UoM Fallowfield

Green-Blue Infrastructure Strategy

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NOTE
For technical reasons it has not been possible to incorporate scaled drawings into the landscape compliance document. Any 3D views are included for illustrative purposes only and are not verified views.

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1.0 Introduction

At the Owens Park / Woolton Hall site in Fallowfield, the University of Manchester has been responsible for the long-term stewardship of a rich and varied environment which makes a major contribution to the areas natural capital; it makes Fallowfield an attractive place to live, study, work and visit, enhances the quality of life and well-being, of students, staff and local residents, and underpins the economy.

The University of Manchester's multi-functional network of green and blue infrastructure assets supports a range of ecosystem services, providing multiple economic, social and environmental benefits for people, places and nature.

The effects of climate change and biodiversity loss on peoples lives and natural systems are becoming increasingly apparent. National planning policy, as well as policies devised by City of Manchester and the University of Manchester, set out to address these effects, setting targets which land development processes will need to meet. .

The proposed redevelopment of the Fallowfield site has the potential to affect the natural environment, which will undergo substantial changes driven by the impacts of demolitions, construction works and occupation.

This Strategy sets out a long-term vision, strategic goals and principles for delivering green and blue infrastructure across within the Fallowfield development site and surroundings, by a range of partners and stakeholders, working together at a variety of scales.

Highlighting "what" is needed and "how" this will be achieved, it provides a high-level framework for developing delivery strategies and detailed implementation plans that reflect the needs of the University, its staff and students, and local residents, and well as the wider neighbourhood, City-wide and, where appropriate, national priorities.

1.1 The Vision for Fallowfield's Green & Blue Infrastructure

Fallowfield's multi-functional network of high quality, biodiverse and accessible green and blue infrastructure is widely valued by staff, students and local residents.

Managed sustainably through strong leadership and partnerships, the green and blue infrastructure network should provide a range of well-being benefits for people, places and nature across the campus and beyond

As a result of working with natural processes to support delivery of multi-functional ecosystem services, the University of Manchester is better able to adapt to a changing climate and biodiversity loss could be reversed.

Networks of green and blue spaces and corridors in the Fallowfield campus and surrounding area support access to nature and healthy lifestyles, and provide high quality landscapes and beautiful places for people to live, work and visit.

1.2 Three Goals

The Green Blue Infrastructure Strategy sets **3 Goals**:

1 Resilience to climate change

- increase the University's ability to mitigate/adapt to climate change through nature-based solutions

