

Chapter 4: Proposed Development

INTRODUCTION

- 4.1
- This chapter of the ES presents a description of the Proposed Development for which planning permission is being applied for. It provides relevant and sufficient information on the Proposed Development to aid the identification and assessment of potential environmental and socio-economic impacts and likely environmental and socio-economic effects across the environmental topic areas addressed by the EIA and as presented in **ES Chapters 6 to 10 (Volume 1)** and **ES Volume 2: Townscape, Built Heritage and Visual Impact Assessment**.
- 4.2
- Further details on the Proposed Development can be found within the Design and Access Statement (DAS)¹ that has been submitted in support of the planning application.

DESCRIPTION OF THE PROPOSED DEVELOPMENT

General Arrangement and Layout

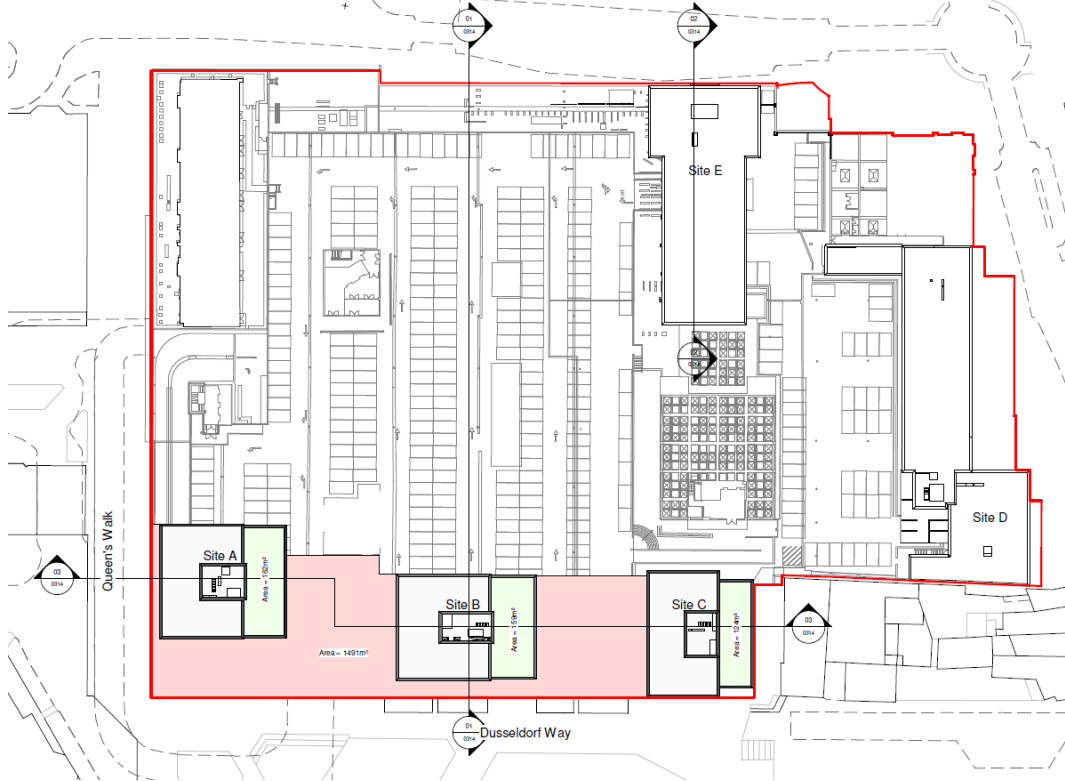
- 4.3
- The redevelopment of the site comprises:

“Construction of three residential buildings (Use Class C3) ranging in height from 5 to 22 storeys above Broad Street Mall and provision of a podium level amenity area; Construction of an 18 storey building on South Court comprising ground and first floor retail (Use Class A1/A2/A3) and residential over upper floors (Use Class C3); Change of use and extension of Quadrant House to form a 3 storey residential building (Use Class C3); Creation of three ground floor retail units (Use Class A1/A2/A3) fronting Dusseldorf Way and Queens Walk; All necessary enabling and alteration works required within the existing Broad Street Mall basement, ground and upper floors; Associated car park alterations, provision of servicing and refuse storage, cycle parking, public realm, landscape, and other works incidental to the phased development” (hereinafter referred to as ‘the Proposed Development’).
- 4.4
- The Proposed Development is to comprise a total uplift of circa 34,738 m² gross internal floorspace (GIA) and 493 residential units (of a range of unit sizes and tenures), which is comprised of the following elements (Figure 4.1):
 - Building A (new build): 22 storey (on top of the existing mall and therefore 25 storeys and 128.95 m above ordnance datum (AOD)in total) development providing 172 residential units with amenity space and parking;
 - Building B (new build): 18 storey (on top of the existing mall and therefore 21 storeys and 117 m AOD in total) development providing 139 residential units, with amenity space and parking;
 - Building C (new build): 15 storey (on top of the existing mall and therefore 18 storeys and 104 m AOD in total) development providing 99 residential units, with a new retail unit;
 - Building D (refurbishment and extension of existing Quadrant House): the existing floors are to be refurbished, with two additional floors proposed above. There will therefore be three levels of residential, within a 5 storey block (64 m AOD), providing 31 residential units; and
 - Building E (new build): provision of 52 residential units within a six storey building (on top of the existing mall therefore 9 storeys or 71 m AOD).
- 4.5
- An amenity deck is present at podium level at the base of Buildings A to C (Figure 4.2). The amenity space will provide seating and informal play space for the residents being directly accessible from Buildings A to C.
- 4.6
- Buildings A to C also provide private roof terraces at floors 24, 20 and 17 respectively (Figure 4.2).

Figure 4.1 Site Arrangement



Figure 4.2 Proposed Development Amenity Space



¹ Corstorphine and Wright (2018) Broad Street Mall Design and Access Statement

Building A

- 4.7 Building A is located on the southern border of the site, above the existing Broad Street Mall (Figure 4.1).
- 4.8 Building A is accessible via a residential core located off Queen's walk (Figure 4.5). The core includes access to the residential units via both stairs and elevators.
- 4.9 Additionally, the Building has a core located in the basement level, this core provides the bin store and access to the cycle store (Figure 4.3).
- 4.10 Building A has direct access to the amenity deck on podium level, via an exit located on the eastern side of the Building (Figure 4.4).

Building B

- 4.11 Building B is located on the southern border of the site, above the existing Broad Street Mall (Figure 4.1).
- 4.12 Building B is accessible via a residential core located off Dusseldorf Way (Figure 4.5). The core includes access to the residential units via both stairs and elevators.
- 4.13 Additionally, the Building has a core located in the basement level, this core provides the bin store and access to the cycle store (Figure 4.3).
- 4.14 Building B has direct access to the amenity deck on podium level, via an exit located on the western side of the Building (Figure 4.4).

Building C

- 4.15 Building C is located on the southern border of the site, above the existing Broad Street Mall (Figure 4.1).
- 4.16 Building C is accessible via the existing retail entrance, off of Dusseldorf Way, into Broad Street Mall, the residential core is located to the east of this hallway. The retail access has two sets of doors, externally and internally, between which the residential access is present (Figure 4.5). The residential core provides access to the upper floors via both stairs and elevators.
- 4.17 Additionally, the Building has a core located in the basement level, this core provides the bin store and access to the cycle store (Figure 4.3).
- 4.18 Building C has direct access to the amenity deck on podium level, via an exit located on the western side of the Building (Figure 4.4).

Building D

- 4.19 Building D is located on the eastern border of the site, above the existing Broad Street Mall (Figure 4.1).
- 4.20 Building D is accessible via an existing retail entrance to Broad Street Mall located on St Mary's Butts. The retail entrance has two sets of doors, externally and internally, the residential core is located between the two sets of doors, to the south side of the entrance. The residential core allows access to upper floors via a stair case (Figure 4.5).
- 4.21 The residential core is also present at basement level where provision for cycle storage and the bin store is present (Figure 4.3).
- 4.22 Building D also has direct access to the car park on the roof level (second floor), this area of access has been added to the existing building to act as an additional fire escape for the end users of the Proposed Development.

Building E

- 4.23 Building E is located on the northern border of the site, above the existing Broad Street Mall (Figure 4.1).
- 4.24 Building E is accessible via a residential core located off Oxford Road. The residential core provides access to the upper floors by stairs and a lift. A separate lift, also located in the core, provides access to the amenity deck on podium level and to the basement level (Figure 4.4).
- 4.25 The bin store is present within the residential core at basement level (Figure 4.3).

