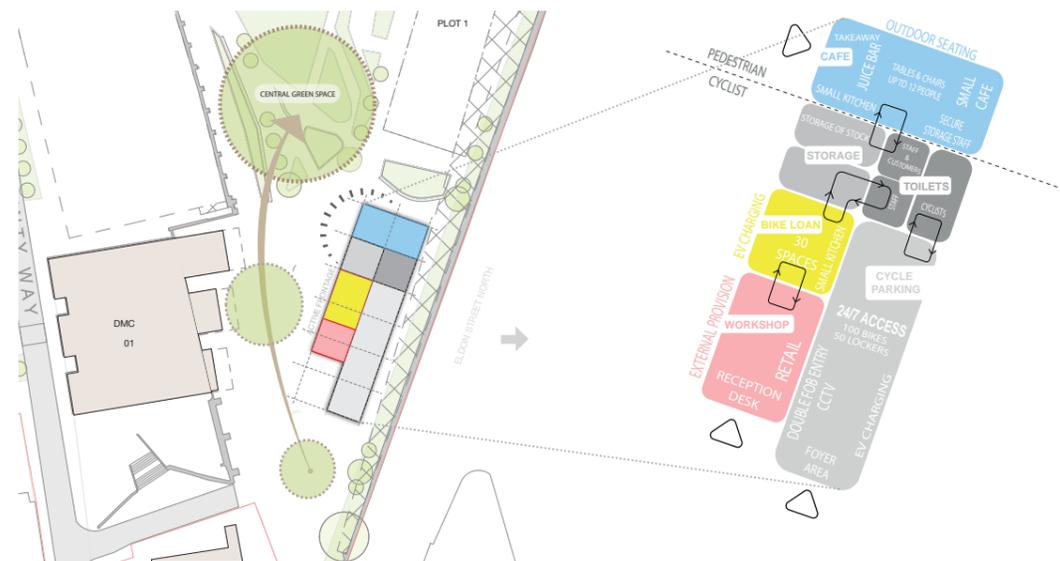


Figure 3.2: Concept diagrams of 3 initial layout options for the ATH

3.2 Brief Requirements

A summary of briefed requirements is noted below.

The building is to contain three independent units each with its own secure access:

1. Bike Loan and Workshop – staffed during working hours
2. Cycle Storage – unmanned, 24/7 access via ‘double fob entry’, with CCTV
3. Café – private, rented space, located to the north of the building

Bike Loan & Workshop

- staffed during working hours
- dedicated entrance with a reception desk, where people can hire bikes, buy bike spares, get information
- small retail space for bike spares, maps, all of which can be made secure
- the workshop and bike loan area could be combined
- staff WC with welfare facilities / kitchenette
- storage space for 30 loan bikes – most bikes should be out on loan
- storage for loan bike accessories – locks, helmets, panniers, etc.
- aspiration for 100 electric bikes by 2040 / 100 pedal bikes by 2040
- percentage of electric bike charging to be confirmed
- some space externally where customers can test ride loan bikes, adjacent to the hub but mindful of pedestrians

Cycle Storage

- unmanned, but with secure 24/7 access, using ‘double fob’ entry with CCTV
- located to the south of the building, keeping cycle movements away from central space
- foyer / lobby area to prevent ‘tailgating’ to gain access to the cycle storage area
- space for storing 100 bikes and 50 lockers
- space for larger bikes, e.g. cargo bikes, Trykes, etc.

- separate provision for commuters via additional security permissions on fob (season pass), with access to lockers, showers, toilets and drying facilities
- double racking for bikes not favoured – could be used in the future to increase capacity?
- percentage of electric bike charging to be confirmed

Café Space

- private rented space, located to the north of the building
- opportunity to create outdoor seating area next to the central green space
- small kitchen, WC for customers / staff
- secure storage area for stock, etc.
- ideas include: small, independent café / juice bar, serving coffee, snacks, takeaway sandwiches, etc.
- internal seating area accommodating around 12 customers, plus outdoor seating

Building layout

- café located to the north of the building
- entrance to cycle storage to the south of the building
- aim to keep pedestrians and cyclists separate

BMBC consulted with local cyclists / users of the existing Active Travel Hub facility at the end of January 2022. Data from this survey was made available to the design team just prior to completion of this report, although there was insufficient time to consider the feedback within the Stage 2 design. The responses to the consultation will therefore need to be reviewed and discussed with BMBC at the commencement of the next stage in the design process.



Figures 3.3 & 3.4: Early design options for the ATH layout; and above, precedent image showing combined cafe and cycle storage building

4.0 Architectural Proposals

4.1 Building layout

The proposed Active Travel Hub (ATH) is located at a prominent location within The Seam, and is intended to act as a gateway building for pedestrians and cyclists approaching the site from Barnsley town centre. The architectural response acknowledges this prominence and proposes a single storey building with a distinctive and high quality design.

The general arrangement of the 500m² ATH footprint addresses the requirements developed in consultation with key stakeholders and defined in the brief. The layout provides cycle storage and associated cyclists' facilities, cycle hire and workshop, and a café to serve The Seam development and wider area.

4.2 Building geometry

The design proposal for the ATH responds to the brief and accommodates the required facilities within three single-storey linear building volumes, orientated along the north-south axis parallel to Eldon Street North. The three volumes are expressed as separate elements through their varying heights, façade material treatments and roof features. This strategy helps to reduce the scale and massing of the building. The plan form allows a vista from the gateway of the site through towards the north and provides a transition space prior to opening up to the central greenspace adjacent to Plot 1. It also responds to and provides a connection with the DMC01 building opposite and the originally intended pedestrian entrance to the building, which will be reopened.

4.3 Cycle Storage facility

The Stage 2 proposal addresses the brief requirements by providing an arrangement for a secure sheltered (unheated) storage space located at the southern end of the ATH building footprint. The intention is that this facility will be unmanned, with secure 24/7 access, using 'double-fob' entry and CCTV. A lobby arrangement

is proposed in order to prevent 'tailgating' and unauthorised access to the cycle storage area, thereby providing enhanced security.

The proposal includes the provision of 98 no. standard spaces, envisaged as vertical 'Spacepods' to address the expressed preference for convenient and speedy-access securing. It is worth noting that the future expansion of capacity to 200 no. spaces could only be achieved within the current proposed footprint by replacing the proposed Spacepods with a two-tier rack system.

To address the requirement for non-standard and accessible cycles (cargo bikes, Trikes, etc.), 5 no. extra-large spaces with low-level 'Sheffield' type rails have been proposed to be located adjacent to the main entrance for ease of access (circa 5% of the standard spaces provided). The proposal also includes provision for secure bike lockers for users wanting additional security. This provision includes 15 no. secure lockers for foldable cycles, as well as 4 no. vertical lockers for standard sized cycles.

Following the recommendation received from a cycle-hub designer, 4 no. lockers, each including 15 no. E-bike battery charging compartments have also been located within the facility to offer secure charging (for batteries that can be detached for charging - total capacity of 60 no.), in addition to adjacent sockets to facilitate in-situ cable charging.

The brief requirement for separate provision for commuters via additional security permissions on fob (season pass), with access to lockers, showers, toilets and drying facilities has been addressed in the proposal with an adjacent unisex changing room facility, accessed off a second secure access lobby. This facility includes the provision of 3 no. standard shower, toilet and changing cubicles and one accessible cubicle, all accessed off a changing lobby including 46 no. 'Z' shaped cycle lockers.

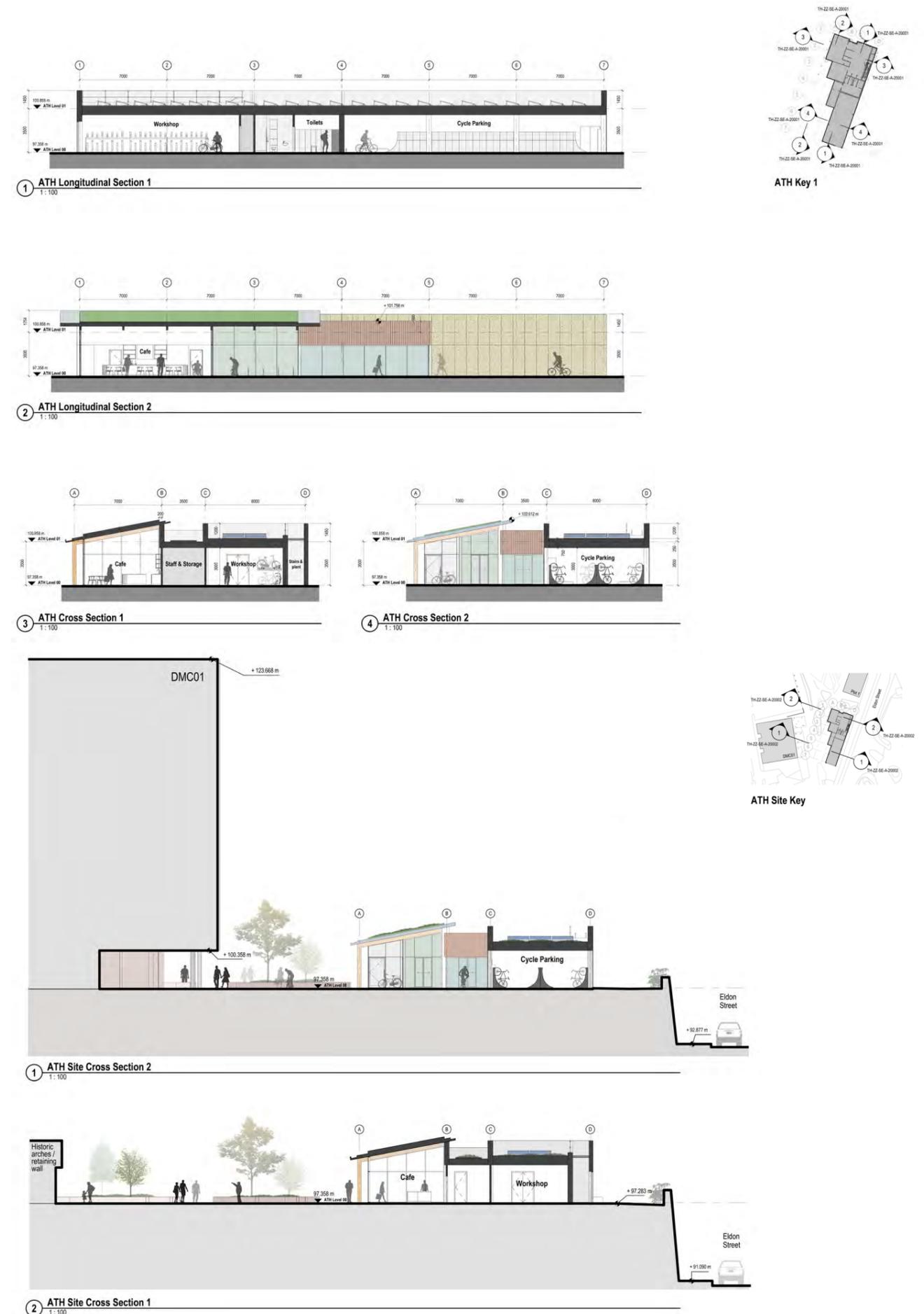


Figure 4.1: Proposed Active Travel Hub sections

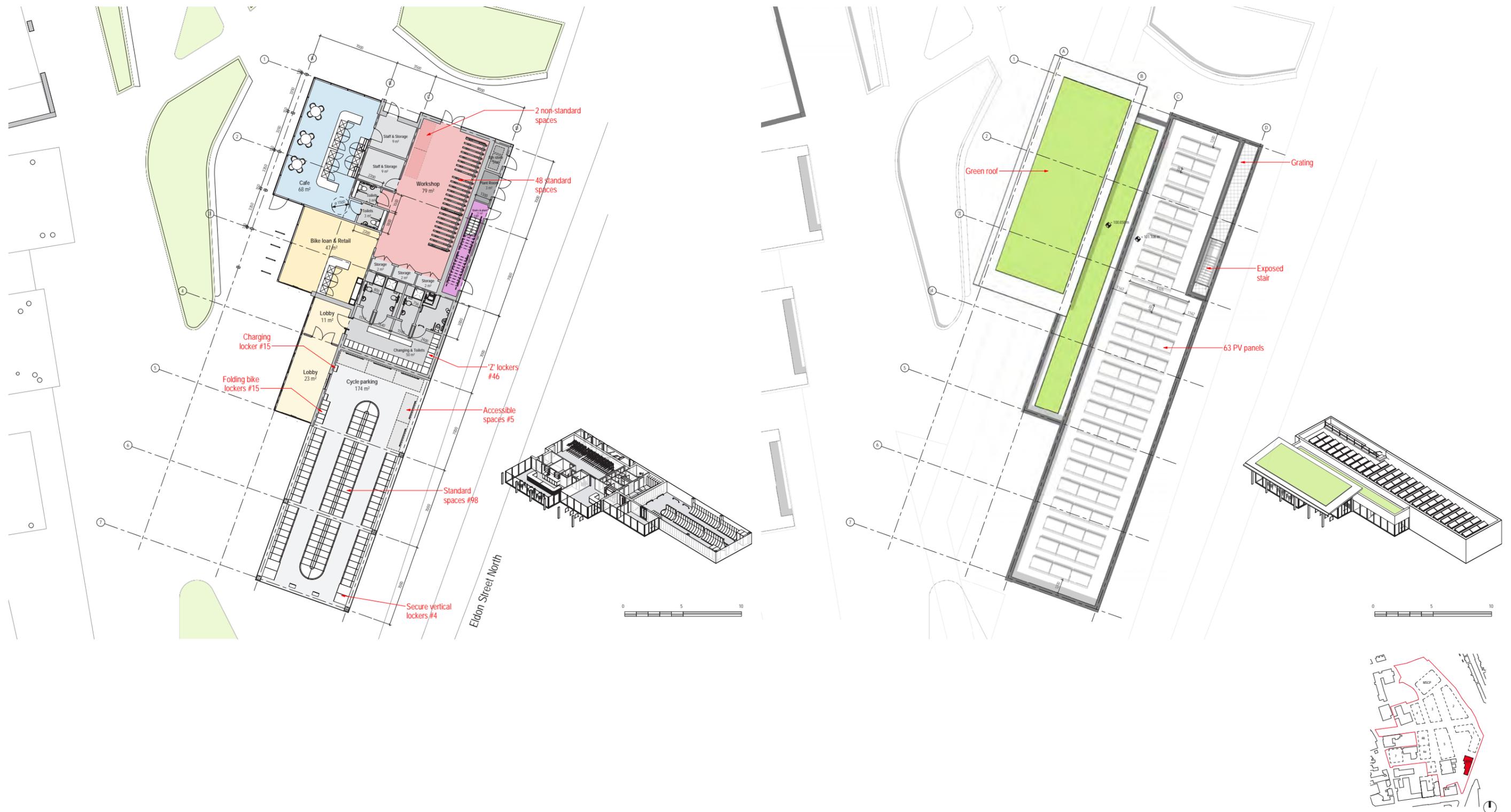


Figure 4.2 & 4.3: Proposed Active Travel Hub ground floor plan (left) and roof plan (right)



Figure 4.4: Visualisations of the ATH with light metal and timber cladding Option 1 (material treatment shown indicatively; to be developed in the next design stage)





Figure 4.5: Visualisations of the ATH with bronze metal and timber cladding Option 2 (material treatment shown indicatively; to be developed in the next design stage)



4.4 Cycle workshop

The second cycling-related component of the ATH brief is the repair workshop and hire facility. This requirement addresses general support for ancillary equipment provision that can help remove some of the barriers to cycling uptake and enable the promotion of cycling as a healthy and convenient mode of transport. The specific brief for this required the provision of a small shop offering essential cycling associated supplies and accessories (locks, helmets, panniers etc.), a workshop space for repairs, and a hire facility including storage for up to 30 no. bicycles.

The Stage 2 design proposal for this presents a 47m² floor space, with a shop-counter to facilitate the sale of cycling associated goods, as well as taking enquiries and cycle hire bookings. This space has a dedicated entrance facing south and west onto the main route through the Seam site, thereby allowing for its secure and independent management. The space is connected to the workshop to the rear of the ATH, which offers facilities to carry out repairs, as well as including storage for 46 no. standard cycles (on two-tier gas assisted and aluminium top frame racks), and 2 no. non-standard hire cycles. This open-plan workshop and storage area also has service access to the north of the ATH to aid the delivery or removal of larger items, as well as providing access and space for people to test bikes without impeding site pedestrian flows. Furthermore, the facility would also be served by a 9m² staff and storage area (including a kitchenette), and an accessible staff toilet.

4.5 Café

The café is intended to be an independent rented space and is located at the north end of the ATH plan. This arrangement allows for 'spill-out space' onto the main greenspace within The Seam, thereby providing a visual connection that promotes engagement with the building. The separation of the café from cycling functions meanwhile allows for unhindered pedestrian flow, free from the risk of collisions with cyclists.

The 68m² café includes an open kitchen / servery, while accessed off this space is a 9m² staff room including storage for general use and stock, and an accessible toilet for both customer and staff use. The access door to the north from the staff room would serve to receive stock and remove refuse, with the latter removed to the bin store located to the northeast (which is envisaged to be shared with the cycle facility).

4.6 Building Envelope

The key components of the ATH building envelope are

the façades of the three building volumes and their three distinct roof treatments. The latter effectively acts as the fifth elevation given the potential for overlooking from current and planned future developments.

4.7 Facades

The three linear volumes of the ATH are envisaged as having distinct façade treatments as a strategy to breakdown its building mass into smaller volumes.

- The largest linear volume accommodating the cycle storage facility is proposed to be clad in a pattern-perforated metal panel rainscreen. The panels allow for daylight penetration into the facility, with the panelling acting as access doors where needed. The perforated pattern, colour and finish to the panels will provide an interesting looking yet robust façade.
- The volume housing the café is envisaged to be fully glazed from floor-to-roof. The transparency of this volume will encourage greater visual connection and engagement from pedestrian flows passing through the site (from both north and south approaches).
- The central connecting linear volume is envisaged to be clad with vertical timber panels where opaque, continuing into the interior of the building, and glazed elsewhere.

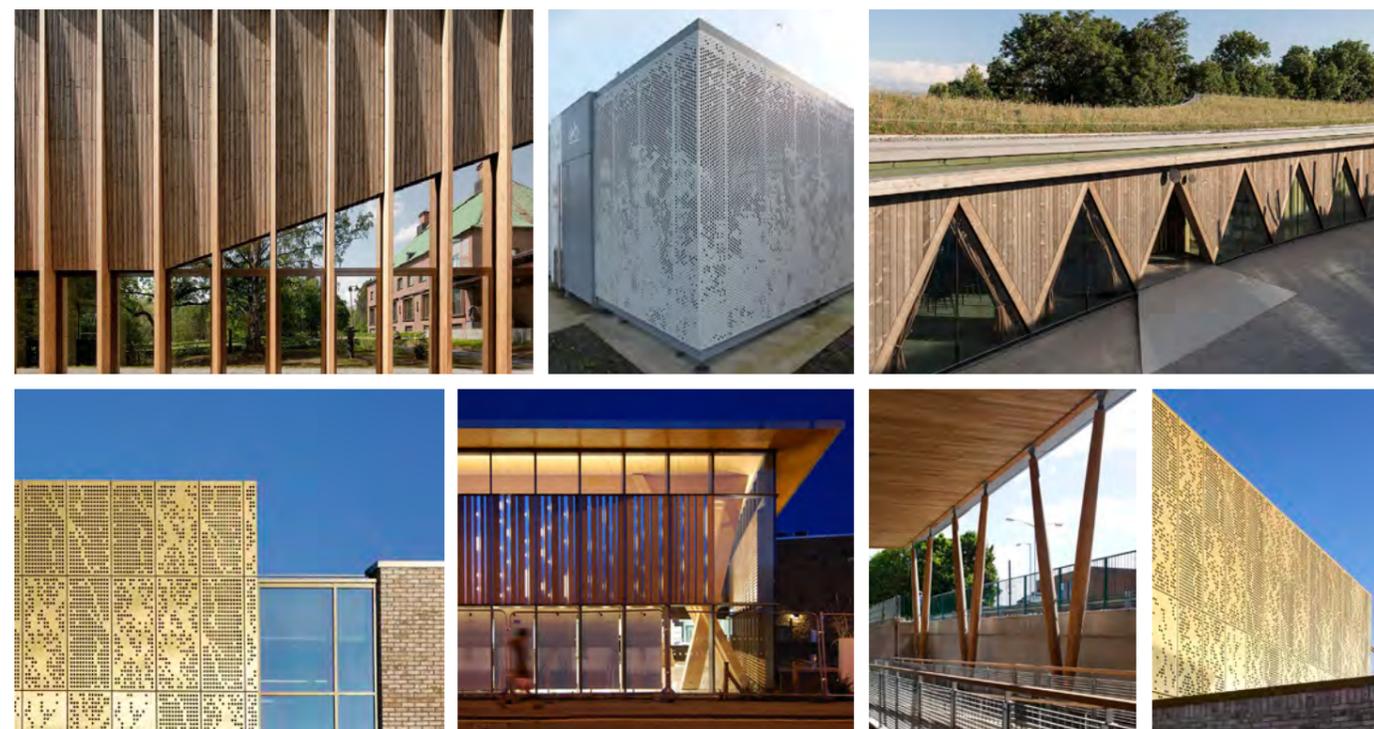


Figure 4.6: Building facade precedent photographs



Figure 4.7: Building precedent photograph

4.8 Roof

The ambition to deliver a low carbon building requires a range of strategies to be implemented. The proposal to include green roofs represents one of these strategies. A key consideration relates to the desire to enhance the aesthetic appeal of the roof elevation given that the ATH is a single storey structure and will be overlooked by surrounding buildings (DMC and Plot 1). The green roof will also attract greater biodiversity to the Seam site.

Given the above considerations, the Stage 2 proposal seeks to implement 'extensive' green roofs on both the roof canopy above the café area (167m²) and the lower central area (83m²). Extensive green roofs typically have a shallow growing medium (100-200 mm depth) and are designed to be relatively self-sustaining (i.e. low maintenance).

The larger roof area of the cycle storage and workshop (294m²) is suitable for the other key low carbon strategy proposed: in-situ energy generation from photovoltaics. It is proposed that this roof area will mostly be covered by an array of PV panels (63 no. proposed at present – subject to further assessment), and this presents two hybrid options to consider:

4.8.1 Option 1

Blue-solar roof: this approach would entail a roof construction with surface water retention (to act as a thermal reservoir), with the photovoltaic arrays installed on top.

4.8.2 Option 2

Bio-solar roof: this would entail either a standard extensive green-roof or semi-intensive wild meadow green-roof arranged in conjunction with photovoltaic arrays. The hybrid deployment of photovoltaics in conjunction with blue or green roofs also improves the performance of the photovoltaic array by helping to keep the adjacent microclimate cooler. This hybrid approach therefore contributes to the enhanced performance of the roof system. The slight disadvantage of a hybrid deployment would be the greater consideration for maintenance, with a semi-intensive wild meadow solution requiring more attention. However this must be balanced by the potential for their greater contribution to biodiversity enhancement, softening the roof elevation aesthetic, enhancing well-being by restoring the link between humans and nature, and reducing the energy costs of the building.

The cycle storage and workshop area of the ATH notably has the highest elevation of the entire building arrangement (5m above ground level). This increased elevational height ensures that the roof area with PV panels remain inaccessible to unauthorised individuals, thereby minimising the risk of vandalism or theft.



Figure 4.8: Proposed Active Travel Hub elevations

5.0 Structures

5.1 Introduction

BDP C&S Engineers have been appointed, on behalf of Barnsley Metropolitan Borough Council (BMBC), to provide structural engineering design advice in relation to the proposed Active Travel Hub (ATH) for the Seam Digital Campus project in the centre of Barnsley.

BDP C&S have worked closely with the wider design team, comprising disciplines from both Arcadis and BDP, to develop the design up to RIBA Stage 2. BDP C&S remit for this Stage extends to the structural engineering design and drainage design (refer to Section 6) with the geotechnical and civil design elements being undertaken by others.

This report section summarises the Stage 2 structural design optioneering process undertaken to develop the most appropriate structural solution in the context of the site constraints, Architectural intent and Client project drivers.

In addition, this section outlines the technical basis of design upon which subsequent design phases are to be based.

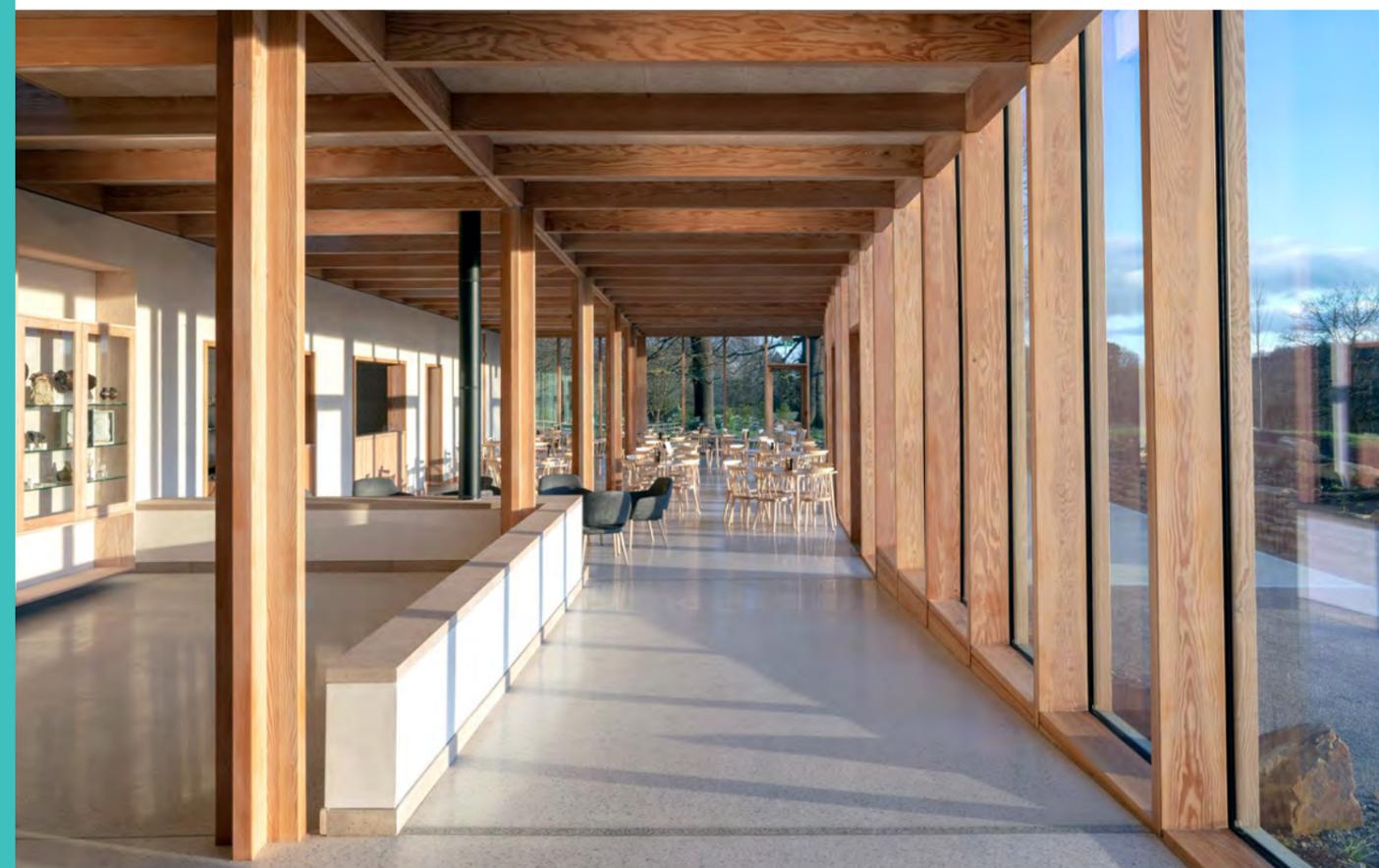


Figure 5.1: Timber frame structure precedent image

5.1.1 Key Project Drivers

The development of the structural design has progressed in the context of some key project drivers including:-

- Cost – Ultimately, the ATH must fit within the funding budget in order to be viable. As such, cost and adopting the best value solutions has been a key influence on the development of the design.
- Sustainability – BMBC have a clear aspiration to make this development as sustainable as possible in the context of the budget. As such, sustainability and the assessment of aspects that maximise the projects sustainable credentials at an early stage is considered a primary project driver. The ATH is seen as a key opportunity to adopt a truly sustainable structure and help drive the aspiration of net zero carbon.
- Space Planning – The ATH is situated at a pinch point between the existing Eldon Street retaining wall and the DMC. As such its footprint and space planning is critical to ensure the site is open and accessible, whilst still achieving the uses required by BMBC. The space planning must work efficiently to optimise the site area.
- Robustness – the workshop nature of the ATH is such that it may be subject to wear and tear that needs to be accounted for. In addition, the Council has expressed concerns that it needs to stand up to potential vandalism. As such the structure and fabric must be robust as well as sustainable.
- Weight of building – in order to minimise foundation costs and concrete volume, and help drive the building towards net zero carbon, a lightweight structure is recommended. In addition, minimising weight and therefore foundation sizes will mitigate any potential impact on the adjacent Eldon street retaining wall.

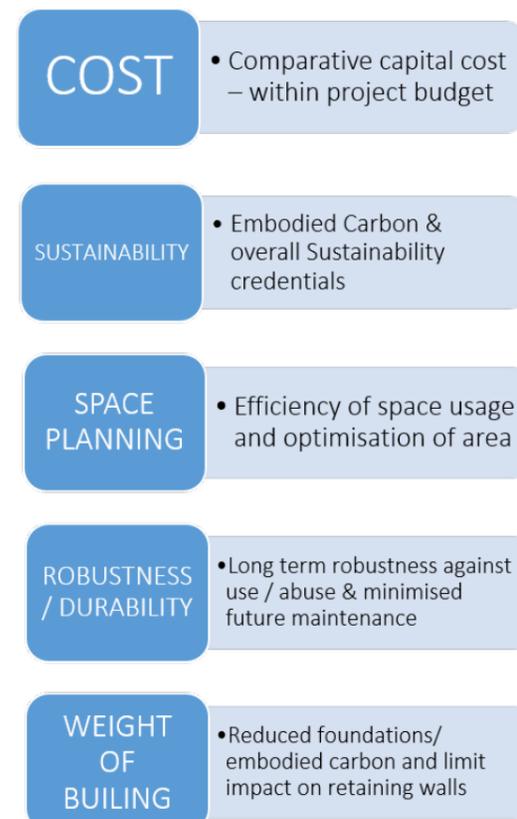


Figure 5.2: Key Design Criteria

In addition the above, the following aspects have been considered to date and should be addressed as any ongoing design progressed:-



Figure 5.3: Further Design Considerations

5.2 Site Constraints

5.2.1 Topography

In the location of the ATH, the existing site is relatively flat, having been re-profiled in order to accommodate its current usage as an external car park. It is anticipated that minimal level changes will be needed to ensure existing adjacent ground levels and tie-ins can be achieved.

5.2.2 Eldon Street Retaining Wall

The Eldon Street retaining wall varies between approximately 2 metres at its smallest to circa 9 metres at the interface with the Network rail bridge, approximately midway along the eastern Phase 1 site boundary. The exact construction of the wall is not known, although site observations indicate stone facing with anchors/nails at the deepest points to assist stability. A full geotechnical and physical survey is to be undertaken in order to model the wall and the influence of any development behind. At this stage, an exclusion zone is proposed to mitigate any detrimental impact on the wall from the Phase 1 development. This is to be validated and adjusted following detailed modelling.