2. Slow or Halt loss of biodiversity

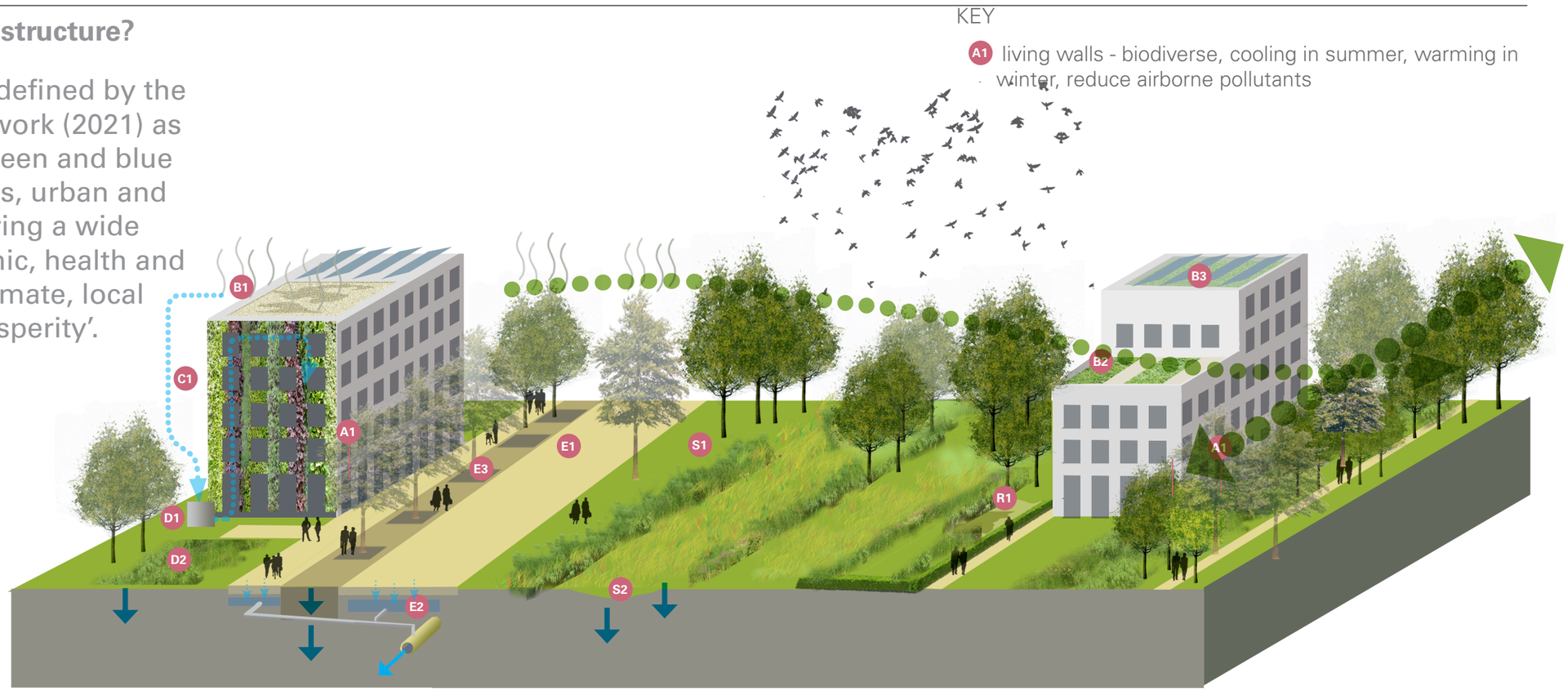
3. Contribute to well being and health : increase benefits of access to nature



2. Green-Blue Infrastructure

2.1 What is Green and Blue Infrastructure?

Green-Blue Infrastructure (GBI) is defined by the National Planning Policy Framework (2021) as 'A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity'.



Benefits derived from GBI include :

- increased resilience to climate heating (through the provision of shade trees, evapo-transpiration which reduce heat-island effects
- reductions in flooding risk (through increased absorption into the ground, and reduction in the rates of surface water runoff through attenuation).
- improved conditions for biodiversity (through establishment of 'joined-up' habitats for flora and fauna, allowing migration of species previously isolated in enclaves)
- improved comfort conditions for outdoor activities (through shelter and shade, reductions in pollution, improvements on water quality)

In cities, where GBI is integrated effectively into urban areas, nature is brought close to peoples lives, and brings benefits including :

- enhanced health (through encouragement to enjoy walking and other forms of exercise in a biodiverse, seasonally changing environment)
- improved well-being (through contact with nature, and with other people in shared environments)
- increased property values through proximity to well-managed natural landscape and street trees
- increased prosperity through increased spend associated with increased footfall and dwell-time in pleasant and attractive surroundings.

B1 blue roofs, with extensive and intensive B2 planting, and under photovoltaics B3

C1 rainwater harvesting for planting irrigation D1

D2 growing garden for food production and sociable interaction

E1 Porous paving allows surface water to infiltrate or attenaute in below ground holding tanks, E2 before discharging into sewer system after storm event

E3 Urban trees assist in shading and cooling through evapotranspiration

S1 Porous ground allows infiltration of surface water

S2 Swales hold water in volume, allowing it collect in storm events, and infiltrate slowly afterwards, thereby reducing accumulations which could cause flooding

R1 Raingardens and ponds provide areas for holding surface water, and ideal conditions for intense biodiversity.

3. Green-Blue Infrastructure Policies

3.1 National Policy and Climate Change

National planning policy requires local planning policies to be in line with the objectives and provisions of the Climate Change Act 2008. In August 2019, the Climate Change Act was amended to set a target for carbon emissions in the UK to become net zero carbon by 2050.

3.1.1 National Policy and Biodiversity

National planning policy requires landowners and developers to protect and enhance valued wildlife habitats and sites of biodiversity importance. It also requires development to achieve a net gain for biodiversity to ensure habitats for wildlife are enhanced and left in a measurably better state than they were in before development.