Figure 4.3 Residential Cores (Bin and Cycle Stores) at Basement Level



Figure 4.4 Access to the Amenity Deck at Podium Level

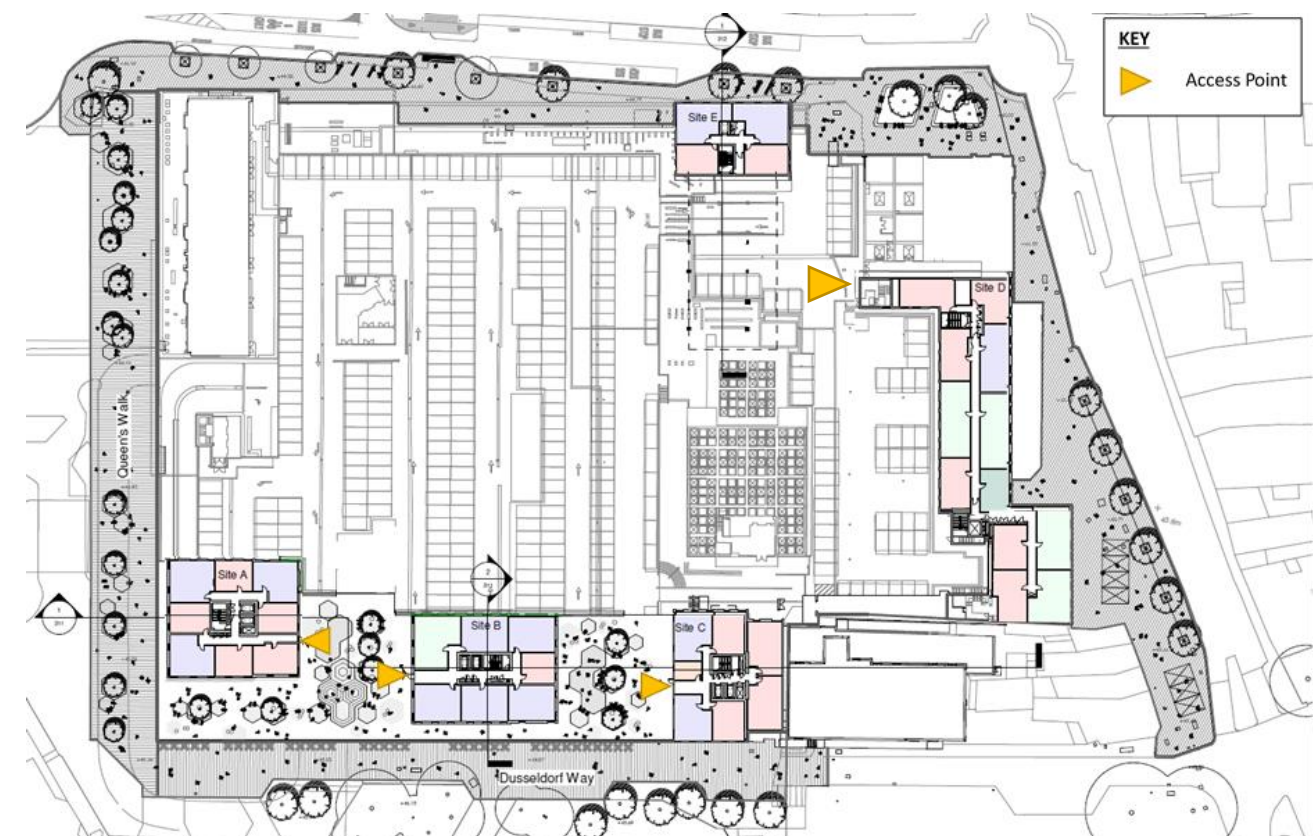
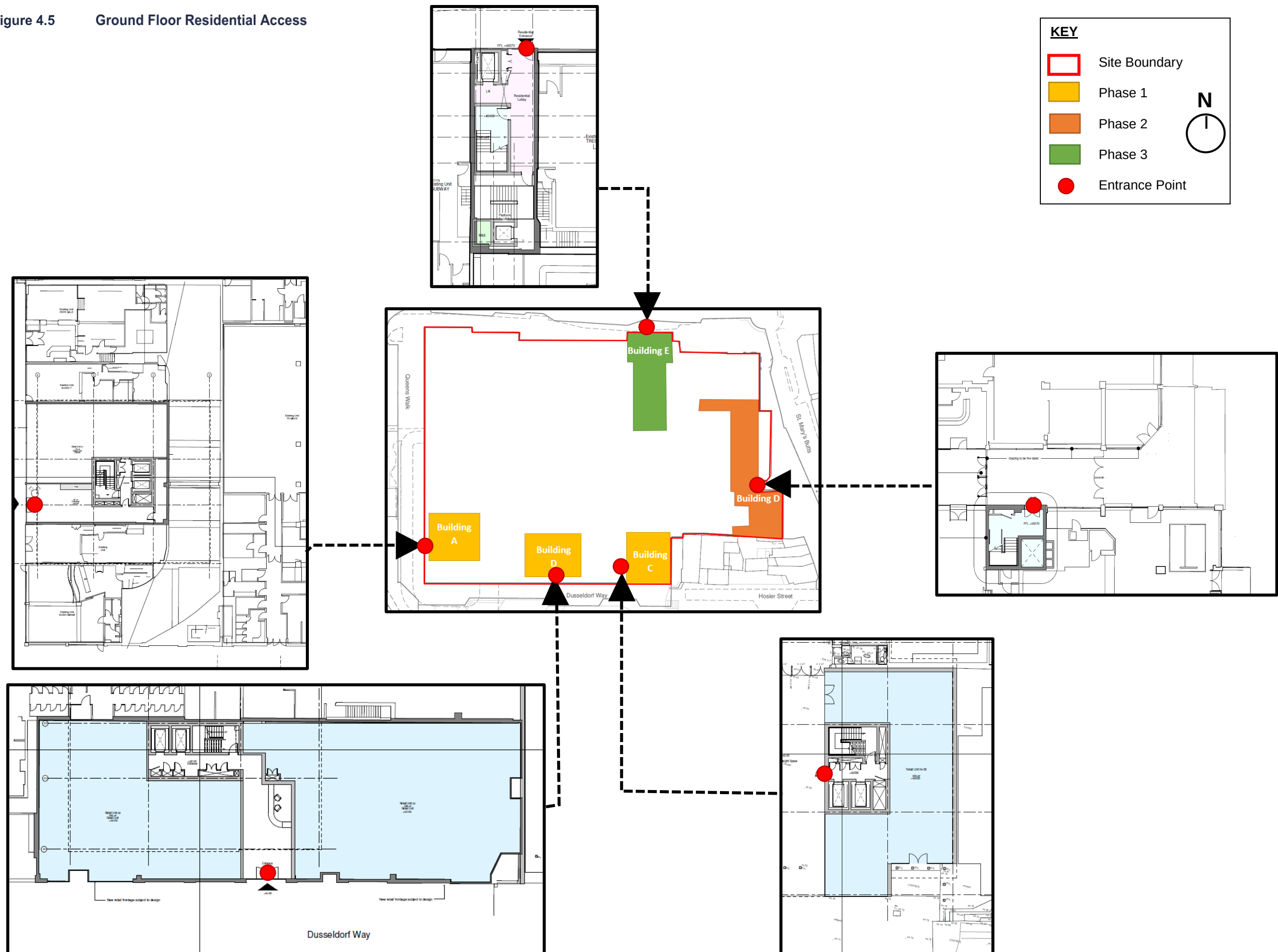


Figure 4.5 Ground Floor Residential Access

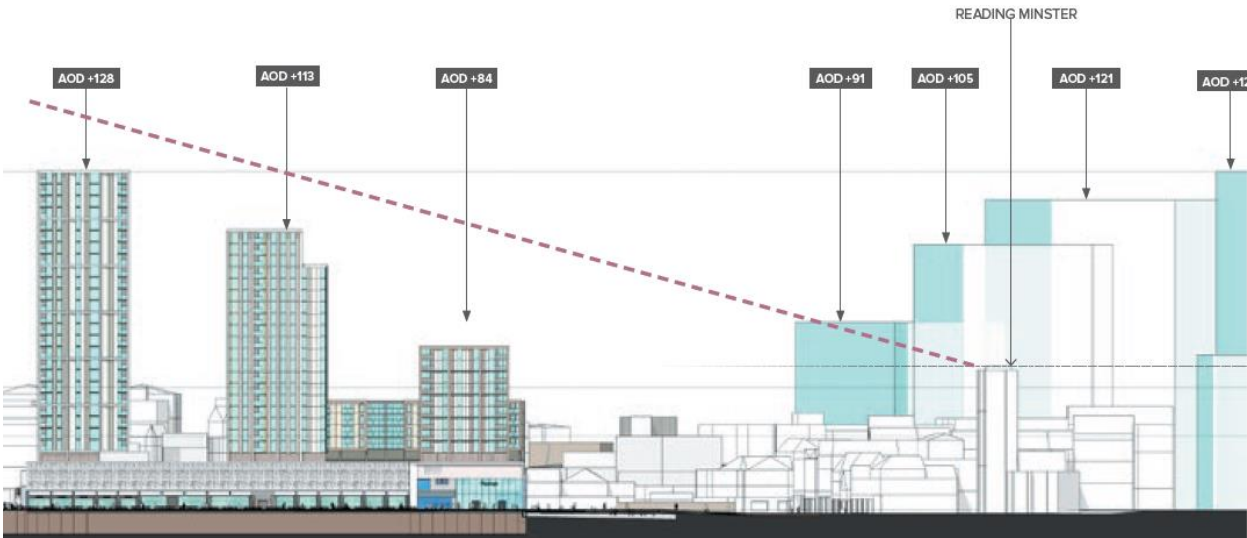


Height, Scale and Massing

Building Height and Scale

- 4.26
- The Proposed Development will have a maximum height of 128 m AOD at its tallest point, Building A (see Figure 4.6). The height of the Proposed Development reflects the height of the Station Hill Development locate to the north east (for further details see *ES Chapter 3 Alternatives and Design Evolution (Volume 1)*).
- 4.27
- The height of the Proposed Development has been designed taking the surrounding local context into account, with buildings A, B, and C will step down in height to the east, to reflect the prevailing building line and respect the setting and heritage of Reading Minster and the St Mary's Butts / Castle Street conservation area (for further details see *ES Chapter 3 Alternatives and Design Evolution (Volume 1)*).