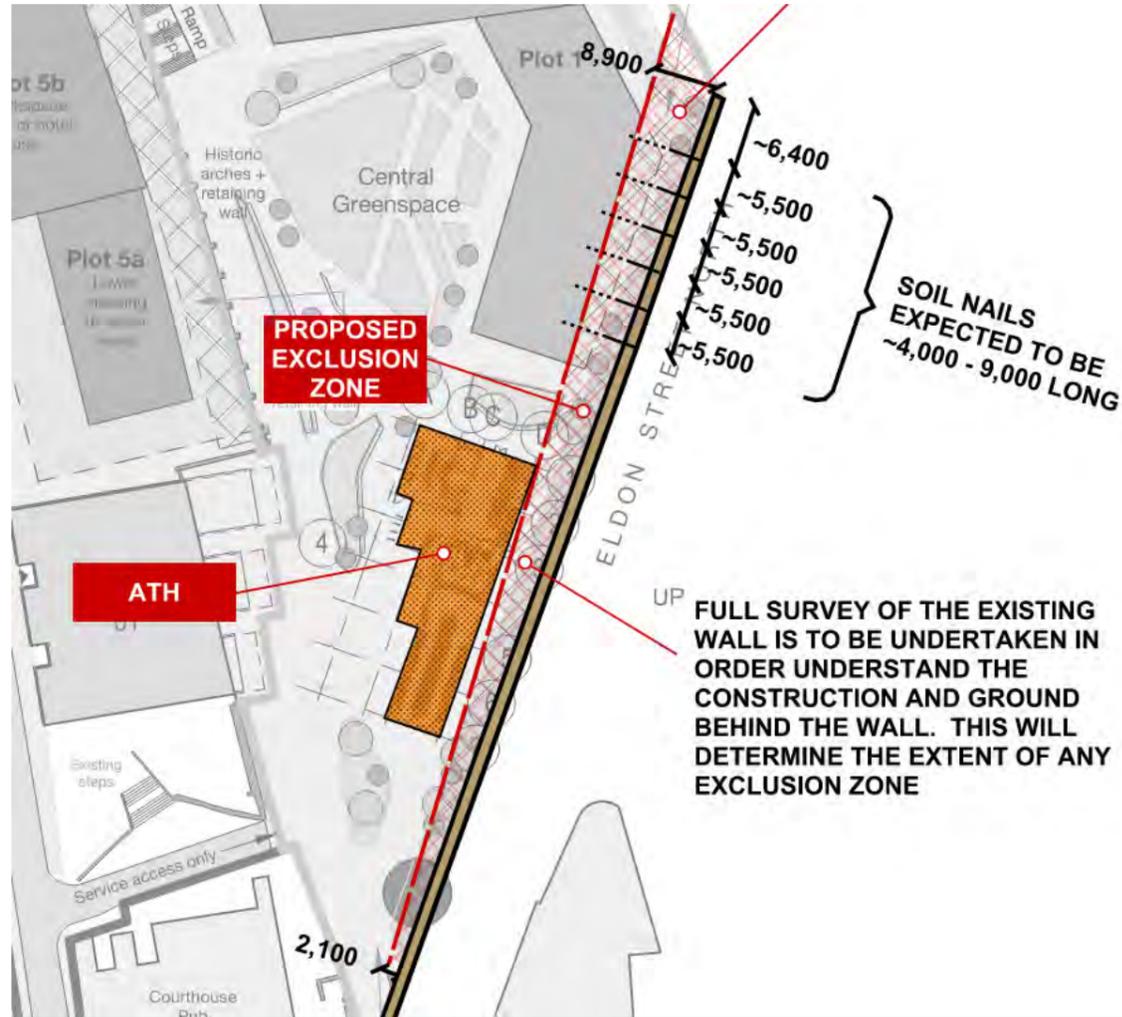


Figure 5.2: Eldon Street retaining wall exclusion zone and ATH location



Figure 5.1: Eldon Street Retaining Wall

5.2.3 Site History

Whilst as full Phase I Site investigation is still awaited, historical maps indicate that the site has had two primary uses namely:-

- railways,
- carpark (as current)

As a previously developed brownfield site, there is risk of made ground, contamination and site obstructions. To manage this risk a full Site Investigation is proposed as outlined in section 7.

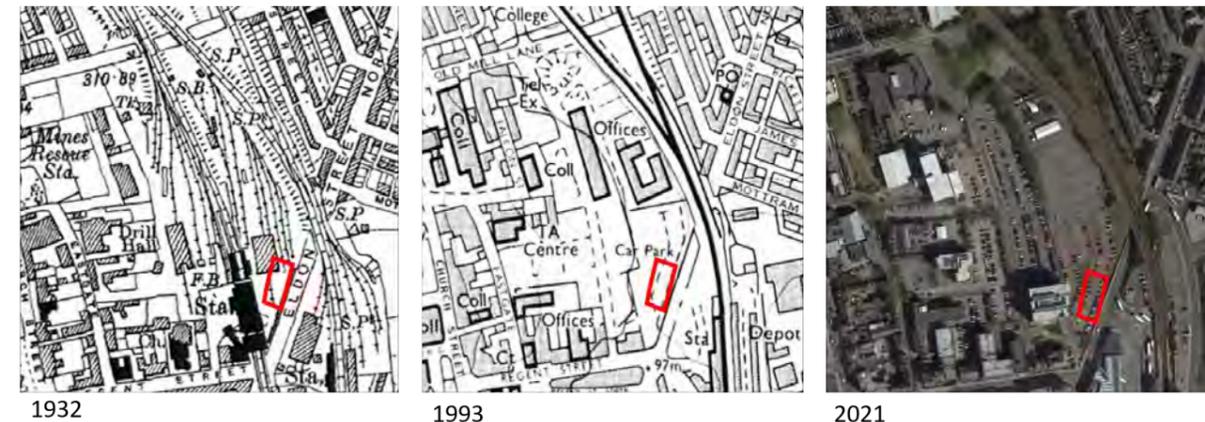


Figure 5.3: Site History

5.2.4 Coal Mining

Due to the presence of coal seams under part of Phase 1, consideration should be given to the potential that coal mining has occurred on or near to site. Following a detailed risk assessment, it is understood that the coal seams are located within or adjacent to the ATH footprint. As such this will be a primary geotechnical consideration and will need to be addressed following the additional site investigation planned

5.2.5 Ground Conditions

A full site investigation is needed to fully understand the ground conditions. This will include informing the foundations solutions for the building and external works as well as considering local contamination and potential ground gasses. BDP C&S have inputted into the scope for the comprehensive Site investigation. This includes investigation in relation to the ATH and the Eldon Street retaining wall. Reference should be made to section 7 for further information.



Figure 5.4: Coal outcrop in relation to the ATH

5.2.6 Existing services

There are a number of existing services currently indicated as crossing the ATH footprint. These will need to be abandoned (if feasible) and grubbed up; or diverted to facilitate the construction of the ATH. Reference should be made to the Utilities section for further details.

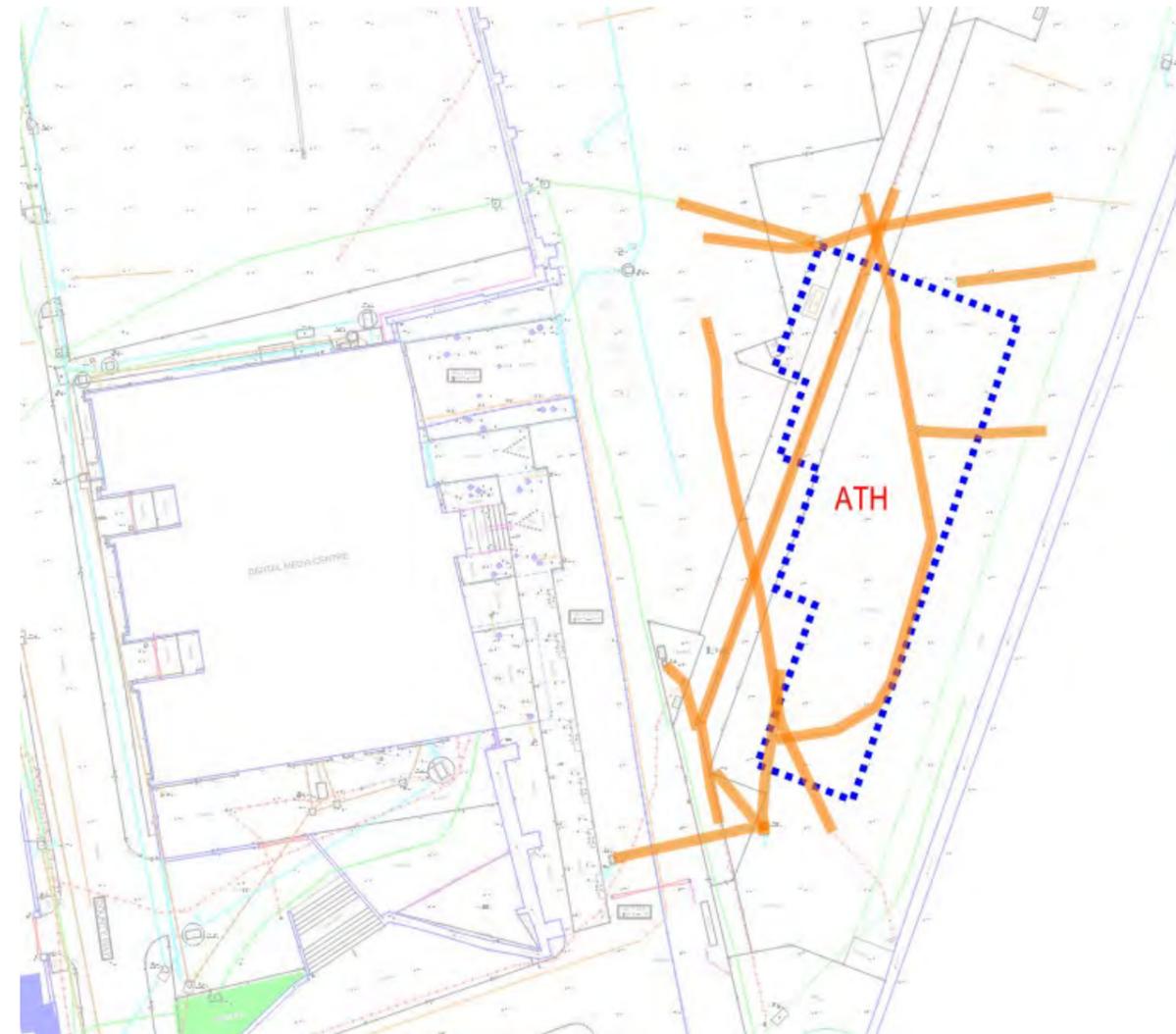


Figure 5.6: Existing services in ATH footprint

5.3 Structural Options

A number of different structural frame types have been explored during the Stage 2 design and are summarised below:

Timber Frame – Glulam beams & columns with CLT roof deck



Figure 5.7: Example of CLT deck with glulam frame structure

Timber Frame and Panel Systems – Glulam beams, SIPS walls & CLT roof deck



Figure 5.8: Example of SIPS construction with glulam beam

Hybrid Timber and Steel columns – Steel beams, steel columns & CLT roof deck



Figure 5.9: Example of a hybrid steel & CLT building

Steel – Steel beams, steel columns & steel roof deck



Figure 5.10: Example of a steel framed building with steel deck roof

5.4 Key Design Considerations

The following design aspects have been considered in the development of the options and have influenced the structural solutions.

Sustainability opportunity

As part of the brief for the scheme it is required that the structure will be a low to zero carbon building, and therefore it is expected that elements of the structure are chosen to minimise embodied carbon.

Therefore, given the size and scale of the building, timber has been identified as a preferable structural construction material. On a fundamental level, timber is an especially sustainable construction material since as a source material it sequesters carbon from the atmosphere, whereas traditional materials require energy to be expended (i.e. omission of carbon). Consequently, to achieve the brief of low to zero carbon the use of timber is sought to be maximised.

Prefabrication



Figure 5.11: Example of a type of prefabricated element construction

By simplifying the construction using prefabrication, the structure can be made more efficiently and quickly and to a higher degree of workmanship than via traditional methods. By maximising prefabrication, wastage is reduced and the construction programme can be shortened which may bring project and commercial benefits.

Traditionally steel, glulam & CLT structures would require off-site pre-fabrication before transport to site and erection, however panellised forms of construction which may be load bearing or non-load bearing could also be utilised (in the form of Structurally Insulated Panels (SIPS), which would in turn bring project benefits.

Architectural Requirements - Column Grid/clear spans/exposed columns/exposed structure
Coordination with the Architectural team has been undertaken to determine some key principles for the structural form of the building.

A column grid of 8.0m x 7.0m was established for the main 'blocks' of the building, which provided the basis of the structural layout of columns. The roof beam layout split the bay into two spans of 3.5m long, with 8.0m long secondary beams. By providing columns on the grid above, columns were avoided in all rooms within the building.

On the west elevation of the building, exposed external columns set 500mm away from the curtain wall of the café was requested to enhance the aesthetic of the building on its most visible elevation.

Internally, it was requested that the finish of the structure was considered since the soffits of the roof structure would be exposed. The provision of a CLT deck is considered the most desirable roof construction, however a steel deck is a viable alternative.



Figure 5.12: Typical structural arrangement at roof level

Green & Blue Roof

In order to improve the sustainability and urban greening of the scheme it is proposed that the building include for an allowance of a sedum roof build-up along with a blue roof storage system. Whilst this comes at the cost of an increase in self-weight, and thus increase in structural material to compensate, it is deemed the most appropriate solution to the project requirements.

PVs

In addition to the requirement for a green & blue roof build up, the provision of PVs is also considered in the Stage 2 design. The provision of PV panels on the roof seeks to meet the objective of the low to zero carbon building set out in the brief.

5.5 Substructure

Given the scale of the building, relatively low loads are expected at the base of structural columns and around the perimeter of the building.

However, at the time of completing the Stage 2 design no factual information from a Phase 2 Geoenvironmental Report is available for the ground. Nevertheless, what information is known about the ground in the vicinity of the building suggests that there is a layer of Made Ground 1-2m deep and the strata beneath may be relatively weak.

Therefore, it has been determined that an allowance for piled foundations should be made at this stage (400dia piles 8m long, 2no. per structural column). Upon completion of the Phase 2 GI report, combined with updated structural designs, this approach can be reconsidered.

Consideration should also be given to the adjacent retaining wall on Eldon Street, for with intrusive investigations are also outstanding, the results of which will enable modelling of the wall which will in turn determine the extent of any limitations on foundations (and their construction) provided for the ATH building.

5.6 Preferred Structural Solution

In order to maximise the sustainability potential of this building, and drive it towards Net Zero Carbon, we recommend a hybrid timber and steel solution. The roof would be constructed utilising glulam beams and CLT roof slab, supported by steel columns. This ensures the lower elements of structure are robust and can be readily protected from fire. We appreciate that this may be a more expensive form of construction in order to gain the clear sustainable benefits. We have therefore provided a cheaper fully steelwork option for cost comparison purposes.

5.6.1 Next Steps

At the next design stage the structural solutions can be refined following completion of the following planned activities:

- Phase 2 GI Report
- Intrusive SI to the Eldon Street retaining wall
- Subsequent modelling to the Eldon Street retaining wall
- Cost review of the various structural options

Further development of the architectural proposals, as well as development from the various cost options, will enable the structural solution to be refined and a revised solution will be produced accordingly.

5.7 Basis of Design

5.7.1 Design Standards

The following section outlines the minimum standards and criteria used to develop the Civil and Structural design proposals and will form the basis of future design. This section is subject to ongoing development as more data is gathered and more specific design detail is developed.

Structural Engineering:-

- Eurocode 1: Actions on structures – Part 1-1: General actions – Densities, self-weight and imposed loads
- Eurocode 1: Actions on structures – Part 1-2: General actions – Actions on structures exposed to fire
- Eurocode 1: Actions on structures – Part 1-3: General actions – Snow loads
- Eurocode 1: Actions on structures – Part 1-4: General actions – Wind actions
- Eurocode 1: Actions on structures – Part 1-5: General actions – Thermal actions
- Eurocode 1: Actions on structures – Part 1-6: General actions – Actions during execution
- Eurocode 1: Actions on structures – Part 1-7: General actions – Accidental actions
- Eurocode 2: Design of concrete structures – Part 1-1: General – Common rules for building and civil engineering structures
- Eurocode 2: Design of concrete structures – Part 1-2: General – Structural fire design
- Eurocode 3: Design of steel structures – Part 1-1: General – Common rules for building and civil engineering structures
- Eurocode 7: Geotechnical design – Part 1

Civil Engineering:-

- Building Regulations Approved documents Part H – Drainage and waste disposal
- BS EN 752 – Drain and sewer systems outside buildings
- BRE 365 – Soak away design
- Interim code of practice for sustainable drainage systems
- PPS25 – Development and flood risk
- Sewer for Adoption 6th Edition
- The SuDS Manual – Good practice guide to sustainable drainage
- BS 594987 – Asphalt for roads and other paved areas
- BS 7533 – Pavements constructed with clay, natural stone or concrete pavers
- Design Manual for Roads and Bridges Volume 6 – Road Geometry
- Design Manual for Roads and Bridges Volume 7 – Pavement Design and Maintenance
- London wide Asphalt Specification
- MCDHW – Specification for highway works

5.7.2 Design Loadings

All building design loads shall comply with the requirements of BS6399: pts 1 to 3, except where specific loading requirement information is provided.

Any areas subject to vehicle loading will be subject to the loading requirements of BS 5400.

5.7.2.1 Imposed (Occupancy) Loading Requirements

All loads are in accordance with BS6399 pt 1, subject to the following minimum loadings and will be combined as necessary to give the most severe effect:

ATH

Area Usage	Minimum Distributed Load (kN/m ²)	Minimum Point Load
(kN)	4.0	3.2
General retail, toilets	4.0	3.2
Storage	5.0	4.5
Flat Roof, maintenance access only	0.6	0.9

5.7.2.2 Dead (permanent) Loads

Self weight loads of building elements and components are calculated in accordance with BS 648 'Schedule of Weights for Building materials' or the product supplier specified loads are used.

Self weight Loads

Dead Loads calculated have assumed the following material densities:

Concrete (Normal weight)	24 kN/m ³
Steel	78.5 kN/m ³
Concrete Block Walls*	20 kN/m ³
Timber (assume hardwood)	7 kN/m ³

*Assumes normal weight blocks

5.7.2.3 Superimposed Dead Loads

In addition to the self weight loads, the structures will be subject to a superimposed dead loading, i.e. permanent loads applied after the structure has been built. Allowances for these are listed below (final loading values subject to adopted floor and wall finishes, service requirements etc):

Car Park/Retail

Superimposed Load Type	Allowance (kN/m ²)	Comments
Floor Finishes	1.2	On plan – retail areas
Green & Blue Roof	3.4	On plan, roof only
Services & Ceilings	0.30	On plan
Curtain Wall Glazing	1.5	On Elevation
Lightweight Cladding	1.0	On Elevation

The above list and loading allowances will be expanded once the cladding and finishes strategy is progressed.

5.7.2.4 Wind Loadings

Wind loads for both overall building stability and localised cladding design shall be calculated in accordance with BS 6399 pt 2. In accordance with BS 6399 pt 2 Foreword, the provided CP3 Basic Wind Speed is converted to a usable BS value by dividing by the Terrain and Building Factor (S_b). Therefore, the following wind loading criteria is adopted:

Superimposed Load Type	Allowance (kN/m ²)	Comments
Floor Finishes	1.2	On plan – retail areas
Green & Blue Roof	3.4	On plan, roof only
Services & Ceilings	0.30	On plan
Curtain Wall Glazing	1.5	On Elevation
Lightweight Cladding	1.0	On Elevation

5.7.2.5 Notional Loads

Notional horizontal loads will be used where they exceed either wind or seismic loading and will be derived and applied in accordance with the parameters of BS8110 pt 1 and BS5950 pt 1 as applicable:

Steel Structures NHL =

0.5% of factored vertical Dead and Imposed loads

Concrete Structures NHL =

1.5% of total characteristic Dead load

5.7.2.6 Construction Loads

Within the design, an allowance for construction loading will be made. Temporary or permanent construction loads will be incorporated into the design as necessary, dependant on the final construction type.

An assessment of any locked in stresses generated from the construction methodology and temporary activities will be incorporated into the design as well as the associated permanent deflections.

5.2.7.7 Load Combinations

Load combinations will be applied in accordance with the relevant design code so as to ensure the most adverse loading conditions for design. The following (minimum) loading conditions will apply:

Superimposed Load Type	Permanent Actions		Leading Variable Action	Accompanying Variable Actions
	Unfavourable	Favourable		
Expression 2.2 in IStructE Manual to EC1	1.35 G _{k,j}	1.00 G _{k,j}	1.50 Q _{k,1}	1.50 ψ Q _{k,j}
Notes				
A) This table assumes low variability in G _k , and therefore that G _{k,sup} and G _{k,inf} need not be used B) The single source principle applies in this case. Therefore the characteristic values of all permanent actions from one source are multiplied by 1.35 if the total resulting action effect is unfavourable; 1.00 if the total resulting action effect is favourable. All actions originating from the self-weight of the structure may be considered as coming from one source; this also applies if different materials are involved.				

5.7.3 Thermal Effects

Temperature changes within the structural elements will result in both thermal movement and deformations. All temperature effects will be incorporated into the design including those related to seasonal climatic variations, day/night variations, internal/external variations and variation due to differing exposures to sunlight.

Absolute movements due to temperature changes will be incorporated into the design of building movement joints, acting in suitable combination with other effects including wind, seismic, shrinkage, expansion and creep.

There are two scenarios that will be required to be considered for thermal effects. During construction stage, structural steelwork will be exposed and should be designed for a temperature range between -15C to 60C to allow for frost, wind chill and direct solar gain. Internally, in the permanent state of the structure, temperature ranges will be advised by MEP.

5.7.4 Deflection, Vibration and Settlement Criteria

5.7.4.1 Gravity Loading

The limiting design deflections of structural elements are all in accordance with the relevant Eurocodes. More specifically these are tabulated as follows:

Element	Dead Load Deflection	Imposed Load Deflection
Roof Beams - Perimeter	Span/360	Span/500
Roof Beams	Span/200	Span/360

Absolute dead deflections within projector rooms is to be 5mm

Relative differential live load deflections shall be limited to 10mm on perimeter beams and 25mm on internal beams and slabs

A 25mm deflection head detail is recommended to the head of all non load bearing internal partitions where they meet the soffit of a floor slab or a supporting beam.

5.7.4.2 Building Sway

The following maximum horizontal building movements will apply:

Wind/NHL	H/500 (total)
	H/300 (inter storey drift)

5.7.4.3 Foundation Settlement Criteria

Any foundation element will be designed to ensure the following maximum settlements are achieved:

Maximum total long term settlement under main foundations = 20mm

5.7.5 Design Life and Durability

The durability of structural elements, both internal and external, will provide a minimum design life of 50 years with minimal maintenance.

This will be achieved by the following means:

Concrete foundations:

Consistent quality concrete, appropriate cover to steel reinforcement and suitable protection to potential aggressive ground conditions. It is critical, particularly for external concrete, that the correct cover to reinforcement is achieved. The site inspection team will be instructed to pay particular attention to reinforcement cover.

Structural steelwork:

Internally exposed steelwork – Intumescent paint to achieve a minimum of 1 hour fire rating with decorative top coat.

Internally concealed and protected steelwork – primer finish only and fire protected via boxing out with fireboard

Protected steelwork within cavities – high build primer

Externally exposed secondary steelwork in car park (no fire protection requirements – galvanised or painted finish

External exposed steelwork in car park (visible) – high build primer and decorative top coat, or galvanised finish and decorative top coat in areas which may be exposed to the more severe weather and climatic conditions

Paint finishes generally will be specified which provide a period to first maintenance of 20 years for accessible elements and 50 years for inaccessible elements.

5.7.6 Fire Protection

At this stage, it is assumed that the following methods of Fire Protection will be applicable (subject to the Fire Strategy) to achieve a minimum 1 hr fire rating:

Exposed Steelwork elements – Intumescent Paint

Concealed Steelwork elements – Fire resistant board / intumescent paint / cementitious spray.

Timber – designed for inherent fire protection by provision of charring depth

5.7.7 Robustness

In addition to designing the building with due regard to economy and safety, and a structure capable of fulfilling its intended function over its intended life, the design will also take into account the additional consideration of disproportionate collapse. This is a national Building Regulations requirement within the UK.

The requirements are such that, the structure is required to be sufficiently robust and adequately tied together, such that if an element were to fail (e.g. a beam or column) due to some form of accidental loading (e.g. vehicle impact or gas explosion) that the resulting damage is neither disproportionate to the cause nor does it lead to progressive failure of significant elements of the structure.

In order to design a building to avoid disproportionate collapse, certain members may be required to be designed as 'key elements'. For a member to be considered as a key element an assessment must be made as to the portion of the building at risk of collapse if this member was notionally 'removed' from the building. If this portion of collapse is considered to be substantial then it should be designed as a key element for the accidental loading specified in BS 6399-1. Key elements will be identified within the final calculations but essentially will comprise of stanchions or structural elements supporting either 15% of the floor area or 70 sqm and two or more sequential levels.

Alternatively, if key element design is not appropriate, then the structure is required to be sufficiently tied – i.e. all beam to column, beam to beam and column to column connections to be capable of resisting a notional additional force.

The building structure is to be designed taking into account the relevant guidance contained within the Eurocodes.

5.7.8 Material Specification

The following minimum material specifications will be adopted in the design of the substructure and superstructure elements:

5.7.8.1 Concrete

The following minimum concrete specification is assumed, subject to SI results and further design development:

Concrete Grade	-	32/40
Aggregate size	-	20mm
Cover	-	50mm
Foundations	-	25mm Slabs

Below Slab Membrane

Further to information gathered from early site investigations and the industrial history of the site, it is envisaged that the land may be contaminated and it therefore proposed that an allowance for 1200g gas proof membrane should be made for below the slab at this stage of design.

5.7.8.2 Steel

The following typical steelwork specification is assumed:

Steel Grade	-	S355
Bolts	-	8.8 Grade
Welds	-	Min. 6mm

Protection

Suitable protection, in accordance with the environmental condition and the position within the building, will be applied to structural steelwork (see 3.6 for protection summary)

5.7.9 Construction Health and Safety

During the conception and design of the structural elements, due consideration will be given to required construction techniques and process to ensure that all parts of the structures can be erected in a safe manner. Furthermore, the design will ensure that inherent risk, either during the construction or working life of the building, is minimised and design out.

The maximisation of prefabrication and incorporation of standardisation and construction techniques will inherently minimise site risk. In instances where significant or unusual construction risks remain, these will be highlighted accordingly.

5.7.10 Spatial Coordination

response, location and size of structure. This includes ensuring that the architectural spatial and aesthetic requirements are met and the coordinated integration of services throughout the building, with the structural design appropriate to the servicing requirements and loading.

5.7.11 Acoustics

The acoustic requirements of the buildings will influence the structural materials and principles that are adopted.

Given the multiple uses of the building, consideration for acoustic separation should be made to ensure sound does not travel to adjoining spaces.

6.0 Drainage

The area proposed for the development of the Active Travel Hub (ATH) is currently utilised as an existing car park. A GPR Survey undertaken by 1st Horizon in January 2018 confirmed this area to be positively drained with surface water runoff assumed to discharge into the public surface water sewer on Eldon Street via a large backdrop. No foul water connections are currently located in the vicinity of the proposed development.

The ATH forms part of the development proposals for Phase 1 and therefore any drainage associated with the ATH will connect into the main infrastructure design proposed for Phase 1.

The outline drainage strategy proposes for surface water runoff from the ATH to be primarily attenuated at source through the provision of a green roof. Any excess runoff from the roof will be drained via rainwater pipes to a new below ground surface water drainage network, connecting into the proposed Phase 1 surface water drainage infrastructure downstream. Runoff from this development will ultimately discharge into the public surface water sewer on Old Mill Lane, subject to approval from Yorkshire Water.

Additional attenuation for the ATH will be provided within the SuDS features located within the public realm area, which will be designed to accommodate runoff up to the 1 in 100 year plus 40% climate change event.

Foul water flows from the proposed WCs are to be directed into a new foul water drainage network, designed to serve Phase 1. Flows are proposed to be discharged into the public combined sewer on Old Mill Lane, subject to approval from YW.



Figure 6.1: Bauder Green Roof_ Sharrow School



Figure 6.2: Bauder Green Roof & PV_Clapham Park

7.0 Geotechnical

7.1 Introduction

7.1.1 Stage 2 Brief

The team was tasked with assessing the existing information relating to ground conditions at the site, to identify potential geo-environmental and geotechnical development constraints and data gaps. The findings have informed the scoping of and detailed specification for supplementary site investigations and surveys to inform the future stages of design. The main deliverable of this work (at Stage 2 Design) is a fully costed/ tendered package of ground investigation (GI) and structural investigation and measured surveys of the existing retaining walls.

7.1.2 Scope of Work

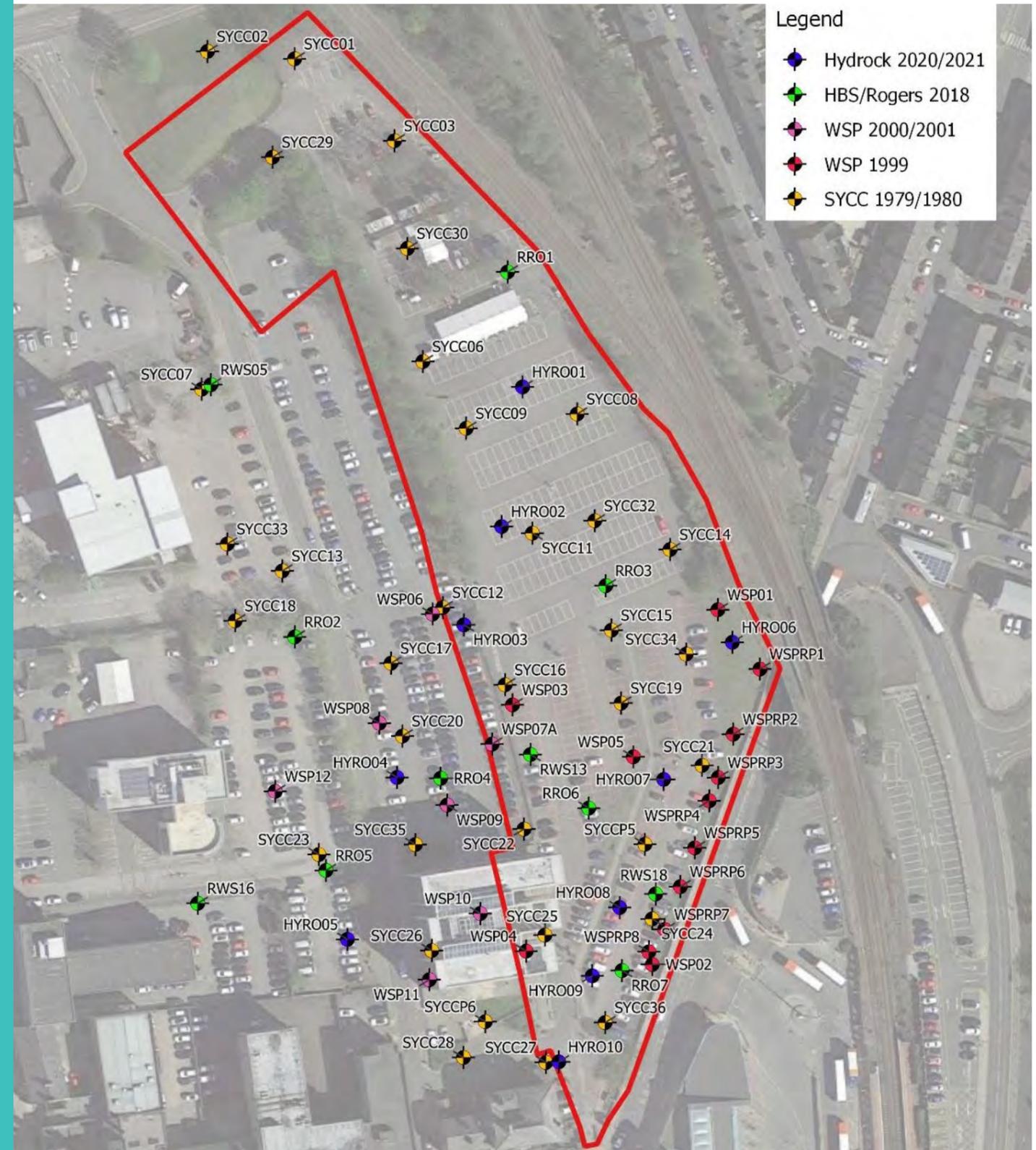
The following scope of work has been completed:

- Review of third-party reports made available by the client;
- Review of readily available online resources including Google Earth, British Geological Survey (BGS) GeoIndex, and the Coal Authority's interactive web viewer;
- Identified data gaps and potential constraints to be investigated through supplementary surveys;
- Developed a scope and written specification of supplementary GI for the whole of the red line site area.