Local Plans need to take a strategic approach to promoting the restoration and enhancement of the GBI network, taking into account its varied benefits including supporting biodiversity, providing opportunities for recreation, mitigating and adapting to climate change and enhancing landscape character.

3.1.2 National Policy and Health & Wellbeing

National planning policy requires that Local Plans should aim to achieve healthy, inclusive and safe places by:

- Creating places that promote social interaction between people who might not otherwise come into contact with each other.
- Making sure places are safe and accessible so that the fear of crime does not undermine quality of life.
- Supporting healthy lifestyles by provision of greenspaces and sports facilities, and opportunities to walk and cycle in accordance with the Local Transport Plan
- Meeting the variety of needs in our community.
- Plans need to ensure development is right for its location, and consider impacts of the development itself, including for issues like air quality and noise. Plans should also consider how they can contribute to the achievement of wider objectives, such as in Air Quality Management Plans.

3.2 Manchester City Policy and Climate Change

In July 2019, Manchester City Council declared a climate emergency (Manchester City Council Climate Emergency Declaration Text). This declaration recognises the need for the Council and the city as a whole to do more to reduce its carbon emissions and mitigate the negative impacts of climate change and demonstrated the Council's commitment to be at the forefront of the global response to climate change and to lead by example. Several documents set out policies which support this declaration.

3.2.1 Manchester City Council Climate Change Action Plan 2020-2025.

This document outlines the specific actions which are required to ensure that the Council reduces its direct emissions by at least 50% by 2025 whilst also playing its part in supporting and influencing the city to do the same. It also covers the Council's plans for adapting to the expected impacts of climate change and supporting and influencing others, including through the implementation of the Manchester Green and Blue Infrastructure Strategy 2015-25



3.2.2 Green and Blue Infrastructure Strategy 2015-25

Manchester City Council has a GBI Strategy which contains an overarching vision for the future of Manchester's green spaces and waterways, namely:

" By 2025 high quality, well maintained green and blue spaces will be an integral part of all neighbourhoods. The city's communities will be living healthy, fulfilled lives, enjoying access to parks and greenspaces and safe green routes for walking, cycling and exercise throughout the city. Green and blue infrastructure will be supporting Manchester's growth. Businesses will be investing in areas with a high environmental quality and attractive surroundings, enjoying access to a healthy, talented workforce. New funding models will be in place, ensuring progress achieved by 2025 can be sustained and provide the platform for ongoing investment in the years to follow.

The delivery of the strategy will mean;

- *Our river valleys are well managed, accessible and safe – providing a key recreational resource to residents.*
- *Our canal network is rejuvenated as a key asset for the city centre and beyond.*
- *Our parks and green spaces are attractive and accessible to residents.*
- *Our networks of urban green connect more residents with urban nature and provide corridors and stepping stones for biodiversity*
- *Our green spaces work harder, providing multiple social, economic and environmental benefits to the city.*
- *Our growth is supported by green and blue infrastructure, as a key part of creating attractive, successful neighbourhoods.*

3.3 University of Manchester : Green-Blue Infrastructure strategy

The University does not have a BGI policy; however, it does have the following strategies which are directly related to the provision of improved and sustainable environments:

3.3.1 Environmental Sustainability Strategy 2019

This recognises the important role the University has in leading research and practice in sustainable futures, and outlines four key areas of action. In Objective 3 : Responsible Processes, it sets out to link its ambitious investment and construction programme with 'day-to-day sustainability into the future'. It states that:

"We will ensure our organisational processes such as campus development, procurement, energy and resource management will create opportunities for the efficient use of natural resources, with the additional benefits of financial savings and an environment that enhances health and wellbeing."

It states that *"The delivery of Objective 3 will be supported by:- (among other measures)*
• Providing biodiverse and functional greenspace to enhance staff and student wellbeing, as well as increasing resilience to the predicted impacts of climate change."