Figure 4.6 Proposed Development Heights - Buildings A to C



Quantum of Development

Retail Floor Areas and Use Classes

- 4.28
- The retail units within the existing Broad Street Mall will be redeveloped and reconfigured in order to provide space for the introduction of the residential cores for the Proposed Development. The reconfigured retail units will be in flexible in land use class offering A1 (Shops), A2 (Professional and Financial Services) and A3 (Restaurants and Cafes) land use classes.

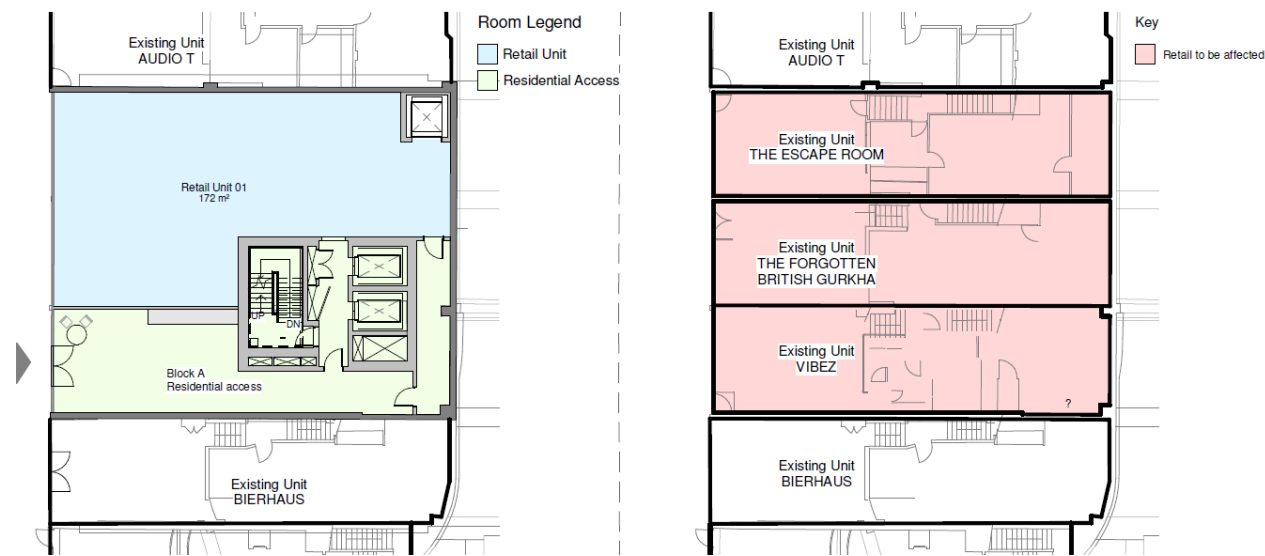
Building A

- 4.29
- In order for the residential core for Building A to be constructed it requires the reconfiguration of three existing retail units and will result in one larger retail unit and the residential core (Figure 4.7). As outlined in Table 4.1, this reconfiguration will lead to a net loss of retail space and Suis Generis and D1 land use classes.

Table 4.1 Building A Proposed Retail space

Exsting Businesses	Existing Land Use Class	Existing Area (m2) GIA	Existing Total Area (m²)	Proposed Retail Area (m²) GIA	Total Proposed Retail (m²) GIA	Net Change (m²) GIA
The Escape Room	Suis Generis	105	318	178	178	-140
The Forgotten British Gurkha	D1	105				
Vibes	A3	108				
TOTAL			318		178	-140

Figure 4.7 Building A Reconfiguration of Retail Units



Building B

- 4.30
- In order for the residential core for Building A to be constructed it requires the reconfiguration of one existing retail units and will result in two retail units and the residential core (Figure 4.8). As outlined in Table 4.2, this reconfiguration will lead to a net loss of retail space.

Figure 4.8 Building B Reconfiguration of Retail Units

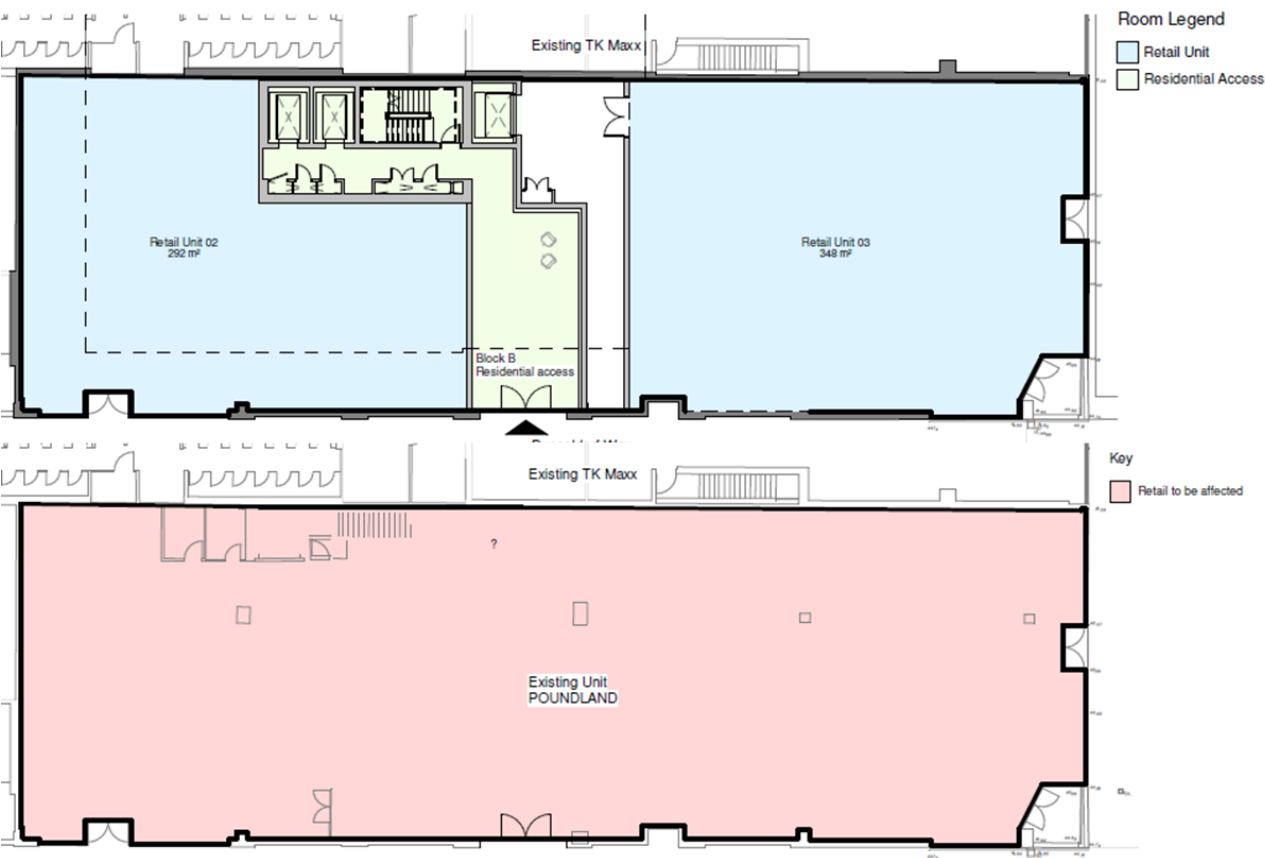


Table 4.2Building B Proposed Retail space

Exsting Businesses	Existing Land Use Class	Existing Area (m²) GIA	Existing Total Area (m²)	Proposed Retail Area (m²) GIA	Total Proposed Retail (m²) GIA	Net Change (m²) GIA
Poundland	A1	831	831	348	640	-191
				292		
TOTAL			831		640	-191