7.1.3 Documents Reviewed

Several phases of ground investigation have previously been undertaken at the site. These are detailed in the following reports which have been made available to for review:

- Ground Investigation Report, Courthouse Leisure Scheme, Barnsley, prepared for The Barnsley Miller Partnership. WSP Environmental, ref: 90913LE, November 1999.
- Report on a Site Investigation, Courthouse Leisure Scheme, Barnsley, prepared for The Barnsley Miller Partnership. WSP Environmental, ref: 21108LE, January 2001.
- Preliminary Land Contamination and Geotechnical Risk Assessment, Courthouse Redevelopment Barnsley, prepared for Barnsley Metropolitan Borough Council. Hamson Barron Smith, ref: 23-24-18-1-6011/DSR1, October 2017.
- Ground Investigation Report, Courthouse Redevelopment Barnsley, prepared for Barnsley Metropolitan Borough Council. Hamson Barron Smith, ref: 23-24-18-1-6011/GIR1, June 2018.
- Review of existing documentation at the Courthouse Campus site, Barnsley, prepared for BDP. Hydrock, ref: 15398-GNST-HYD-TDN-001, August 2020.



7.2 Previous Work

7.2.1 Investigation Techniques

In summary, previous investigations have comprised:

- The formation of cable percussion boreholes to depths up to ~10m bgl;
- Rotary boreholes to depths up to 30m bgl;
- Windowless sample boreholes to a maximum depths of 3.45m bgl;
- Dynamic probe holes adjacent to selected boreholes;
- Machine excavated trial pits to establish foundations of the retaining wall along the western site boundary;
- Limited geotechnical laboratory analysis on soils.
- Soil chemical laboratory testing (general suites of contaminants appropriate to the site present and past uses/brownfield nature);
- Ground gas monitoring.

7.2.2 General Ground Conditions

Recorded ground conditions comprised Made Ground of varying thickness between approximately 1 and 8m. The thinnest Made Ground is generally in the south of the site with the thickest deposits in the central and eastern areas of the site. A “wedge” of Made Ground backfill is also present behind the Eldon Street North retaining wall up to ~7m thick.

Made Ground was variably described as:

- Medium dense fine to coarse angular sandstone gravel.
- Loose to medium dense clayey sandy fine to medium gravel, interbedded locally with soft to firm gravelly clay
- Firm to stiff clay with mudstone and sandstone gravel.

The Pennine Middle Coal Measures lie directly beneath the Made Ground deposits. The upper layer of weathered rock comprises firm to stiff slightly gravelly, silty, clay between ~0.5 and 6.5m in thickness. Underlying solid strata generally comprised sandstone (Kent's Rock) bedrock to the north, and mudstone and siltstone across the central and southern site areas.

A band of dull black coal, 0.6m thick, was recorded in several boreholes along the southern end of the Eldon Street North Retaining wall at depths of between 3 and 5m bgl. Voids were recorded in four borehole locations on the site, at depths of between 12.60 and 22.40mbgl.

Resting groundwater was recorded in only two locations at around 2.5m, all other exploratory holes remained dry.

7.2.3 Coal Mining

Evidence of potential mine workings were recorded in three boreholes drilled behind the Eldon Street North

retaining wall. A loss of flush within soft or broken ground was recorded at a depth of 12.2m bgl in the northernmost borehole along the retaining wall, and at around 19m bgl further south along the retaining wall.

Within all of the previous investigation data, Hydrock did not identify any particular boreholes where voids were encountered with insufficient competent material above the void to prevent potential void migration and collapse at the surface. However, coal seams present close to rockhead may impact on the design of piled foundations.

7.2.4 Contamination

No obvious visual/olfactory evidence of soil or groundwater contamination was noted in previous investigations. Based on the historical dataset of chemical test results, the overall environmental risk is considered generally low, however certain mitigation measures may need to be implemented during development to protect end-users including potentially barrier pipe for new potable water supplies and importation of clean topsoil for landscaping.

7.2.5 Ground Gas

Only limited ground gas monitoring has been undertaken however the monitoring recorded low concentrations of carbon dioxide (<1.7%v/v) and no elevated concentrations of methane or detectable flow rates. It has been concluded that the site is likely not significantly affected by ground gas, however further development specific monitoring would be required to satisfy guidelines and planning.

7.2.6 Retaining Walls

Very limited investigation into the existing retaining walls has been undertaken. Only two foundation pits were carried out along the base of the retaining wall to the west of the site (former railway arches). One uncovered a sandstone foundation bearing on clay strata at 1.15m bgl, however the second pit was not able to excavate to the base of the foundation.

Behind the Eldon Street North retaining wall Made Ground was found to approach a thickness of 7m to the north, reducing to 2m towards the southern end, comprising a “wedge” of mudstone fill material. Two of the rotary holes encountered mortared brickwork to around 7m bgl indicative of a buttressed type retaining wall design.

7.3 Data Gap Analysis

The key data gaps which have informed the scope of supplementary investigations are presented in the following table:

Made Ground	Limited in-situ strength information available. Additional data required to support design of floor slabs, roads & pavement, and assessment of potential for ground improvement/earthworks if required (e.g. to support shallow foundations).
Shallow Founding Strata	The characteristics of any natural deposits (weathered strata) above rock head have not been well defined. These are important for the exploration of shallow foundation options and ground-bearing floor slabs.
Deep Founding Strata	The strength profile and rock quality/condition has not been suitably investigated beneath proposed building to date. Such data is required to support deep foundation/pile design in the future.
Coal Mining / Underground Workings	There is some evidence of voids/potential workings beneath the site however these are currently thought to be at depths which will not significantly affect or require stabilisation to permit development of the site. Notwithstanding this, weak coal seams may be present near the top of the bedrock and therefore further investigation and characterisation of this is required for foundation design.
Soakaway drainage	Soakaway testing is required to determine whether soakaway drainage of surface water will be feasible and if so the design infiltration rates.
Gas Monitoring	A complete programme of development-specific ground gas monitoring is required to support future planning applications.
Supplemental Chemical Testing	Supplemental chemical testing and analysis should be undertaken as part of future investigations to provide additional confidence in the condition of the site soils and the level of risk posed to the development and end-users.
Retaining Wall Structure and Stability	Very limited investigation into the structure and stability of the retaining walls has been undertaken to date. To allow geotechnical stability analyses to be undertaken in the future design, data is required on the construction of the wall (materials & geometry) and the foundation/supporting and backfill/retained soils. The Eldon Street North wall is also constructed with soil nails at its northern end - the length of which are currently unknown.

7.4 GI Survey Scope & Specifications

A Site Investigation Specification (Arcadis document ref: 10052406-ARC-XX-XX-SP-GE-0001-01, full copy attached in Appendix G) has been produced. In summary the scope includes:

- 12no cable percussive boreholes to bedrock / refusal (anticipated depths given in Table 1). Boreholes are to be located to target the potential footprints of the proposed development plots, or to investigate retaining wall fill. All boreholes include in-situ Standard Penetration Tests (SPTs) at regular depth intervals.
- Rotary core follow-on within 10no of the above boreholes to prove 12m of competent solid strata. Rock cores are to be logged and core sub-samples for testing shall be chosen in consultation with the investigation supervisor.
- 10no dynamic windowless sample boreholes, to target depths of 5mbgl.
- Monitoring well installations in selected boreholes;
- 4no trial pits are to be formed by saw cutting and mechanical excavation to a depth of 2m bgl to allow BRE365 full soakaway tests to be undertaken. CBR testing is also required in these four locations, beneath the existing subbase to provide design CBR values.
- 2no mechanically excavated trial pits to be formed to a target depth of 3m bgl behind the Eldon Street North retaining wall.
- 2no hand-excavated pits to investigate the foundations at the base of the County Way car park retaining wall.
- 2no pits to be formed by vacuum excavation to investigate the foundations at the base of the Eldon Street North retaining wall.
- Comprehensive soil sampling schedule for geotechnical and environmental laboratory analysis.
- Comprehensive suites of geotechnical and geo-chemical laboratory testing and analysis.
- 6no rounds of ground gas and groundwater monitoring.

In addition, a GPR survey is to be undertaken along the area at the back of the Eldon Street North retaining wall with the objective of identifying any buttresses or buttress-like features which are part of the wall construction. It is also proposed to investigate the length of the existing soil nails which extend back into the site from the face of the Eldon Street North wall. These must be investigated in a non-destructive way ruling out intrusive investigation and it is therefore proposed to use geophysical techniques to attempt to map the length and positions of the soil nails.

7.5 Retaining Wall Survey Works

A scope and specification for retaining wall surveys was also produced (BDP document ref SEAM-BDP-ZZ-SP-S-0001, full copy attached in Appendix G). In summary the scope includes:

- Measured survey of both retaining walls;
- Photographic record of the entire elevations of both retaining walls; and
- Drill tests & cores on both retaining walls to determine thicknesses and composition of the retaining wall structure.

7.6 Tender and Commission of Investigations & Surveys

The tender process has been completed as part of Stage 2 design. The selected contractor is set to be appointed during February 2022 with a 1- week programme (from instruction to issue of factual report) with follow-on period of 7 weeks to complete the ground gas monitoring programme.

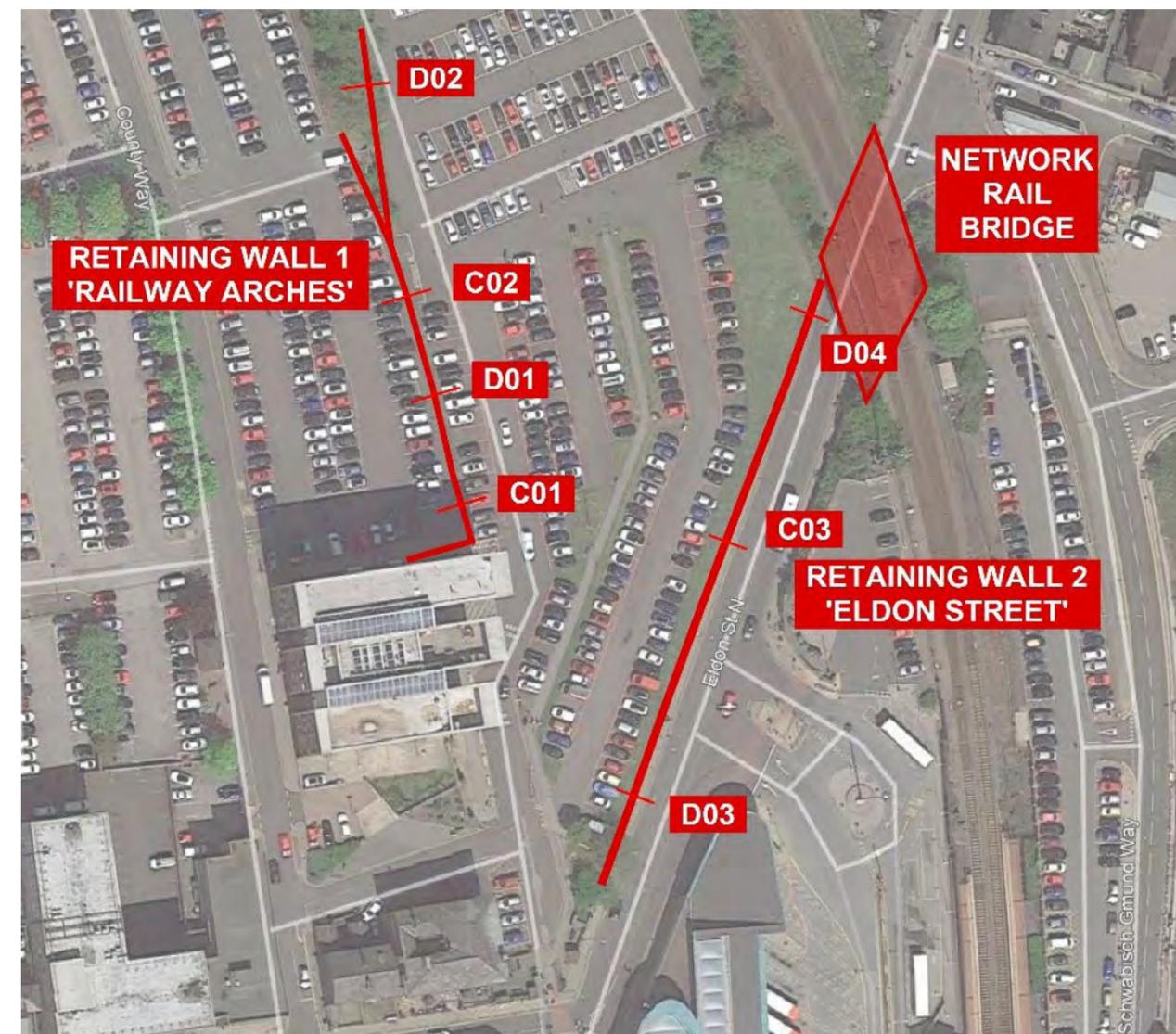


Figure 7.2: Proposed retaining walls survey extents and core ("C") and drill ("D") locations.

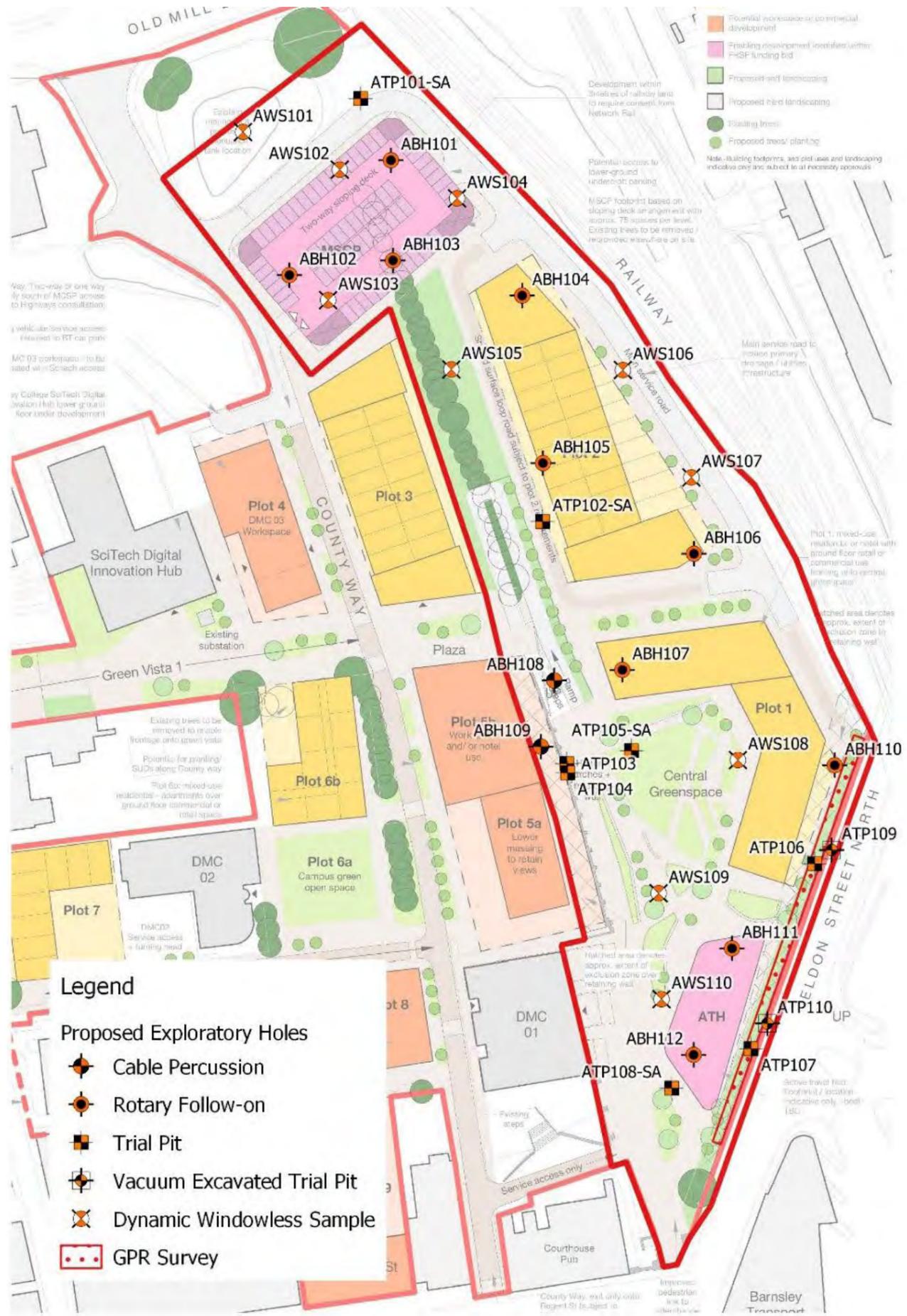


Figure 7.3: Proposed site investigation exploratory hole locations shown in relation to proposed development (conceptual design)

8.0 Building Services Engineering

8.1 The Building Services Engineering Strategy

8.1.1 Introduction

The energy strategy for the ATH uses the following energy hierarchy:

- Use Less Energy (Be Lean)
- Supply Energy Efficiently (Be Clean)
- Use Renewable Energy (Be Green)
- Monitor Energy Consumption (Be Seen)

Specifically the building services engineering design uses the following strategies:

- use the most onerous envelope performance as is commercially available at construction.
- construct with the minimum air permeability, be mechanically ventilated, with appropriately sized and shaded windows.
- Mechanically ventilate generally, with openable windows as required.
- Efficient building engineering systems with heat recovery where possible to minimise resource consumption and pollution.
- To reduce wasted energy and water wherever feasibly possible.
- Use renewable energy sources wherever practical.

All engineering equipment will be installed in secure locations, with secure and easy access for operation, maintenance and replacement.

8.2 Mechanical Engineering Strategy

The mechanical engineering strategy is to provide safe and healthy environment for those working and using the ATH as energy efficiently as practical,

8.2.1 Mechanical Design Criteria

The proposed Stage 2 Concept MEP design for the MSCP is based and follows the requirements, guidelines and recommendations in the following documents:

The following Design Standards are to be followed:

Building Regulation Approved Document B – Fire Safety
 Building Regulation Approved Document F - Ventilation
 Building Regulation Approved Document L – Conservation of Fuel and Power

Relevant CIBSE Technical Memoranda including:

CIBSE Guide A: Environmental Design

CIBSE Guide B: Heating, Ventilation Air Conditioning and Refrigeration

Relevant BSRIA Guides

British standards, including: BS 6700, BS 9251, BS9999, BS5041

The design will be in line with all the relevant British Standards and EN documents. Where existing, BSRIA guides and industry good practice recommendations are to be followed.

Expected Life Time of Equipment,

- | | |
|--------------------------------|----------|
| • Heat Pumps | 20 years |
| • Air Handling Units | 20 years |
| • Heat Emitters | 30 years |
| • Pumps | 20 years |
| • Pipework | 35 years |
| • Ductwork | 25 years |
| • Detectors, Actuators Sensors | 20 years |

8.2.2 Ventilation Strategy

The ventilation strategy is to provide comfortable healthy internal environment for those working and using the ATH. In line with the sustainability strategy where possible, natural ventilation has been proposed.

8.2.3 Internal conditions

For the ATH spaces' design criteria please see below table:

Building	Room	Ventilation Strategy			Internal Ambient Noise levels (NR)	Notes
		Natural Ventilation	Mechanical Ventilation	Smoke Ventilation		
ATH	Café	Windows	8 ACH	Windows /Doors	40	
	Retail	Windows	8 ACH	Windows /Doors	40	
	Workshop	Windows	10 ACH	Windows /Doors	45	
	Rental Bike Store	Windows	10 ACH	AOV	45	
	Toilets / Showers	N/A	10 ACH	Windows /Doors	40	
	Circulation and Lobbies	Windows	N/A	Windows /Doors	40	
	Internal Stores	N/A	4 ACH	Doors	45	
	Main Cycle Store	Louvred elevations	N/A	Louvred elevations	45	Minimum open free area = 5% floor area
	Internal Plantroom	N/A	6 ACH	Doors	45	Fully louvred on external wall
External Plantroom	Louvred elevations	N/A	Louvred elevations	45	Fully louvred on external wall	

Table 8.1, Ventilation Systems Design Criteria

8.2.4 Café Area

The Cafe will be either naturally or mechanically ventilated by a dedicated ceiling mounted supply and extract unit.

Generally the mechanical ventilation unit will run continually at low speed during the operational hours of the building. As the café has more customers the unit will increase in speed to maintain a comfortable environment as controlled by CO2 sensors. The returning exhaust air will pass through a heat exchanger warming the incoming outside air whenever needed, before supplying the toilets with warm filtered air. The air exhaust and intake louvres will be on two different elevations.

The staff can decide to open the windows or doors depending on the weather. The doors and windows will include contacts that will stop the mechanical ventilation operating.

If required, there will be a dedicated kitchen extract canopy that will be controlled by the staff. Whenever this is in use, the mechanical ventilation unit's extract fan will step back in speed to allow the kitchen canopy extract to be the lead unit.

8.2.5 Retail Area

The Retail area will be similarly ventilated as the café, and will be either naturally or mechanically ventilated by a dedicated ceiling mounted supply and extract unit.

Generally the mechanical ventilation unit will run continually at low speed during the operational hours of the building. As the retail has more customers the unit will increase in speed to maintain a comfortable environment as controlled by CO2 sensors. The returning exhaust air will pass through a heat exchanger warming the incoming outside air whenever needed, before supplying the toilets with warm filtered air.

The air exhaust and intake louvres will be on two different elevations.

The staff can decide to open the windows or doors depending on the weather. The doors and windows will include contacts that will stop the mechanical ventilation operating.

8.2.6 Workshop and Rental Bike Store

The workshop will be either naturally or mechanically ventilated by a dedicated ceiling mounted supply and extract unit.

Generally the mechanical ventilation unit will run continually

at 50% speed during the operational hours of the building, unless the staff manually push the unit to maximum speed whenever they want need the workshop to have increased ventilation. The returning exhaust air will pass through a heat exchanger warming the incoming outside air whenever needed, before supplying the toilets with warm filtered air.

The air exhaust and intake louvres will be on two different elevations.

The staff can decide to open the windows or doors depending on the weather. The doors and windows will include contacts that will stop the mechanical ventilation operating.

The workshop unit will also ventilate the rental bike store. The unit will ventilate the store continually, operating at low speed out of hours. The Rental Bike Store will include Automatic Opening Ventilation (AOV) panels in the external walls. The AOVs will fall open on a fire being detected in the store, as needed by the Fire Fighters.

8.2.7 Main Cycle Store

The Main Cycle Store will be naturally ventilated via the three open external elevations. A minimum free area of 1/20th of the floor area is required, and located to promote cross flow ventilation.

8.2.8 Stores

The stores will mechanically ventilated by a dedicated ceiling mounted supply and extract unit.

Generally the mechanical ventilation unit will run continually to ventilate the stores. The returning exhaust air will pass through a heat exchanger warming the incoming outside air whenever needed.

The air exhaust and intake louvres will be on two different elevations.

The same ventilation unit will also provide the supply air to the toilets and showers.

8.2.9 Toilets and Showers

The Public Toilets will be mechanically ventilated by twin extract fans will run continually at low speed during the operational hours of the building and will be boosted via presence detectors (PIR) whenever the any of the toilets or showers are in use before setting back to lower speed i.e. trickle ventilation.

The make up air will be provided by the stores' ventilation unit, as described above.

8.2.10 Plantrooms

The Internal Plantrooms will be mechanically ventilated with fans extracting the air out each plantroom and louvres allowing air from the adjacent areas to be drawn back in.

The external plantrooms will be fully louvred.

8.2.11 Circulation and Lobbies

The circulation corridors and lobbies will be naturally ventilated via openable windows.

8.2.12 Metering

The power to the ventilation equipment will be metered, with the metering connected to a BMS (Building Management System) or an Energy Management System. All meters and calculated values will be totalled and trended.

8.2.13 Outline Specification

Ventilation Units:

- Direct drive plug type with motor in the air stream
- Variable speed drive units
- Turndown to 10% without a drop in efficiency.
- Motors will be provided with thermistor over temperature protection.
- Provide cross plate heat exchangers with summer bypass.
- Provided with flexible connections to ductwork and be installed on isolation bases to prevent vibration transfer to structure.
- Duct mounted sound attenuators will be provided on both the supply and extract and on the atmospheric and on the room side of the air handling units.



Figure 8.1 MVHR Unit

Extract Fans:

- Duty/ Standby Fans as required.
- Direct drive plug type with motor in the air stream
- Variable speed drive units
- Turndown to 10% without a drop in efficiency.
- Motors will be provided with thermistor over temperature protection.
- Provided with flexible connections to ductwork and be installed on isolation bases to prevent vibration transfer to structure.
- Duct mounted sound attenuators will be provided on both the supply and extract and on the atmospheric and on the room side of the fans

Ductwork:

- Galvanized Sheet metal to HVCA DW/144, Class A.
- Thermal insulation on intake, supply, return air ductwork, and for 2m downstream of extract ductwork from final louvre connection.
- Thermal insulation to be metal mesh faced mineral wool mattresses and Mineral wool slabs insulation.
- Automated Fire Smoke Dampers (mode 6) mounted in the ductwork at all penetrations through fire compartment walls and floor slabs within the building.
- Cross Talk attenuators mounted in the ductwork between noise sensitive spaces and whenever the ductwork crosses an acoustically rated partition.
- VAV and CV and MCDs to be provided throughout the different ventilation systems for full automatic control of all areas served based on air quality, a space temperatures and occupancy.

8.3 Heating and Cooling

The heating and cooling strategy is minimised to be as energy efficient as possible, with only the necessary areas being heated or cooled.

Wherever heating and cooling is provided the design of the spaces will follow the sustainable strategy guidelines:

- The best U values possible for the walls, floor, ceiling, doors and windows.
- Windows will be include for solar control.
- The rooms will be of an air tight construction.
- Target <15kWhr/m2/yr of heating for the enclosed spaces.

8.3.1 Internal conditions

For the individual spaces design criteria please see below table:

Building	Room	Winter Design Temperature (°C) (min)	Cooling (Y/N)	Summer Design Temperature (°C) (max).	Relative Humidity (% r.h.)	Ventilation Strategy			Notes
						Natural Ventilation	Mechanical Ventilation	Smoke Ventilation	
ATH	Café	18	Y	24°C +/-1	UNCONTROLLED	Windows	8 ACH	Windows /Doors	
	Retail	18	Y	24°C +/-1	UNCONTROLLED	Windows	8 ACH	Windows /Doors	
	Workshop	18	N	N/A	N/A	Windows	10 ACH	Windows /Doors	
	Rental Bike Store	18	N	N/A	N/A	Windows	10 ACH	AOV	
	Toilets / Showers	18	N	N/A	N/A	N/A	10 ACH	Windows /Doors	
	Circulation and Lobbies	18	N	N/A	N/A	Windows	N/A	Windows /Doors	
	Internal Stores	16	N	N/A	N/A	N/A	4 ACH	Doors	
	Main Cycle Store	N/A	N	N/A	N/A	Louvred elevations	N/A	Louvred elevations	
	Internal Plantroom	16	N	N/A	N/A	N/A	6 ACH	Doors	
	External Plantroom	N/A	N	N/A	N/A	Louvred elevations	N/A	Louvred elevations	

Table 8.2, Heating and Cooling Systems Design Criteria

The Active Travel Hub will be served by an energy efficient Heat Pump which will provide the heating and cooling. The Heat Pump will be located in a louvred compound integral with the building. The hybrid unit will serve heat exchanger unit from which water based heating and cooling circuits will serve the different sapces as follows:

8.3.2 Café and Retail Areas

The Café and Retail area will each include a ceiling mounted Fan Coil Unit (FCU) which will heat or cool the spaces.

8.3.3 Workshop, Rental Bike and General Stores

The workshop and stores will be heated using radiant panels, all serve by the Heat Pump.

8.3.4 Toilets and Showers

The Toilets and Showers will include underfloor heating.

8.3.5 Circulation and Lobbies

The circulation corridors and lobbies will include underfloor heating.

8.3.6 Plantrooms

Any plantrooms requiring heating will include electric heaters.

8.3.7 Main Cycle Store

The Main Cycle Store will not be heated and the thermal line of the building will be exclude the cycle store.

8.3.8 Metering

The power to the Heat Pump will be metered, with the metering connected to a BMS (Building Management System) or an Energy Management System. All meters and calculated values will be totalled and trended.

8.3.9 Outline Specification

Heat Pumps

- Turndown to 20% without a drop in efficiency.
- High efficiency
- Low GWP, R32 with GWP=675.
- Refrigerants Leak Detection
- Maximising free cooling.



Figure 8.3 Hybrid VRF Unit

Pumps, Pipework and Fittings

- Variable Speed, Duty/Standby Pumps
- Heavy Grade Steel pipelines.
- Thermally insulated pipework throughout
- Any external LTHW and CHW services pipework will be trace heated to stop freezing.
- PICV control



Figure 8.4 Pumps

8.4 Public Health Services

The public health engineering strategy is to provide safe and healthy water and drainage services for those working and using the ATH as energy efficiently as practical. All engineering equipment will be installed in secure locations, with secure and easy access for operation, maintenance and replacement.

8.4.1 Design Criteria

The proposed Stage 2 Concept MEP design for the MSCP is based and follows the requirements, guidelines and recommendations in the following documents:

- Building Regulation Approved Document B – Fire Safety
- Building Regulation Approved Document G - Sanitation, hot water safety and water
- Building Regulation Approved Document H – Drainage and Waste Disposal
- HSE Health and Safety: Legal Series L8 Legionnaires' disease.
- Water Regulations: 1999
- Relevant CIBSE Technical Memoranda
- CIBSE Technical Memoranda TM 13 Minimising the risk of Legionnaire's disease: 2013.
- Relevant BSRIA Guides
- British standards, including:
 - BS EN 12056 – 2: Gravity Drainage Inside Buildings
 - BS 6700, BS 9251, BS9999, BS5041

The design will be in line with all the relevant British Standards and EN documents. Where existing, BSRIA guides and industry good practice recommendations are to be followed.

Expected Life Time of Equipment,	
• Pumps	20 years
• Pipework	35 years
• Detectors, Actuators Sensors	20 years

The following tables detail the criteria by which the Domestic Water System will be sized.

Appliance	Draw off Per Fitting			Discharge Rate per fitting, Demand Unit
	Hot water (l/s)	Cold water (l/s)	Demand Unit	
WC Cistern	N/A	0.13	2	1.8
Wash Hand Basin	0.15	0.15	2	0.3
Shower	0.2	0.2	3	0.4
Cleaners Sink	0.2	0.2	3	1.3
Washdown Point	N/A	0.2	2	0.3

Table 3, Domestic Water and Above Ground Drainage Systems Design

System	Storage (l/ person)	Storage (hr)	Recovery Time (hr)
Cat 5 Cold Water	N/A	6	1.5

Table 4, Domestic Water Tank Storage

8.5 Above-Ground Drainage

8.5.1 Rainwater Drainage

The surface water drainage collected from the roof; the system will be gravity fed and connect into a new below ground surface water drainage system designed by the civil engineers.

Collecting the rainwater from the ATH will be considered, with the rainwater to be reused for irrigation and WC flushing.

8.5.2 Waste Water Drainage

The Waste Water Foul from the sinks, showers and appliances in the ATH will connect via gravity into the new below ground waste drainage system. The connection will be entirely separate from the foul waste drainage up to the final below ground connection. This separation will allow for the waste water to be collected and to be reused for irrigation and WC flushing.

8.5.3 Foul Drainage

Foul drainage will run from the ATH WCs and connect into the new below ground waste drainage system.

8.5.4 Outline Specification

Pipework and Fittings

- Small diameter branch discharge pipework and fittings:
 - High Density Polyethylene (HDPE) above ground waste water branch discharge pipelines
 - Copper pipelines where required, for example, the café dish washer.
- Large diameter branch discharge pipework and fittings:
 - High Density Polyethylene (HDPE) above ground drainage pipelines
- Discharge stack pipework and fittings:
 - Cast iron above ground discharge and ventilation pipes

8.6 Hot and Cold Domestic Water Systems

8.6.1 Domestic Cold Water Systems

The new metered incoming mains water connection will serve the ATH, and the Cat 5 tank.

- The Cat 5 supply (air separated from the incoming mains water connection) will pump cold water to:
- wash-down points in the cycle stores and workshop
 - the irrigation tank

An irrigation system will be irrigate the green roof. This system will be located with a dedicated plant room.