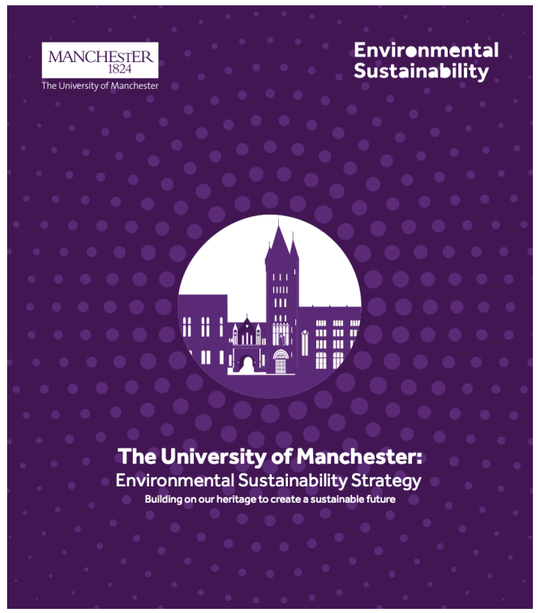
3.3.2 Green Roof and Wall Policy 2014

This recognises the important role of green roofs and facades in heloing to mitigate the loss of greenspace on campus due to development, whilst delivering a climate-adapted estate that is resilient to extreme weather events, enhances biodiversity and improves health and wellbeing.

3.3.3 University of Manchester : Tree Plan and Policy 2016

This document, prepared by Red Rose Forest for the University. This outlines a management policy for the University Estate. It specifically excludes any advice on the Owens Park / Fallowfield sites, but does include a range of policies which are applicable to Fallowfield, which include:

- implementation of a tree plan for the Campus
- aim to increase tree cover within the Universities land-holdings, as part of the Universities commitment to sustainability and social responsibility (ref UoM Manchester 2020 strategy)
- aim to increase tree cover as part of the Universities commitment to increasing biodiversity on campus (ref UoM Living Campus Plan)
- two for one tree replacement, with replacement both on and off Campus.
- all trees to have 2.2m clear stem



4. Green-Blue Infrastructure : UoM Fallowfield Campus

4.1 University of Manchester Campus and Fallowfield

The University of Manchester City Campus is situated to the south of Manchester city centre, on both sides of the Oxford Road / Wilmslow Road corridor.

The Fallowfield Campus is located some 2.8km south and is directly connected by the Oxford / Wilmslow Road

The University also includes a third area, the Victoria Park Campus, located between City and Fallowfield Campuses.

The University campuses are located in a predominantly suburban setting, which was developed from the late 19th century as Manchester expanded southwards. The mix of housing, factories and institutional buildings form an almost continuously urbanised townscape. There are no significant watercourses or woodland belts which might have otherwise formed continuous green corridors; instead, pockets of greenspace have been retained, often as public parks or playing fields.

The greenspace network in south Manchester is discontinuous.

Initiatives such as the Oxford Road corridor improvements; which primarily set out to improve Active Travel through provision for cycling and pedestrian movement, have brought localised improvement through verge and median strip planting. And the Fallowfield Loop creates an east-west green corridor.

Fallowfield Campus is located in an area close to nearby public parks



4.2 Fallowfield Campus : Green Infrastructure

Existing Green Infrastructure

The Fallowfield development site is located within the Fallowfield Campus, which itself is located within a wider patchwork of greenspaces including Platt Fields Park to the west, to Armitage Sports Centre and Playing Fields and Birchfield Park in the east.

Treelined roads and lanes form partial corridors which link these open spaces. Of particular significance is Wilmslow Road which forms an important green corridor extending north-south, together with Whitworth Lane. Important east-west corridors are formed by Old Hall Lane and Moseley Road

The existing Fallowfield Campus incorporates the following green infrastructure:

- Woodland belts : usually the remnants of former estate tree plantings laid out in the 19th century, these form continuous belts of mature woodland trees. These woodland belts are particularly noticeable along site boundaries. Typical species include Beech (Fagus spp), Lime (Tilia spp), Oak (Quercus spp), Pine (Pinus spp) and Sycamore (Acer ps. Spp).
- Tree groups : more recently planted trees are distributed in groups and lines within the Campus area. The combined coverage tree cover across the Fallowfield development site is 29%
- Mixed species hedgerows : these have been planted to subdivide parts of the campus area.
- Ornamental Shrubs : evergreen foliage shrubs have been planted to provide seasonal interest.
- Lawns : mown grass is a ubiquitous feature of the Fallowfield Campus.