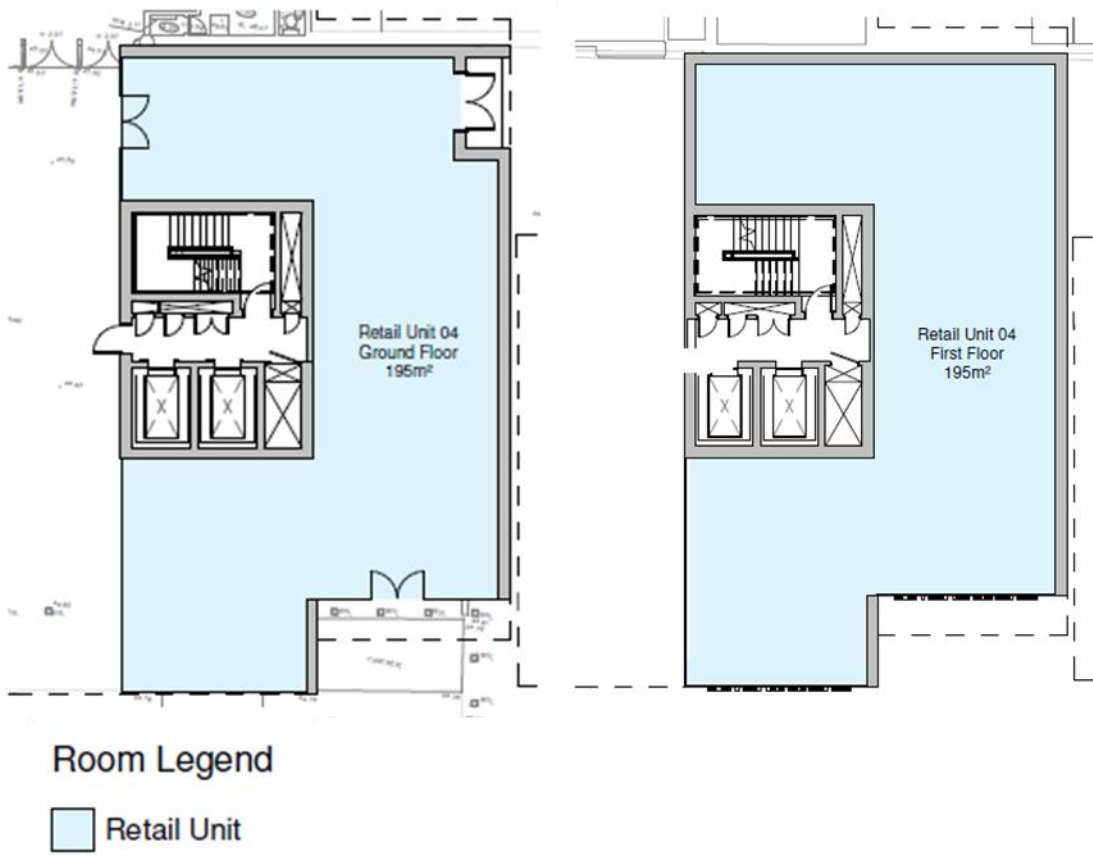
Building C

4.31 The construction of Building C and the associated residential core will introduce a new retail provision on site (Figure 4.9). As outlined in Table 4.2, Building C will result in the net gain of retail space.

Table 4.3 Building C Proposed Retail Space

Exsting Businesses	Existing Land Use Class	Existing Area (m²) GIA	Existing Total Area (m²)	Proposed Retail Area (m²) GIA	Total Proposed Retail (m²) GIA	Net Change (m²) GIA
N/A	N/A	0	0	195	390	390
				195		
TOTAL			0		390	390

Figure 4.9 Building C Proposed Retail Units



Building D

4.32 Building D will not impact the existing retail provision, nor will it introduce any new retail provision to the site.

Building E

4.33 The residential core of Building E will be constructed within an existing retail unit (Figure 4.10), and as outlined in Table 4.4, this will lead to a net loss of retail space.

Figure 4.10 Building E Reconfiguration of Retail Units

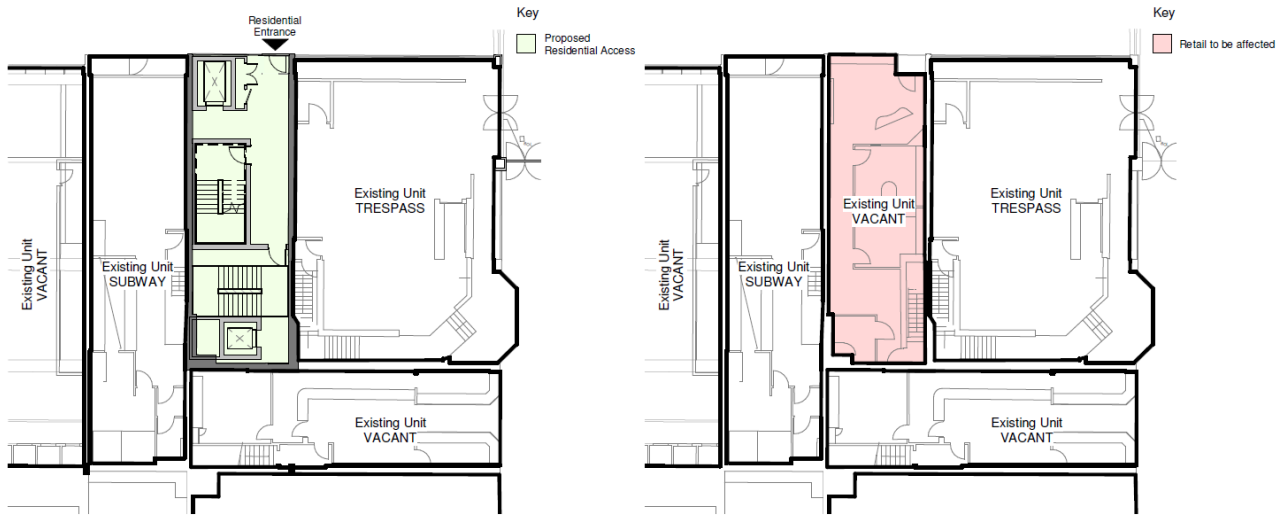


Table 4.4Building E Proposed Retail space

Exsting Businesses	Existing Land Use Class	Existing Area (m²) GIA	Existing Total Area (m²)	Proposed Retail Area (m²) GIA	Total Proposed Retail (m²) GIA	Net Change (m²) GIA
Digital Hearing	A1	82	82	0	0	-82
TOTAL			82		0	-82

Residential Units

4.34 Table 4.5 provides an overview of the mix of retail units comprising the Proposed Development. A total of 5% of the residential units within the Proposed Development will be accessible units.

Table 4.5 Area Schedule by Block

Unit Size	Block A	Block B	Block C	Block D	Block E	Total
1	87	33	51	17	26	214
2	83	103	46	3	18	253
3	2	3	2	11	8	26
Total	172	139	99	31	52	493

4.35 Additionally, the Proposed development fully acknowledges the importance of affordable housing in the context of RBC's adopted and emerging planning policy. The applicant will endeavour to deliver the maximum reasonable amount of affordable housing as part of the proposed scheme, subject to viability testing.

Appearance

4.36 The design of the Proposed Development has been influenced by the need to achieve slender built forms above the centre of Reading. Additionally, as the scheme is visible from key points across Reading, it was important to choose a material that is durable, good quality but also provides variations across the façade treatment.

Figure 4.12 Appearance of Building A



Building A

- 4.37** Site A will be clad in a terracotta cladding in an off-white / light grey with a smooth and profiled texture.
- 4.38** The southern elevation of Building A is split in a 1 to 3 ratio allowing for 2 tones of cladding material, which aim to emphasise verticality
- 4.39** Building A will have two separate elements, with the east of the building be set back and lower in height. The west of the buildings will be clad in a light grey or white terracotta cladding, whilst the east of the buildings will be clad in a contrasting darker tone terracotta cladding (Figure 4.12).
- 4.40** Window reveals will use a bronze anodised metal finish.
- 4.41** The split in the elevation allows for the built form to step up and away from the Minster helping reduce overall mass whilst being sensitive to the adjacent conservation area.

Building B

- 4.42** Building B will also be clad in terracotta cladding, however it shall be a slightly darker tone that present on Building A.
- 4.43** Building B will also have two separate elements, with the east of the building be set back and lower in height. The buildings will utilise two tones of cladding material, the eastern (set back side of the split) will use the slightly darker tone cladding (Figure 4.13).

Building C

- 4.44** Building C is the only building of the Proposed Development to be grounded.
- 4.45** Building C, similarly, has a set back, reduced height section to the building. The western side of the building will use a light buff, multi tone brick and the east section of the building will be constructed using a darker buff with a red tint multi tone brick (Figure 4.14). This materiality will be in keeping with the pattern of Buildings A and B, whilst being sympathetic to Reading Minster and the St Mary's Butts / Castle Street Conservation area.

Building D

- 4.46** Building D is in close proximity to surrounding residential and retail units a lot of are constructed of brick, as a result Building D will be clad with a brick slip system, whilst the existing windows will be replaced with new windows, to match those present in the extension of the building (Figure 4.15).
- 4.47** Building D will utilise silver grey brick treatment with aluminium lined reveals in the fenestration of the façade (Figure 4.5).

Figure 4.15 Appearance of Building D



Figure 4.13 Appearance of Building B



Figure 4.14 Appearance of Building C



Figure 4.16 Appearance of Building E



Building E

4.48 Building E is in close proximity to numerous red and buff brick buildings present along Oxford Street, as such Building E will be clad in a buff brick to fit in with the existing character of the area (Figure 4.16).