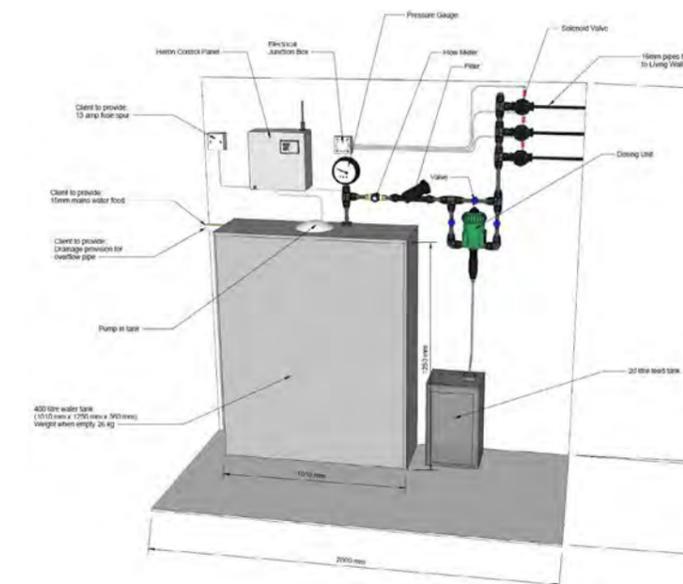


Figure 8.5 Schematic Example of Irrigation Plant

8.6.2 Domestic Hot Water (DHW) Systems

Domestic hot water will be provided by either a dedicated Heat Pump, or local electrical water heaters, whichever is proven to be the most energy efficient, for the final number of outlets needed.

8.6.3 Metering

Meters will be installed to measure water consumed for:

- Hot water
- Café
- Toilets and Showers
- Irrigation

All metering will be connected to a BMS (Building Management System) or an Energy Management System.

All meters and calculated values will be totalled and trended.



Figure 8.6 Sub Meter

8.6.4 Outline Specification

Domestic Water Pipework and Fittings

- Cat 5 Water Pumps - Duty/Duty/Standby
- Copper pipelines.
 - o Thermally insulated throughout.
 - o Fire stopped at all penetrations through fire compartment walls and floor slabs within the building.
 - o External domestic water services pipework will be trace heated to stop freezing.
 - o No dead legs of HWS pipework greater than 300mm
- WRAS approved fittings.

8.7 Electrical Engineering Strategy

The Electrical engineering strategy is to provide safe and healthy environment for those working and using the MSCP as energy efficiently as practical.

All engineering equipment will be installed in secure locations, with secure and easy access for operation, maintenance and replacement.

8.7.1 Electrical design criteria and targets

The criteria for the electrical engineering systems is based, BS 7671 18th edition and any specific system's standard as described in each of the following sections.

The following table details the Electrical Design Criteria for the different types of systems.

System type	Reference	Applied Design Criteria																																																																																																						
Lighting	BS EN 12464-1:2021	<table border="1"> <thead> <tr> <th rowspan="2">Type of Task/activity area</th> <th colspan="2">E_m lx</th> <th rowspan="2">U_o</th> <th rowspan="2">R_a</th> <th rowspan="2">R_{UGL}</th> <th rowspan="2">$E_{m,x}$ lx</th> <th rowspan="2">$E_{m,wall}$ lx</th> <th rowspan="2">$E_{m,ceiling}$ lx</th> <th rowspan="2">Specific requirements</th> </tr> <tr> <th>required</th> <th>modified^b</th> </tr> </thead> <tbody> <tr> <td>Workshop</td> <td>300</td> <td>500</td> <td>0,60</td> <td>80</td> <td>25</td> <td>100</td> <td>50</td> <td>30</td> <td></td> </tr> <tr> <td>Office</td> <td>500</td> <td>1000</td> <td>0,60</td> <td>80</td> <td>19</td> <td>150</td> <td>150</td> <td>100</td> <td>DSE-work, see 5.9 Room brightness, see 6.7 and Annex B Lighting should be controllable, see 6.2.4 For smaller cellular offices the wall requirement applies to the front wall. For other walls a lower requirement of 75lx could be accepted.</td> </tr> <tr> <td>Bike parking area</td> <td>150</td> <td>200</td> <td>0,40</td> <td>40</td> <td>-</td> <td>50</td> <td>50</td> <td>15</td> <td>1. Illuminance at floor level 2. A high vertical illuminance increases recognition of people's faces and therefore the feeling of safety.</td> </tr> <tr> <td>Retail</td> <td>300</td> <td>750</td> <td>0,40</td> <td>80</td> <td>22</td> <td>75</td> <td>75</td> <td>30</td> <td>Ensure sufficient vertical illuminance on shelves.</td> </tr> <tr> <td>Till area</td> <td>500</td> <td>1000</td> <td>0,60</td> <td>80</td> <td>19</td> <td>100</td> <td>75</td> <td>30</td> <td></td> </tr> <tr> <td>Cafe</td> <td>500</td> <td>750</td> <td>0,60</td> <td>80</td> <td>22</td> <td>150</td> <td>150</td> <td>75</td> <td></td> </tr> <tr> <td>Lobbies</td> <td>100</td> <td>150</td> <td>0,40</td> <td>80</td> <td>25</td> <td>50</td> <td>50</td> <td>30</td> <td>During night-time lower levels are acceptable. Illuminance on floor level.</td> </tr> <tr> <td>Storage</td> <td>150</td> <td>200</td> <td>0,50</td> <td>80</td> <td>25</td> <td></td> <td></td> <td>30</td> <td>Illuminance at floor level, R_{UGL} only in the viewing direction of luminaire.</td> </tr> <tr> <td>Toilets</td> <td>200</td> <td>300</td> <td>0,40</td> <td>80</td> <td>25</td> <td>75</td> <td>75</td> <td>50</td> <td>In each individual toilet if these are fully enclosed.</td> </tr> </tbody> </table>	Type of Task/activity area	E_m lx		U_o	R_a	R_{UGL}	$E_{m,x}$ lx	$E_{m,wall}$ lx	$E_{m,ceiling}$ lx	Specific requirements	required	modified ^b	Workshop	300	500	0,60	80	25	100	50	30		Office	500	1000	0,60	80	19	150	150	100	DSE-work, see 5.9 Room brightness, see 6.7 and Annex B Lighting should be controllable, see 6.2.4 For smaller cellular offices the wall requirement applies to the front wall. For other walls a lower requirement of 75lx could be accepted.	Bike parking area	150	200	0,40	40	-	50	50	15	1. Illuminance at floor level 2. A high vertical illuminance increases recognition of people's faces and therefore the feeling of safety.	Retail	300	750	0,40	80	22	75	75	30	Ensure sufficient vertical illuminance on shelves.	Till area	500	1000	0,60	80	19	100	75	30		Cafe	500	750	0,60	80	22	150	150	75		Lobbies	100	150	0,40	80	25	50	50	30	During night-time lower levels are acceptable. Illuminance on floor level.	Storage	150	200	0,50	80	25			30	Illuminance at floor level, R_{UGL} only in the viewing direction of luminaire.	Toilets	200	300	0,40	80	25	75	75	50	In each individual toilet if these are fully enclosed.
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Toilets	200	300	0,40	80	25	75	75	50	In each individual toilet if these are fully enclosed.																																																																																															
Fire Alarm	BS 5839-1: 2017	Category L1. Secondary supply to fire alarm panel provided by 6 hours integral battery																																																																																																						
Electrical load	BSRIA Rule of Thumb	Small power and lighting, Retail: 150w/m2, Workshop: 40w/m2, Parking area: 10w/m2																																																																																																						
Load diversity	N/A	0.7																																																																																																						
Security	Park Mark Plus Guidance	CCTV camera throughout, Access Control																																																																																																						
SMART services (requiring power)	Site wide Smart philosophy	IoT-based system that sends data about free and occupied parking spaces via web/mobile application; WIFI points., information displays.																																																																																																						
Bike charging points	Stage 1 information pack	100% of parking spaces+100% of Bike loan																																																																																																						
PV system	BS 7671	Roof mounted with 235 m2 area, 35kW peak circa																																																																																																						

- The works will include all elements to complete the procurement, installation, witnessing & commissioning and operation of the complete working systems including Builder's Work in Connection, access systems (allowing for complete replacement of all plant). It also includes generating all as built system drawings separately using computer generated software e.g. AutoCAD and REVIT.
- All items of LV switchgear and distribution equipment will be installed in secure locations, ensuring ease of access for maintenance and operation, in an area inaccessible to staff or visitors.
- All low voltage cabling will be tagged, with tag numbers corresponding with the LV schematic and O&M documents.

8.7.2 Design Life

HV Substation	30 years
Transformers	30 years
LV Switchgear and Distribution Boards	20 years
LV Submain Distribution	20 years
HV / LV Cables (Thermosetting)	35 years
Busbar Trunking	35 years
General LV Power	25 years
Conduits & Cable Trunkings	30 years
Light Fittings Internal	20 years
Light Fittings External	15 years
Emergency Lighting (Self Contained)	25 years
Photovoltaic devices, including cells, panels, modules etc.	25 years
Earthing & Bonding Cables and Components	30 years

8.7.3 Electrical Standard and guidances

CIBSE Guide M: Maintenance Engineering and Management
 CIBSE TM39 Building Energy Metering
 BR Approved Document L2A Conservation of Fuel and Power in new buildings other than dwellings
 BS7671 18th edition Requirements for Electrical Installations. IET Wiring Regulations
 BS EN 50173-1:2011 - Information Technology - Generic Cabling Systems.
 BS EN50174 Information technology Cabling installation
 BS 6701 Telecommunications equipment and telecommunications cabling
 BS 7346 Components for smoke control systems
 BS 8300 Design of an accessible and inclusive built environment. Buildings - code of practice
 CIBSE Lighting Guides
 BS7430 Code of practice for protective earthing
 BS EN IEC 61936-1 Power installations exceeding 1 kV a.c. Common rules
 BS EN 50522:2010 Earthing of power installations exceeding 1 kV a.c.
 Electricity Distributors (UKPN) requirements

G99 Document
 Construction product regulations (CPR)
 ANSI/TIA 568C
 BSUH-CL-ST1- PO-A20
 Low Voltage Directive 2006/95/EC
 EMC Directive 2004/108/EC
 EN 60950-1:2001/A11:2004
 EN 61000 – All sections - Electromagnetic compatibility
 BS EN81-72 Safety rules for the construction & installation of lifts – Firefighters lifts
 To BS EN 60839-11-1
 BS EN 50131

8.8 Power

8.8.1 LV Distribution and small power

Power to the ATH building will be provided by a LV switchboard (MS/GF/01) located in the plant space as shown in the MEP layouts. The switchboard will be directly fed from a new substation to also feed plots 1 and 2.

The main switchboard will supply:

- A general DB for toilets and corridors;
- Cycle parking DBs to supply E-Bikes;
- Café Switchboard;
- Main fire alarm panel;
- EVAC system panel;
- PV Inverter;

The supply cables will distribute by means of metallic perforated trays and trunking above ceilings or fixed to exposed walls.

The Distribution Boards will be provided with 25% spare outgoing ways and designed to be suitable for future expansion.

All distribution boards will be dual-metered split-load allowing the loads to be metered separately, for energy management purposes.

The proposed electrical design will be installed to the following parameters:

Voltage 400V/230V +/- 4%, 3 Phase 50Hz AC nominal.

The new supply will ensure compliance with all relevant Codes of Practice, Byelaws and Statutory requirements, including:

- BS 7671 of IEE Wiring Regulations 18th Edition
- Relevant Utility Services Provider Approval

All items of LV switchgear and distribution equipment will be installed in secure locations, ensuring ease of access for maintenance and operation, in an area normally inaccessible to staff or visitors.

8.8.2 LV Switchboards

A 400A main LV switchboard will be located at ground floor in the plantroom area and manufactured to Form 4 Type 4b with front access, to include 25% spare ways. The switchboard will contain protective devices, and a surge protection device.

8.8.3 Submain Cables

The submain cables coming from the main LV switchboard MSB will be multicore armoured XLPE/SWA/LSOH cables compliant with BS EN 60332-1-2 will be installed (equivalent to cable CPR class Eca).

8.8.4 Distribution Boards

Distribution boards will include an integral switch-disconnector and will utilise outgoing miniature circuit breakers (MCB), residual current devices (RCD) and combined residual current and over-current circuit breakers (RCBO). These devices will be selected to suit the type of load being served and provided in line with the council's requirements.

The distribution boards will be supplied complete with lockable hinged front cover(s), mixed-capacity single and multi-pole circuit breakers as necessary, 'dedicated' earth bars and suitably sized terminations for the cable size as specified.

All metering, contactors and control components are to be incorporated with a separated section of the distribution boards in a purpose-built enclosure to match the distribution board in size and colour and be complete with a separate access door clearly labelled as to its purpose.

Distribution boards will be provided with a suitably bolted solid neutral (unswitched) supply connection complete with bolted test link facility.

Distribution boards will be sized and provided with 25% spare capacity.

8.8.5 Small Power

The small power distribution considers the final power circuits from the distribution boards to the power outlets, luminaires and fixed electrical equipment. The small power system will serve the following types of final circuits:

- Fixed mechanical equipment wired as dedicated radial circuit with MCB rating of the equipment;
- Power supply to fixed items served as dedicated radial circuits and fed via fused connection units;

- General-purpose socket outlet circuits such as cleaners' sockets will normally be wired as dedicated standard radial or ring main circuits and mounted on the wall. These will be protected by suitable earth leakage 'RCD' devices;
- High-level lighting circuits will be supplied as 10A radial circuits.
- Security access control, fire alarm and control systems will be wired as 16A or 20A radial circuits.

Small power and lighting cables will run in exposed soffit mounted metallic trunkings or ducts in the parking area.

8.8.6 Metering

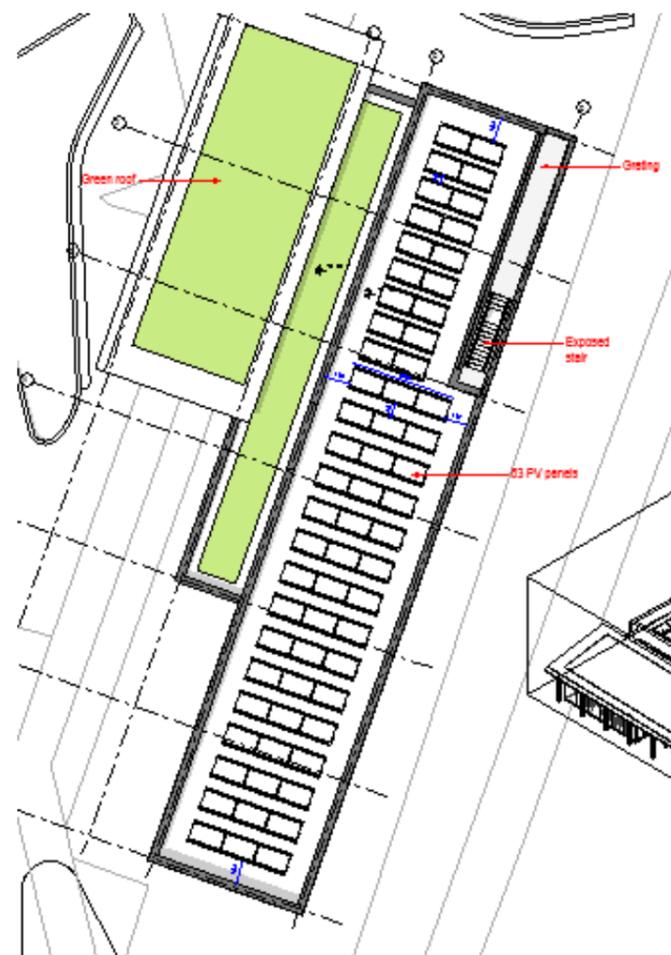
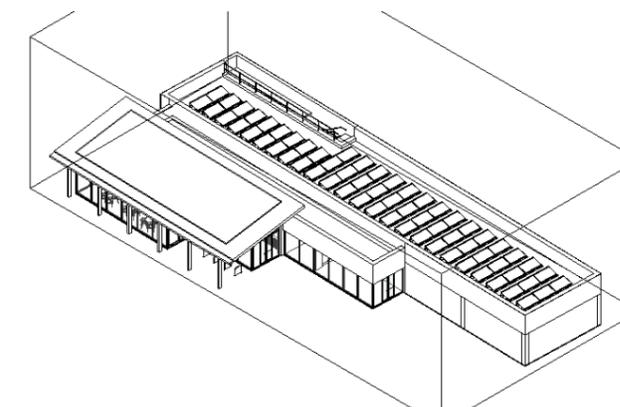
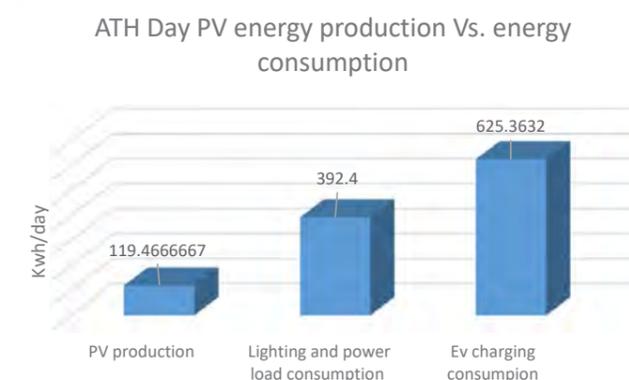
The metering strategy will follow the Building Regulations part L.

All final distribution boards greater than 50kW will be metered and the distribution boards in the risers will be split metered lighting and power.

8.8.7 PV System and battery storage

The building will have a PV system located at roof level. The PV system will be designed and installed in accordance to BS 7671 18TH edition and the relevant IET guides. An initial assessment based on the available PV area and the ATH energy consumption shows that the available PV area is insufficient to charge a battery capable of supplying the required energy.

Figure 8.7 - PV Energy Production Vs. Energy Consumption



8.8 Earthing and Bonding

Earthing and bonding will consist of LV system circuit protective conductors, equipotential bonding, supplementary bonding and dedicated clean earth distribution to any IT rack.

The electrical earthing system in the ATH building will be TN-S type, and will have separate CPCs and neutrals throughout the system coming back to the new substation.

Each switchboard will have its own earth terminal, which will be connected via armour and/or extra CPC to the main earth bar located in the new substation.

All exposed conductive parts will be connected by a protective conductor to the relative switchboard/distribution board earth reference bar. Each, sub-distribution board, motor control centre and final distribution board will have its own integral earth bar.

Submain cables will be sized to ensure a 5s disconnection time is achieved in case of short circuit or earth fault as per BS7671. Each final circuit wired in single core cable will include a separate full-sized circuit-protective conductor. Main equipotential bonding will ensure that all extraneous conductive parts are bonded to the earth bar of the main earth terminal. This will generally consist of bonds to the main water pipes, main gas pipes, ductwork, pipework, exposed metallic parts of building structure, thermal insulation metallic cladding and metallic cable sheaths of all cables (except British Telecom).

Supplementary equipotential bondings will be made at each floor to interconnect all extraneous metallic parts to the closest earth terminal as a minimum.

8.8.1 Lightning protection system

A Lightning Protection System will be provided to comply with the guidance contained within BS EN 62305 utilising either the steel framework or metal re-bars within concrete columns as down conductors. The air termination network will utilise metallic roof materials where suitable otherwise copper tapes will be utilised.

The system will be concealed within the building fabric. A layered system of transient over-voltage protection will be provided comprising surge protection devices incorporated into main switchboards and distribution boards as noted elsewhere in this report.

8.8.2 E-bikes

The facility will be provided with a provision for 100%

E-bikes chargers located in both the cycle parking and the Bike loan for a total of 141 charging points (based on wall mounted chargers).

The type and quantity of chargers will be confirmed during the next design stage.

ATH E-Bikes single phase				
Bike spaces(176+50)	E-bikes percentage	E-bikes	kW	
	141	100%	141	
460W (2 A)		60%	84.6	38.916
630W (2.7A)		40%	56.4	35.532
Diversity		70%		
Total kW			52.1136	

Table 8.2 Excel file – E bikes types and load assessment

8.8.3 Lighting

The design objectives of the lighting scheme may be summarised as:

- Illuminate both vertical and horizontal surfaces appropriate to the specific tasks taking place, supplying the visitors with a comfortable operational environment.
- Provide a cost effective, sustainable and energy efficient system, in terms of initial capital costs and continuing operational use. Select lamp types for their efficacy, colour rendition and longevity to provide an efficient lighting solution with a predictable maintenance regime.
- Utilise light sources appropriate for the character and function of each space while retaining a coherent, rationalised illumination system in terms of lit effect, and equipment installed.

Select light sources and luminaires for their performance, material construction, design, fabrication and ingress protection. Identify luminaires from standard product ranges and site equipment in accessible locations.

8.8.4 Design parameters

The following mandatory, legislative and regulatory requirements, British Standards, Codes of Practice and Best Practice professional guidance publications will form the parameters of the lighting installation:

- BS EN 12464-1:2011 Light and lighting - Lighting of work places. Indoor work places
- SLL Lighting Handbook, 2018
- The Health and Safety (Display Screen Equipment) Regulations 2002
- BS 8300-2:2018 Design of an accessible and inclusive built environment, Part 2: Buildings, Code of practice
- BS EN 13201-2 - 2015 Road Lighting - Part 2 -

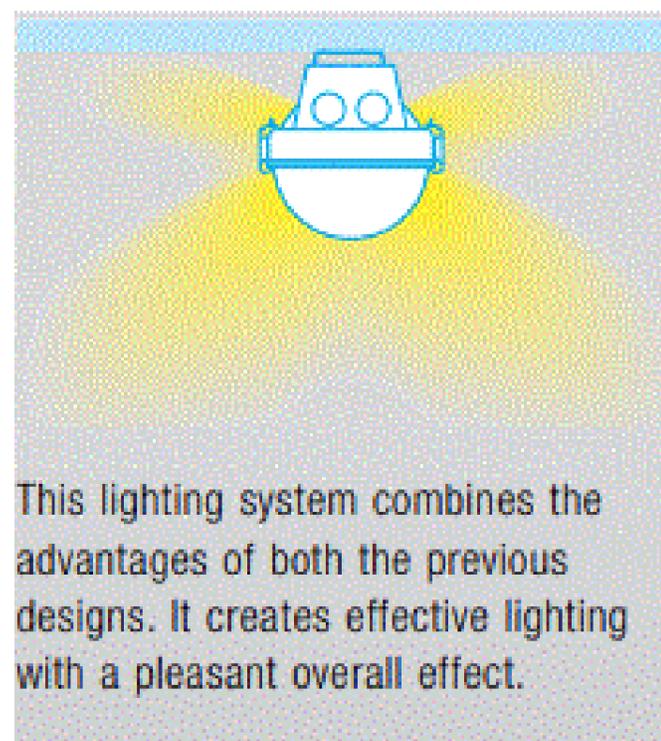
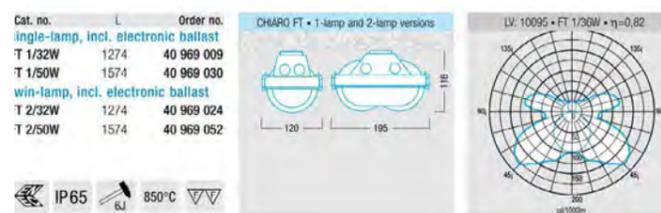
Performance Requirements.

- ILP Guidance Notes for the Reduction of Obtrusive Light GN01:201

8.8.5 Lamps and Luminaires

Luminaires will be specified for their photometric performance, with suitable distribution, efficiency and appropriate glare control, for effective illumination of a particular task or space. Materials, construction, build quality and cost effectiveness will also determine luminaire selection.

Specified luminaires will comply with the current relevant European or British Standards, principally BS EN 60 598. High frequency electronic control gear will be used to eliminate stroboscopic effects, improve lamp life and maximise energy efficiency.



This lighting system combines the advantages of both the previous designs. It creates effective lighting with a pleasant overall effect.

8.9 CDM

Any CDM issues relating to the lighting design scheme have been identified per area within the area-by-area descriptions. As a general strategy throughout the building, LED technology has been embraced to minimise maintenance and access at height along with a task-oriented lighting scheme to ensure light is provided where needed.

8.9.1 WEEE Directive - Waste Electrical and Electronic equipment

All lamps, luminaires and relevant lighting equipment must be procured from manufacturers/suppliers registered with the WEEE directive PCS (Producer Compliance Scheme). All these manufacturers/ suppliers must prove that they are registered by providing their PCS registration number.

8.9.2 Controls

A lighting control system will be provided to enable the illumination levels to be controlled to meet the needs of the occupants and functions of each space. This will result in energy savings, and therefore reduced running costs for the life of the installation.

8.9.3 Lighting Control Strategy

The lighting control system will use a DALI interface to control the luminaires.

8.9.4 Daylight linking

The system must enable the dimming and switching of all luminaires in areas where daylight ingress is sufficient to reduce their output for all or part of the day. This will typically include luminaires near external glazing and building perimeter, but must also include any luminaire inside or outside the building which may be dimmed or switched off due to daylight ingress. Where daylight linking is active, the illuminance provided in the space by the combination of electric and natural light must not fall below the required illuminance criteria.

In addition, the system must enable constant light sensing across the areas: to ensure illuminance levels are maintained to within ±10% of intended value throughout the maintenance cycle.

8.9.5 Presence / Absence Detection

The system must enable single or groups of luminaires to be dimmed down from 100% to 20% of their output in response to absence sensors. In the cycle parking presence detectors and day light sensors will be installed. In all the other areas,

absence detectors will be installed. A timer switch will allow the output to be completely switched off after 30 minutes of non-use of spaces equipped with absence detectors.

8.9.6 Emergency Lighting

Emergency lighting is designed to facilitate the safe egress of a building or space in the event of failure of mains power supply to the normal lighting.

It is critical for the safety of users of the building and should be given careful consideration throughout the detail design phase of the project.

Emergency lighting needs to be provided to external escape routes and final muster locations.

The emergency lighting design for the Homer Road Gateway development will use a stand-alone system. This will be detailed on an area-by-area basis at the detail stage of the design (Stage 3).

8.9.7 Guidance documents

Emergency lighting must be designed to comply all mandatory, regulatory and legal design guidance documents including some/all of the following:

- BS 5266 Part 1:2016; Emergency lighting – Part 1: Code of practice for the emergency escape lighting of premises
- CIBSE LG12 – Emergency lighting 'Lighting for the built environment', 2015

8.9.8 Performance requirements

The following performance requirements will be used for the emergency lighting strategy;

8.9.9 Open areas (anti-panic lighting)

A minimum of 0.5lux must be achieved at any point on the floor within a central core area which excludes a border of 0.5m from the wall or any fixed obstructions

8.9.10 Escape route

A minimum of 1.0lux must be achieved at any point on the 2m wide central line of the escape route. 0.5lux must also be achieved over 50% of the entire width of the escape route.

8.10 Detection, Fire & Security

8.10.1 Fire Detection System

The minimum level of fire alarm and detection system required is category L1.

All areas will be protected with point smoke detectors, installed in compliance with BS EN 5839-1. The system will be in accordance to BS9999, BS5839 Part 1, the requirements of Building Control and the Local Fire Officer. The system will utilise analogue addressable technology with wiring configured as loops connecting, fire alarm panels, repeater panels, detection devices, interfaces and sounders. The main fire alarm control panel will be located on the B02 Floor adjacent to one of the stair cores, where it is easily accessed by the fire brigade.

Fire alarm cabling throughout will be routed on dedicated steel wire cable tray. All fire alarm cabling is to be of the 'enhanced' category and be provided with a red outer sheath to comply with BS5839-1, meeting the PH120 classification when tested in accordance with BSEN 50200 and the 120 minute survival time when tested in accordance with BS 8434-2.

Batteries and chargers to the system will be sized to provide sufficient power for 24-hour quiescent operation followed by ½ hour at full output of sounders.

The system will comprise the following; fire alarm and repeater panels, automatic smoke and heat detectors, break-glass call units, electronic sounders and xenon beacons for DDA purposes. In areas where there are likely to be high levels of noise, for example in plantrooms, it is recommended that visual notification is provided - for example by flashing beacons.

8.10.2 Detectors

Manual call points should be provided adjacent to all exits in accordance with BS 5839-1. Manual call points will be provided with covers to guard against accidental activation, particularly in the public areas and the logistics routes. Manual call points will be coloured red and positioned adjacent to all external doors with additional units located along.

Fire alarm interface units will be provided as required to a number of emergency systems. These include:

Outputs to:

- Access Control system;
- Toilet alarm systems;
- Ventilation systems

8.10.3 CCTV

The ATH should be suitably covered by CCTV relayed back to the council's security control room.

If a CCTV system is installed it must include a digital recorder (DVR) that allows for the images to be downloaded along with the appropriate software to enable them to be viewed on another system. The digital recorder must be kept in a secure office, ideally separate to that of the CCTV system. It is strongly recommended that if there is no on-site management, a network enabled digital recorder is used. This will permit off-site review and download as appropriate by the managing agents.

As a general guide the following issues should be considered:

- CCTV cameras should be capable of providing images from which the person shown can be identified.
- All pedestrian and bike access points should be fitted with CCTV cameras

8.10.4 Card Access Control

A online door Access Control system will be provided to access the staff & Storage rooms, the café, the workshop and the bike loan & retail. The Access Control system will be used to access the areas above during closing times. The system will refer back to the local IT racks located in the GF plantroom and will be linked to the wider site network. The system will consist of proximity card readers and be online and IP based.

The physical appearance and specification of the devices are to be fit for purpose in terms of robustness, durability, functionality, infection control, and aesthetics and are to be subject to approval from the design team.

The principle for access control system will generally follow the below strategy.

The system will include the following as a minimum:

- Magnetic locks and strike plates
- Door Ironmongery
- Swipe access reader (only at secure line doors)
- Face recognition monitors for each access point
- Push to Exit green button
- Emergency green break glass unit
- Fire alarm interfaces
- Power supplies unit with 3hr battery backup
- Standby power supplies
- Data supplies
- Control panels
- Access control hubs
- Proximity cards

- Card printers
- Door status monitoring device
- Audio intercom out going call set installed ad the facility entrance door and in each Lab;
- Audio intercom receiving set c//w over ride facility to release the door lock located at the Labs
- Manager Office. MDC to confirm location.
- Cable type - Power cables (compliant with CPR spec Dca s2 d2 a1) Thermosetting insulated and thermoplastic sheathed LSHF cables
- Cable type - ELV cables (compliant with CPR spec Cca, S1b, d2, a2) Thermosetting insulated and thermoplastic sheathed (LSHF) cables
- Provide 10% Spares and consumables
- Provide As-built information and technical literature for O&M manual
- The access control system will be online - Mains powered door access control.
- Will require power and data, door locking mechanism, Card/Face recognition Reader, Push to
- Exit button and Emergency Break Glass

The power supply Unit will require a fire alarm interface and live connection to the network data base.

8.10.5 Design standards

Some of the key design standards are described as below.
 BSEN 50133-1: 1996
 BS4737/EN50131
 NACOSS requirements.
 BS7671:2008 + A3:2015
 BS EN 60839-11-1 - (Agree Security grading with the client)
 BS EN 60839-11-2 - (Agree Security grading with the client)
 BS EN 61386-23
 BS 7671:2008 Amendment 3:2015

8.10.6 IT/DATA System

The main requirement for the ATH ICT system is to provide the backbone for the access control, CCTV and smart systems. The IT architecture will be designed and developed in line with the Council's IT specialist. The communication system deployed throughout the site will support the communications and IT needs for the following functions and systems:

- Data communications
- Voice communications
- Telephony systems
- Mobile telephony systems
- Information display systems
- Fire notifications

Outlets will be provided as standard RJ45 outlets and

the allocation as voice or data will be carried out by the departmental IT management. All cabling will be CAT6 U/UTP.

The structure cabling works undertaken will be installed in accordance with the following requirements:

- ISO/IEC 11801 - Information Technology – Generic Cabling for Customer Premises – Class A to F
- ISO/IEC 14763-3 - Information Technology – Implementation and Operation of Customer Premises Cabling –Testing of Optical Fibre Cabling
- BS EN 68025 for optical communications
- BS EN 60950 for data communications
- BS 7671 17th Edition of the IEE wiring regulations.

The IT structured wiring system will be robust and flexible and arranged to enable integration of all technology systems, security, lighting controls, etc) onto the same cabling system and to possibly be combined onto a converged microprocessor control / monitoring system.

3no . 1200x600 racks will provisionally be located in the plantroom at Ground floor level.

8.10.7 Smart parking systems

The cycle parking will be implemented with a smart technology system to provide data of free and occupied spaces via web/mobile application.

The Smart parking system comprises of bike sensors, which are installed per cycle bay and link up to a network of WiFi enabled SmartSpots, which in turn feed real time data into a SmartCloud platform.

This not only shows live parking events, but affords users detailed site information such as parking trends and abuse of parking spaces, meaning informed decisions can be made around how the status of each individual bay is regulated. As well, detailed reports can be generated, and analysts also have the power to generate customised, targeted reporting themselves, without having to bring in external IT contractors.

