5.0 Proposed Landscaping Strategy

Proposed Street Furniture - Supporting Images

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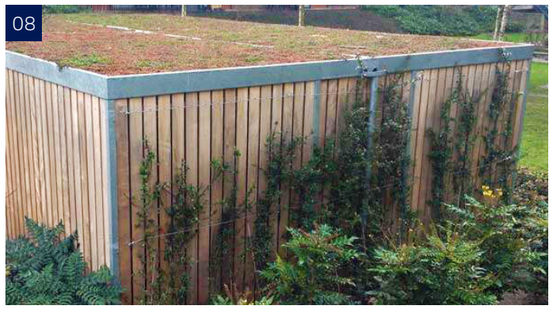

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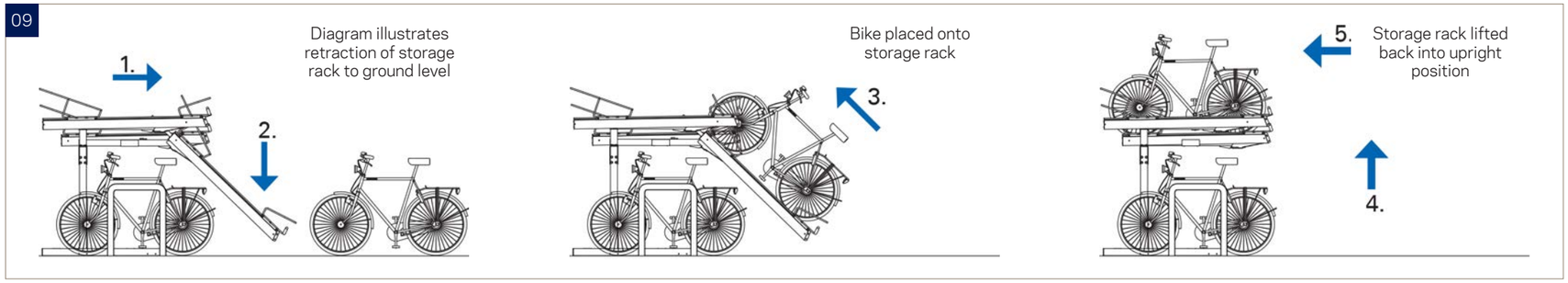

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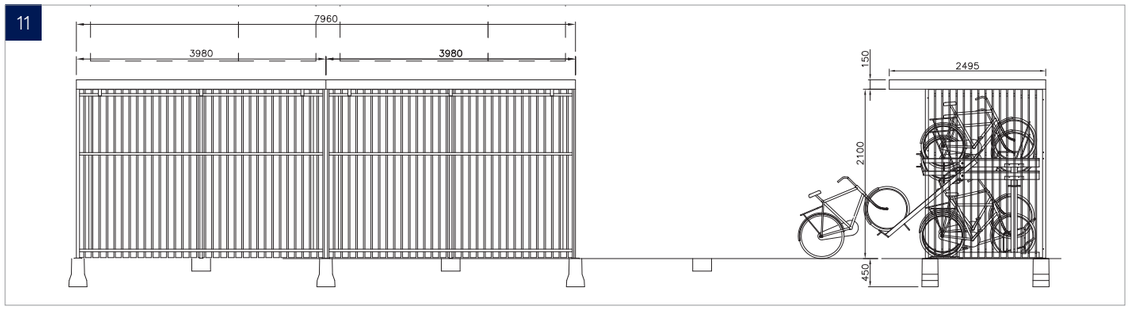