4.49 Building E will follow a similar approach to Building D, but using a buff coloured brick. The element above the parade will be rendered a light shade to blend in with the existing structure below.

Amenity Space

4.50 The existing building contains nearly no landscaping and planting, and the Proposed Development seeks to increase the planting and landscaping on site.

4.51 The Landscape Masterplan seeks to provide significantly improved public realm to this key site, with generous amenity space provided on the podium level and communal roof terraces for the new residential blocks.

4.52 With respect to the provision of open space in new residential developments within the centre of Reading the Sites and Detailed Policies Document² states:

'Development in central Reading will not always be expected to comply with the standards set for flats (outside the centre of Reading.) Open space is nonetheless required, unless exceptional circumstances prevail, to accommodate modest sitting out areas and clothes drying facilities.'

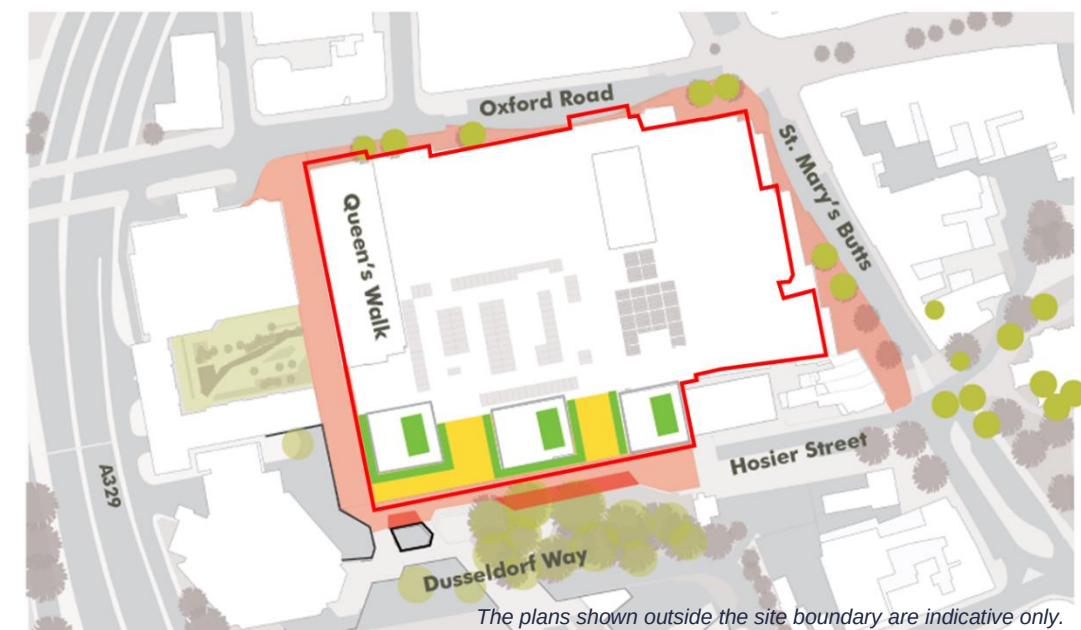
*'The Open Spaces Strategy states that, 'All guidelines recommend that at least some open space for children to play, whether publicly or privately owned, be available within 100-200m of every home. This will primarily affect very high-density developments, like flats in central Reading.'*³

4.53 The Proposed Development will provide (Figure 4.17):

- Residential amenity space of approximately 1,149 m²; and
- Private terrace area of approximately 607 m².

4.54 The landscaping strategy shows both those works and design which are included within the Proposed Development (located within the site boundary) and those which are indicative (those located outside of the site boundary).

Figure 4.17 Amenity Space



Podium Level

4.55 The Proposed Development amenity area will use decorative screens to the northern edge to minimise views from the amenity area over the car park areas to be retained to the north. In addition, a number of seating 'pods' will be provided which include screens and integrated planters across the deck area.

4.56 An indicative plan of the seating to be used for the podium level amenity area can be seen in Figure 4.18, with and a cross section of the amenity deck and the seating can be seen in Figure 4.19.

4.57 The planting strategy for this scheme has been developed to ensure robust and attractive year round cover to the raised beds on the roof terraces. The planting is to be tolerant of a variety of conditions, and to provide seasonal colour.

4.58 Podium level amenity areas will be provided as amenity space for residents with seasonal and robust planting, using grasses and herbaceous flowering species to provide colour. A colour combination of purples, oranges and dark green is proposed, making reference to the vibrant colours of a mixed herbaceous and annual border, and Suttons Seeds, an indicative strategy can be seen in Figure 4.21.

4.59 Flowering multi stem feature shrubs will be included in the amenity areas where appropriate.

4.60 The results of the wind tunnel testing identified that the unsuitable wind conditions were present within the amenity area at podium level, as such landscaping to mitigate the effects will be identified and confirmed through further detailed design. Landscaping measures may include the use of pergolas, trellises, screens and further planting (Figure 4.20). See **ES Chapter 10 Wind Microclimate (Volume 1)** for more details.

² Sites and Detailed Policies Document (5.6 Private and Communal Outdoor Space: 5.6.10: <http://www.reading.gov.uk/media/1049/Sites-and-Detailed-Policies-Adopted-October-2012/pdf/SDPD-Adopted-Oct12-Altered-Jan15.pdf>

³ Sites and Detailed Policies: 8.1 Provision of Public Open Space: 8.1.12: <http://www.reading.gov.uk/media/1049/Sites-and-Detailed-Policies-Adopted-October-2012/pdf/SDPD-Adopted-Oct12-Altered-Jan15.pdf>