The range of planting types and species is relatively limited, relying heavily on non-native evergreen shrubs and high-maintenance grass lawns.



4.3 Fallowfield Campus : Blue Infrastructure

Existing Blue Infrastructure

A desktop review and site visit has established that the existing Fallowfield Campus area incorporates the following blue infrastructure:

The Fallowfield Brook is a culverted watercourse which runs from east to west below Moseley Road, immediately to the south of the Fallowfield Campus.

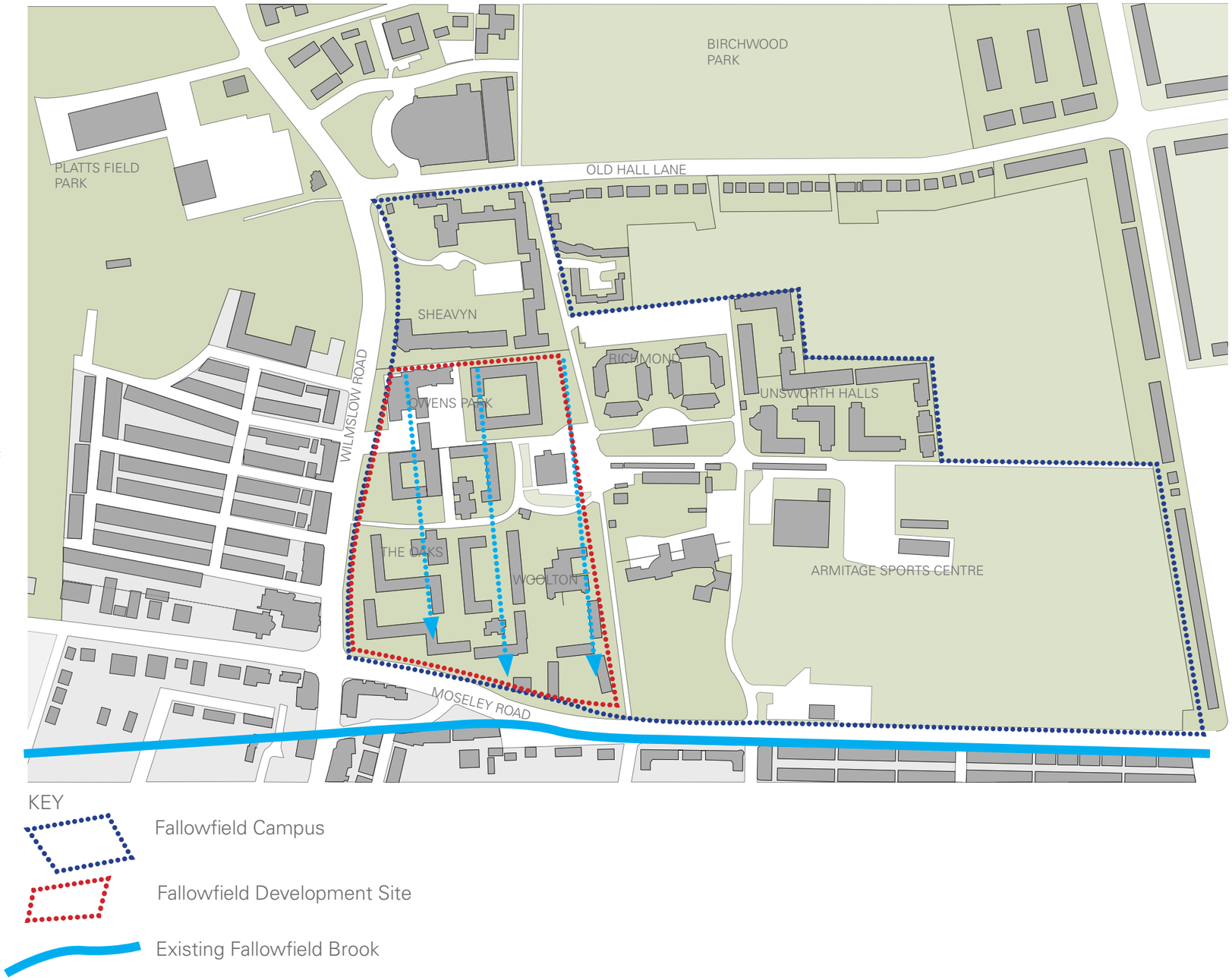
N-S Gradient: surface water run-off flows downhill from the North to the South / South-West of the site due to the topography and level change (approx. 44.5m AOD along the N boundary to 39m AOD along Moseley Road to the South)

Existing terrain: the terrain has been shaped by cutting and filling, to create a series of level terraces, separated by changes in level of approx. 1 to 1.2m.