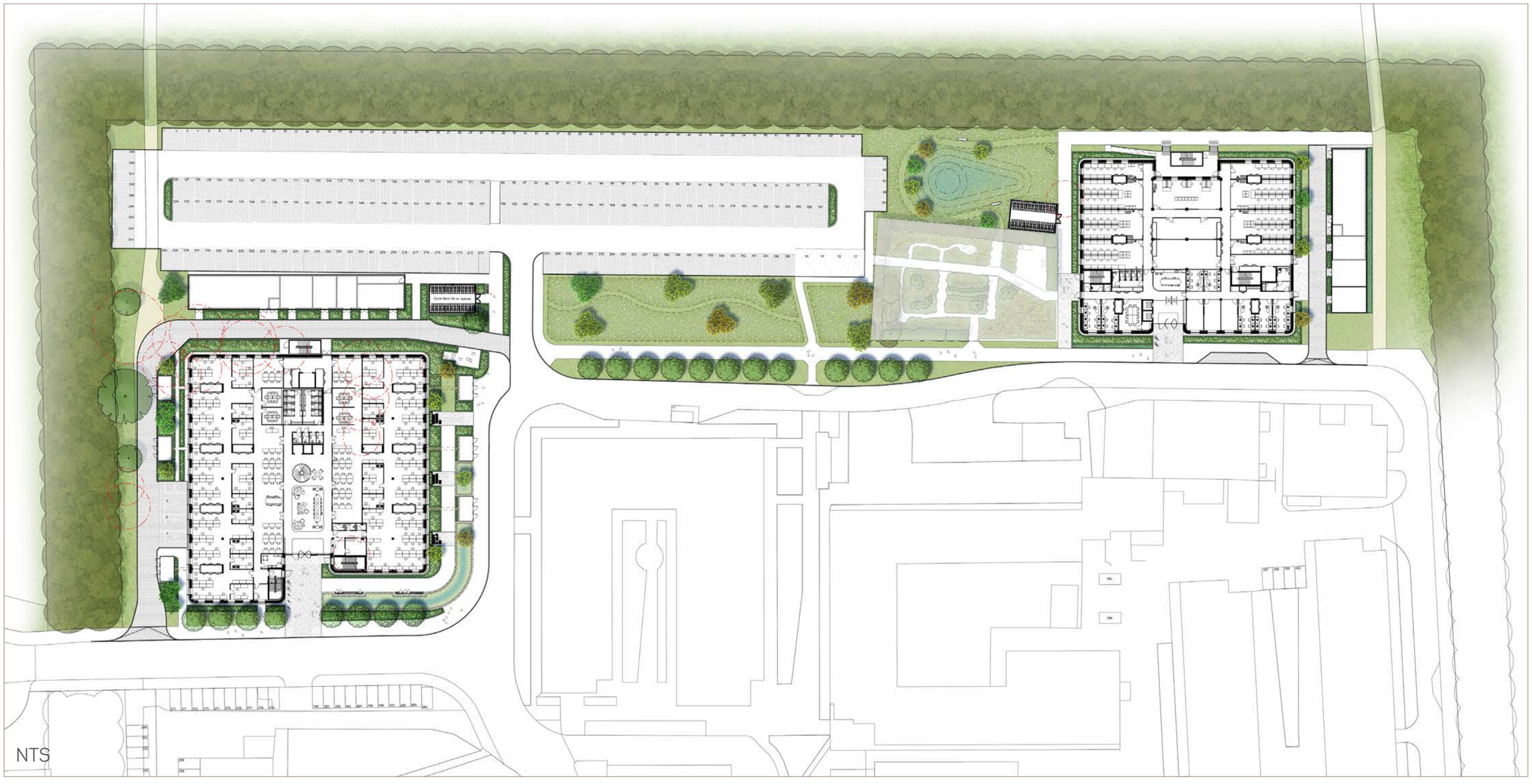
1. Timber and steel benches with back and arm rests
2. Timber and steel benches
3. Timber and steel communal seating and tables to outdoor workstations
4. Timber and steel seating cubes to outdoor workstations
5. Timber and steel benches to outdoor workstations
6. Timber and steel bins for litter and recycling
7. Stainless steel Sheffield cycle stands to building entrances for visitor use
8. Cycle storage unit: Steel frame with timber cladding, sedum roof system and climbing plants
9. Diagram of two-tier cycle storage rack with Sheffield cycle stand at grade
10. Example of two tier cycle rack
11. Cycle storage unit typical detail

5.0 Proposed Landscaping Strategy

Planting Strategy

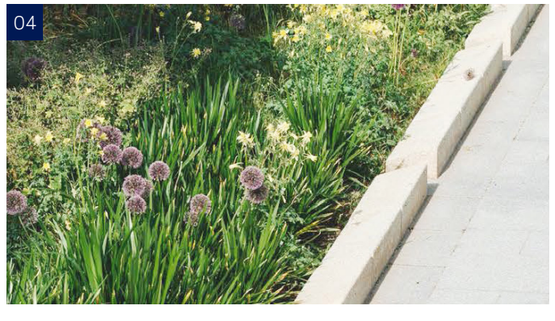
The planting proposals for this scheme will provide year round colour and interest. The species-rich grassland and the maginal species have been included to maximise the biodiversity gain for the project. Where native planting cannot be used, species from the RHS plants for pollinators have been used to promote invertibrates.