Figure 4.18 Furniture Layout

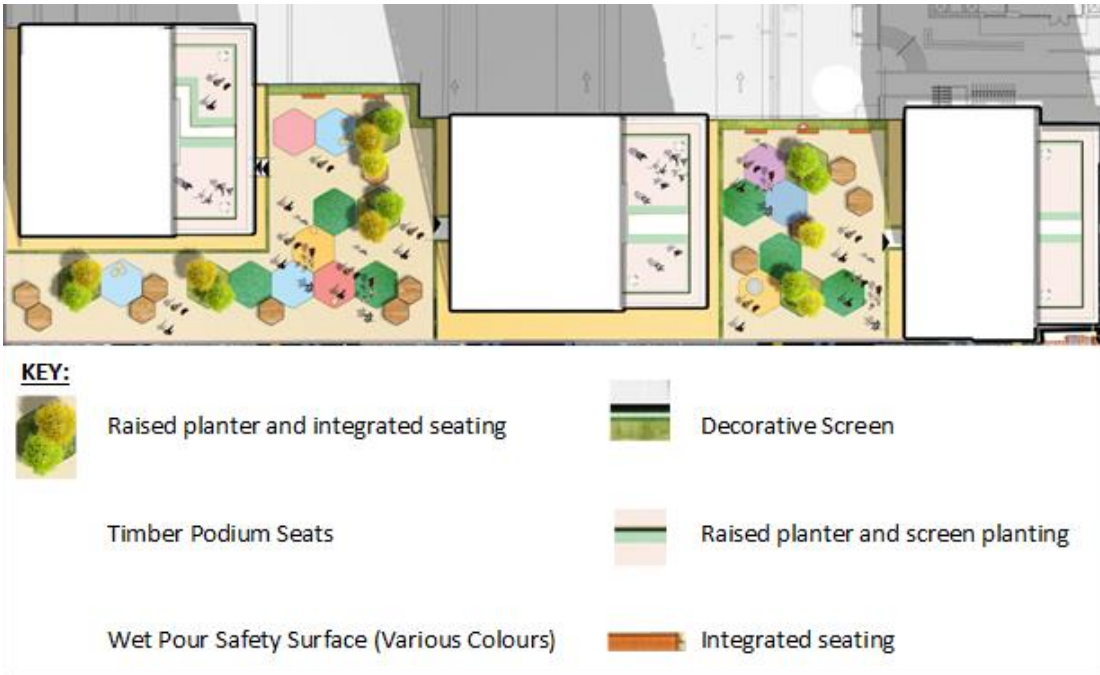


Figure 4.19 Indicative cross section through terrace and planter with railings

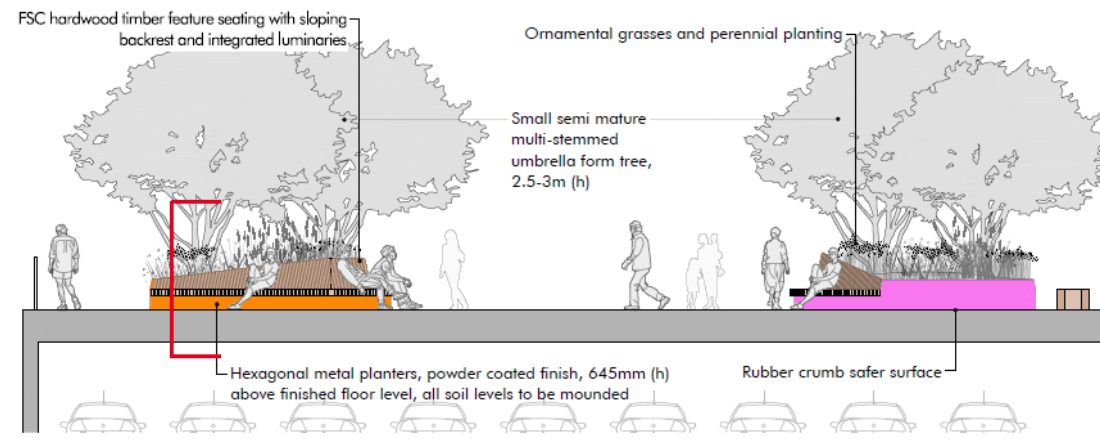


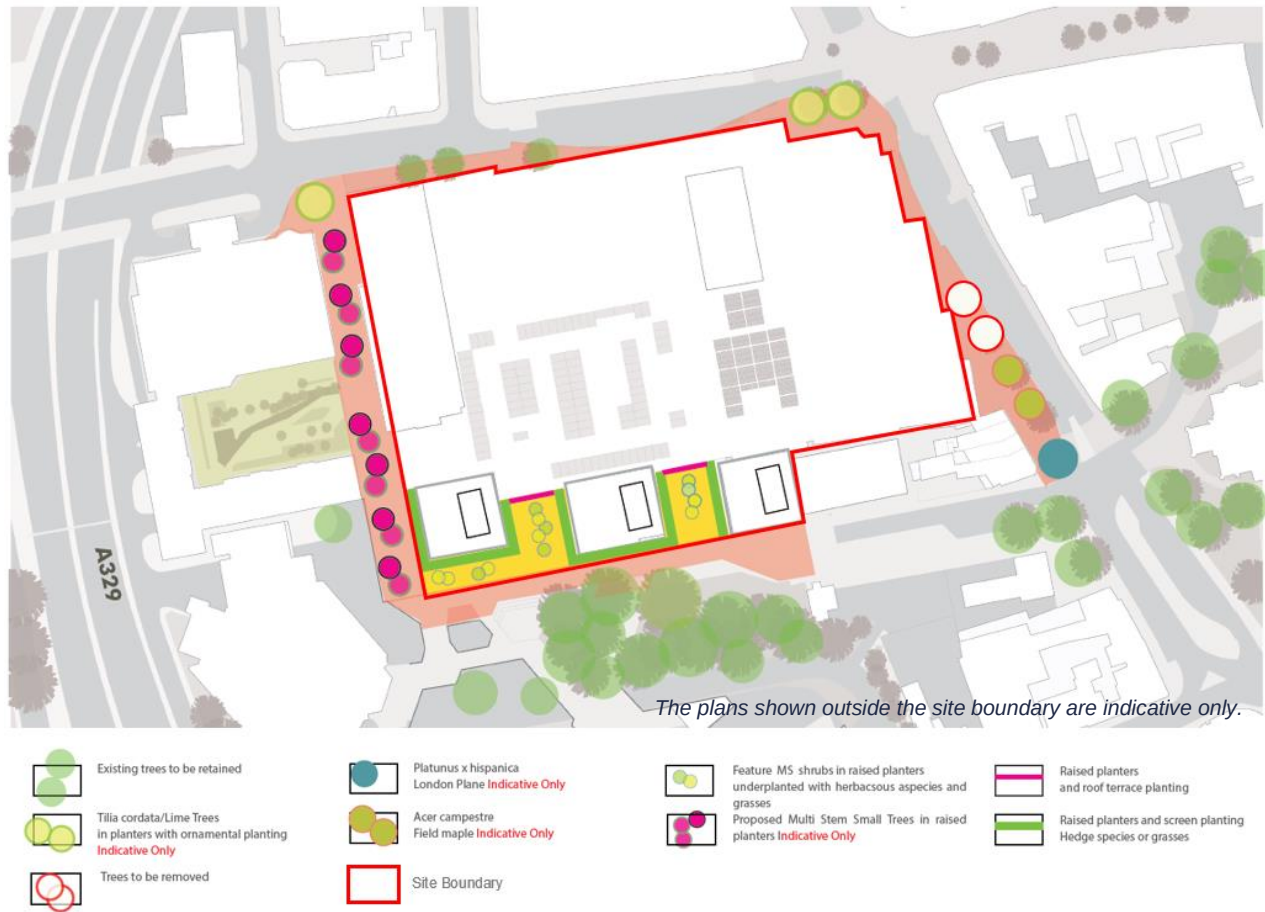
Figure 4.20 Example Landscaping Measures



Roof Terrace

- 4.61 Three roof terraces will be provided to residential Blocks A, B and C, with seating, planting and incidental play opportunities.
- 4.62 The planting strategy for this scheme has been developed to ensure robust and attractive year round cover to the raised beds on the roof terraces.
- 4.63 Roof terraces will be provided as amenity space for residents with seasonal and robust planting, using grasses and herbaceous flowering species to provide colour. A colour combination of soft pastel colours, including pinks and yellows is proposed to the flowering plants, an indicative strategy can be seen in Figure 4.21.
- 4.64 Flowering multi stem feature shrubs are proposed to the communal roof gardens where appropriate.

Figure 4.21 Indicative Planting Strategy



Access, Parking and Servicing

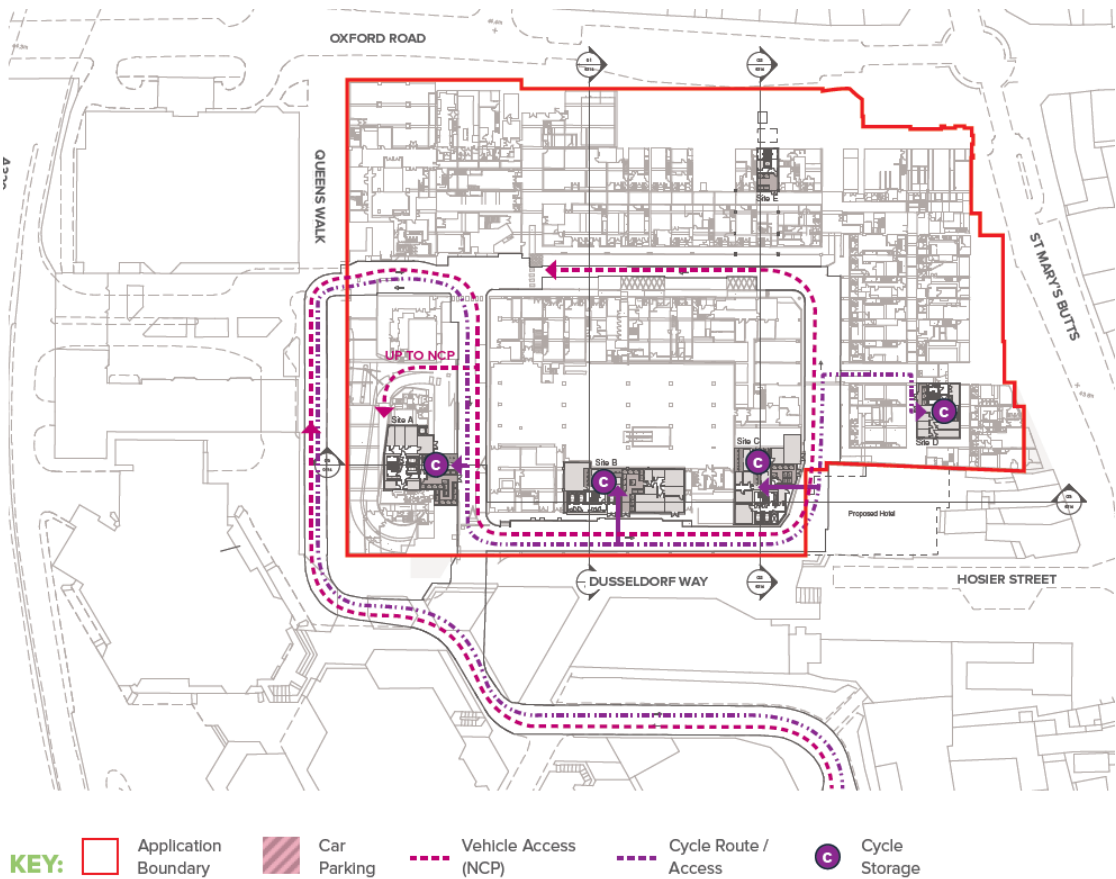
Vehicular Access and Parking

- 4.66 The Proposed Development is a car free scheme, however it will provide 24 accessible parking spaces for the accessible residential units in the Proposed Development.
- 4.67 These spaces will be accommodated within the existing multi storey car park and the spaces will be provided through the realignment of existing car parking spaces affected by the Proposed Development. Vehicles currently access the site via Castle Street to the south, this provides access to the basement level for the existing multi storey car park or for servicing the existing retail units (Figure 4.25).
- 4.68 Overall 60 spaces lost within existing car park to facilitate residential cores, introduction of accessible spaces and realignment of vehicular routes

Cycle Access and Parking

- 4.69 The residents of the Proposed Development will be provided with secure cycle storage within the residential cores at basement level. Residents will access the cycle stores through the existing basement along the access road off Castle Street. (Figure 4.25).
- 4.70 Cycle parking will be provided a total of 260 cycle spaces on site, in the following provision:
- Buildings A and B will provide triple stacked cycle parking spaces in the cycle store in the residential cores at basement level;
 - Building C will provide cycle parking spaces in the cycle store in the residential core at basement level; and
 - Building D will provide double stacked cycle parking spaces in the cycle store in the residential core at basement level.