Infiltration and Permeability : the existing campus is mostly porous ground (planted) and therefore porous; surface water falling on these areas will infiltrate into the ground.

Buildings and infrastructure : these have limited permeable surfaces – most roofs and hardstandings are impermeable, so water from these areas drains into sewers.

Flood risk mapping shows the potential for the south east corner of the site to flood as a result of surface water accumulation during rainfall events.



4.4 Existing Green Blue Infrastructure at Fallowfield Development Site

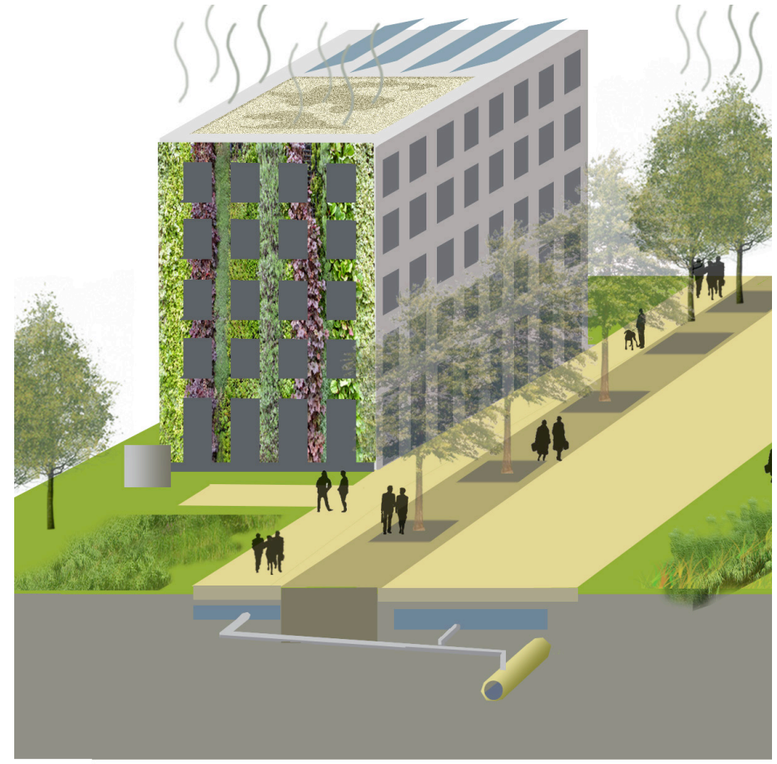
The review of existing GBI shows that the Fallowfield site has :

- few surface water management features which will attenuate runoff from buildings and hard surfaces; currently these discharge directly into surrounding sewers, or accumulate on the surface, adding to potential flood risk.
- high levels of tree coverage, many of which are mature. Successional tree planting will be necessary to ensure long-term viability of tree belts
- potential to develop green corridor linkages with surrounding greenspace, particularly elsewhere within the Fallowfield Campus, where areas such as the Armitage Sports Centre Playing Fields have few trees and little biodiversity.
- Potential to become a green hub, forming a focal place at the centre of a network of green links which could be further exploited by integrating paths and cycleways, as well as places for outdoor activity.