- Existing trees and hedges on site to be retained
- Proposed avenue trees: 20-25 cm girth
- Multistem trees: 3.5m-4m high
- Lawn areas
- Species-rich meadow grasses with mown paths
- Single species clipped formal hedges
- Shrub and herbaceous amenity planting: 6 plants per m^2
- Rain gardens
- Semi dry/wet marginal planting to attenuation area



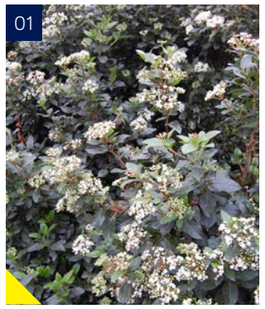
5.0 Proposed Landscaping Strategy

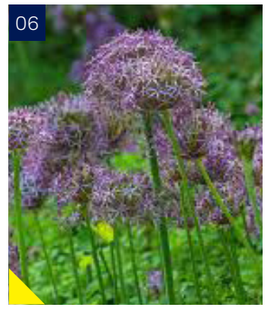
Planting Strategy - Supporting Images

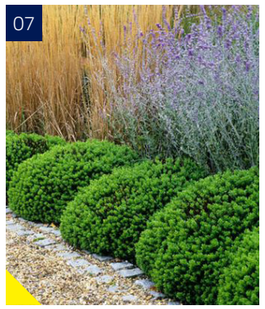


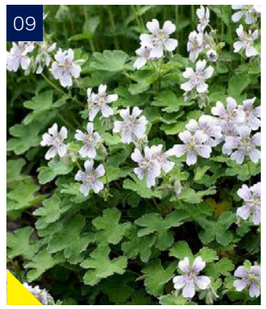
1. Proposed avenue trees
2. Species rich grassland
3. Example of formally clipped single species hedge adjacent to path
4. Example of shrub and herbaceous planting to rain gardens
5. Example of multistem trees with seasonal interest
6. Mown grass paths
7. Example of shrub and herbaceous amenity planting
8. Example of aquatic marginal planting to attenuation area

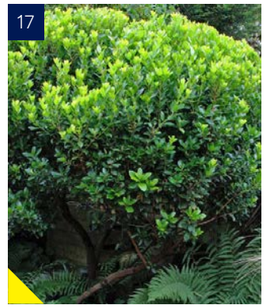
Planting Strategy: Indicative shrub & herbaceous species











PERENNIAL GRASSES & BORDER SHRUBS
INDICATIVE LIST:

1. Viburnum tinus ‘Eve Price’
2. Stipa gigantea
3. Carex flagellifera
4. Ceanothus ‘Blue Mound’
5. Salvia nemorosa
6. Allium cristophii
7. Hebe ‘Emerald Gem’
8. Stipa tenuissima
9. Geranium renardii
10. Lavandula angustifolia ‘Imperial Gem’
11. Echinacea purpurea
12. Rudbeckia fulgida var. sullivantii ‘Goldsturm’
13. Hebe ‘Mrs Winder’
14. Hydrangea arborescens Lime Rickey
15. Rosa Alba Meidiland
16. Viburnum rhytidophyllum
17. Arbutus unedo
18. Cornus mas ‘Aurea’

Plants Marked are on the RHS Plants for Pollinators List

Planting Strategy: Indicative shrub & herbaceous species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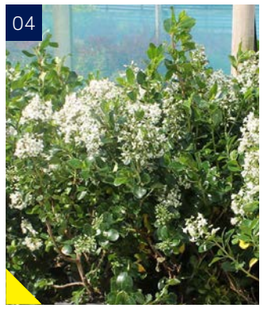
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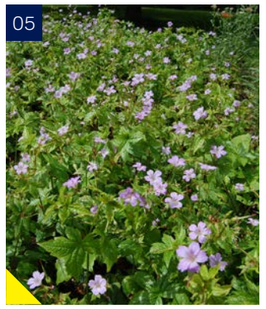
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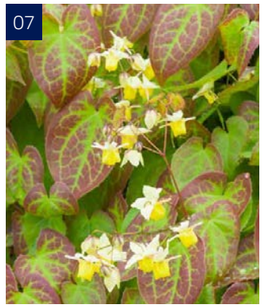
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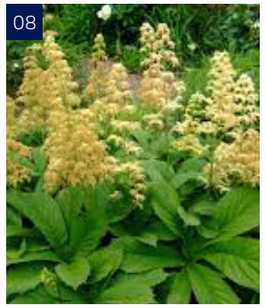
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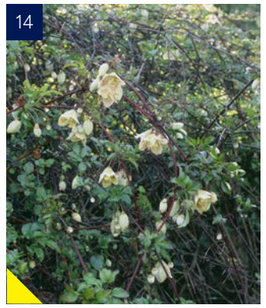
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PLANTS FOR SEMI SHADE AND SHADED AREAS
INDICATIVE LIST:

1. Sarcococca confusa
2. Pachysandra terminalis ‘Green Carpet’
3. Acanthus spinosus L.
4. Escallonia ‘Iveyi’
5. Geranium nodosum
6. Dryopteris filix-mas
7. Epimedium × versicolor ‘Sulphureum’
8. Rodgersia pinnata ‘Superba’
9. Hosta June
10. Anemone × hybrida ‘Honorine Jobert’
11. Hosta ‘Halcyon

SHADE TOLERENT CLIMBING SPECIES

12. Hydrangea anomala subsp. petiolaris

CLIMBING SPECIES

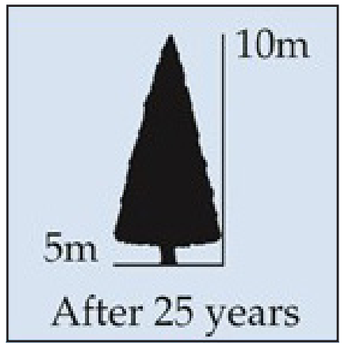
13. Parthenocissus tricuspidata
14. Clematis cirrhosa
15. Lonicera periclymenum ‘Graham Thomas’

Plants Marked are on the RHS Plants for Pollinators List

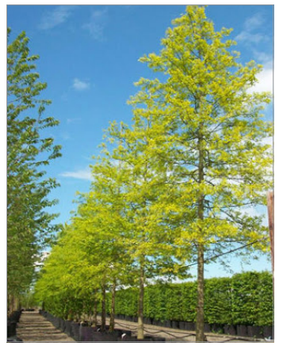
5.0 Proposed Landscaping Strategy

Planting Strategy - Indicative tree species

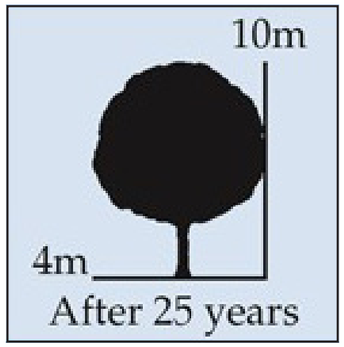
01	QUERCUS PALUSTRIS
COMMON NAME: PIN OAK	
SIZE: 10M HIGH X 5M WIDE AFTER 25 YEARS, ULTIMATELY A LARGE TREE.	
CANOPY: LARGE, UNIFORM PYRAMIDAL SHAPED CROWN.	
FOLIAGE: DEEPLY AND SHARPLY LOBED, GLOSSY GREEN AND TURNING A STRIKING SCARLET IN AUTUMN.	



WET SOIL	●
DRY SOIL	●
LIME TOLERANCE	
HARDI-NESS	4

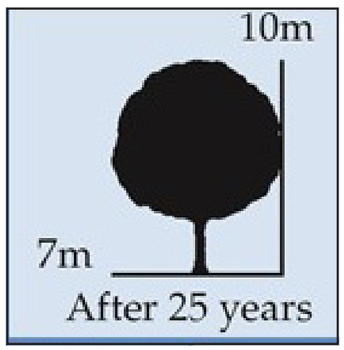


02	ULMUS 'NEW HORIZON'
COMMON NAME: RESISTANT ELM	
SIZE: 10M HIGH X 4.5M WIDE AFTER 25 YEARS. ULTIMATELY MEDIUM LARGE	
CANOPY: MEDIUM / LARGE CANOPY, BECOMES ROUNDED WITH AGE.	
FOLIAGE: FRESH GREEN EVEN IN DROUGHT CONDITIONS, TURNS YELLOW IN AUTUMN	



WET SOIL	●●
DRY SOIL	●
LIME TOLERANCE	●●
HARDI-NESS	4

03	ACER CAMPESTRE
COMMON NAME: FIELD MAPLE	
SIZE: 10M HIGH X 7M WIDE AFTER 25 YEARS, ULTIMATELY A LARGE TREE.	
CANOPY: LARGE, BROADLY OVAL HEAD.	
FOLIAGE: EVERGREEN, SMALL BUT VARIABLE IN SIZE, SHAPE AND TEXTURE.	