8.10.8 Electrical Utility Loads

The calculated maximum demand load for the ATH has been estimated as 105 kW including the E-bikes loads. This figure can be broken down as following:

- 98 kW - general load, including :
 - o General lighting and power;
 - o Roof Irrigation System;
 - o Café;
 - o Bike Loan and Retail;

- o Café;
 - o Workshop
- 52 kW – E-bikes charging points. This figure is based on an installation of 100% points of the bike spaces (141 spaces), including 83 spaces in the cycle parking and 48 spaces in the bike loan.

The ATH load would be supplied from the new substation feeding plots 1 and 2.

In the pictures below we can compared the load consumptions per type of load for 3no. different EV charging future options.

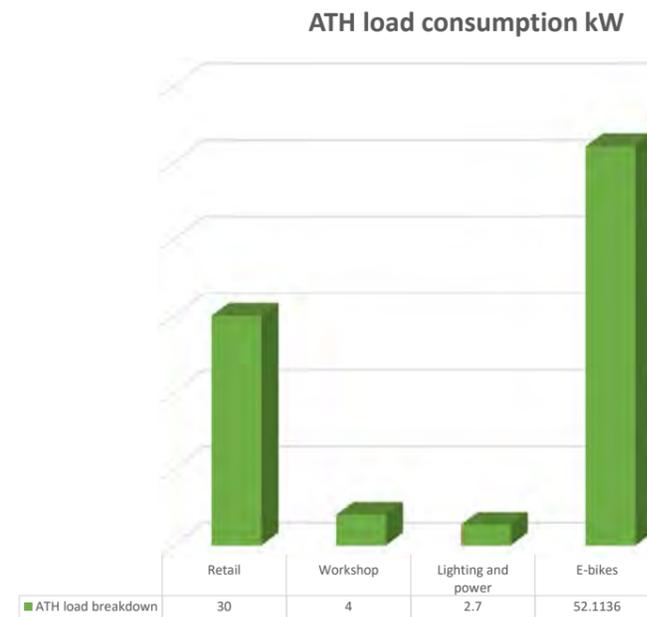


Figure 8.7 excel. ATH Load comparison (non-diversified).

9.0 Utilities

9.1 Introduction

This chapter describes the existing utility infrastructure located within and immediately surrounding The SEAM Site (Phase 1). Existing utility infrastructure has been identified from a combination of asset plans from various relevant utility providers, and also from Topographical and Ground Penetrating Radar (GPR) Surveys carried out within the site.

This chapter also describes how estimated loadings have been derived for the proposed re-development of the site.

9.2 Existing Utilities

9.2.1 Electricity

Within the Phase 1 development site area, below ground electrical cabling has been identified from GPR Surveys. A main cable route enters the site from County Way at the south-west corner of the site, and runs through the existing car parks, extending all the way to the northern edge of the site, with various spurs extending towards lighting columns and payment machines. This cable route extends under the proposed footprint of the Active Travel hub building.

Other than a short length where this cable route enters the site at the south-west corner, this cabling is not shown on Northern PowerGrid asset plans. It is therefore assumed that these electrical cables are Low Voltage (LV) and will become redundant upon redevelopment of the site.

Beyond the Phase 1 site boundary, Northern PowerGrid asset plans show that there are established LV networks within the public highway domain serving existing adjacent development. 33kV routes are also indicated close to the site boundary close both at the Old Mill Lane / County Way junction to the north, and at the Regent Street / County Way junction to the south.

9.2.2 Gas

Within the Phase 1 development site area, one below ground gas main has been identified from GPR Surveys. This extends from County Way to the south-west and runs parallel to the adjacent Digital Media Centre (DMC) building under the initial access road into the existing car parks on the site. The gas main then extends up to the DMC building and appears to serve this building alone. This gas main is also identified on Cadent Gas asset plans of the area, where it is shown as a 90mm Low Pressure Main.

This existing gas main would need to be diverted or retained as part of the development proposals. Whilst the gas main route extends relatively close to the proposed footprint of the Active Travel Hub building (to within less than 10m), the GPR Survey indicates it is far enough away from the proposed building that it should be possible for it to be retained in its current alignment. Beyond the Phase 1 site boundary, Cadent Gas asset plans show that there are established Low Pressure networks within the public highway domain, serving existing adjacent development. These extend into the site to the south-west, as described above, and close to the site to the north, within Old Mill Lane.

9.2.3 Potable Water

Within the Phase 1 development site area, only one short length of water pipework was identified from GPR Surveys. This enters the site towards the north and appears to be connected to a single fire hydrant within the existing car parks on the site. This connection is not shown on Yorkshire Water asset records, which also show no other existing water mains within the site. Beyond the Phase 1 site boundary, Yorkshire Water asset plans show that there are existing water mains within the surrounding public highway domain, including a 5-inch cast iron main within Regent Street to the south of the site, and both 9-inch and 180mm mains within Old Mill Lane to the north of the site.

9.2.4 Drainage

Within the Phase 1 development site area, there are two

separate surface water drainage networks identified on GPR Surveys. Neither of these are shown on Yorkshire Water asset plans, and it is therefore assumed that these are private, and appear to be draining the existing car parks on the site.

The first network appears to drain the southern part of the site, including the area under the footprint of the proposed Active Travel Hub building, with a 150mm outfall pipe shown discharging from the site eastwards Eldon Street, where it is presumed this connects to the public surface water sewer system. The second network appears to drain the northern areas of the site, with a 150mm outfall pipe shown discharging from the site northwards Old Mill Lane, where again it is presumed this connects to the public surface water sewer system. It is presumed both of these systems will become redundant upon redevelopment of the site.

Beyond the Phase 1 site boundary, Yorkshire Water asset plans show both foul and surface water sewer networks in the surrounding public highway domain, which generally convey flows from west to east. In Eldon Street to the south-east of the site, the asset plans show a 450mm diameter surface water sewer and a 225mm diameter foul sewer. In Old Mill Lane to the north of the site, the asset plans show a 680mm diameter surface water sewer and a 300mm diameter foul sewer.

9.2.5 Telecommunications

Within the Phase 1 development site area, there are several telecommunications cables identified on GPR Surveys. These are situated towards the southern end of the existing car parks within the site. Some of this existing cabling appears to serve CCTV within the car park, but the purpose of other cable routes is not clear from the survey. It may be that some of these cable routes served the previous council buildings which used to occupy the central area of the site and are now redundant.

No assets are indicated within the site boundary on asset plans received from Cable & Wireless, CityFibre,

Virgin Media, or Vodafone. BT Openreach asset plans do indicate above and below ground cable routes towards the north of the site, though these do not appear to have been identified on the GPR Survey. Again, it is possible that these cable routes served the previous council buildings which used to occupy the central area of the site and are now redundant.

Beyond the Phase 1 site boundary, there are established telecommunications networks within the surrounding public highway domain indicated on various providers' asset plans, most notably BT Openreach and Virgin Media.

9.3 Proposed Utilities

9.3.1 Electricity

The peak electrical demand from Phase 1 of the proposed SEAM development has been estimated as approximately 2,250kVA. This estimate is based on the following key assumptions:

- Peak electrical demand from the MSCP estimated as 1085kW, understood to include 20% provision of Electric Vehicle (EV) charging
- Peak electrical demand from Active Travel Hub estimated as 156kW
- Peak electrical demand from proposed Retail Units and Hotel in Development Plot 1 estimated as 730kW
- Peak electrical load per proposed dwelling (assume all electric scenario) of 3.0kW, with a diversity of 0.7

A capacity enquiry and budget estimate request for the supply of electricity to the development has been submitted to Northern PowerGrid, the incumbent Distribution Network Operator (DNO). A response to this enquiry is currently awaited. Should any offsite network reinforcement works be required, these will be confirmed once a response has been received from Northern PowerGrid. In addition, requests for budget estimates have also been submitted to three Independent Distribution Network Operators (IDNOs) for comparison.

In the absence of any responses to the above enquiries, it is currently presumed that two new final distribution sub-stations will be required to serve the Phase 1 development, with HV electrical supply to these two sub-stations most likely to enter the site from Old Mill Lane to the north and run within a Primary Utilities corridor within the footway / public realm alongside the Primary Service Road, extending beyond the southern end of this service road to supply the Active Travel Hub. Indicative locations for the two new sub-stations are shown on the Proposed Utility Routing drawing in Appendix D.

Connections from the two new sub-stations will be formed into the different Phase 1 development components, with the first sub-station situated towards the north of the site likely to supply the MSCP, and the second sub-station situated towards the centre of the Phase 1 site likely to serve the Active Travel Hub and Development Plots 1 & 2.

9.3.2 Gas

The UK Government's Spring Statement of 2019 announced that from 2025, they will introduce a "Future Homes Standard" that will require new homes to be highly energy efficient and prevent the use of fossil fuel heating systems. Whilst this doesn't currently cover non-residential buildings, non-fossil fuel heating systems are likely to continue to become more common.

As a result, it is therefore presumed that none of the proposed buildings on Phase 1 of the site wide development will be gas heated, and that therefore there will be no requirement for gas to be supplied to the development. If gas were to be required, it is likely to enter the site from Old Mill Lane to the north and run within the Primary Utilities corridor within the footway / public realm alongside the Primary Service Road extending beyond the southern end of this service road to supply the Active Travel Hub.

9.3.3 Potable Water

The peak water demand from Phase 1 of the

proposed site wide development has been estimated as 6.2l/s, based on the following key assumptions:

- Daily water demand from the MSCP of 3,000 litres
- Daily water demand from the ATH of 1,500 litres
- Daily water demand from residential buildings based on 120 litres/person/day as recommended in The Code for Sustainable Homes (2010)

A Pre-Planning Enquiry has been submitted to Yorkshire Water to confirm whether there is sufficient spare capacity within the existing local network to supply the development. A response to this enquiry is currently awaited. Should any offsite network reinforcement works be required, these will be confirmed once a response has been received from Yorkshire Water.

In the absence of any responses to the above enquiry, it is currently presumed potable water supply to the development will be most likely to enter the site from Old Mill Lane to the north and run within a Primary Utilities corridor within the footway / public realm alongside the Primary Service Road, extending beyond the southern end of this service road to supply the Active Travel Hub.

9.3.4 Drainage

Proposals for new drainage infrastructure to serve the development are described in Chapter 6 of this document.

9.3.5 Telecommunications

New telecommunications connections are currently presumed to be most likely to enter the site from Old Mill Lane to the north and run within a Primary Utilities corridor within the footway / public realm alongside the Primary Service Road, extending beyond the southern end of this service road to supply the Active Travel Hub.

A search on BT Openreach's website suggests that Full Fibre to the Premises (FTTP) is not currently

available in the area, but that Superfast Fibre to the Cabinet (FTTC) is available, offering speeds of up to 80Mbps.

10.0 Transport

10.1 Design Principles

10.1 Introduction

10.1.1 Background

The Blueprint for The Seam project proposes the comprehensive redevelopment of 7 plots of land located on either side of County Way, which runs north-south through the site between Old Mill Lane and Regent Street.

The transportation vision for the development is create virtually a car free with existing and new public spaces that are dominated by pedestrians and cyclists. Included within Blueprint for The Seam is a proposed Active Travel Hub (ATH) within a new public space.

10.1.2 Purpose of Section 10

The purpose of this section of the report is to:

- Set out the principles of access to the ATH within the context of the public realm for:
 - o Pedestrians
 - o Cyclists
 - o Servicing and access for emergency vehicles.
- Set out options for improvements to the junction Regent Street and Elsdon Street

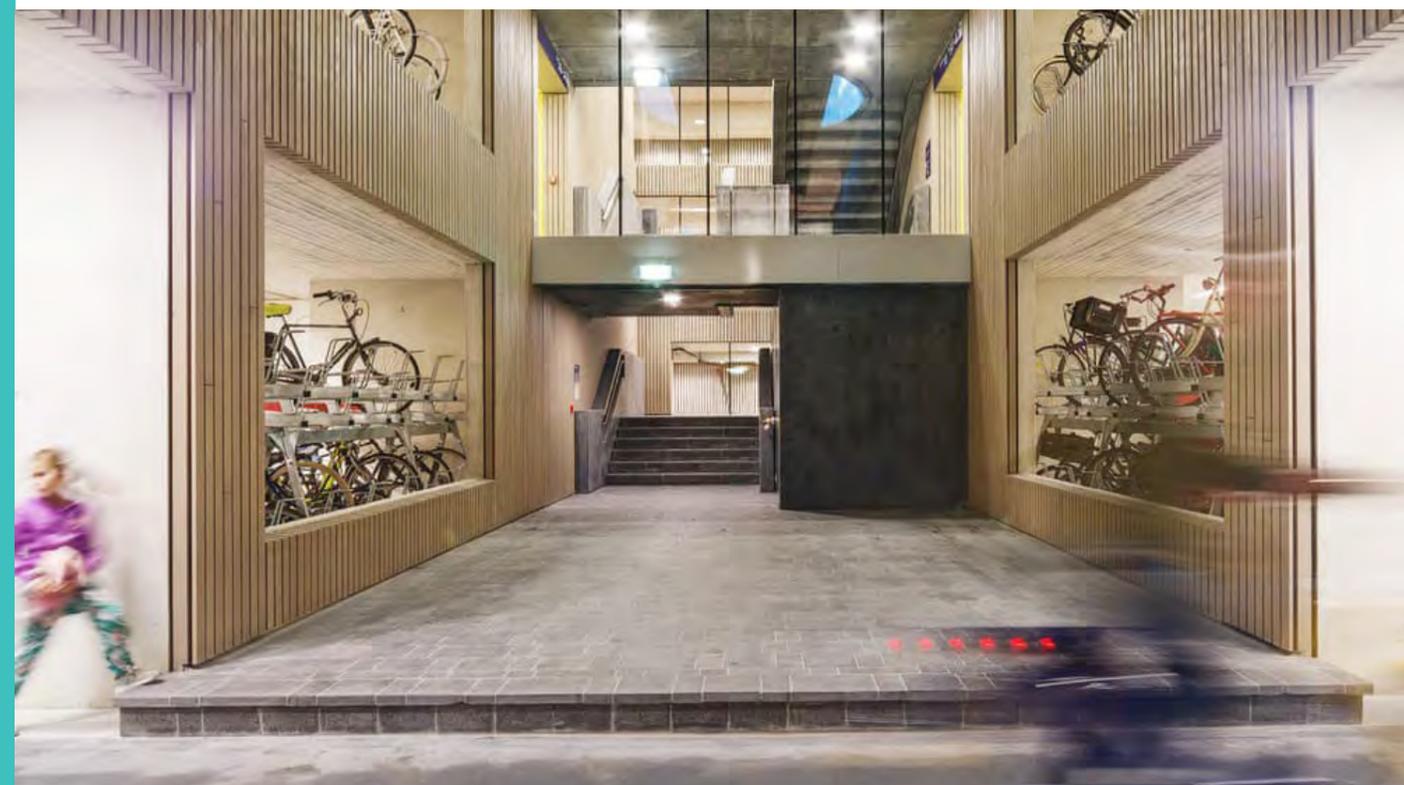


Figure 10.1: Precedent images of cycle storage and facilities



Figure 10.2: Relationship to the wider town centre and local transport links

10.2 ATH Principles of Access

The ATH is proposed to be located at the southern end of Phase 1 on the eastern side of the Blueprint that has been identified for a new public space that is intended to be free of vehicles.

10.2.1 Pedestrians

The key pedestrian movement through the public realm and the wider Phase 1 development is north/south linking the railway and bus station, ATH, new residential uses and finally the MSCP and onto Old Mill Lane.

The ATH can be directly access by pedestrians via the:

- Road linking County Way to the Lower Seam car park, to the rear of the Courthouse pub; and
- The steps at the far southern end of Phase 1 that drops down to the corner of Regent Street with Eldon Road North.

Figure 10.1 shows these access points.

The route to the rear of the pub currently has no / very narrow footways and as such this should, at the next stage, be improved given that only service access will be required in the future. See Section 10.2.3.

10.2.2 Cyclists

As noted in the previous section, the new public realm is intended to be a pedestrian dominated space.

Cyclists and micro-mobility users will need to have access to the ATH from the surrounding network. The most direct access routes to the ATH are from:

- Road linking County Way to the Lower Seam car park, to the rear of the Courthouse pub; and
- The ramp at the far southern end of Phase 1 that drops down to the corner of Regent Street with Eldon Road North.

At the next stage of the design process for the public realm, consideration needs to be given to how cyclists and micro-mobility user move through the space. Given that the space is envisioned to be pedestrian dominated, then the other users should dismount at walk to the ATH and other land uses.

10.2.3 Service & Emergency Vehicles

The ATH will require servicing, even if this is infrequent, depending upon the final and future uses within the building. The servicing will need to take place as close to the building as possible, preferably directly adjacent.

This is proposed to take place via the road linking to County Way to the rear of the pub and across the public space. This could take place outside of busy period for pedestrian activity and informal access provided to allow servicing and deliveries. This is the approach taken across many pedestrianised streets / spaces in town centres up and down the country.

Emergency vehicles should be able to access the hub via the servicing route. The design of the public realm should be cognisant of this and provide a 'route' through the space that allows the vehicle(s) to move around, although not a delineated carriageway)

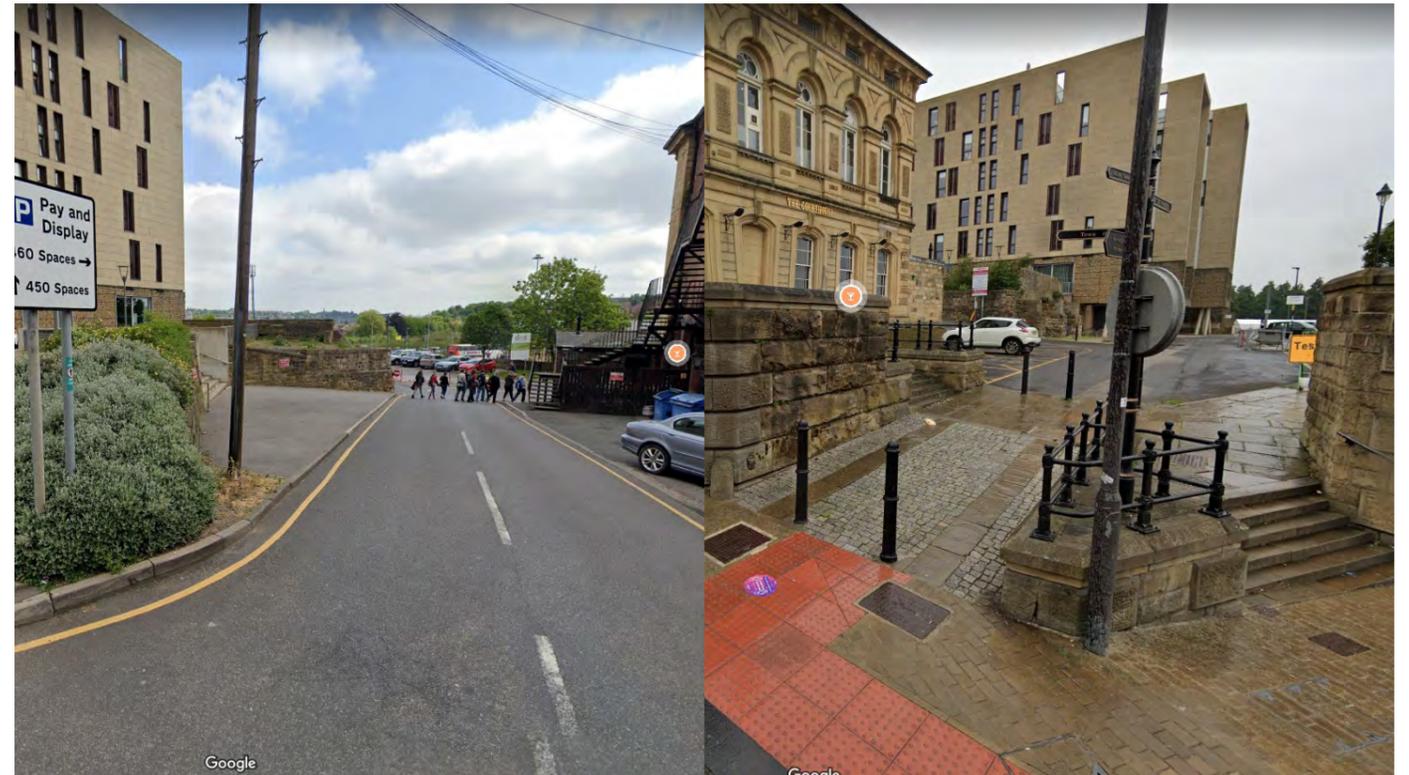


Figure 10.3 (above): Road to Rear of Courthouse Pub (Left) and Steps & Ramp between Seam and Regent Street (Right)
Figure 10.4 (below): Precedent image of cycle storage and facilities



10.3 Off-Site Infrastructure

The brief for Phase 1 required the design team to develop options for the junctions of County Way with Old Mill Lane and Regent Street with Eldon Street.

This report (ATH) sets out potential options for the junction of Regent Street with Eldon Street.

The team were tasked with preparing a Transport Assessment for a Phase 1 to 5 to accompany a planning application for Phase 1. The conclusions are summarised in Section 10.4.2 of this report.

10.3.1 Junction Options

The design team meet the Local Highway Authority 12th December 2021 to discuss the approach to potential interventions to the junction of Regent Street with Eldon Street. The key point raised was that there is aspiration from the Council to integrate facilities for cyclists.

The design team have prepared 2 options for the junction to improve the environment for pedestrians to allow for integration of cycle facilities. Option 1 is shown in Figure 10.5 and Option 2 is shown in Figure 10.6.

10.3.2.1 Option 1

Option 1 proposes minor changes to the existing layout to provide more space for pedestrians on the southwest side of the central triangle island and increase the width of the crossing points to accommodate increased footfall and cyclists walking bikes across.

There is also a small section of widening (1m) of the footway on the west side of Eldon Street North to provide more space for pedestrians.

10.3.1.2 Option 2

Option 2 proposes the reconfiguration of the junction to provide a signalised T-Junction with Regent Street being the side arm. New TOUCAN crossings are to be provided across all arms, with a new crossing point to the north of Regent Street.

Regent Street has been reduced to one running lane on approach allowing for significant widening of the footway on the north side of Regent Street by 2.3m and increased the footway on the corner of Regent Street and Eldon Street South.

This layout can be adapted to incorporate facilities to direct cyclists to the TOUCAN crossings. It also reduces the number of stages in crossing for pedestrians between the train and stations from 2 to 1, via the new facility on Eldon Street North

10.3.2 Transport Assessment

The design team met with the Local Highway Authority on the 11th November 2021 to discuss the scope of a Transport Assessment that covers Phase 1 to Phase 5 of The Seam Blueprint.

The scope of the Transport Assessment to examine possible wider implications of The Seam development is agreed to take place in the next stage of work.

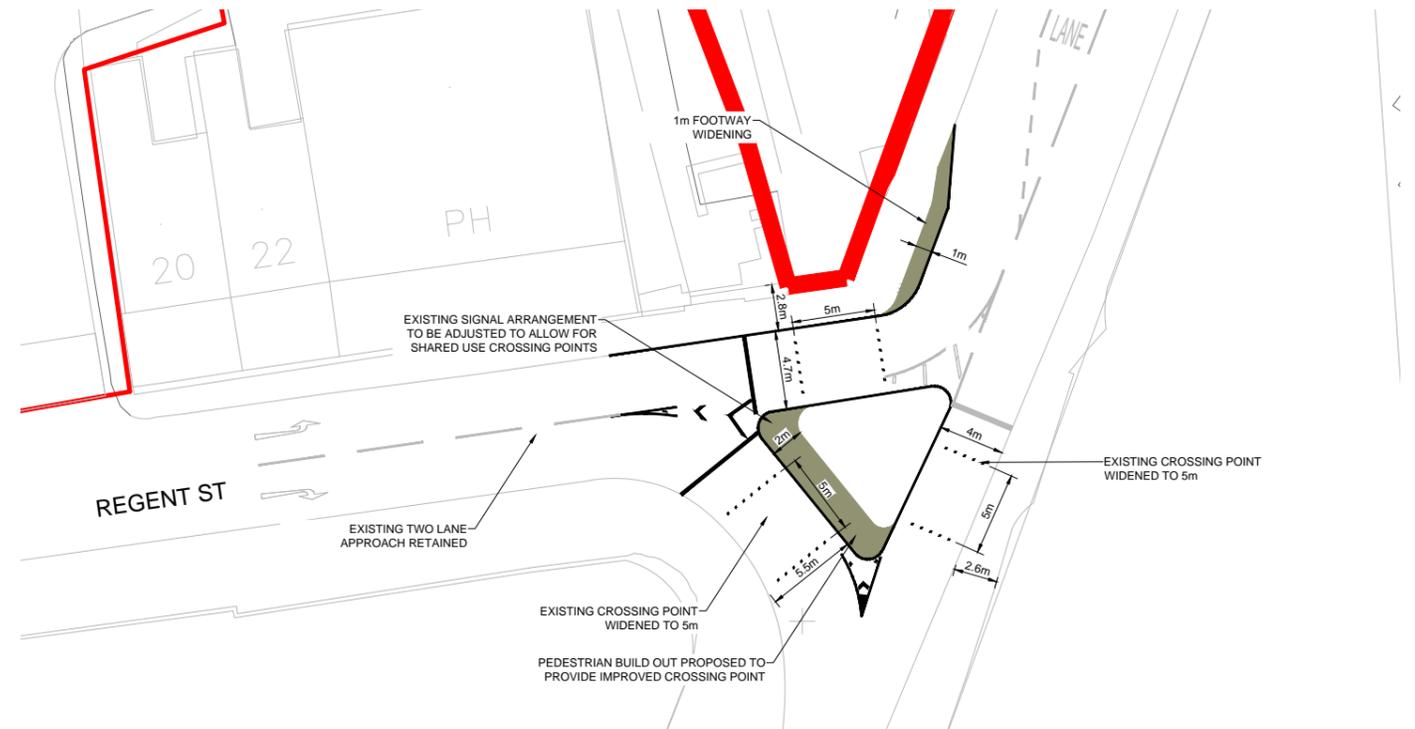


Figure 10.5: Option 3

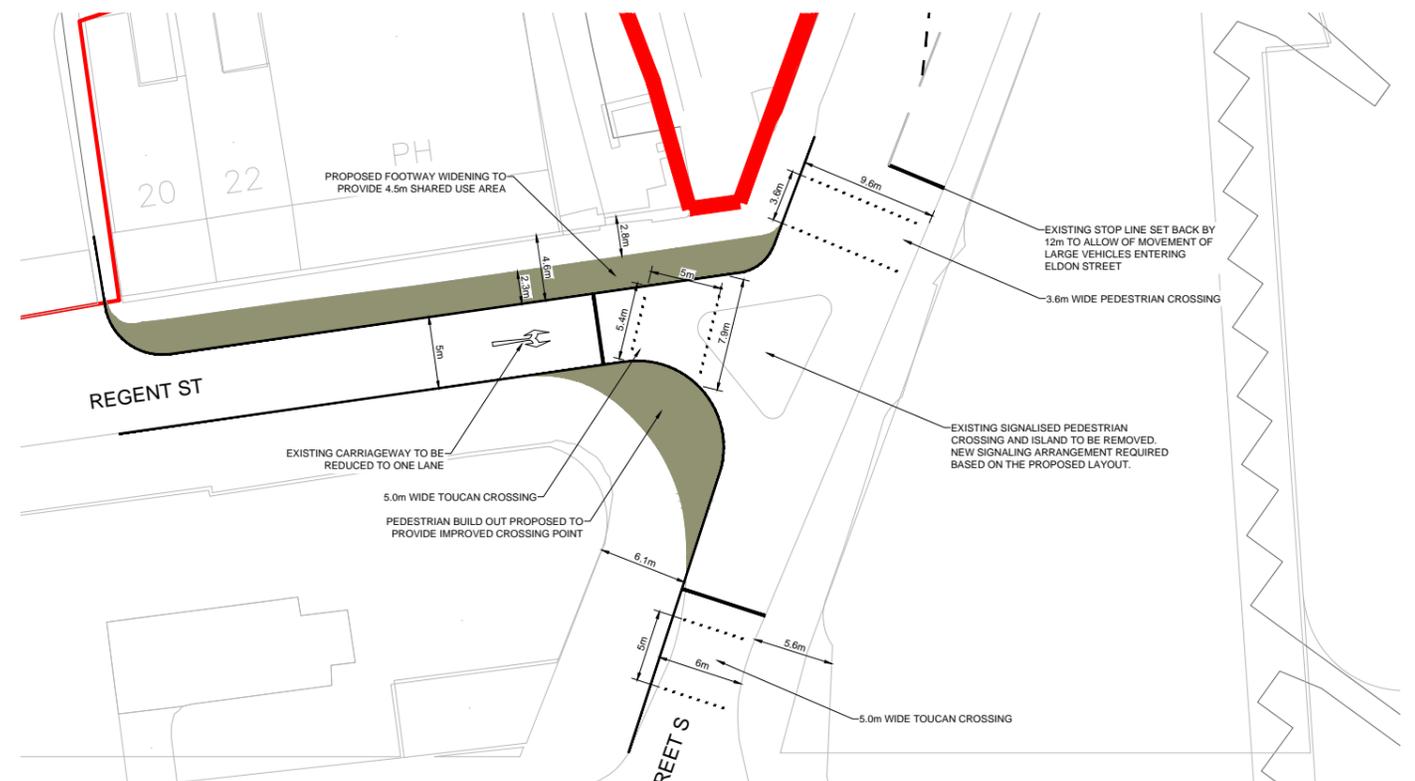


Figure 10.6: Option 4

11.1 Sustainability

11.1 Sustainability

11.1.1 Introduction

Reflecting Barnsley Metropolitan Borough Council's (BMBC's) strong sustainability and climate change agendas, sustainable development is a key driver and major priority for the Seam. Jointly appointed to develop the overall sustainability strategy, the BDP and Arcadis sustainability consultants have worked closely with BMBC and the design team to develop the sustainability outcomes and targets (referred to as "outputs" within this document) for the Active Travel Hub (ATH), multi-storey car park (MSCP), Plots 1 and 2, and the public realm.

This section of the report details:

- The methodologies employed to derive the sustainability outcomes and outputs.
- The agreed strategy, including measurable, ambitious and unambiguous outputs.
- Where applicable, the design response, to date.

11.2 Methodology

- Future Homes Standard
- Living Buildings Challenge

Establishing the Vision and Outcomes:

The vision and outcomes reported have been developed through:

- A review of the sustainability objectives and targets set out within:
 - o Barnsley Local Plan 2012 – 2033
 - o Barnsley Zero Carbon Sustainable Energy Action Plan 2020 – 2025
 - o The Seam Barnsley Digital Campus Development Blueprint
- A workshop with the design team and Barnsley Metropolitan Borough Council (BMBC). The aim of the workshop, held on 18th November 2021, was to:
 - o Review and agree the overall vision and outcomes for Phase 1.
 - o Highlight any wider ambitions or stretch targets.
- Further liaison with the design team and BMBC to further develop the outcomes in line with their overarching ambitions. This included separate meetings with BMBC's Sustainability and Climate Change Group Leader.

Establishing the Outputs and the Sustainability Strategy:

The purpose of establishing the outcomes was to allow them to serve as underlying design principles, underpinning the overall strategy, and allowing the project team, supported by the BDP and Arcadis Sustainability Consultants, to set measurable, ambitious and unambiguous targets / outputs relevant to environmental, social and economic sustainability.

Based on each outcome, a number of outputs and KPIs were established, based on best practice. Best practice was established through a review of the following documents and frameworks:

- Barnsley Local Plan 2012 – 2033
- Barnsley Zero Carbon Sustainable Energy Action Plan 2020 – 2025
- Barnsley Sustainable Travel SPD (Draft document November 2021)
- LETI Climate Change Emergency Design Guide
- UKGBC guidance
- RIBA 2030 Climate Challenge (v2)
- BREEAM New Construction 2018
- BREEAM Communities
- WELL Building Standard v2
- WELL Building Standard Communities
- Home Quality Mark
- CEEQUAL v6
- Future Buildings Standard

The KPIs and outputs set have been linked to the Barnsley Council Plan 2021 - 2024, which sets out key ambitions for the Borough, and to demonstrate the alignment the Phase 1 delivery with Barnsley's sustainability and climate change agenda:

Barnsley - the place of possibilities			
Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley
People are safe and feel safe.	People have the opportunities for lifelong learning and developing new skills including access to apprenticeships.	Business start ups and existing local businesses are supported to grow and attract new investment, providing opportunities for all.	People live in great places, are recycling more and wasting less, feel connected and valued in their community.
People live independently with good physical and mental health for as long as possible.	Children and young people achieve the best outcomes through improved educational achievement and attainment.	People have a welcoming, safe and enjoyable town centre and principal towns as destinations for work, shopping, leisure and culture.	Our heritage and green spaces are promoted for all people to enjoy.
We have reduced inequalities in health and income across the borough.	People have access to early help and support.	People are supported to have safe, warm, sustainable homes.	Fossil fuels are being replaced by affordable and sustainable energy and people are able to enjoy more cycling and walking.
Enabling Barnsley We are a modern, inclusive, efficient, productive and high-performing council			

For completeness, and to demonstrate the holistic and joined up approach to sustainability throughout Phase 1, the strategy presented in this document contains outcomes and outputs for the ATH, MSCP, Plots 1 and 2, and the public realm areas.