Figure 4.22 Proposed Development vehicle and cycle accessibility



Servicing

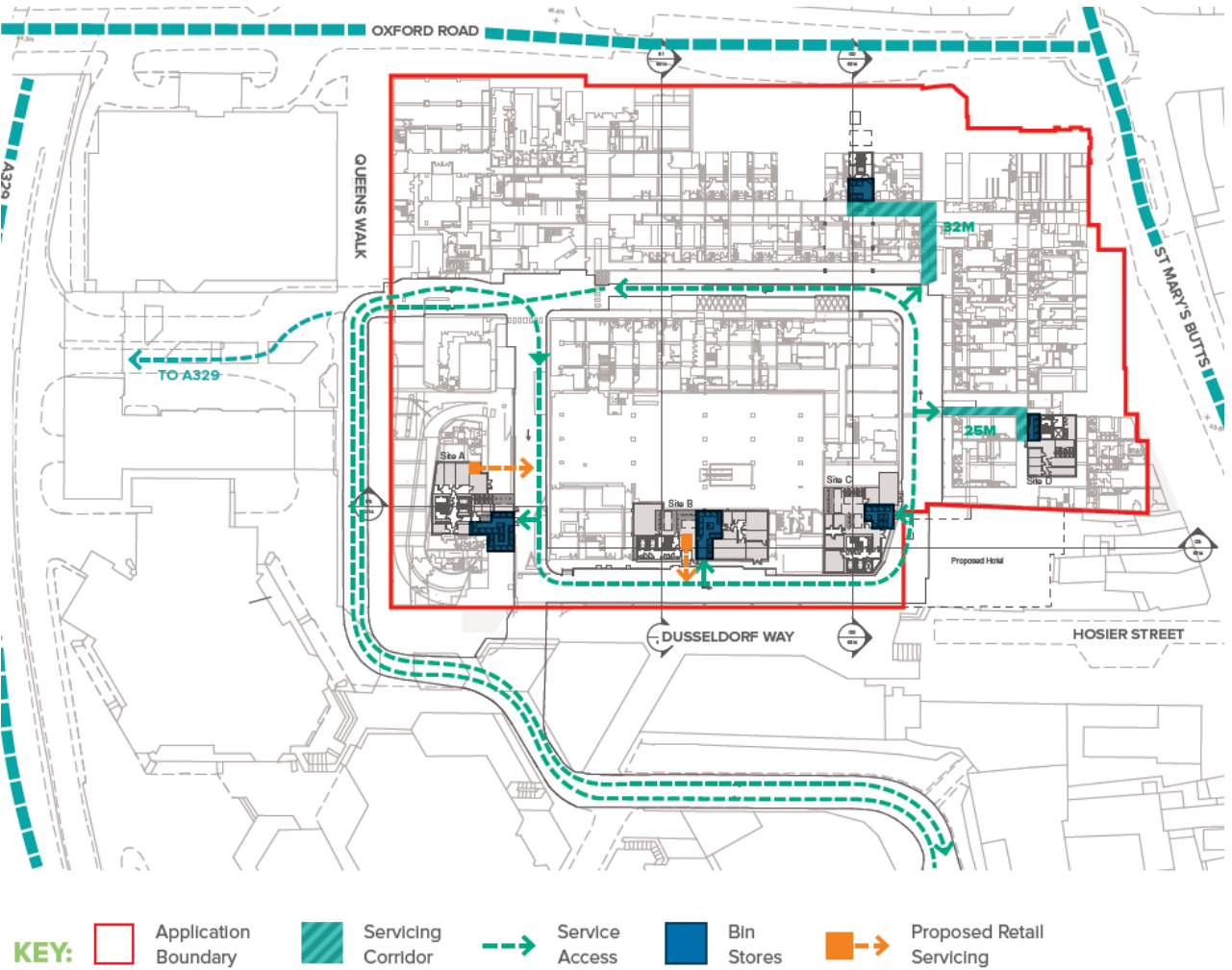
- 4.71 Servicing vehicles for commercial units will access the Proposed Development via the existing basement level which is accessible off Castle Street, located to the south of the site.
- 4.72 The existing retail units within Broad Street Mall are serviced via this route, therefore it is deemed appropriate that the Proposed Development is serviced via the same route.

Waste Management

- 4.73 Bin stores for each of the residential developments are located within residential cores at the basement level. Sites D and E will have servicing corridors, as the bin stores are not directly accessible from the existing service road, the drag distance for Site D is 25 m and Site E is 32 m.

- 4.74 The amount of bin storage for each of the developments has been established from the "Waste Management Guidelines for Property Developers, Architects, Planners and Contractors"⁴ and assumes a weekly collection of bins to include general waste and recycling. It is anticipated that a waste management company will be responsible for the collection of residential waste.

Figure 4.23 Proposed Development Servicing



External Landscaping Strategy (Indicative)

- 4.75 The refurbishment of the Broad Street Mall opens up opportunities to also upgrade the adjacent streetscapes, and in association with the new residential towers, to provide adjacent amenity space.
- 4.76 The Proposed Development indicatively looks to upgrade the pedestrian walkways of Queen's Walk and Dusseldorf Way linking Oxford Road with St Mary's Butts. These walkways could be activated with raised planters and integral seating, with space for cafe seating to the edges.
- 4.77 The landscaping shows indicative plans for upgrading Oxford Road and St Mary's Butts with new enhanced surface treatments, street tree planting to supplement the existing, and raised planters at each end of the Broad Street Mall frontage to Oxford Road.
- 4.78 Footways adjacent to areas adjacent to the mall will be may be improved, with simple paving palettes reflecting the colours and materiality of the existing historic streets.

⁴ Reading Borough Council: "Waste Management Guidelines for Property Developers, Architects, Planners and Contractors". Available at: http://www.reading.gov.uk/media/5931/Waste-management-guidelines-for-property-developers/pdf/Waste_Management_Guidelines_for_Reading_V1_2.pdf

- 4.79 The indicative surface materials to the Queen's Walk and Dusseldorf Way may be upgraded, and materials would reflect those of the wider streetscape to create the impression of a continuous and seamless public realm around the Mall.
- 4.80 The hard landscape materials palette has been selected to reflect the surface and building materials found in the immediate vicinity. That comprises, brindle and red clay pavers with granite kerb edges (Figure 4.20).
- 4.81 The Hosier Street Area Outline Development Framework also recommends use of a similar palette in developing proposals for the regeneration to the south.
- 4.82 The landscape proposals will deliver a net increase in tree cover to Oxford Road and St Mary's Butts, which is currently limited.
- 4.83 The trees to Oxford Road will be retained and reinforced with new planting, while the trees to St Mary's Butts are of insufficient merit to be retained and will be removed and replaced with new semi mature trees to reflect the scale and importance of the stree
- 4.84 There is a group of mature trees within an area of green space to the south of Hosier Street, including a number of plane trees, which make a significant contribution to the visual amenity of the area.
- 4.85 The cluster of trees around the junction of St Mary's Butts and Hosier Street are also significant in combination with the trees adjacent to The Minster.

ENVIRONMENTAL CONSIDERATIONS

Flooding and Drainage

- 4.86 The following sections of this chapter summarise the flooding and drainage considerations relevant to the site. Further details and supporting information can be found within the **Flood Risk Assessment including Surface Water Strategy**⁵, submitted alongside the planning application, and presented within **ES Volume 3, Appendix Scoping Report**.

Surface Water Drainage

- 4.87 The site has been identified to have a low risk of flooding from surface water.
- 4.88 The Proposed Development is being constructed within the boundary of the existing Broad Street Mall. The Proposed Development will not increase the amount of impermeable surfacing on site.
- 4.89 As the amount of impermeable surfacing is not changing from existing to proposed, the site run-off rates remain the same. As such the Proposed Development will be served by the existing underground drainage facilities.
- 4.90 SUDS techniques have been considered, however the use of SUDS is not feasible due to the lack of space for the implementation of such measures within the existing site.

Groundwater Flooding

- 4.91 The site is located within Flood Zone 1, which is land which is susceptible to a low probability of flooding.
- 4.92 Additionally, the site has an existing basement and the Proposed Development within which the Proposed Development will be constructed.
- 4.93 If perched water is encountered during construction in the basement, suitable protections will be put in place such as the pumping of any ground water (as outlined in the Demolition and Construction chapter, **ES Chapter 5 Demolition and Construction (ES Volume 1)**).

Water Resources

Water Demand

- 4.94 The Site is currently by existing retail provision in the form of Broad Street Mall, therefore there is an existing water demand and usage for the site.
- 4.95 The indicative water demand volumes for the Proposed Development have been calculated as follows using CIRIA Guidance C657⁷ and information provided from **ES Chapter 6: Socio- Economics (Volume 1)**:

- 122,500 l/d for residential use (980 residents at 125 litres/person/day); and
- An additional 102 l/d for retail/commercial use (net increase of 6 employees with a consumption of 17l per day, per person).