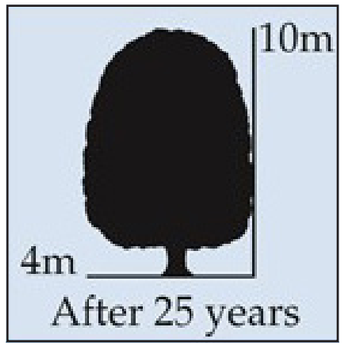
WET SOIL	●
DRY SOIL	●
LIME TOLERANCE	●
HARDI-NESS	4

INFORMATION SOURCED FROM:
https://www.hillier.co.uk/trees/listings/

5.0 Proposed Landscaping Strategy

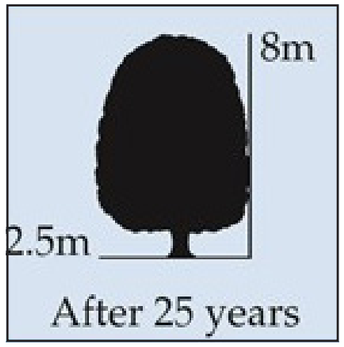
Planting Strategy - Indicative tree species

04	BETULA JACQUEMONTII 'SNOW QUEEN'
COMMON NAME: HIMALAYAN BIRCH	
SIZE: 10M HIGH X 4M WIDE AFTER 25 YEARS, ULTIMATELY MEDIUM SIZED TREE.	
CANOPY: FULL CANOPY IN SUMMER, MAKING IT A GOOD SHADE TREE.	
FOLIAGE: PALE UNDERSIDES TO LEAVES, LEAVES TURN YELLOW IN AUTUMN, ATTRACTIVE WHITE BARK.	



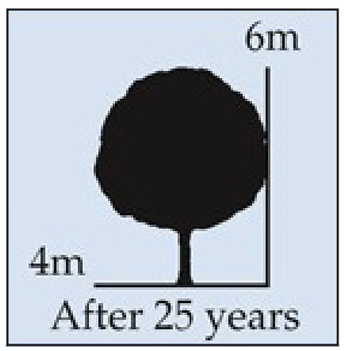
WET SOIL	●
DRY SOIL	●
LIME TOLERANCE	●
HARDI-NESS	4

05	AMELANCHIER LAMARCKII
COMMON NAME: JUNEBERRY	
SIZE: 8M HIGH X 2.5M WIDE AFTER 25 YEARS (SINGLE STEM), SMALLER VARIANTS TO BE SPECIFIED FOR ROOF TERRACES.	
CANOPY: SMALL TO MEDIUM SIZED TREE WITH BROAD ROUNDED CANOPY AS A MULTI STEM VARIANT	
FOLIAGE: ALMOST ROUND LEAVES WHICH CHANGE COLOUR WITH SEASONAL CHANGES.	

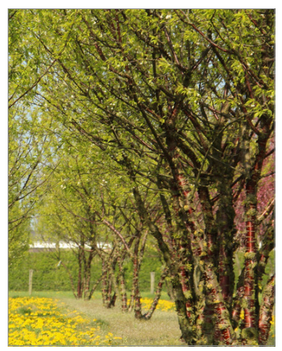


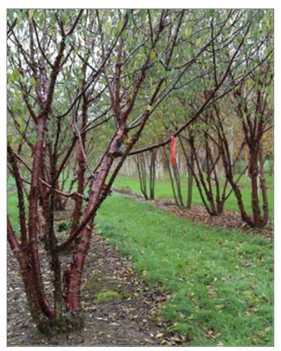
WET SOIL	●
DRY SOIL	●
LIME TOLERANCE	
HARDI-NESS	4

06	PRUNUS SERRULA
COMMON NAME: TIBETAN CHERRY	
SIZE: 6M HIGH X 4M WIDE AFTER 25 YEARS, ULTIMATELY A MEDIUM SIZED, TREE.	
CANOPY: MEDIUM, BROAD CANOPY	
FOLIAGE: VIBRANT DARK GREEN, NARROW LEAVES TURNING YELLOW IN AUTUMN	