It should be noted that the sustainability strategy should remain a live document, incorporating any future updates relevant to design changes, industry trends or Council policies and agendas.

11.3 The Sustainability Vision

Following the workshops described in Section 11.2, the following overarching vision was agreed for Phase 1:

"To lead by example through the development of a digital SMART campus which is climate resilient and supports the 2045 "Zero45" net zero carbon target for the Borough of Barnsley. This is achieved by demonstrable contributions to the local community, wellbeing, reduced carbon emissions, and the restoration and enhancement of the natural environment. The masterplan aims to be a catalyst for carbon reduction across the local, regional, national and international communities, aspiring to be an exemplar beacon of sustainability within the built environment."

11.4 Sustainability Strategy

Please note the sustainability strategy should be read alongside the Landscape and Public Realm Concept Design Strategy, the Multi-Storey Car Park Stage 2 report, and the supporting sections of this report.

				Links to Barnsley Council Plan					
Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
1. Transport and Connectivity									
1.1 In support of Barnsley's zero carbon strategy, the scheme contributes to a reduction in health inequality, improved local air quality and general health and wellbeing, and increased fossil fuel free local travel. Improvements in connectivity and quality external environments increase footfall within the area, thereby supporting local businesses, increasing revenues, and reducing crime rates. Also refer to topics: - 2.1 Multi-Functional Green Space - 6.1 External Spaces	Emerging Sustainable Travel SPD Compliance	ALL PHASE 1: A transport assessment and travel plan will be produced, in line with the emerging Sustainable Travel SPD requirements, to further inform the design and promote sustainable transport measures.	The design response will be confirmed following receipt of the interim / final transport assessment and travel plan. This will occur in the next stages of design.	●	●	●	●	Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression. Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides. Increased footfall within the area and increased revenue for local businesses. Further indicators and measures are to be confirmed on receipt of the interim / final transport assessment and travel plan.	Sustainable Travel SPD (Draft Document November 2021)
	Cycle Storage	ACTIVE TRAVEL HUB: The use of bicycles as a mode of transport is promoted. PLOTS 1 & 2: The use of bicycles as a mode of transport is promoted. Safe and secure cycle storage is provided for residents of Plots 1 and 2. The number of cycle storage spaces required is informed by a transport assessment. Alternatively, the following is met: - Studios/1 bedroom dwellings - storage for 1 cycle for every two dwellings - 2/3 bedroom dwellings - storage for 1 cycle - 4 + bedrooms - storage for 2 cycles	The ATH, by the very nature of its design and purpose, will promote active travel and the use of bicycles, thereby improving health and wellbeing, and reducing transport-based emissions. The current design comprises: • 98 standard spaces • 5 accessible spaces • 15 secure lockers for foldable bikes • 4 vertical lockers for standard sized cycles Currently, 100% of the entire provision has been assumed to require charging facilities (i.e., E-bike charging). To support the requirements of frequent and longer stay users, lockers, showers, toilets and drying facilities are provided. Security has also been a key consideration, with double-fob entry and CCTV provided. A lobby arrangement has been proposed with two entrances to prevent 'tailgating' to gain access to the cycle storage area. With regards to Plots 1 and 2, the requirements of this output will need to be reflected in the drawings and specifications, moving forward.	●		●	●	The number of safe and secure cycle storage spaces meet or exceed the requirements of this output. Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression. Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.	Barnsley Local Plan 2012–2033 BREEAM Communities Home Quality Mark

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
<p>1. Transport and Connectivity</p> <p><i>(continued)</i></p> <p>1.1 In support of Barnsley's zero carbon strategy, the scheme contributes to a reduction in health inequality, improved local air quality and general health and wellbeing, and increased fossil fuel free local travel. Improvements in connectivity and quality external environments increase footfall within the area, thereby supporting local businesses, increasing revenues, and reducing crime rates.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 2.1 Multi-Functional Green Space - 6.1 External Spaces 	<p>Pedestrian and Cyclist Routes</p>	<p>PUBLIC REALM:</p> <p>Dedicated and safe cycle paths are provided from the site entrance to cycle storage, and connect to off-site cycle paths, where possible. For safety purposes, these are segregated from vehicles and pedestrians as appropriate:</p> <ul style="list-style-type: none"> - On low speed streets, below 20mph (30km/h), cyclists can be integrated with vehicles - On busy streets or where there are higher traffic speeds there should be clearly defined cycle lanes - Separate cycle tracks should be introduced where space allows - Pedestrians and cyclists can share the same space, but steps must be taken to segregate the two, for example, a raised kerb or clear markings. Where pedestrians and cyclists share the same space but segregation is not possible, a minimum width of 3 metres should be provided. <p>Dedicated and safe footpaths are provided, where required.</p>	<p>As per the details in the Landscape Strategy, three alternative cycle routes have been considered:</p> <ol style="list-style-type: none"> 1. Connecting route via the ramp and Promenade: This link allows cyclists to move through the lower areas of the masterplan and connect back onto County Way via the proposed ramp. Concerns have been raised about the risk of conflict between pedestrians and cyclists moving at speed especially along the ramp. 2. Promenade Route routing behind the MSCP: The link directs cyclists through the new space, providing opportunities for dedicated cycle path integrated into the public realm. Routing behind the MSCP appears to be less direct and could put cyclists off taking this route. 3. County Way cycle route: This route follows the line of County Way, avoiding a route through the Phase 1 project area. This route is straight and direct and could re-connect between the pub and DMC01. <p>Cycle route provision and layout will be considered further in the following stages.</p> <p>Traffic running across the site will be restricted. However, where roads and pedestrian routes cross / run in parallel, dedicated pedestrian pathways will provided.</p> <p>Compliance with the remaining requirements are to be considered as the design progresses.</p> <p>Please refer to the Landscape and Public Realm Concept Design Strategy for further details.</p>	●		●	●	<p>The number and design of dedicated cycle and pedestrian cycle paths and routes meet or exceed the requirements of this output.</p> <p>Reduced collisions between cyclists / pedestrians and motor vehicles.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p>	<p>Barnsley Local Plan</p> <p>BREEAM Communities</p> <p>BREEAM NC 2018</p> <p>Sustainable Travel SPD (Draft Document November 2021)</p>
	<p>Quality Cyclist and Pedestrian Environments</p>	<p>PUBLIC REALM:</p> <p>Quality external environments have been designed in order to promote active travel and movement. This is demonstrated through at least two of the following being present at regular intervals along at least 75% of active travel routes:</p> <ul style="list-style-type: none"> - Seating - Trees, planters and/or other landscaped/biophilic elements - Natural (e.g. landscape elements such as trees) or man-made shading devices intended to block direct sunlight and glare - Artistic installations 	<p>Based on the current landscape and public realm design, a variety of open space and green space typologies and planting will be provided alongside key travel routes. Although street furniture and artistic installations will be decided in the following design stages, based on the current design intentions, that the requirements of this output will be met. For further details please refer to the Landscape and Public Realm Concept Design Strategy (3rd Edition).</p>	●		●	●	<p>The number of elements / features meet or exceed the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p>	<p>BREEAM Communities</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
1. Transport and Connectivity									
<p><i>(continued)</i></p> <p>1.1 In support of Barnsley's zero carbon strategy, the scheme contributes to a reduction in health inequality, improved local air quality and general health and wellbeing, and increased fossil fuel free local travel. Improvements in connectivity and quality external environments increase footfall within the area, thereby supporting local businesses, increasing revenues, and reducing crime rates.</p> <p>Also refer to topics: - 2.1 Multi-Functional Green Space - 6.1 External Spaces</p>	Connectivity	<p>PUBLIC REALM: A connected campus is created, identifiable by its use of planting, where varied green space and green infrastructure links combine to establish legible active travel routes throughout the site.</p>	<p>A movement framework has been developed as part of the Landscape Strategy to determine the layout and design of the streetscape, and hence promote sustainable modes of movement and transport.</p> <p>As per the details in the Landscape Strategy, the change of level along the edge creates a distinct landscape setting with proposed ramp, sloping and terraced landscapes and attractive walkways. At the core of the public realm masterplan there is an opportunity to establish an attractive network of routes, and green spaces based along a main north-south axes that leads towards the town centre.</p> <p>As per the details in the Landscape Strategy (section "Movement Strategy), the 'Promenade' will generate the greatest footfall and will be founded on the creation of a high quality public realm and a diverse and high quality green landscape infrastructure, which will interface with a new greenspace, proposed development and ATH building and other community facing amenities, such as DMC01, a cafe and other leisure uses. New tree planting and a green infrastructure of bio-diverse rich planting will give rise to a greener neighbourhood with strong sustainable principles.</p> <p>Current proposed active travel routes will allow easy navigation around the development using key features to aid navigation. As the design progresses, the following principles shall remain embedded within the design: - New routes into the development are a continuation of existing routes from the surrounding area - Routes connect residential areas to, and between, community focal points in the development and surrounding area</p> <p>As per the current landscape designs, the primary, secondary and tertiary routes identified create legible travel routes. All will be provided with tree planting and green space provision.</p>	●		●	●	<p>The number and design of active travel route meets or exceed the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	BREEAM Communities
	Wayfinding	<p>PUBLIC REALM Wayfinding signage detailing directions and route information is provided to aid active travel around the development and into the surrounding area, contributing to accessibility, reduced stress and user empowerment. Signage includes the following: - Forward-facing street map that includes street names - Basic cardinal directions - Designation of active travel routes - Identification and location of, distance to and/or time to key community focal points such as those within an 800m walk distance or bicycle ride</p> <p>Where appropriate and feasible, wayfinding is connected to the SMART Technology Strategy.</p>	Wayfinding solutions will be developed in the later stages of the design.	●		●	●	<p>The signage design and links to SMART technologies meets or exceed the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	BREEAM Communities WELL Communities

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
1. Transport and Connectivity									
<p><i>(continued)</i></p> <p>1.1 In support of Barnsley's zero carbon strategy, the scheme contributes to a reduction in health inequality, improved local air quality and general health and wellbeing, and increased fossil fuel free local travel. Improvements in connectivity and quality external environments increase footfall within the area, thereby supporting local businesses, increasing revenues, and reducing crime rates.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 2.1 Multi-Functional Green Space - 6.1 External Spaces 	Safety and Security	<p>PUBLIC REALM:</p> <p>Street layouts and the design of pedestrian and cycle routes are safe and secure by incorporating the following:</p> <ul style="list-style-type: none"> - In residential areas, all streets and open spaces are overlooked - All access points and routes through the site are well lit, direct and overlooked - Pedestrian crossings are designed to ensure safety for all users - A clear distinction is made between public, semi-public and private external spaces <p>Design measures are incorporated into the masterplan to ensure safety with regard to large vehicles, pedestrian and cyclist movement. As a minimum, vehicle delivery areas are not accessed through parking areas and do not share pedestrian and cyclist routes.</p>	Compliance with these requirements will be demonstrated as the design progresses and the site layout is confirmed. Current safety features include, for example, provision of HMV bollards, and well lit cyclist and pedestrian routes.	●		●	●	<p>The number of safety measures meet or exceed the requirements of this output.</p> <p>Provision of appropriate cycle and pedestrian paths.</p> <p>If required, number of pedestrian crossings.</p> <p>Reduced local crime rates.</p> <p>Reduced collisions between cyclists / pedestrians and motor vehicles.</p>	<p>BREEAM Communities</p> <p>BREEAM NC 2018</p> <p>Home Quality Mark</p>
	Car Sharing	<p>MULTI-STOREY CAR PARK:</p> <p>To promote car sharing, priority parking spaces are provided for at least 5% of the total car parking capacity. Spaces are located nearest the development entrance.</p> <p>Where appropriate, the promotion of car sharing may be linked to the SMART Technology Strategy.</p>	This concept and outcome will be considered further in the next stages of the design.	●		●	●	<p>The % car sharing spaces meets or exceed the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p>	<p>BREEAM Communities</p> <p>BREEAM NC 2018</p>
	Electric Vehicle Charging Points	<p>MULTI-STOREY CAR PARK:</p> <p>At least 10% of parking spaces incorporate electric vehicle charging points. The minimum charging point specification shall be mode "3", 32AMP, 7kW.</p> <p>Infrastructure is provided for future provision, and to meet a 20% target.</p> <p>PLOTS 1 & 2, PUBLIC REALM:</p> <p>If private / in-plot parking is provided, 1 EV charging point is provided per dwelling. Where unallocated parking is provided for residents, EV charging points are provided for at least 10% of spaces. The minimum charging point specification shall be mode "3", 32AMP, 7kW.</p>	<p>The current MEP design of the MSCP includes charging points for 10% of parking spaces. Of this 10%:</p> <ul style="list-style-type: none"> - 70% will be slow charging spaces (7.4kW) - 20% will be fast charging spaces (22kW) - 10% will be rapid charging spaces (43kW) <p>Infrastructure allowing for future additional provision (20% of parking spaces) is allowed for in the design.</p> <p>The requirements and responses for the remainder of the development will be confirmed in the next stages of design.</p>	●		●	●	<p>The % EV charging points >7kW meets or exceed the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p>	<p>BREEAM NC 2018</p> <p>Building Regulations Part S (2021)</p> <p>Home Quality Mark</p> <p>Sustainable Travel SPD (Draft Document November 2021)</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
1. Transport and Connectivity									
<p><i>(continued)</i></p> <p>1.1 In support of Barnsley's zero carbon strategy, the scheme contributes to a reduction in health inequality, improved local air quality and general health and wellbeing, and increased fossil fuel free local travel. Improvements in connectivity and quality external environments increase footfall within the area, thereby supporting local businesses, increasing revenues, and reducing crime rates.</p> <p>Also refer to topics: - 2.1 Multi-Functional Green Space - 6.1 External Spaces</p>	<p>SMART Parking Technologies</p>	<p>ACTIVE TRAVEL HUB AND MULTI-STOREY CAR PARK:</p> <p>As part of the wider SMART Technologies Strategy, SMART technologies are employed to reduce traffic congestion, improve parking management, reduce pollution and optimise the use of available spaces.</p>	<p>As per the MEP strategy, allowance has been made for an IoT-based system within the ATH and MSCP to allow for the communication of free and occupied bike parking (ATH) and car parking (MSCP) spaces over web or mobile applications. The SMART parking system comprises of bike sensors, which are installed per cycle bay and link up to a network of WiFi enabled SmartSpots, which in turn feed real time data into a SmartCloud platform. This will not only show live parking events, but affords users detailed site information such as parking trends and abuse of parking spaces, allowing informed decisions to be made around how the status of each individual bay is regulated.</p>	●		●	●	<p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Reduced overhead costs associated with parking meters and enforcement effectiveness.</p>	<p>Bespoke</p>
2. Biodiversity and Green Infrastructure									
<p>2.1 Opportunities for nature are increased. This is achieved through the provision of quality habitats which are joined up at all scales, and which enhance human health and wellbeing, support wildlife corridors, enhance climate resilience and deliver environmental benefits.</p> <p>Also refer to topics: - 1.1 Quality Cyclist and Pedestrian Environments - 1.1 Connectivity - 3.1 Urban Heat Island Mitigation - 3.2 Nature-Based SUDs Solutions - 6.1 Edible Landscapes</p>	<p>Multifunctional Green Space</p>	<p>ALL PHASE 1:</p> <p>A network of multifunctional green infrastructure assets and public green spaces are delivered, in line with Barnsley's Green Space Strategy and Green Infrastructure Strategy. Consultation has taken place with Barnsley Metropolitan Borough Council, existing residents and potential users of the development to understand the desired uses, design, quantity and location of accessible and natural green space.</p> <p>An ecosystem service approach is adopted with regards to green space and green infrastructure design.</p>	<p>Sustainability and delivery of ecosystem services have been key drivers for the design of Phase 1. As detailed in the Landscape and Public Realm Concept Design Strategy, through the creation of the 6 character areas, a number of different green space and green infrastructure typologies are proposed:</p> <ol style="list-style-type: none"> 1. Parade Promenade: Although largely hard surface, trees and planters will be provided. 2. Central Green Space: A large open lawn enclosed by colourful planting. 3. The Gardens (Green Seam): A natural setting with displays of form, colour and texture of varying plants. The space will be rich in biodiversity with structured mixed planting for all year round interest. 4. The Activity Spine (Building Threshold): Soft landscape edges will be shaped to accommodate established desire lines. 5. Public realm around Plot 2: Although largely hard surface, soft landscaping, trees and planters may be provided. 6. Southern Gateway Arrival: The Gateway marks the town entrance into the Digital Campus and therefore impressions of the 'green' nature of the public realm. <p>Furthermore, street trees, pocket parks, and planters will be provided throughout the development. A 200m2 green roof space is also proposed to the ATH.</p> <p>Together, the landscape design will offer numerous ecosystem services, including, for example:</p> <ul style="list-style-type: none"> - Opportunities for recreation, as well as providing aesthetic and "spiritual" (also referred to as sense of place) services - Mitigation and control measures relating to water quality, noise, air quality and light pollution - Climate change mitigation and reduction of the urban heat island effect, shading and biotic cooling - Management of surface water run off and flood risk management - Improvement in biodiversity <p>Consultation and development of the ecosystem services approach will be considered further in the next stages of design.</p>	●		●	●	<p>Increased number of green space typologies and % cover of green space and green infrastructure.</p> <p>Increased percentage of surface water attenuation resulting from nature-based SUDS solutions.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced mortalities resulting from heatwaves.</p> <p>Improved air and water quality.</p> <p>Reduced flood risk and surface water runoff, and subsequent local flooding events.</p> <p>Improved ecological / biodiversity value (% biodiversity net gain - DEFRA / Natural England).</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	<p>Barnsley Local Plan 2012–2033</p> <p>BREEAM Communities</p> <p>Home Quality Mark</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
2. Biodiversity and Green Infrastructure									
<p>2.2 The natural environment is improved and is an attractive place to live, work and play in, helping to secure further inward investment, improve health and wellbeing and promote social cohesion.</p> <p>Also refer to topics: - 1.1 Quality Cyclist and Pedestrian Environments - 1.1 Connectivity - 3.1 Urban Heat Island Mitigation - 3.2 Nature-Based SUDs Solutions - 6.1 Edible Landscapes</p>	Biodiversity	<p>ALL PHASE 1: Through the production of a net gain plan (as per the Environment Act), adverse impacts on habitats will be minimised. This applies to both the pre-development and post-development biodiversity value of onsite habitats, the biodiversity value of any offsite habitat produced in relation to the development, and any statutory biodiversity credits purchased (if applicable, plus any further requirements set out in secondary legislation).</p>	<p>Following the completion of the ecology survey, a net gain plan will be established. It is thought, however, that a net gain will be easily achieved based on the ecological improvements proposed for the site.</p>	●		●	●	<p>Improved ecological / biodiversity value (% biodiversity net gain - DEFRA / Natural England).</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses, obesity and mental health issues such as depression.</p> <p>Reduced mortalities resulting from heatwaves.</p> <p>Improved air and water quality.</p> <p>Improved local air quality.</p> <p>Reduced flood risk and surface water runoff, and subsequent local flooding events.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	<p>Barnsley Local Plan 2012–2033</p> <p>BREEAM Communities</p> <p>CEEQUAL v6</p> <p>Home Quality Mark</p> <p>RIBA 2030 Climate Challenge v2</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
3. Climate Resilience									
<p>3.1 The development is resilient to future impacts of climate change. Appropriate and robust analysis demonstrates that increases in rainfall, summertime temperatures and flood risk will be managed effectively, and potable water consumption minimised.</p> <p>Also refer to topics: - 2.1 Multi-Functional Green Space - 2.2 Biodiversity - 3.2 Nature-Based SUDS - 6.3 Overheating</p>	<p>Urban Heat Island Mitigation</p>	<p>ALL PHASE 1: Localised temperatures are reduced and thermal comfort improved. At least 75% of all non-occupiable or non-mechanical rooftops (excluding areas with photovoltaic installations) meet one or more of the following: - Uses a green roof system that includes at least a 2-inch covering of hardy groundcover - Low-sloped roofs (slope ≤ 2:12) have a three-year aged solar reflectance index (SRI) of 64, or an initial SRI of 82 - Steep-sloped roofs (slope > 2:12) have a three-year aged SRI of 32, or an initial SRI of 39</p> <p>PUBLIC REALM: Localised temperatures are reduced and thermal comfort improved. For 50% or more of pedestrian-accessible street segments in the project and for 50% of roadways in the project, one or more of the following is met: - Pavements provide shade with trees or with architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28, or an initial SR of at least 0.33 at installation - Roads use paving materials with a three-year aged solar reflectance (SR) value of at least 0.28, or initial SR of at least 0.33 at installation</p>	<p>In line with the current proposals, >75% of the ATH roof area comprises either green roof or photovoltaic panels. The green roof specification will be defined in the following stages, however the current design is in line with this output.</p> <p>This issue will be addressed further in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.</p>	●		●	●	<p>The % applicable surfaces meets or exceed the requirements of this output.</p> <p>Reduced mortalities resulting from heatwaves.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Lower energy bills (associated with any required mechanical cooling).</p>	<p>WELL Communities</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
3. Climate Resilience									
<p><i>(continued)</i></p> <p>3.1 The development is resilient to future impacts of climate change. Appropriate and robust analysis demonstrates that increases in rainfall, summertime temperatures and flood risk will be managed effectively, and potable water consumption minimised.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 2.1 Multi-Functional Green Space - 2.2 Biodiversity - 3.2 Nature-Based SUDS - 6.3 Overheating 	Regulated Water Consumption	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK:</p> <p>Issues around future water scarcity are managed through the specification of low-water-consuming fittings. A 40% reduction against baseline water consumption is achieved, in line with the BREEAM 2018 Wat 01 methodology (or any future revision thereof).</p> <p>PLOTS 1 & 2:</p> <p>Issues around future water scarcity are managed through the specification of low-water-consuming fittings. Potable water consumption is limited to 75 litres/person/day.</p>	<p>In line with the BREEAM pre-assessment produced for the ATH (see Section 7 for further details), water consumption is anticipated to be reduced to a minimum of 40% reduction over a notional baseline. This can be achieved through the following specification:</p> <ul style="list-style-type: none"> • WCs: 3.75 litre effective flush volume • Wash-hand basin taps: 5 litres/min • Showers: 6 litres/min • Kitchenette taps (if provided): 6 litres/min • Kitchen taps (pre-rinse nozzles only): 7.30 litres/min • Domestic sized dishwashers: 40 litres/use • Commercial sized dishwashers: 7.5 litres/rack <p>The same rational can be applied to the MSCP.</p> <p>The technical details above should form part of the Stage 3 specification to ensure compliance. Technical requirements for Plots 1 and 2 will need to be defined at a later date, and once the proposals have been developed further.</p>					<p>Reduced water consumption (% reduction or litres/person/day).</p> <p>Reduced water bills.</p>	<p>BREEAM NC 2018</p> <p>RIBA 2030 Climate Challenge v2</p>
	Unregulated Water Consumption	<p>ALL PHASE 1:</p> <p>The potable water demand relating to the irrigation of planting is offset through one or a combination of the following solutions:</p> <ul style="list-style-type: none"> - Planting relies solely on precipitation, during all seasons of the year - Drip-fed subsurface irrigation incorporating soil moisture sensors. The irrigation control should be zoned to permit variable irrigation to different planting assemblages. This should link to the SMART Technologies Strategy - Reclaimed/recovered water from a rainwater collection or waste water recovery system, with appropriate storage. This includes borehole water - All planting specified is restricted to contextually appropriate species that thrive without irrigation and will continue to do so in those conditions likely as a result of climate change, i.e. typically warmer and drier conditions 	<p>The offsetting of potable water with regards to irrigation will be considered in the following stages of design. That said, as part of the drainage strategy, the project will work to alleviate storm-water runoff as part of a sustainable drainage system strategy (SUDs), by allowing the surface water to be directed into soft planted areas for natural absorption and slow percolation in the soil layers.</p>					<p>Reduced water consumption (litres of water saved and / or % offset through reclaimed / recovered water),</p> <p>Reduced water bills.</p>	<p>BREEAM NC 2018</p>
	Potable Water Offsets	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2:</p> <p>The design allows for the future installation of greywater / or rainwater harvesting tanks (as appropriate).</p>	<p>Allowance has been made for a greywater harvesting tank within the MSCP design, and for a rainwater harvesting tank within the ATH design.</p> <p>For Plots 1 and 2, allowance for either or options must be made within future design proposals.</p>					<p>Layouts allow for future integration of appropriately sized rainwater and / or greywater harvesting tanks (size tbc.)</p> <p>Reduced water consumption.</p> <p>Reduced water bills.</p>	<p>Bespoke</p>
	Water Leak Detection	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK:</p> <p>Water leak detection systems which are capable of detecting major water leaks on the mains water supply within the building and between the building and the utilities water meter are provided.</p> <p>Flow control devices (e.g. PIRs and solenoid valves) that regulate the water supply to each WC area or sanitary facility, according to demand, are provided.</p>	<p>Water leak detection and flow control devices will be incorporated into the design in the following stages.</p>					<p>Reduced water consumption.</p> <p>Reduced water bills.</p> <p>Reduced maintenance costs resulting from water damage to properties.</p>	<p>BREEAM NC 2018</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
3. Climate Resilience									
<p>3.2 As a result of the development, there is improved protection from flooding through increased water storage capacity, enhanced water quality, a reduction in the amount of pollution to the water environment and the creation of new habitats for wildlife.</p> <p>Also refer to topics: - 2.1 Multi-Functional Green Space - 2.2 Biodiversity - 3.1 Rainfall Events (Peak Rate of Runoff) - 3.1 Rainfall Events (Volume of Runoff)</p>	Rainfall Events (Peak Rate of Runoff)	<p>PUBLIC REALM: Drainage measures are specified so that the peak rate of run-off from the site to the watercourses (natural or municipal) is no greater for the developed site than it was for the pre-development site / achieves a 30% betterment. This will comply with the 1-year and 100-year return period events. Allowance will be made for climate change, in line with best practice.</p>	Based on the current drainage design, this will be achieved. Please refer to Section 6 of this report for further details.	●		●	●	Reduced flood risk and surface water runoff, and subsequent local flooding events.	Barnsley Local Plan 2012–2033 BREEAM Communities BREEAM NC 2018 CEEQUAL v6 Home Quality Mark
	Rainfall Events (Volume of Runoff)	<p>PUBLIC REALM: Drainage design measures are specified so that the post-development run-off volume, over the development lifetime, is no greater than it would have been prior to the assessed site's development / achieves a 30% betterment. This will be for the 100-year 6-hour event, including an allowance for climate change. Any additional predicted volume of run-off for this event will be prevented from leaving the site by using infiltration or other SUDS techniques.</p>	Based on the current drainage design, this will be achieved. Please refer to Section 6 of this report for further details. For further details regarding the SUDS strategy, please refer to the concept design response summary of output 3.2 f	●		●	●	Reduced flood risk and surface water runoff, and subsequent local flooding events. Improved water quality.	Barnsley Local Plan 2012–2033 BREEAM Communities BREEAM NC 2018 CEEQUAL v6 Home Quality Mark
	Nature-Based SUDS Solutions	<p>PUBLIC REALM: Where feasible the use of nature based solutions and sustainable urban drainage (SUDS) measures such as raingardens, swales and tree pits will be maximised within the drainage strategy.</p>	<p>The outline drainage strategy for Phase 1 aims to implement a variety of SUDS features in accordance with the CIRIA SuDS guidance and Local policy. It is proposed for as many SUDS features as possible to be put forward for adoption by Yorkshire Water under an S104 agreement to ensure that sufficient maintenance of the SuDS features is applied in the future.</p> <p>In line with the Design and Construction Guidance and the suitability of the site, the following adoptable SuDS features are proposed to be incorporated into the drainage strategy:</p> <ul style="list-style-type: none"> - Bioretention systems, e.g. rain gardens or tree pits - Storage basins, which are depressions in the ground that are normally dry but are designed to store water to provide attenuation (and are comprised of vegetation) - Tanks / geo-cellular tanks <p>The bioretention areas and detention basin are proposed to be integrated into the central green open space in the public realm area in the south of the site. However, in order to maintain the amenity value of the area, the proposed features are to be designed offline, only providing attenuation in extreme rainfall events.</p> <p>Non-adoptable features such as permeable paving within the hard landscaped areas and blue/green roofs on proposed flat roofs, are to also be included in the drainage strategy to provide additional storage.</p> <p>Based on the current proposals, the public realm, MSCP and ATH are proposed to be constructed first with Plots 1 and 2 proposed to be developed at a later stage within Phase 1. At present, it is assumed that Plots 1 and 2 are to be developed for residential purposes. Depending on the structural/architectural design of the Plots, it is encouraged for these developments to incorporate source control SuDS, where feasible. Therefore, the use of blue/green roofs and rainwater harvesting should be considered as part of the design.</p> <p>However, to ensure there is no detrimental impact on the infrastructure that will be in place prior to the development of Plots 1 and 2, an allowance for surface water attenuation from these areas has been incorporated into SUDS features located in the public realm.</p>	●		●	●	Fewer localised flooding events (on and offsite). Improved water quality. Improvements in ecological / biodiversity value (% biodiversity net gain - DEFRA / Natural England). Improved real-estate value.	Barnsley Local Plan 2012–2033 BREEAM Communities BREEAM NC 2018 CEEQUAL v6 Home Quality Mark WELL Communities

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
4. Energy and Operational Carbon									
<p>4.1 Businesses and residents benefit from reduced running costs and are less reliant on natural resources. Barnsley residents and businesses have improved quality of life, and health and socioeconomic inequalities are reduced across the Borough.</p>	<p>Net Zero Operational Carbon</p>	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: In line with current best practice, e.g. the UK Green Building Council (UKGBC), LETI and RIBA 2030 Climate Challenge guidance, and in support of Barnsley's 2045 net zero target, a route to achieving net zero operational carbon for the multi-storey car park, Active Travel Hub and residential units of Plots 1 and 2 will be investigated. Any available district heat networks will be utilised, where appropriate.</p> <p>Alongside a costing exercise, the requirements and outcomes of the net zero carbon study will be implemented, as far as practically and technically possible.</p> <p>Nature-based carbon capture programmes will be considered for any required offsetting.</p>	<p>High level net zero operational carbon solutions have been proposed at Concept Design, as detailed below. These will need to be developed further at the following stages, and as the proposals develop.</p> <p>With regards to heat networks, BMBC are currently assessing opportunities to create a new district heat network within Barnsley Town Centre to provide lower-carbon, locally generated heat for residential and commercial properties. At present, no allowance has been made for this within the utilities strategy, however, this will require further updates if, and when, a district heating scheme is brought forward as an option, and the likely heating demand of the various plots is established.</p> <p>MSCP: It is currently understood that the car park will not be covered by Part L, is not a habitable area and will not be heated. It is advised, however, that any energy demand is offset via PVs, with PV provision maximised on the canopy. All energy demands, e.g. lighting, should be reduced as far as practically possible. To support this approach, and as per the MEP strategy, the building services engineering design will implement the following strategies:</p> <ul style="list-style-type: none"> • Use of the most onerous envelope performance as is commercially available at construction. • Construct with the minimum air permeability, be mechanically ventilated, with appropriately sized and shaded windows. • Mechanically ventilate generally, with openable windows as required. • Efficient building engineering systems with heat recovery where possible to minimise resource consumption and pollution. • Reduce wasted energy and water wherever feasibly possible. • Use renewable energy sources wherever practical. <p>ATH: Based on the Future Building Standard, it is recommended that in order to become NZC, a minimum carbon reduction of 27% over the current Part L 2013 should be achieved. This needs to be accompanied by:</p> <ul style="list-style-type: none"> • Low carbon heating (likely electric heat pumps) • An increase in fabric standards • Renewable energy sources (PVs) • Smart metering and access to energy consumption data. <p>The Future Building Standard will be implemented in 2025. It will deliver buildings that are 'zero carbon ready' and do not feature a fossil fuel heat source. From 2022 to 2025 interim changes to Part L 2013 through this standard will produce 27% less CO2 emissions compared to current standards.</p> <p>More specifically, and as per the MEP strategy, the building services engineering design will implement the following strategies:</p> <ul style="list-style-type: none"> • Use of the most onerous envelope performance as is commercially available at construction. • Construct with the minimum air permeability, be mechanically ventilated, with appropriately sized and shaded windows. • Mechanically ventilate generally, with openable windows as required. • Efficient building engineering systems with heat recovery where possible to minimise resource consumption and pollution. • Reduce wasted energy and water wherever feasibly possible. • Use renewable energy sources wherever practical. <p>As per the M&E strategy, a space heating target of <15kWh/m2/yr has been set, in line with current LETI guidance.</p> <p>The approach to net zero operational carbon should be further investigated at RIBA Stage 3. Once the full and final energy model is available, requirements for offsetting, is necessary, can be established.</p> <p>Plots 1 & 2: Based on the Future Home Standards, a minimum 31% reduction in CO2 emissions will be required (over the current Part L 2013). A fabric first approach will be adopted, focusing on high standards of fabric insulation (e.g. high performing triple glazed windows with a whole unit U-value of less than 1.0 W/m²K, and low air Permeability (< 1 m³/h/m² at 50 Pa). In line with the Future Homes Standard, Plots 1 and 2 will be fully electric and will not be connected to the gas grid.</p>	<p>●</p>	<p>●</p>	<p>●</p>	<p>Energy use intensity value (kWh/m²/year)</p> <p>Space heating demand (kWh/m²/year)</p> <p>Reduced carbon emissions (kWh/year, kWh/m², kgCO₂e/m², tCO₂e and /or % reduction against baseline)</p> <p>Reduced operational costs.</p> <p>Improved air quality, e.g. a reduction in NOx emissions where gas boilers are no longer used.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Improved real-estate value.</p>	<p>Future Buildings Standard</p> <p>Future Homes Standard</p> <p>UKGBC Guidance</p> <p>LETI Climate Emergency Design Guide</p> <p>RIBA 2030 Climate Challenge v2</p>	