- 4.96 The estimated water demand calculations do not take into account the use of water efficient fixtures and fittings (as they will be based upon standardised average levels of demand) and which will be implemented as mitigation as part of the Proposed Development.

- 4.97 To inform the detailed design stage, TWUL may need to carry out flow and pressure tests for daily demand estimations when the planning application for the Proposed Development is submitted. This will assess the available capacity in the local supply network and determine whether any additional mains laying is necessary to support the Proposed Development and provide an indication of any cost of upgrades to the network. This would be undertaken as part of the detailed design stage if required.

Wastewater Generation

- 4.98 The foul water and surface water generated on-site will be discharged into the TWUL network. Based on the stated allocations above, for a worst-case scenario, 100% of the water supplied has been assumed to discharge to the foul drainage network. Thus approximately 122,602 l/d (equivalent to 44,750 m³/year) of additional wastewater will be discharged to the sewer network.

- 4.99 During the detailed design stage, TWUL will be contacted regarding connection to the sewer network. It is likely that TWUL will need to undertake an assessment to determine the capacity of the local network and the point of connection and will identify any requirement to upgrade the local network.

Energy Strategy

- 4.100 The energy hierarchy stages of 'Be Lean', 'Be Clean' and 'Be Green' have been followed to maximise the reduction of Carbon Dioxide (CO₂) emissions of developments. 'Be Lean', incorporates passive design measures including stringent fabric performance and energy efficient equipment for unregulated emissions. 'Be Clean', incorporates the efficient supply of energy to developments and 'Be Green' incorporates the use of renewable technologies where feasible. Measures incorporated into the design of the Proposed Development, for each of the Energy Hierarchy, are discussed below:

- Be Lean Measures:
 - Low Air permeability;
 - Efficient LED lighting;
 - Good fabric performance; and
 - High efficiency ventilation.
- Be Clean Measures:
 - Due the proposed changes to the carbon emission factors in future revisions of Part L – the use of Combined Heat and Power (CHP) is likely to offer a 'negative benefit' within the next five years and therefore has not been explored as part of the energy strategy.
- Be Green Measures
 - Technologies such as wind turbines and biomass boilers can be discounted from the outset. Locating a wind turbine or providing adequate storage for biomass fuel in an urban environment would be difficult to accommodate. These technologies also come with inherent air quality and environmental impacts i.e. light flicker.
 - The proposed building layout has minimal roof space – therefore the use of heat pump technology and Photovoltaics (PV) would provide difficult to integrate into the proposed strategy.

- 4.101 Using passive design measures and energy efficiency using an all-electric heating and hot water strategy, the Proposed Development shows a 3% reduction in annual regulated carbon emissions compared to the Part L 2013 benchmark. This surpasses the Reading Policy CS1¹⁰.

⁵ BJB Consulting (2018) Flood Risk Assessment including Surface Water Strategy

⁷ CIRIA (2006) 'Water Key Performance Indicators and benchmarks for Offices and Hotels', C657

¹⁰ Reading Borough Council Core Strategy (Alteration adopted January 2015)

Climate Change

Greenhouse Gas Emissions

- 4.102** Principles on climate change mitigation and Environmental Impact Assessment identify climate change as one of the defining environmental policy drivers of the future, and that action to address greenhouse gas (GHG) emissions is essential.
- 4.103** The principles are based on the following considerations:
- All projects create greenhouse gas emissions that contribute to climate change;
 - Climate change has the potential to lead to significant environmental effects; and
 - There is a carbon budget that defines a level of dangerous climate changes whereby any greenhouse gas emissions within that budget can be considered as significant.
- 4.104** As a result, the Institute of Environmental Management and Assessment (IEMA) guidance¹¹ recommend that all greenhouse gas emissions, including any residual emissions following adoption of any mitigation measures, are to be determined as significant.
- 4.105** Consistent with the guidance, the net GHG emissions from the Proposed Development have been quantified and compared against an existing carbon budget (defined at national level – the UK National Carbon Budgets) in order to contextualise the project's carbon contribution by developing a sense of the scale of the emissions anticipated. The GHG Report prepared is presented within **ES Volume 3, Appendix: Supporting Environmental Information**.
- 4.106** The report estimates the potential GHG emissions over the life of the development (assumed 60 years), with the following stages identified:
- Emissions associated with pre-construction activities, products and the construction process.
 - Emissions associated with the operation of the Proposed Development.
 - Emissions associated with the de-construction and demolition of the Proposed Development.
 - Emissions associated with activities beyond the project boundary and life cycle of the Proposed Development
 - GHGs from transport associated with the operation of the Proposed Development.
- 4.107** The GHG emissions of the Proposed Development were compared with those of the UK National Carbon Budgets (the current UK carbon budgets are projected to 2032).
- 4.108** The UK national Carbon Budget for the period 2018 to 2032 has been adopted, which is 6,219 metric tonnes of CO₂ (MtCO₂). The total estimate of GHG emissions for the Proposed Development over the assumed building life is 80,763 tCO₂ (or 0.808 MtCO₂).
- 4.109** Emissions associated to the enabling and construction works stage will fall within the third carbon budget and 'In-use' stage emissions will also fall within the third budget UK National Carbon Budgets, these emissions account for 0.002% of the UK National Carbon budget. Emissions as a result of the Proposed Development for the fourth (2023-2027) and fifth (2028-2032) budgets equate to 0.0001% and 0.0002% of the UK National Carbon Budgets for these periods respectively.
- 4.110** The report outlines a range of measures which can be adopted to reduce the yield of GHG emissions during the stages of the Proposed Development, relative to the assumptions accounted for within the initial assessment undertaken. Examples of potential measures include:
- A building lifecycle assessment will be undertaken in accordance with BREEAM criteria;
 - The design will consider the specification of materials and products that are robust in order to reduce the likelihood of replacement over the building's life cycle
 - Reduce energy consumption (refer also to the *Energy Strategy* submitted within the planning application) through a range of measures including:
 - Utilising the internal air to pre-heat the incoming fresh air.
 - Construction Site & Resource Management Plan: The completion of a Resource Management Plan that will focus on opportunities for material re-use, increasing recycling rates and avoiding diversion

to landfill. The Proposed Development will aim to generate less than 3.2 m³ of waste per 100m² of GIFA.

- The completion of a pre-demolition audit of any existing buildings, structures or hard surfaces to determine whether refurbishment or reuse is feasible and, in the case of demolition, to maximise the recovery of material for subsequent high grade or value applications;
- Improved insulation level beyond Part L minimum targets to meet the fabric efficiency target and reduce heat losses;
- The use of Mechanical Ventilation Heat Recovery (MVHR) in each dwelling helps to reduce energy consumption by utilising the internal air to pre-heat the incoming fresh air.
- All external light fittings are automatically controlled for prevention of operation during daylight hours and presence detection in areas of intermittent pedestrian traffic.
- A water meter with a pulsed output will be installed on the mains supply to each building/unit. A leak detection system will be installed which is capable of detecting a major water leak on the mains water supply within the building and between the building and the utilities water meter

Climate Change Resilience

- 4.111** From worldwide observations on climate change, conclusions can be drawn that long-lasting droughts, torrential rain, heavy thunderstorms, heatwaves, gales and hail stones as well as pressure from pests and diseases are on the increase. Climate change could reduce the amount of water available and increase demand in summer, with impacts upon the growing season of a 30% reduction in rainfall.

Planting

- 4.112** To ensure that planting is resilient to climate change, a number of factors will be taken into consideration when selecting trees and plants which focus upon being fit for purpose and include: size, shape, seasonal variation, appropriateness to level of altitude, wind and sun exposure, hardiness, resilience to pests and disease, leaf and seed litter, and plants at risk registers.
- 4.113** The Proposed Development provides extensive planting on terraces and amenity space provided. This urban greening creates habitats for wildlife, helping to lower urban air temperatures and locally mitigating the urban heat island effect.

Overheating and Cooling

- 4.114** The Building Regulations Part L (Criterion 3) and SAP Appendix P require each dwelling to demonstrate that it will not 'overheat' during the summer months June to August. This criterion has to be achieved without the use of mechanical cooling, whilst maintaining the acoustic criteria for the habitable rooms. Instead, the design of the façade must be refined to reduce heat gains, with ventilation used to limit internal temperatures.
- 4.115** There is a risk that the recommended acoustic levels for the habitable spaces may be exceeded when windows are opened. Therefore the ventilation strategy is to be progressed with no reliance upon openable windows. The mechanical ventilation heat recovery (MVHR) units to be utilised for each dwelling will be sized for ventilation rates to suit building regulations Part F requirements and to deal with overheating. Thermal modelling will be undertaken to review the ventilation rates required to achieve comfortable internal conditions without relying on openable windows using predicted climate data.
- 4.116** Openable windows are to be provided for purge ventilation purposes only.

¹¹ IEMA guidance 'Assessing Greenhouse Gas Emissions and Evaluating Their Significance' (2017)