WET SOIL	●
DRY SOIL	●
LIME TOLERANCE	●
HARDI-NESS	4





INFORMATION SOURCED FROM:
https://www.hillier.co.uk/trees/listings/

6.0 Sustainability

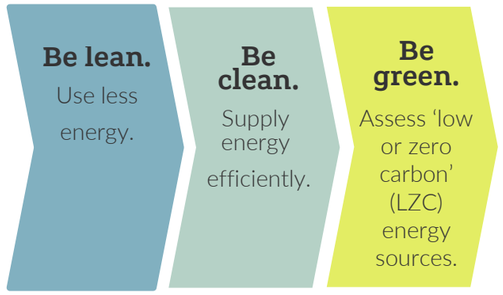
6.0 Sustainability

Sustainability

The proposals seek to create high quality, high performing and sustainable research developments for the campus.

Approach to Energy

As part of the developing design of the proposed development the energy strategy is being developed in line with Policy ESD2 and the energy hierarchy (Figure 1). This approach prioritising savings made through passive design and energy efficiency prior to consideration of connection to existing heat networks (although this is not relevant in this instance) and provision of low and zero carbon technologies.



Be lean

Passive design and energy efficiency measures form the basis for the reduction in overall energy demand and carbon emissions. Passive Design measures are those which reduce the demand for energy within buildings, without consuming energy in the process.

These are the most robust and effective measures for reducing CO2 emissions as the performance of the solutions, such as wall insulation, is unlikely to deteriorate significantly with time, and are less likely to be subject to change in the future. In this sense, it is safe to assume that the benefits these measures have will continue at a similar level for the duration of their installation. Some typical passive design measures are likely to include optimisation of fabric performance, ventilation strategies and daylight/lighting strategies. Passive design will constitute a major element of the approach to energy.

Early stage Passivhaus workshops have been completed to evaluate the inherent passive design of both buildings and determine potential adjustments to reduce the operational energy. As the design progresses the thermal performance targets will be developed further to support thermal comfort. External shading devices are proposed to control excessive solar gains.

Be clean

This stage of the energy hierarchy refers to the use of heat networks or on-site Combined Heat and Power (CHP) in order to provide energy and reducing consumption from the national grid and gas networks, through the generation of electricity, heating and cooling on-site. Due to CHP systems being considered to be no longer an appropriate technology to pursue a Net Zero agenda, this step will not be explored for this project.

Be green

The Be Green stage of the energy hierarchy explores the feasibility of Low and Zero Carbon (LZC) technologies to allow for the production of renewable energy onsite in order to offer a further reduction in carbon emissions. Policy ESD5 encourages the use of renewable and low carbon energy provision. The national grid is continually decarbonising and the effect of this is to make the use of gas systems less preferable compared to electrically fuelled systems. Irrespective of the NZC ambition, the proposed design of buildings eliminates the need for the combustion of fuels on site to deliver heat. This solution aligns with the NZC approach and also take advantage of the continuing decarbonisation of the grid. In line with Policy ESD3, sustainable design solutions have been integrated into the design philosophy and will continue to be developed as the design progresses. The proposed strategy will integrate the use of highly efficient Air Source Heat Pumps and a PV array.

Thermal Comfort

Both sites will be design with occupant comfort in mind. In line with the Be Lean stage of Energy Hierarchy, the glazing ratios and solar shading of the proposed buildings will be designed to mitigate excessive solar gains and control the thermal comfort of the spaces. A thermal comfort analysis will be completed in line with BREEAM Hea 04 to ensure that all occupied spaces will remain in comfortable operative temperature ranges in both Summer and Winter.

Environmental assessment methodologies

BREEAM

BREEAM is a third-party certification scheme developed by the BRE (Building Research Establishment). It is used to rate the environmental performance of new or existing buildings at Design and Post Construction stages. A BREEAM rating (Pass, Good, Very Good, Excellent, Outstanding) can be awarded where sufficient credits have been achieved on the basis of meeting environmental performance criteria in each of the technical categories. An initial BREEAM pre-assessment has been completed for both the Academic and Commercial building identifying the route to achieving a BREEAM "Excellent" rating.