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
4. Energy and Operational Carbon									
<i>(continued)</i> 4.1 Businesses and residents benefit from reduced running costs and are less reliant on natural resources. Barnsley residents and businesses have improved quality of life, and health and socioeconomic inequalities are reduced across the Borough.	Low Energy External Lighting	PUBLIC REALM: Low energy external light fittings are provided within the construction zone. The fittings meet the following: - Have an average initial luminous efficacy of not less than 70 luminaire lumens per circuit Watt. - Are fitted with automatic controls to prevent to prevent operation during daylight hours. - In areas of intermittent pedestrian traffic (e.g. bin and bike stores), presence detection is specified.	This issue will be addressed in the following stages of design.	●		●	●	The lighting specification meet or exceeds the requirements of this output. Reduced operational costs. Reduced carbon emissions.	BREEAM NC 2018
	Building Energy Metering	ACTIVE TRAVEL HUB: In order to monitor and reduce energy consumption, and to reduce the performance gap, energy metering systems are installed so that at least 90% of the estimated annual energy consumption is assigned to the end-use categories, as follows (and as applicable): - Space heating* - Domestic hot water* - Humidification - Ventilation (major fans) - Pumps - Lighting and small power - Renewable or low carbon systems (separately) - Controls - Any other major energy consuming plant or systems, where appropriate. The energy consuming end uses listed will be easily identifiable to building users, e.g. through labelling or data outputs. *Space heating and hot water can be metered together where it is impractical to sub-meter these separately.	This is currently reflected within the MEP strategy.	●		●	●	Metering specification meets or exceeds the requirements of this output. Reduced operational costs. Reduced carbon emissions.	BREEAM NC 2018
	Low and Zero Carbon Technologies	ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: Renewable energy opportunities are exploited and battery storage technologies incorporated, where feasible. Opportunities to utilise mine water heating will be investigated, and where possible and feasible, utilised.	The current MEP strategy proposes 235m ² of roof mounted PVs at 35kW to the ATH, and 1450m ² roof mounted PVs at 250kW to the MSCP. An initial assessment concluded that there is insufficient PV area available to charge a battery capable of meeting the ATH's and MSCP's energy demands. As such, battery storage has been discounted for these two buildings. A renewables strategy for Plots 1 and 2 will need to be undertaken by the developers. Previous rotary boreholes identified potential mine working voids beneath the site. However, the investigations were not sufficiently targeted. Further investigations will be required in the following stages to establish whether the utilisation of mine water for heating is viable.	●		●	●	Reduced operational costs. Reduced carbon emissions.	Barnsley Local Plan 2012–2033 Bespoke BREEAM NC 2018

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
5. Resource Efficiency and Embodied Carbon									
5.1 The scheme contributes to a sustainable circular economy and a reduction in embodied carbon emissions, supporting the Barnsley Net Zero Carbon agenda and targets, improving mental and physical health and wellbeing, and promoting the local economy and local skillsets. The impact on the Borough's waste on the environment is minimised.	Recycled and Reclaimed Materials	<p>ALL PHASE 1: At least 25% (by volume) of suitable / useable material from demolition or de-construction on site will be incorporated into the project.</p> <p>PUBLIC REALM: At least 15% of road or path construction material is locally reclaimed or constituted from recycled material.</p>	This issue will be addressed in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.	●		●	●	<p>The % recycled or reclaimed materials meet or exceed the requirements of this output.</p> <p>Reduced vehicular transmissions (associated with the transport of new materials) including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p>	BREEAM Communities CEEQUAL v6
	Locally Sourced Materials	<p>ALL PHASE 1: Manufacturer locations for materials adhere to the following restrictions:</p> <ul style="list-style-type: none"> • 20% or more of the materials construction budget come from within 500km of construction site. • 30% of the total materials construction budget come from within 1000km of the construction site or closer. • An additional 25% of the materials construction budget come from within 5000km of the construction site. • The remaining 25% of materials may be sourced from any location. <p>Exclusions may apply where materials with lower overall embodied carbon values are procured (compared to the locally sourced alternative).</p>	This issue will be addressed in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.	●		●	●	<p>The % recycled or reclaimed materials meet or exceed the requirements of this output.</p> <p>Increased local spend and increased revenue for local businesses.</p> <p>Reduced vehicular transmissions (associated with the transport of new materials) including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p>	Living Building Challenge
	Modular Construction and Prefabrication	<p>ALL PHASE 1: A feasibility study will be carried out to investigate the use of modular construction and prefabrication . This will include both services and building elements.</p> <p>Modular construction / prefabrication will be used where the feasibility study has shown this will reduce deliveries, waste, time and resource spent on site.</p>	This issue will be addressed in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.	●		●	●	<p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Reductions in on site waste generation and waste to landfill.</p> <p>Fewer reported accidents at work (relevant to construction site activities).</p>	BREEAM NC 2018 CEEQUAL v6 UKGBC Circular Economy Programme

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
5. Resource Efficiency and Embodied Carbon									
<p><i>(continued)</i></p> <p>5.1 The scheme contributes to a sustainable circular economy and a reduction in embodied carbon emissions, supporting the Barnsley Net Zero Carbon agenda and targets, improving mental and physical health and wellbeing, and promoting the local economy and local skillsets. The impact on the Borough's waste on the environment is minimised.</p>	Material Efficiency	<p>ALL PHASE 1: At each stage of the project, opportunities for materials efficiencies relevant to design, specification and construction will be identified and implemented, where appropriate, to reduce the quantity of materials required, waste, and all subsequent and associated carbon emissions.</p>	<p>This issue will be addressed in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.</p> <p>Moving forward, design teams will need to consider the following at each stage of design to promote material efficiency:</p> <ul style="list-style-type: none"> - Increasing the utilisation factor of structural members - Designing to standard material dimensions to reduce off-cuts and waste on site - Removing redundant materials from the design - Using materials that can be recycled or reused at the end of their service life - Making use of recycled or reclaimed materials - Designing for deconstruction and material reuse - Using pre-fabricated elements where appropriate to reduce material waste - Consider using an 'exposed thermal mass' design strategy to reduce finishes - Avoiding over-specification of predicted loads - Using lightweight structural design strategies - Making use of bespoke structural elements where this will reduce overall material use - 'Rationalisation' of structural elements - Optimising the foundation design for embodied environmental impact. 	●		●	●	<p>Cost savings as a result of materials and waste minimisation.</p> <p>Reduced on site waste generation and waste to landfill.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p>	<p>BREEAM NC 2018</p> <p>UKGBC Circular Economy Programme</p>
	Future Disassembly / De-Construction	<p>MULTI-STOREY CAR PARK, PUBLIC REALM: At least 15% (by volume) of components or pre-fabricated units used can be easily separated on disassembly / de-construction into material types suitable for recycling or reuse.</p> <p>ACTIVE TRAVEL HUB, PLOTS 1 & 2: Design features that will enable and facilitate future disassembly and functional adaptation will be incorporated within the design.</p>	<p>This issue will be addressed in the following stages of design. The design and nature of the MSCP will likely exceed this target, however.</p> <p>The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.</p>	●			●	<p>Reduced carbon emissions associated with the production of new products and materials (applicable to future projects).</p>	<p>BREEAM NC 2018</p> <p>CEEQUAL v6</p> <p>UKGBC Circular Economy Programme</p>
	SMART Waste and Recycling	<p>ALL PHASE 1: Informed by the SMART Technologies Strategy and in collaboration with DMC and Barnsley College, SMART Waste and recycling projects are piloted to promote resource efficiency to SMEs and residents across the campus.</p>	<p>Compliance with this output will be explored and developed in the following stages of design.</p>	●	●	●	●	<p>Number of projects piloted.</p> <p>Contribution to living lab and learning opportunities and reduced waste.</p>	<p>Bespoke</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
5. Resource Efficiency and Embodied Carbon									
<p><i>(continued)</i></p> <p>5.1 The scheme contributes to a sustainable circular economy and a reduction in embodied carbon emissions, supporting the Barnsley Net Zero Carbon agenda and targets, improving mental and physical health and wellbeing, and promoting the local economy and local skillsets. The impact on the Borough's waste on the environment is minimised.</p>	<p>Net Zero Embodied Carbon</p>	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PUBLIC REALM:</p> <p>In line with the LETI, UKGBC and / or RIBA 2030 Climate Challenge guidance, using the RICS Whole Life Carbon Assessment for the Built Environment professional statement 2017, different low embodied carbon superstructure, substructure, hard landscaping and services options will be investigated, with the aim to meet either of the following embodied carbon targets:</p> <ul style="list-style-type: none"> - Target embodied carbon of <970kgCO2e/m2 - Stretch target embodied carbon of <750kgCO2e/m2 	<p>A formal embodied carbon analysis should take place in the next stages to further inform the design with regards to low carbon materials, and to meet the relevant targets.</p> <p>Although formal analysis of each asset (in full) has not yet taken place, embodied carbon has been considered as part of the Concept Design. Following an optioneering exercise and the latest Inventory of Carbon and Energy database for carbon figures (applicable to Stages A1 - A3, 'cradle to gate'), the recommended structural frame option for the MSCP (Option G1 - precast double tee steel frame) has been selected on the basis of being the most sustainable and lowest embodied carbon solution, whilst still achieving the requirements of the brief, minimising internal columns and likely being one of the quicker options to construction (thereby reducing further emissions related to site and installation works). Please refer to Section 5 of the Multi-Storey Car Park Stage 2 report for further details.</p> <p>Further narrative and analysis on low carbon options will be provided in the next stages of the design.</p>	●		●	●	<p>Reduction in embodied carbon associated with the development (kgCO2e/m2).</p> <p>Increased local spend and increased revenue for local businesses.</p> <p>Reduced vehicular transmissions including carbon monoxide, particulate matter and nitrogen oxides.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.</p> <p>Cost savings as a result of materials and waste minimisation.</p> <p>Reduced on site waste generation and waste to landfill.</p>	<p>LETI</p> <p>RICS Whole Life Carbon Assessment Framework</p> <p>RIBA 2030 Climate Challenge v2</p> <p>UKGBC</p>
6. Health and Wellbeing									
<p>6.1 The development supports measures which address issues of health inequality, obesity and heart disease, and contributes towards good physical and mental health, including encouraging active travel and non-sedentary behaviour.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 1.1 All topics - 2.1 Multi-Functional Green Space - 2.2 Biodiversity - 3.1 Urban Heat Island Mitigation - 3.2 Rainfall Events (Volume of Runoff) - 3.2 Nature-Based SUDs Solution - 6.2 All topics - 6.3 All topics 	<p>Interior Fitness Circulation</p>	<p>MULTI-STOREY CAR PARK, PLOTS 1 & 2:</p> <p>At least one staircase will be open to regular occupants, servicing all floors of the project and is aesthetically designed through the inclusion of at least two of the following on each floor:</p> <ul style="list-style-type: none"> - Artwork - Light levels of at least 215 lux when in use - Windows or skylights that provide access to daylight - Natural design elements (e.g. plants, water features, images of nature) - Gamification <p>Stairs will ideally be physically or visually located before any lifts, and signage provided directing building users to stairs.</p>	<p>This issue will be addressed fully in the following stages of design. Consideration has been given to interior fitness circulation with regards to the MSCP staircase, with openable windows provided to allow for natural ventilation and daylight ingress.</p> <p>The requirements of this output will need to be reflected within the drawings and specifications for Plots 1 and 2.</p>	●			●	<p>The design meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as obesity and mental health issues such as depression.</p> <p>Improved real-estate value.</p>	<p>WELL Building Standard v2</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
6. Health and Wellbeing									
<p><i>(continued)</i></p> <p>6.1 The development supports measures which address issues of health inequality, obesity and heart disease, and contributes towards good physical and mental health, including encouraging active travel and non-sedentary behaviour.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 1.1 All topics - 2.1 Multi-Functional Green Space - 2.2 Biodiversity - 3.1 Urban Heat Island Mitigation - 3.2 Rainfall Events (Volume of Runoff) - 3.2 Nature-Based SUDs Solution - 6.2 All topics - 6.3 All topics 	External Activity Spaces	<p>PUBLIC REALM:</p> <p>A variety of activity spaces are provided to encourage movement and exercise, taking into account different age ranges and physical and neurological needs.</p>	<p>As per the Landscape Strategy, the Northern Plot 2 public realm is conceived as a flexible, community focused outdoor space with the capacity to be used for a range of activities including play, community garden and green space. The topography in the space is relatively even, up to the retaining wall and sloped planted bank with existing mature trees, which define the upper and lower Courthouse. Open space around Plot 2 is limited, so the concept aims to utilise activity within the confines of pocket spaces and linear design responses.</p> <p>The concept ideas also propose opening up the steps and ramp between the upper and lower tier in order to maximise viewpoints across the valley and create further opportunity for community to meet and socialise. This is explained in more detail within the Landscape Strategy report.</p> <p>Another key consideration with regard to facilitating activity is the inclusion of power sources and WiFi to enable the use of technology for events and temporary pop-up facilities. This will need to be integrated seamlessly into the design. As well as being a relaxing space, the Central Green will incorporate an element of activity. This use will tie in to the wider philosophy of the green, allowing for small scale activity within the defined social spaces of the design.</p> <p>Yoga, pilates, stretching and body weight exercises would all be suitable for the Central Green space and would compliment the lush, green, calm feel. By not defining specific areas for exercise and activity, we allow the layout to be more flexible for users to make decisions about where to undertake exercise, based on the time of day, sunlight direction, other events etc.</p> <p>The Central Green will be designed to allow integration of temporary active uses, such as table tennis. Tables could be set up in a similar way to other events tying into wider Campus activities.</p> <p>Opportunities for a Pump Track for children are also incorporated within the design.</p>	●		●	●	<p>The design meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as obesity and mental health issues such as depression.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	WELL Communities
	Edible Landscapes	<p>ACTIVE TRAVEL HUB, PLOTS 1 & 2, PUBLIC REALM:</p> <p>Where appropriate and feasible, communal food growing spaces or edible landscapes are provided for use by residents of Plots 1 and 2 and the Active Travel Hub. For residences, it is suggested that >50m² or 1m² per residential unit of growing space is provided. For the Active Travel Hub, it is suggested that >18.5m² of growing space is provided.</p>	Edible landscapes are currently under consideration. The will be considered further in the next stages of design.	●	●	●	●	<p>The area of edible landscape meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as obesity and mental health issues such as depression.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	<p>Home Quality Mark</p> <p>WELL Building Standard v2</p> <p>WELL Communities</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
6. Health and Wellbeing									
<p>6.2 Social cohesion and mental health is supported by the provision of high quality social spaces which are fully accessible, considering all physical and neurological needs.</p> <p>Also refer to topics: - 1.1 Quality Cyclist and Pedestrian Environments - 1.1 Connectivity - 1.1 Wayfinding - 1.1 Safety and Security - 2.1 Multi-Functional Green Space - 6.1 All topics - 6.3 All topics</p>	Nature Based Design (Biophilic Design)	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: Social cohesion and mental health is supported by the provision of high quality internal social spaces.</p> <p>The following are integrated throughout internal spaces, including common circulation routes, shared seating areas and rooms and workstations (where applicable): - Natural materials, patterns, shapes, colours, images or sounds - Plants (e.g., potted plants, plant walls) or views of nature</p>	<p>The biophilic design strategy will be developed in the following stages, however, based on the current design of the ATH and MSCP, building users in occupied spaces will have views out into nature and the surrounding green spaces, thereby alleviating feelings of stress and supporting mental health and wellbeing.</p>	●		●	●	<p>The design meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such mental health issues, including depression.</p> <p>Improved real-estate value.</p>	<p>Living Building Challenge</p> <p>WELL Building Standard v2</p>
	Sense of Belonging and Connection to Place	<p>ALL PHASE 1: Social cohesion and mental health is supported by the provision of high quality internal and external social spaces.</p> <p>Buildings and the public realm contain features intended solely for the celebration of culture, spirit and place.</p> <p>This will be linked to the SMART Technology Strategy, where feasible and appropriate.</p>	<p>The landscape and public realm provides an array of different, high quality, external spaces of varying use and design. This is represented by the six character areas, all of which will be furnished with varying degrees and types of planting and soft landscaping, hard landscaping, street furniture, and other installations. As described in the Landscape Strategy, the six character areas are:</p> <ol style="list-style-type: none"> 1. Parade Promenade: This is the main connecting avenue linking through the Digital campus. The paved surfaces are designed to create a visual continuity, and the levels to be adjusted to create a step free accessible route. The Promenade will be a location for linear pop-up markets such as flea markets and flower markets, creating interest and a feeling of connection to place. 2. Central Green Space: The central community green space, enclosed by colourful planting, will comprise a large open lawn to encourage activity in the summer, with infrastructure to allow for covering the space in winter for activities. This will naturally draw residents into the area. 3. The Gardens (Green Seam): The Gardens will comprise a natural setting with displays of form, colour and texture of varying plants. Creating a distinct and clear visual identity linking through the public realm, the space will be rich in biodiversity with structured mixed planting for all year round interest. 4. The Activity Spine (Building Threshold): This area will highlight main building entrances with a distinctive surface treatment. Areas of uplift will be enhanced with warmer, lighter tones using granite trims and finishes. Soft landscape edges will be shaped to accommodate established desire lines. 5. Public realm around Plot 2: Providing access to the Plot 2 residential development, landscape treatments will be defined for residential demarcation. It will be of high quality aesthetic and open character, and will create the opportunity to incorporate informal play along the linear route. 6. Southern Gateway Arrival: The Gateway marks the town entrance into the Digital Campus and therefore impressions of the 'green' nature of the public realm. The public realm palette, including surfacing will be cohesive with the overall design whilst create a notable entrance point. The design layout will aim to open and invite people into the public realm area. <p>The current landscape design also maximises viewpoints with scenic views over the landscape, encouraging a sense of belonging and connection to place.</p> <p>The approach to public art will be developed in the following stages, however this may take the form of: - Stand alone artwork where the public realm provides a platform to house artwork - Artwork integrated into public realm components (e.g. surfaces, raised walls, furniture etc.) - Artwork overlaid as digital art / interactive lighting (aligning with the SMART Technology Strategy)</p> <p>As per the requirements of the sustainability strategy, high quality internal spaces will also be provided, with designs incorporating, for example, biophilic elements and healthy materials.</p>	●	●	●	●	<p>The design meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such mental health issues, including depression.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Decreased local crime rates.</p> <p>Improved real-estate value.</p>	<p>WELL Building Standard v2</p> <p>WELL Communities</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
6. Health and Wellbeing									
<p><i>(continued)</i></p> <p>6.2 Social cohesion and mental health is supported by the provision of high quality social spaces which are fully accessible, considering all physical and neurological needs.</p> <p>Also refer to topics:</p> <ul style="list-style-type: none"> - 1.1 Quality Cyclist and Pedestrian Environments - 1.1 Connectivity - 1.1 Wayfinding - 1.1 Safety and Security - 2.1 Multi-Functional Green Space - 6.1 All topics - 6.3 All topics 	<p>Inclusive and Accessible Design</p>	<p>ALL PHASE 1:</p> <p>The design allows for multiple uses for different users, including children, the elderly and disabled people with consideration given to safety, comfort, disturbance and security. The design adheres to UK accessible design laws and standards.</p>	<p>The design brief for the Seam and its components delivers facilities that accommodate the needs of all users. With regards to the ATH, cycle parking is an integral aspect of any cycle network, as well as the wider transport system including other public transport modes. The availability of secure cycle parking at interchange points has a significant influence on cycle use and the efficiency of the network. The fear or direct experience of vandalism or theft can deter cycling, which in turn can reduce the return on any investments made to deliver new routes and transport infrastructure enhancements. The ATH brief explicitly aims to address this concern by providing a modern facility that caters to all users and their respective cycling needs.</p> <p>Proximity to Barnsley Railway Station is essential for cyclists and site users with mobility impairments. For short stay users the primary concern would be convenience of access, while having a safe place to secure their cycle. With longer stay parking however, security is the primary concern. Such users are more likely to trade convenience for additional security, shelter from weather, and secure access.</p> <p>Further examples of inclusive and accessible design are details within the landscape strategy, for example the ramp provision alongside step provision to aid with level changes, and different character areas, each intended for different uses (see previous output for further details). All internal and external spaces will be safe and comfortable, in line with the requirements of the sustainability strategy, e.g. external spaces are overlooked, and issues such as thermal comfort will be addressed in both internal and external spaces. The response to this output will continue to be developed as the design progresses, with issues such as audio and visual accessibility in the materials specification, the use of technology to support audio and visual accessibility and facilities to support parents explored further.</p>	●		●	●	<p>The design meets or exceeds the requirements of this output. The development is wheelchair friendly and incorporates audio/visual accessibility features.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as mental health issues, including depression.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p>	<p>Barnsley Local Plan 2012–2033</p> <p>BREEAM Communities</p> <p>UK Part M Regulations</p>
	<p>Digital Connectivity</p>	<p>ALL PHASE 1:</p> <p>The development achieves the requirements below relevant to digital infrastructure OR WiFi networks:</p> <ul style="list-style-type: none"> - Digital infrastructure: A “dig once” principle is adopted, whereby all new buildings must install internet cables or fibre optics cables when laying underground lines. The development is provided with provider-neutral wiring that any Internet service carrier can connect to from an access point in or near the building. - WiFi Networks: A network of free-to-use WiFi hotspots or zones is available in public spaces. The network covers at least 75% of the public use area owned, operated or managed by the project owner. 	<p>The current SMART and digital infrastructure strategy confirms that free-to-use WiFi will be available across the site.</p>	●	●	●	●	<p>The % WiFi cover or digital infrastructure meets the requirements of this output.</p> <p>Increased footfall within the area and increased revenue for local businesses.</p> <p>Improved real-estate value.</p> <p>Improved socioeconomic outcomes.</p>	<p>BREEAM Communities</p> <p>Sustainable Travel SPD (Draft Document November 2021)</p>

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
6. Health and Wellbeing									
<p>6.3 Steered by the health metrics proposed in the RIBA 2030 Climate Challenge (version 2) documentation, the unintended consequences of poor health and wellbeing are avoided through avoidance of overheating and poor indoor air quality, and through the promotion of natural light in occupied spaces, thereby enhancing quality of life and promoting physical and mental wellbeing.</p> <p>Also refer to topics: - 3.1 Urban Heat Island Mitigation</p>	Overheating	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: All occupied spaces achieve 25-28°C maximum for 1% of occupied hours.</p>	<p>This issue will be addressed in the following stages of design. The requirements will need to be reflected within the performance requirements for Plots 1 and 2.</p>	●		●	●	<p>The PMV, PPD, and % occupied hours meet the thresholds of the relevant standards (e.g. CIBSE TM52 or CIBSE TM59).</p> <p>Improved health and social outcomes.</p> <p>Reduced mortalities resulting from heatwaves.</p> <p>Reduced energy costs resulting from mechanical cooling.</p>	RIBA 2030 Climate Challenge v2
	Healthy Materials	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: The following thresholds will be met for all occupied spaces: - Total VOCs: <0.3mg/m3 - Formaldehyde: <0.1mg/m3</p>	<p>This issue will be addressed in the following stages of design. The requirements will need to be reflected within the specifications for Plots 1 and 2.</p>	●		●	●	<p>Post construction, but pre-occupation, air quality testing confirming the total VOC emissions are <0.3mg/m3 and formaldehyde emissions <0.1mg/m3.</p> <p>Reductions in non-elective admissions and presentations to GPs relevant nose, ear, eye and throat irritation.</p>	BREEAM NC 2018 RIBA 2030 Climate Challenge v2 WELL Building Standard v2
	Healthy Sunlight Exposure	<p>ACTIVE TRAVEL HUB, MULTI-STOREY CAR PARK, PLOTS 1 & 2: At least 75% of occupied spaces receive sufficient daylight and a view out.</p>	<p>This issue will be addressed in the following stages of design. It is thought, however, that this will be achieved for the ATH and MSCP.</p> <p>The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.</p>	●		●	●	<p>The % floor area meets or exceeds the requirements of this output.</p> <p>Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as mental health issues, including depression.</p> <p>Reduced energy costs resulting from a lower artificial lighting demand.</p>	Living Building Challenge

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
6. Health and Wellbeing									
(continued) 6.3 Steered by the health metrics proposed in the RIBA 2030 Climate Challenge (version 2) documentation, the unintended consequences of poor health and wellbeing are avoided through avoidance of overheating and poor indoor air quality, and through the promotion of natural light in occupied spaces, thereby enhancing quality of life and promoting physical and mental wellbeing. Also refer to topics: - 3.1 Urban Heat Island Mitigation	Healthy Entrances	PLOTS 1 & 2: Where apartment blocks (or retail units within Plots 1 & 2) are provided, all regularly used building entrances (not individual dwelling entrances) incorporate the following: - The building includes an entryway system composed of grilles, grates, slots or rollout mats or removable carpet tiles that are at least the width of the entrance and 3m long in the primary direction of travel (sum of indoor and outdoor length). - One of the below is in place to slow the movement of air from outdoors to indoors: - Building entry vestibule with two typically closed doorways. - Revolving entrance doors.	This issue will be addressed in the following stages of design. The requirements will need to be reflected within the drawings and specifications for Plots 1 and 2.	●				The number of compliant entrances meet or exceed the requirements of this output. Improved health and social outcomes including contributions to a reduction in presentations to GPs regarding issues such as respiratory illnesses.	WELL Building Standard v2
7. Sustainable Communities and Social Value									
7.1 Social value opportunities and an approach to procurement which prioritises local suppliers and manufacturers supports the local economy and local communities, enhancing their quality of life and benefiting health and wellbeing. Also refer to topics: - 5.1 Locally Sourced Materials - 5.1 SMART Waste and Recycling	Fair Payment	ALL PHASE 1: In accordance with the Construction Supply Chain Payment Charter, main contractors will pay their Tier 1 supply chain within 30 calendar days from the end of the calendar month in which the work is carried out or products are supplied.	This issue will be addressed in the following stages of the development, and should form part of the contractor's tender requirements.			●	●	The contractor's payment policy reflects these requirements. Reductions in the number of working days lost due to labour disputes.	Bespoke
	Community Benefits and Social Value	ALL PHASE 1: There is local labour and engagement with under-presented groups and apprentices on the project. Local is defined as being within the sub-region. Demonstrate that more than 50% of workers are from the sub-region (South Yorkshire). Alternatively, adhere to BMBC's requirements for local workforces.	This issue will be addressed in the following stages of the development, and should form part of the contractor's tender requirements.	●	●	●	●	Increased percentage of local labour and apprentices.	CEEQUAL v6
7.2 The integration of SMART technologies and digital infrastructure within buildings and the public realm create a 'living laboratory' for digital experimentation and creativity, enhance the overall user experience of the space, and assist in the reduction resource consumption and improved air quality. Also refer to topics: - 1.1 Wayfinding - 1.1 Car Sharing - 1.1 SMART Parking Technologies - 1.4 Car Sharing	SMART Technologies	ALL PHASE 1: SMART technologies and digital infrastructure are integrated within buildings and public realm to create a 'living laboratory' for digital experimentation and creativity.	SMART Technologies and Digital Art is one of the key public realm themes. As detailed in the landscape strategy, digital technology can enhance placemaking by creating meaningful experiences for people in the Digital Campus by fusing fixed components such as connected street furniture, digital wayfinding features, with mobile and personal devices, including smartphones and wearable products. As described in previous sections, SMART Technologies will be integrated into the development, e.g. regarding car sharing and parking. Infrastructure in the form of fibre ducting and chambers, additional power points, and IoT gateways and sensors will be provided to allow for future SMART technology integration. Examples of opportunities include: • Digital artists augmenting building facades with either projection or through the interface of screens. Also using walls (e.g. existing arches) and facades as canvases for artists to interact digitally with the public. • Screens displaying data, for example Andrea Polli's Particle Falls (2008–2018), an installation showing the quality of the air with streams of blue pixels when it is pure and red spots when it is saturated with PM2.5 particles. • Light Installations using LED technology software, lenses, to create of dazzling virtual spaces • Immersive technology such as Augmented Realities to invite visitors to interact with public space. • Sculptures, for example artists like Ken Kelleher reimagine the digital sculpture with the use of computers to render what place sculpture could occupy in urban spaces. • The use of data to encourage engagement, e.g. realtime data from hire bikes including location and journey map, gamification of carbon offsets for car journeys to the Seam, displays of Barnsley and regional data sets and energy and water consumption, and displays of air quality.	●	●	●	●	The SMART Technologies strategy meets or exceeds the requirements of this output. Increased learning opportunities for the local community.	Bespoke

Outcome	Topic	Output	Concept Design Response Summary	Healthy Barnsley	Learning Barnsley	Growing Barnsley	Sustainable Barnsley	Measurement / Indicators	Metric / KPI Reference
7. Sustainable Communities and Social Value									
7.3 As a result of local community consultation, the development improves health and wellbeing and reduces crime and vandalism (including littering) through and creating a sense of place and pride in place.	Community Engagement	<p>ALL PHASE 1: Local communities and stakeholders have influenced the development proposals.</p> <p>The community and stakeholder engagement process meets the requirements of the BREEAM New Construction 2018 Man 01 Stakeholder Consultation (interested parties) and BREEAM Communities G01 Consultation Plan issues, demonstrating that teams have considered public space, local heritage, amenity uses, inclusive design and diverse uses, alongside local priorities into design.</p> <p>All relevant stakeholders have been consulted regarding the effects on neighbours that are expected to occur during both the construction and operation of the completed works.</p>	<p>Consultation activities have commenced, including consultation with the local community on the Active Travel Hub. Further consultation activities will take place in the next stages to inform the design.</p> <p>Moving forward, in order to comply with this output, a consultation plan should be put in place. This will need to be reviewed by the BMBC. Consultation should also be undertaken early enough for the community and stakeholders to influence key decisions.</p>	●		●	●	<p>Consultation events are carried out in line with the requirements of this output. The design incorporates the outputs of the consultation events, as appropriate.</p> <p>Reduced local crime rates.</p>	<p>BREEAM Communities</p> <p>BREEAM NC 2018</p> <p>CEEQUAL v6</p>
7.4 A sustainable community and buildings are delivered, resulting in improved environmental, social and economic sustainability.	Sustainability Frameworks	<p>ACTIVE TRAVEL HUB: The design, construction and operation of the Active Travel Hub is supported by frameworks including BREEAM and the WELL Building Standard. The building achieves BREEAM Very Good, as a minimum.</p> <p>MULTI-STOREY CAR PARK, PUBLIC REALM AND PLOTS 1 & 2: The design, construction and operation of these assets are supported by frameworks including BREEAM, WELL Building Standard and the Home Quality Mark, and achieve the targets set out in this strategy.</p>	<p>Why way of compliance with the sustainability strategy, the development will be supported by the relevant frameworks. The frameworks should be revisited throughout the design, however, and additional sustainability and wellbeing features incorporated, where appropriate.</p> <p>A BREEAM pre-assessment exercise has been undertaken for the ATH, proposing a strategy for achieving BREEAM 'Very Good'. Further details are provided in Section 11.5.</p>	●	●	●	●	<p>BREEAM 'Very Good' certification for the Active Travel Hub.</p> <p>The measurements and indicators will encompass numerous environmental, social and economic sustainability benefits.</p>	Barnsley Local Plan 2012–2033
	Life Cycle Costing	<p>ALL PHASE 1: All major design or specification changes relevant to the sustainability strategy are supported by a life cycle costing exercise to ensure the subsequent operational expenditure is not compromised due to savings in capital expenditure.</p>	The use of life cycle costing exercises to inform major design changes will be applied in the following stages.	●	●	●	●	<p>Reduced operational expenditure.</p> <p>Improved environmental performance.</p>	Bespoke

11.5 BREEAM Strategy

BREEAM (Building Research Establishment's Environmental Assessment Method) is the world's foremost environmental assessment and rating system for buildings. BREEAM works to raise awareness amongst owners, occupiers, designers and operators of the benefits of adopting a sustainable approach towards development. It also helps them to successfully and cost effectively adopt sustainable solutions, and provides market recognition of their achievements, whilst reducing the negative effects of construction and development on the environment.