4.5 Future Green Blue Infrastructure at Fallowfield Development Site

Priorities for Action

1. Creating more and better green spaces in the Fallowfield site to maintain its atrractiveness as a place to live and study, and to help prevent flooding and increase biodiversity
2. Planting the right trees in the right places to support natural flood management, contribute to carbon net zero targets and strengthen ecological connectivity, provide shade and improve air quality.
3. Supporting access to nature via a viable walking and cycling network
4. Encouraging environmentally sensitive landscape management practice in ways that enhance soil quality, sequester carbon, encourage wildlife, produce food and provide employment.
5. Embedding GBI into development and place-making to include nature-based solutions such as implementing sustainable drainage systems, green roofs and living walls



Buildings, Infrastructure and landscape as an integrated system

5 Green Blue Infrastructure Objectives

5 Green Blue Infrastructure Strategy for Fallowfield Development Site

The GBI strategy is set out as a series of interellated Objectives, which when implemented will result in an improved Green Blue Infrastructure network at Fallowfield, and a more resilient site.

5.1 Objective 1 Flooding & Water Management

The redevelopment of Fallowfield will incorporate greater use of natural flood risk management solutions, promote the use of more nature-based flood management solutions where appropriate, developed in accordance with the principles of the Working with Natural Processes (WWNP) approach to reducing flood risk

Trees have an important role to play as a nature-based solution to flooding and water management. Trees can:

- Catch rainfall to prevent water reaching the soil and adding to flooding, which can amount to 40% of annual rainfall
- Increase infiltration of water deep into the soil reducing surface water flows and recharging the ground water, helping prevent future drought
- Stabilise soil and prevent erosion
- "Slow the flow" by increasing surface roughness, helping to reduce flooding



porous surfaces assist with surface water management

Sustainable Drainage Systems

Surface water flooding presents a significant and increasing risk, which can result in the flooding of sewers which in turn leads to environmental pollution.
The GBI Strategy seeks to promote the increased use of sustainable drainage systems (SuDS), especially in new developments

- Sustainable Drainage Systems (SuDS) manage surface water run-off from rainfall close to where it falls using blue roofs, swales, raingardens, ditches and ponds
- these measures will reduce pressure on existing piped systems and therefore reduce the risk of flooding. In addition to providing flood risk mitigation, well-designed SuDS can increase property value and enhance the GBI of a development.
- SuDS can moderate microclimate, benefit ecology, improve water quality and provide amenity spaces with opportunities for recreation, exercise and active travel. SuDS can also help make the University Estate more resilient to climate change. The cost of SuDS construction can also work out much cheaper than traditional drainage methods if planned properly from the outset.

Blue infrastructure elements

The Fallowfield development should consider the inclusion of the elements outlined on this page as part of the blue infrastructure strategy

- wider surface water infrastructure
- levels and surface water flows
- porous surfaces
- swales
- green / blue roofs
- ponds
- raingardens













5.2 Objective 2 : Nature Recovery & Landscape Management

The University should build on the good work initiated by the Tree Plan and Policy 2016, and the Environmental Sustainability Strategy 2019 by applying these policies to the Fallowfield Development Site.

- implementation of a tree plan for the Campus
- aim to increase tree cover within the Universities land-holdings, as part of the Universities commitment to sustainability and social responsibility (ref UoM Manchester 2020 strategy)
- aim to increase tree cover as part of the Universities commitment to increasing biodiversity on campus (ref UoM Living Campus Plan)
- Increase Biodiversity

As part of changes in the way it manages trees, woodland and urban green space for multiple benefits, it should develop a well-connected nature recovery network for the Campus that offers greater opportunities for wildlife to disperse between increasingly fragmented habitats.

The University should work with their partners at a landscape-scale to protect Fallowfields "biodiversity hotspots", and develop an expanded patchwork of high value habitats, in better condition and in bigger patches that are more closely connected, augmenting our network of protected wildlife sites and linking green spaces in our towns. As well as helping wildlife thrive, this will provide a wide range of additional ecosystem benefits including greater public enjoyment; pollination; carbon capture; water quality improvements and flood management.

UoM Streetscene team should also support wildflower growth in verges and lawns by amending management regimes throughout the campus

The B-Lines Initiative

Buglife - The Invertebrate Conservation Trust - is committed to halting declines in our native insect pollinators, which have suffered significant declines over recent decades as a consequence of habitat loss, pesticide use and other factors.

Native insect pollinators provide an essential 'ecosystem service' and are responsible for pollination of a large proportion of our food crops and our native plants. Further declines could lead to dramatic reductions in crop yields, alongside further deterioration in our native flora. Large areas of wildflower-rich habitat need to be both restored and created to provide essential food and shelter for pollinators.