The Academic Building has been registered under BREEAM 2018 scheme and assessed using the New Construction Other Buildings (Non-Residential) criteria. The building is currently considered to be most suitable to be assessed using a Fully fitted assessment type. The Commercial Building has been registered under BREEAM 2018 scheme and assessed using the New Construction Other Buildings (Non-Residential) criteria. The building is currently considered to be most suitable to be assessed using a Shell & Core assessment type. Both buildings are targeting a minimum of BREEAM "Excellent". All mandatory credits have been targeted and early stage actions have been completed to secure the stage specific credits. As part of the BREEAM assessment the following credits have been targeted to align with the Cherwell Planning policy:

- WAT 01-05: The BREEAM Water credits have been targeted to ensure that efficient water usage is achieved from sanitary wear devices and water consumptions is monitored appropriately.
- POL 03: The BREEAM flood risk credits have been targeted aligning with ESD6 and ESD7 to manage and reduce the flood risk in the area.
- TRA 01-02: The BREEAM Transport Credits have been targeted to ensure that a range of sustainable transport solutions, such as Cycle facilities and accessible amenities are provided.
- LE01-05: The BREEAM ecology credits will align with ESD10 and the landscaping proposed to deliver a increase in biodiversity.

Net Zero Carbon

Global climate change is widely considered to be one of the most pressing challenges at a regional, national and international level. Industrialisation has resulted in the use of refined and unrefined fossil fuels as an energy source and since the start of the industrial revolution, use of fossil fuels and their resultant release of carbon dioxide into the atmosphere. This has caused an exponential increase in the concentration of carbon dioxide and other pollutants that are generally agreed to result in increasing global average surface temperature.

Carbon emissions from operational use of buildings has been the subject of regulation for some time and has historically been the primary focus of reducing the impact of built environment projects. More recently, this focus has been expanded to also include carbon emission associated with the building materials themselves as well as more in-depth predictions of the Operational energy consumption.

6.0 Sustainability

The assessment of Whole Life Carbon (WLC) emissions consists of the following sections: total operational carbon emissions (regulated plus unregulated); embodied carbon emissions; and any future potential carbon emissions 'benefits', post end-of-life, including benefits from reuse and recycling of building structure and materials.

Embodied Carbon

Using information provided by the design team the baseline embodied carbon of the proposed development will be estimated. In line with the UK GBC methodology, potential routes to further reduce the embodied carbon of the design and to mitigate the environmental impacts of the development.

Operational Carbon

Operational carbon emissions are those associated with the use of energy for the running of the building. This energy needs to be included in the WLC carbon calculation and is evaluated in the context of offsetting. The Building Regulations Part L methodology is known to have limited suitability as an estimation of operational energy usage. This methodology is intended as a compliance mechanism to enforce legal minimum standards of energy efficiency. There is mounting evidence that buildings regularly use more energy than intended or anticipated at the design stage. This difference between measured energy use and design intent is known as the 'performance gap'. It means some buildings can use more than twice as much energy as expected. A design stage TM54 assessment will be completed to provide a more detailed assessment of the operational energy of the proposed development. In line with the BREEAM ENE 01.2 criteria, a sensitivity analysis will be completed to determine how the significant factors affecting the operational carbon and routes of how this consumption could be reduced.

Sustainability Charter

A sustainability charter has been developed for the proposed project. The charter and targets to capture and respond to key challenges, i.e. climate, biodiversity and health and wellbeing.

The charter is also informed by national and local policy requirements, United Nations (UN) sustainable development goals as well as the client vision for the development. The charter will ensure that an exemplar development is delivered, one that is built for the future, creates connections between local businesses and community groups, creates new opportunities for local people, provides an environment that enhances healthy living and working activities and has a positive environmental impact as a result of the development works and ongoing monitoring.

The approach to the charter is to follow the five capitals model of sustainability. The following 'straplines' capture the 'why' behind the theme, objectives and targets defined under each capital:

– Physical: Building the future – A development that kick starts innovation through a baseline that is futureproofed for emerging technologies and policies.

– Social: Creating local opportunities – Utilise the spaces between buildings and landscape to provide a range of spaces for human interaction and to support local events.

– Economic: A new business address – A new hub to attract innovation and boost the local economy.

– Human: Healthy people – A cleaner, greener, responsive environment for healthy people. More efficient, better connected and WELL enabled.

– Natural: Enhanced natural environment – A landscape woven through park to improve ecology, biodiversity and habitat.