As per the requirements of the Barnsley Local Plan (2012 – 2033), all occupied non-residential developments must meet BREEAM Very Good requirements, as a minimum. A BREEAM pre-assessment exercise was undertaken by BDP against the BREEAM New Construction 2018 Retail (Shell and Core) scheme to propose an initial and draft strategy for achieving BREEAM Very Good based on early design information, local area information, and assumptions based on the current sustainability strategy and previous similar projects. Moving forward, the strategy will need to be refined further alongside BMBC and the design team.

The current proposed strategy for achieving BREEAM Very Good is detailed in the Figure 11.1 and Table 11.2 below. Based on the current approach, a final score of 63.33% is anticipated, providing an 8.33% buffer beyond the minimum 55% requirement. A score above 55% will help secure the final rating should future changes to the design or new evidence come to light preventing any of the current targeted credits being awarded. A further 55.67% worth of credits have been identified as potentially achievable. "Potential" credits have not been targeted as they may require further investigation, or may incur additional costs.

In addition to a score of 55%, there are a number of mandatory/minimum requirements that must be met (see Table 11.1). Where these requirements are not met, the targeted rating cannot be achieved.

BREEAM issue	Minimum requirements for BREEAM Very Good
Final score	55%
Man 04: Commissioning and handover	One credit: Compliant commissioning and testing schedules and responsibilities.
Man 04: Commissioning and handover	Criterion 11: Complaint building user guide.
Ene 02: Energy Monitoring	One credit: Sub-metering of end-use energy categories
Wat 01: Water consumption	One credit: Minimum 12.5% improvement in potable water consumption over a notional baseline.
Wat 02: Water monitoring	Criterion 1: Provision of a water meter to the mains supply to the building.
Mat 03: Responsible sourcing of construction products	Criterion 1: All timber and timber-based products used on the project must be legal and sustainable, as per the UK Government's Timber Procurement Policy.

Table 11.1: Minimum requirements for BREEAM Very Good



Figure 11.1: Proposed strategy for BREEAM Very Good (ATH)

Category	Credit score (% per credit)	Issue	Credits		
			Available	Targeted	Additional potential
Management	0.61%	Man 01: Project design and brief	4	2	2
		Man 02: Life cycle cost and service life planning	4	2	2
		Man 03: Responsible construction practices	6	6	-
		Man 04: Commissioning and handover	4	4	-
Health and Wellbeing	0.73%	Hea 01: Visual comfort	4	1	3
		Hea 02: Indoor air quality	1	1	-
		Hea 04: Thermal comfort	2	2	-
		Hea 05: Acoustic performance	1	1	-
		Hea 06: Security	1	1	-
		Hea 07: Safe and healthy surroundings	2	1	1
Energy	0.67%	Ene 01: Reduction of energy use and carbon emissions	13	6	7
		Ene 02: Energy Monitoring	2	2	-
		Ene 03: External lighting	1	1	-
		Ene 04: Low carbon design	3	1	2
Transport	0.96%	Tra 01: Transport assessment and travel plan	2	-	2
		Tra 02: Sustainable transport measures	10	6	4
Water	0.78%	Wat 01: Water Consumption	5	3	2
		Wat 02: Water Monitoring	1	1	-
		Wat 03: Water leak detection	2	2	-
		Wat 04: Water efficient equipment	1	1	-
Materials	1.25%	Mat 01: Environmental impacts from construction products – building life cycle assessment	7	2	5
		Mat 02: Environmental impacts from construction products	1	1	-
		Mat 03: Responsible sourcing of construction products	4	2	2
		Mat 05: Designing for durability and resilience	1	1	-
		Mat 06: Material efficiency	1	-	1

(continued on following page)

Category	Credit score (% per credit)	Issue	Credits		
			Available	Targeted	Additional potential
Waste	0.70%	Wst 01: Construction waste management	5	3	2
		Wst 02: Use of recycled and sustainably sourced aggregates	1	-	1
		Wst 03: Operational waste	1	1	-
		Wst 05: Adaptation to climate change	1	-	1
		Wst 06: Design for disassembly and adaptability	2	-	-
Land Use and Ecology	1.15%	LE 01: Site selection	2	1	1
		LE 02: Ecological risks and opportunities	2	2	-
		LE 03: Managing impacts on ecology	3	3	-
		LE 04: Ecological change and enhancement	4	3	1
		LE 05: Long term ecological management and maintenance	2	2	-
Pollution	0.75%	Pol 01: Impact of refrigerants	3	2	1
		Pol 02: Local air quality	2	2	-
		Pol 03: Flood and surface water management	5	4	1
		Pol 04: Reduction of night time pollution	1	1	-
		Pol 05: Reduction of noise pollution	1	1	-
Innovation and exemplary level credits	1.00%	Innovation and exemplary level credits (a maximum of 10 may be awarded)	19	-	10
Target weighted score rating:			63.33% (Very Good)		
Additional 'potential' credits (weighted rating)			55.67%		

For further details on each of the targeted credits, please refer to the pre-assessment tracker in appended to this report.

11.5 BREEAM Strategy

In order to ensure that the sustainability strategy remains embedded within the design, the appointment of a Sustainability Advisor is advised. The Sustainability Advisor will oversee the delivery of the strategy, undertaking regular workshops with the project team and reviews of proposals in order to ensure they align with sustainability outcomes and outputs. Part of the role will also be to assign responsibilities for outputs to key project team disciplines, ensuring all parties are aware of the requirements for each output within the strategy.

Furthermore, a BREEAM Assessor should be appointed at the earliest available opportunity to ensure that BREEAM 'Very Good' remains achievable.

As mentioned in Section 11.2, the sustainability strategy should remain a live document, incorporating any future updates relevant to design changes, industry trends or Council policies and agendas.

12.0 Smart Technology

12.1 Smart Narrative for the SEAM

The starting point for our work was to create a consensus view of what 'smart' means within the context of the aspirations for BMBC, the community it serves and the embryonic businesses that will bring the SEAM to life. To get to this view Arcadis hosted two well attended workshops drawing in stakeholders from the community, academia, and business. Two overriding themes emerged. Digital start-up businesses of the kind that will be drawn to the SEAM told us that whilst basic digital infrastructure (high performance broadband, mobile coverage and WiFi) was important, space to collaborate was probably the key ingredient. We heard from the former CEO of one City Centre IOT focussed accelerator, that lack of a café in the purpose-built facility was one of her biggest regrets. Engagement with the wider community was also complicated by the ability to open up the ground floor as community space because of difficulties in securing access to the higher floors of the building, which were only overcome by further investment in remedial actions. This latter point is important because the second key theme that emerged from the workshops was the need for the SEAM to engage with the community and describe outcomes in practical terms showing benefit to the people and businesses of Barnsley and the wider South Yorkshire city region.

The need for the SEAM to explain itself in practical terms is at the heart of our smart proposal. Rather than seek to conceal the digital workings of the campus and the work of companies based in the SEAM hidden inside the buildings, our approach is to expose, inform and educate. The routes of fibre networks passing through the campus will be sketched out on the paving surface. Street furniture-mounted Internet of Things (IOT) gateways will connect to sensors in the soil, air quality and movement sensors. Information signage with QR codes will explain how fibre carries traffic to the internet and what the gateways and sensors are doing. Realtime information will be displayed on the public screen in the central green space. The same screen will allow visitors

to browse cameo videos of the companies based in the SEAM and what they do. An event programme will be used to attract visitors to the campus, free public space WiFi will encourage people to stay, explore and engage. Interactive streetlights, recording and replaying shadows will bring a playful note to the engagement offer.

The outdoor spaces of the SEAM will become a place for experimentation for local businesses and academia. BMBC have plans for a local and regional IOT network which could potentially be managed from the SEAM. This network will deliver a range of practical applications far beyond the SEAM campus (ranging from air quality monitoring to more specialist applications such as informing better gritting decisions using road temperature sensors) but will support the innovation agenda of the SEAM. Hinged lighting columns will allow new sensors and radio equipment to be installed simply and quickly, supporting that experimental agenda.

The multi-storey carpark and active travel hub are potentially uncomfortable bed-fellows but we can use the smart agenda to explain how both are part of one transitional journey. A barrierless and ticketless parking solution will give a real-time view of car park occupancy. These vehicle journeys could be turned into a carbon target to be offset by active travel; hire bikes could use IOT tracking to record mileage (and do more such as give insight for road repairs and potential future cycle routes) and a parking premium could even be applied at busy times to subsidise bike hire and fund carbon offset. All of this information will be visualised on the Big Screen.

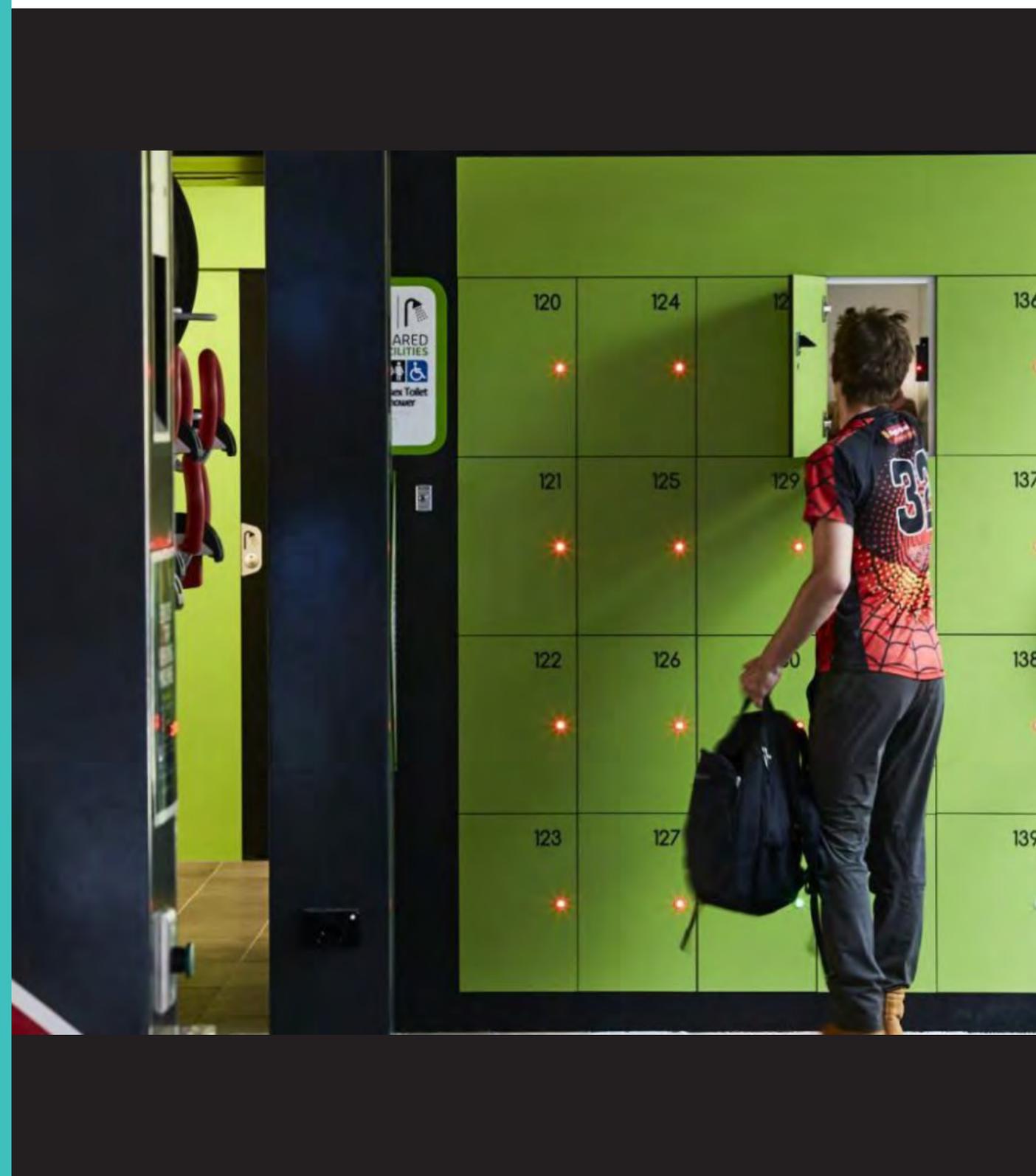


Figure 12.1: Example of smart technology integrated into cycle facilities

13.0 Health and Safety

13.1 CDM

During Stage 2 the emerging design and strategies have been reviewed from a CDM perspective, with the design team discussing issues as a group.

This extends to undertaking risk reviews and production of Designers Risk Assessments. The aim is remove / mitigate risks where possible within the design stages.

A copy of the current Designers Risk Assessments is included on the page opposite.

A Pre-Construction Information Pack can be found in CDM Appendix L.

13.2 Principal Designer

The Stage 2 design for the Multi-Storey Car Park, Active Travel Hub and the public realm is currently being progressed as one distinct project for Principal Designer activities.

Design risks are reviewed holistically as a team through design team meetings / risk workshops, while each individual discipline is responsible for the review and production of its own Designers Risk Assessments (DRAs). The DRAs are issued to the Principal Designer (PD) for inclusion in the Significant Hazard and Risk Register which as a live document, will be reviewed at regular intervals in Design Team Meetings and CDM workshops.

The first issue of the Pre-Construction Information Pack (PCIP), see Appendix L, has been issued to BMBC for review and comment. As with the Risk Register, the PCIP will be reviewed and updated on a regular basis as the design progresses in the pre-tender period. On completion, the PCIP and Risk Register will be issued with the Tender pack to the Principal Contractor in order to include relevant information into the Construction Phase Information Plan.

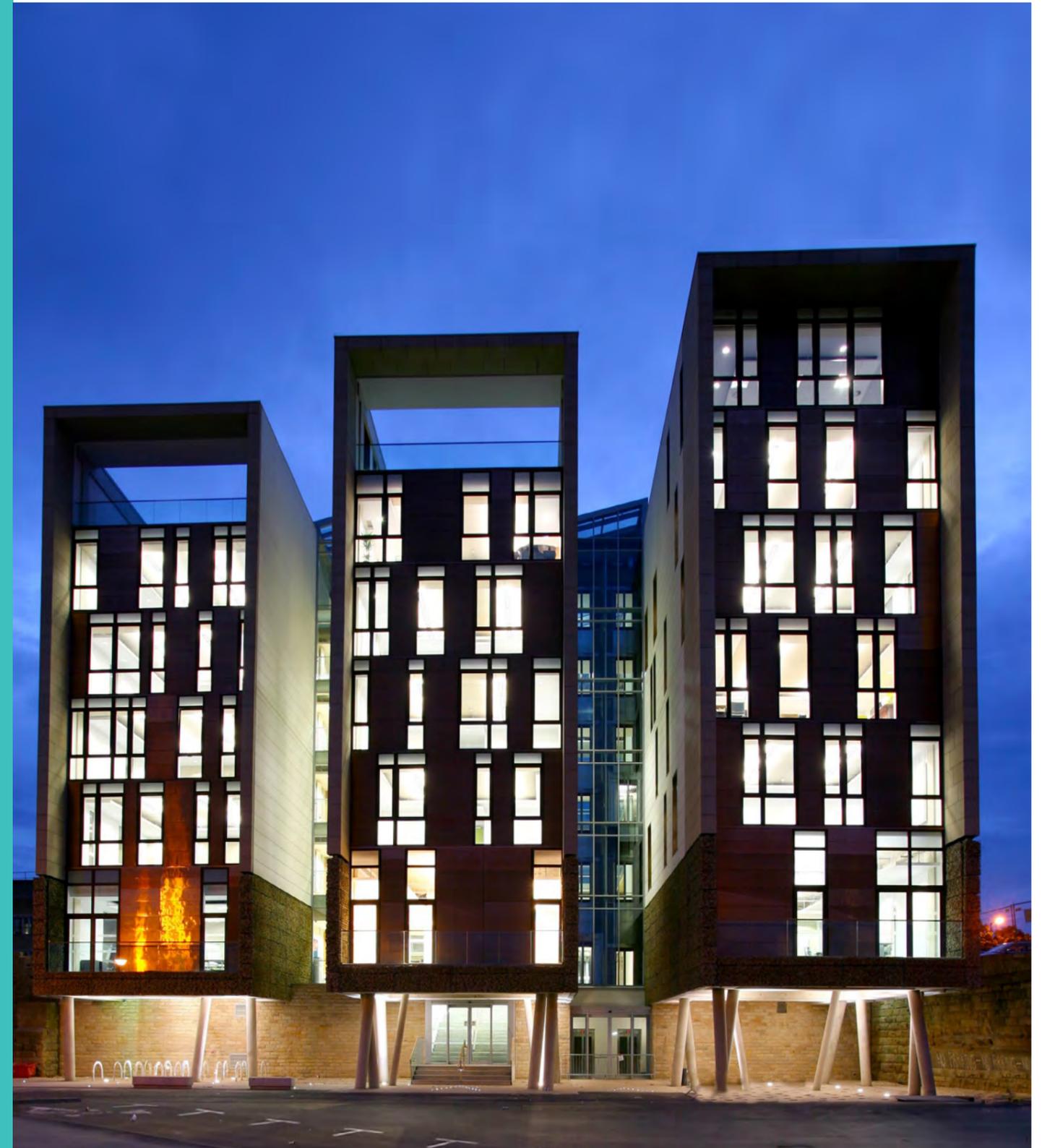


Figure 13.1: Photograph of the DMC01 building at night

BDP MEP										
MEP 01										
Arcadis Geotechnical										
GEO 01	Construction	Existing Retaining Walls - Eldon Street RW - Details of soil nails / ground anchors unknown. Potential for development to adversely affect anchors and stability of RW.	Whole site	19/01/2022	Reduce risk by undertaking detailed investigations and geotechnical stability analysis. Use design solutions which can avoid anchor locations. Specialist piling advice to be sought when in proximity to soil nails.	Arcadis	Exclusion zones to be clearly set out and marked onsite/fenced off as appropriate.	RR	OPEN	
GEO 02	Pre Construction	New development surcharge on retaining walls. Loadings within zone of influence could have detrimental impact (destabilising effect) on wall.	Whole site	19/01/2022	Site investigations and stability analysis to inform exclusion zones/easement behind the wall. Surcharge loads to be eliminated or reduced to magnitudes no greater than current use. Building loads to be transferred to soil/rocks outside of retained element (e.g. pile foundations).	Arcadis	Hazards risk to be clearly communicated on all design drawings related to the zone of influence of the retaining walls.	RR	OPEN	
GEO 03	Construction	Existing retaining walls - Temporary construction loads/surcharge, e.g. piling rigs, excavators, cranes, MEWPs etc., may have destabilising effect on the wall.	Whole site	19/01/2022	Exclusion zone/easement behind wall with loads limited to equivalent of current uses. If loading cannot be avoided, temporary propping to be used to ensure stability is maintained.	Arcadis	Exclusion zones to be clearly set out and marked onsite/fenced off as appropriate.	RR	OPEN	
GEO 04	In Use	Contamination and Made Ground: The HBS GIR identified human health risks from polycyclic aromatic hydrocarbons and asbestos containing materials in the Made Ground. Ground gas and groundwater monitoring in the HBS GIR are also incomplete.	Whole site	19/01/2022	Supplementary geo environmental ground investigation required to infill data gaps and update the conceptual site model.	Arcadis	To be updated following completion of the supplementary geo environmental ground investigation.	Hamson Barron Smith 'Ground Investigation Report' ref. 23-24-18-1-8011/GIR1 (June 2018)	OPEN	
GEO 05	In Use	Coal Mining - A CMRA undertaken by Hydrock (in previous Blueprint masterplan commission) identified there is a moderate to high risk of shallow coal workings beneath parts of the site.	Whole site	19/01/2022	Hydrock have undertaken a supplementary mining investigation to infill data gaps and produce an updated mining risk assessment report based on the findings.	Arcadis	To be updated following issue of the mining risk assessment report.	Hydrock 'Coal Mining Risk Assessment' ref. 15398-HYD-XX-XX-RP-GE-0001 (14 August 2020) and 'Coal Mining Ground Investigation Report' ref. 15398-HYD-XX-XX-RP-GE-0003 (20 January 2021)	OPEN	
Arcadis Utilities										
UTL 01										
Arcadis Transport										
TRN 01										

14.0 Fire Safety

The fire safety engineering proposals are for the new Active Travel Hub (ATH) building, considered as a single storey multi-use building.

The general fire safety guidance used for such a building will be the recommendations of BS 9999:2017.

14.1 Requirement B1: Means of Warning and Escape

14.1.1 Fire Detection and Fire Alarm

The provision of Automatic Fire Detection (AFD) within the building will be required to meet the following in accordance with BS 5839-1:

- Category L2 system to the café (i.e., detection installed throughout).
- Category L2 system to the Bike Loan & Retail and Workshop (i.e., detection installed throughout).
- Category L2 system to the plant rooms (or an extension as part of the main area they serve).
- Category M system to the cycle store / changing facilities (i.e., manual call points installed from the escape side of the cycle store / changing facilities entering an escape route).

A single Main Fire Alarm Panel (MFAP) will be provided within each unit / compartment (i.e., a panel within the café, a panel within the Bike Loan & Retail and Workshop, and a panel within the cycle store lobby).

It is noted that the building as a whole (all panels) will be proposed to be designed and interlinked to raise a simultaneous evacuation alarm throughout all areas / all parts of the whole building.

14.1.2 Alarm Strategy

A single-stage alarm strategy will be adopted (i.e., a single knock system with no investigation period), i.e., a single device will give an immediate evacuation alarm signal throughout the whole building.

14.1.3 Escape Signage

Escape signage will be designed and installed in accordance with both BS EN ISO 7010 and BS 5499-4, to suit the proposed layouts.

Safety signage will be provided to all fixed and portable first aid fire-fighting equipment locations, manual call points and any other fire & life safety related equipment and devices.

14.1.4 Emergency Lighting

Emergency lighting will be designed and installed in accordance with both BS 5266-1 and BS EN 1838, to suit the proposed layouts.

Emergency lighting should be designed for 3 hours non-maintained.

14.1.5 Active Fire Protection (Sprinklers)

There are no Building Regulations requirements for sprinkler protection to be provided within this building.

No sprinkler protection is proposed. Separation between different occupancies / usage is considered reasonable.

14.1.6 Evacuation Strategy

The entire building will adopt a simultaneous evacuation strategy.

14.1.7 Assembly Point / Rendezvous Point (RVP)

A suitable assembly muster point will be provided as a rendezvous point (RVP) located and designated to land adjacent to the car park.

14.1.8 Horizontal and Vertical Means of Escape

Horizontal and vertical means of escape from all areas of the building will meet the recommendations of BS 9999.

Travel distances will be provided within 20m single

direction of travel from within all areas of the building. Where more than one escape route is provided the maximum two-way travel distance is 50m.

14.1.9 Assisted Evacuation for PRMs

The evacuation plan will not and cannot rely on the assistance of the attending Fire & Rescue Service.

Step-free access is afforded and can be made for the evacuation of PRMs.

Each tenant demise will manage their own PRM requirements.

PRMs will be expected to be directed to evacuate the areas to make their escape from the available fire exit points (usually the building entrance points). No additional requirements are considered to be required.

Please refer to the Fire Safety Strategy report for more information.

14.2 Requirement B2: Internal Fire Spread (Linings)

The internal linings of a room or area of a building (any materials or products in lining any partition, walls, ceilings, floors or other internal structure) will be a minimum of class B-s3,d2, due to the open-plan nature of the areas.

14.2.1 Thermoplastic Materials

It should be noted that no thermoplastic materials are to be used in the external wall construction or any internal walls, windows, doors, diffusers or roof lights of the proposed works (including any attachments to the external walls).

14.3 Requirement B3: Internal Fire Spread (Structure)

3.1 Structural Fire Resistance

The structural fire resistance of the ATH building is required to achieve a minimum of FR 30 minutes fire resistance rating to load bearing capacity (R), including all columns, beams, floors (where required) and primary structural elements.

Any attachments to the external walls will require to be reviewed.

3.2 Compartmentation

Each tenant space should be provided as a separate compartment of sufficient fire-resistant construction to FR 30 minutes load bearing, integrity, and insulation (REI).

The compartmentation and fire-resistant construction requirements will be identified and provided in accordance with the recommendations of Tables 22, 23, 29 and 30 of BS 9999.

Please refer to the Fire Safety Strategy report for more information.

3.3 Cavity Barriers and Fire Stopping

Concealed spaces are required to be split by cavity fire barriers and any service penetrations are required to be fire stopped effectively both in accordance with BS 9999.

3.4 Ventilation Ducts, Service Ducts/Shafts and Service Pipes

Service pipes, drains etc passing through any floor/roof soffit will be fire stopped in accordance with Table 31 of BS 9999.

Services, ducts or shafts passing through a fire resisting element (such as a wall, floor, ceiling / soffit etc) will maintain the fire integrity and insulation of such an element to one or more of the following methods:

- Method 1 – thermally activated fire dampers (unless passing through a compartment or located on an escape route); or
- Method 2 – fire-resistant enclosure; or
- Method 3 – protection using fire-resisting ductwork; or
- Method 4 – automatically activated fire and smoke dampers triggered by the buildings AFD system.

14.4 Requirement B4: External Fire Spread

4.1 External Fire Spread / Boundary Conditions

The building is new and unprotected openings should be in accordance with both BS 9999 and BR187 for such buildings and usage. The following are subject to review at RIBA Stage 3.

Cycle Store:

- Unprotected openings areas are required to be greater than 5% of the floor area, required to each façade at each level to an open perimeter to outside.
 - Unprotected openings area shall be restricted to no more than 40% allowable unprotected area of the full height of each façade.
- Any walls / areas around the allowable unprotected areas (not including protected stair enclosures) shall be provided as 90 minutes fire resistant construction (from the internal face of the internal wall construction).

Café:

The café can be 100% unprotected.

Bike Loan & Retail and Workshop:
The bike loan & retail can be 100% unprotected.

The workshop can be 100% unprotected.

Plant Rooms:
The plant rooms can be 100% unprotected.

The external fire spread analysis of the proposed boundary conditions will be reviewed at RIBA Stage 3 in more detail, please refer to the fire strategy report for more information.

4.2 External Walls

The materials for any cladding / external wall construction should be Class A1 (Class A2-s1,d0 will be subject to further approving authority approvals). This includes all components of the external wall construction such as trays and membranes etc. and any attachments.

4.3 Roof

The roof should be designed to achieve a minimum of BROOF(t4), this is classified as being on a suitable non-combustible substrate or fire rated ceiling below and impenetrable within 60 minutes.

It should be confirmed if solar panels are to be provided. They should specifically be located on non-combustible materials, provided with sufficient fire breaks and suitable solar PV panel fireman's override isolation switch provided in the access points to the roof.

14.5 Requirement B5: Access and Facilities for Fire Service

5.1 Vehicle Access

The building will have access to within 50% or greater of the perimeter of the building.

Suitable access into the internal parts of the building will be provided, which is considered as reasonable access for a single level building.

Any external roads will be provided as suitable hard standings for fire service vehicle access points, which will be in accordance with the recommendations of Table 20 of BS 9999 (i.e., for a pump appliance with a 3.7m clear width, a 3.7m clear height and a minimum carrying capacity of 14 tonnes).

Vehicular fire appliance access will be able to be made to within 45m (along a route for laying a hose of each internal area).

5.2 Personnel Access

Access directly into the building for fire service personnel is considered reasonable, this is via the main entrance points to each compartment (i.e., the café entrance, the bike loan & retail entrance and the cycle store entrance).

5.3 Hose Distances

All areas internally are considered to be reached within a 45m hose distances from the fire appliance parking position.

5.4 Fire Hydrants

Fire hydrants should be within 90m of the fire-fighting access points.

It would appear that the existing hydrant provision is not considered reasonable (based on a map/street review). This should be confirmed by the local water authority / fire authority. Therefore, new fire hydrants are required to be provided to the site.

A new fire hydrant is proposed immediately outside the building within the landscaping area to the vehicular access point.

Suitable hydrant provision should also be made to the other plots outside this building i.e., to within 90m of the hotel complex (proposed both sides), to within 90m of the MSCP and to within 90m of all the residential units to this site and the later phases.

5.5 Solar PV Panels

Fireman's override isolation switches shall be provided at the Solar PV Panel access points, so that the attending fire service can isolate the solar PV panels (if solar PV panels are provided to the roof of the ATH).

5.6 Smoke and Heat Ventilation (Typical Upper Levels Car Park)

The cycle store is considered as open-sided and should have opposing opening areas (each of 5% of the floor area or greater) will therefore be required to have natural smoke ventilation. Natural smoke ventilation should be provided to two or more sides (preferably each façade on the perimeter of the space) which are open to air. These façades shall be each be provided with a minimum opening area calculated as 5% of the floor area of that level.

Natural smoke vent openings to each façade shall be no more than 40% of the façade area.

5.7 Smoke and Heat Ventilation (Workshop)

To allow flexibility in the use of the workshop, smoke ventilation should be provided in the form of AOVs, preferably located through the roof and evenly distributed i.e., 3no. 3sqm AOV openings or 6no. 1.5sqm AOV openings.

Such override controls / fireman's override switches will be located at the fire alarm panel to that demise (i.e., the bike loan & retail entrance point).

5.8 Smoke and Heat Ventilation (Other Enclosed Areas)

There is no requirement to provide smoke and heat ventilation of the café, bike loan & retail, or the lobbies and toilets to the cycle store.

As such manual smoke clearance using the openable / breakable windows and door openings to the façade along with mobile PPV fans are considered reasonable for such areas.

5.9 Emergency Power Supplies

Secondary power supplies will be provided to all relevant fire & life safety systems (including the AOVs, automatic fire detection systems, and emergency lighting etc.).

Emergency lighting will either be battery combined back-up or integral to each device.

Automatic Fire Detection (AFD) will be battery back-up, integral to the panel.

Automatic opening vents (AOVs) will either be battery combined back-up or integral to each device.

All power and cabling required for any fire & life safety systems listed above will be specified and installed in accordance with BS 8519.

Please refer to the Fire Safety Strategy report for more information.

14.6 Evacuation for PRMs

PRMs require an evacuation strategy to meet the Equality Act 2010.

It is expected that any PRMs will be required to evacuate unassisted and shall not rely upon the attending Fire & Rescue Service or any emergency services. Therefore, the directions and signage will direct any PRMs to use the escape routes (step-free) to make their immediate evacuation.

14.7 Fire Safety Strategy Report

All the points above for the ATH building as a whole is considered reasonable in meeting the functional requirements of Part B of Schedule 1 to the Building Regulations (subject to review and approval by the approving authorities and relevant stakeholders).

15.0 Appendices

Appendix A

A1 Architecture Drawings

Appendix B

B1 Structural costing information

B2 Retaing Wall Intrusive Investigations

B3 Drainage Strategy

Appendix C

C1 Building Services Engineering Drawings

Appendix D

D1 Utilities Drawings

Appendix E

E1 Transport + Highways Drawings

Appendix F

F1 Fire Strategy Report

Appendix G

G1 Site Investigation Specification

G2 Scope for Retaining wall Survey Works

Appendix H

H1 Smart Technology Strategy

Appendix I

I1 Arboricultural Report

Appendix J

J1 Party Wall Assessment

Appendix K

K1 Preliminary Ecological Assessment

Appendix L

L1 Pre-Construction Information Pack

Appendix M

M1 Planning Strategy

Appendix N

N1 Decision Trackers

Appendix O

O1 BREEAM Preassessment

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BDP.