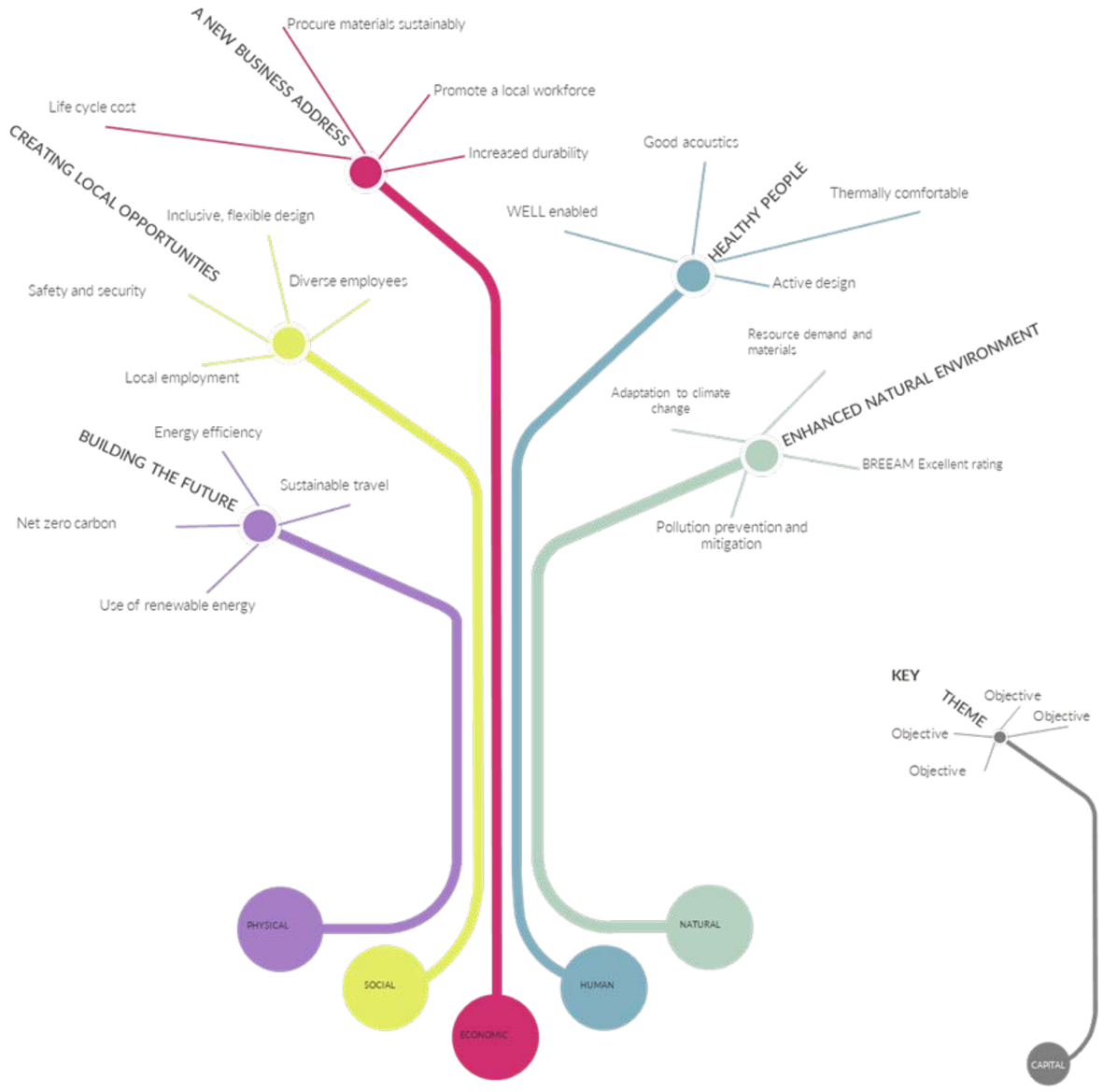


Figure 2: Approach to Sustainability for Begbroke.

Summary

Summary

The proposals for the two new buildings on Begbroke Science Park seek to increase the capacity for laboratory space across the park to support the growing need for innovative and high quality research spaces across Oxfordshire.

Applying a shared, high quality design language on the proposed developments will bring aesthetic cohesion to the current campus whilst setting up a new vision and design direction for future developments on the science park.