To increase opportunities for species to move around the countryside as our climate changes, Buglife is promoting the need to identify and develop priority dispersal corridors – The B-Lines.

Carbon Capture and Improving Air Quality

Trees, woodlands and hedgerows play an important role in capturing and storing carbon by absorbing CO2 and acting as carbon sinks. In urban and rural areas, trees and woodlands also help improve air quality by absorbing gaseous pollutants, lowering temperatures, preventing pollutant concentration, and by producing oxygen during photosynthesis.



Peacock butterflies : increasing overwintering as a result of climate heating



starling murmuration

5.3 Objective 3 : Woodland & Trees

The redevelopment of the Fallowfield site will contribute to the University's climate change, biodiversity and health and well-being goals by planting the right trees and woodlands in the right places...

Trees, woodlands and hedgerows play an important role in capturing carbon and improving air quality.

In addition to capturing carbon and improving air quality, well-placed and well- chosen urban trees can provide a range of other ecosystem services – such as regulating micro-climatic conditions by reducing wind speeds, noise pollution and light levels, providing shade and supporting bats, birds and invertebrates and supporting recreation, wellbeing and providing a pleasant environment and sense of place

5.3.1 Urban Trees

Well-placed and well-chosen trees on streets and in urban green spaces can provide a range of benefits or ecosystem services such as:

- Reducing noise and excessive heat.
- Supporting sustainable drainage.
- Encouraging walking and enhanced physical and mental health.
- Contributing to local environmental character and distinctiveness.
- Providing habitats for wildlife.

As a changing climate, in particular hotter summers and more frequent periods of dry weather, and unknown pests and diseases, will place new pressures on GBI in the long-term, selecting trees of the right species and age profile for planting is essential.



existing tree cover at Fallowfield Development Site

The Trees & Design Action Group's Tree Species Selection for Green Infrastructure Guide provides advice on selecting appropriate species for a range of tree planting scenarios in around towns and cities. In addition to guidance on maximising desired ecosystem services from trees, the Guide sets out advice for achieving aesthetic impact through appropriate tree selection.

The redevelopment of Fallowfield will impact on existing trees; a tree survey carried out in 2023 by Murray Tree Consultants recorded the location, physical extent of trees and tree groups, and their condition, according to BS5738:2012

5.3.2 UoM Policies on Trees at Fallowfield

University of Manchester : The UoM Tree Plan and Policy 2016 document, prepared by Red Rose Forest for the University, outlines a management policy for the University Estate. It specifically excludes any advice on the Owens Park / Fallowfield sites, but does include a range of policies which are applicable to Fallowfield, which include:

Implementation of a tree plan for the Campus

- aim to increase tree cover within the Universities land-holdings, as part of the Universities commitment to sustainability and social responsibility (ref UoM Manchester 2020 strategy)
- aim to increase tree cover as part of the Universities commitment to increasing biodiversity on campus (ref UoM Living Campus Plan)
- two for one tree replacement, with replacement both on and off Campus.
- all trees to have 2.2m clear stem

5.3.3 Manchester City Council: Policies on Trees at Fallowfield

MCC have several policy documents which relate to trees and their management, including:

- Manchester Tree Action Plan 2016-2020
- MCC Tree Management Principles
- MCC Green and Blue Infrastructure Strategy 2016
- In addition, MCC supports city-wide tree initiatives promoted by the following organisations:
- Manchester A Certain Future
- Manchester City of Trees Movement

There appear to be no MCC policies or designations which apply directly to trees at Fallowfield Campus; it is understood that MCC planning apply the following policies to trees more generally:

- three for one tree replacement.

5.3.4 Application of Tree Policies to Fallowfield Redevelopment.

Key Policies :
The following key policies have been applied to the parameters which related to trees and development of the Fallowfield site:

- presumption that all trees should be retained (in order to meet UoM Tree Plan and Policy)
- If individual trees must be felled for development purposes, 3 new trees must be planted for each tree that is felled. (in order to meet MCC planning policy)
- Develop a Tree Management Plan for the Fallowfield Campus

5.3.5 Tree Replacement Strategy and Site Capacity

The policy to plant 3 new trees for each existing tree which is removed for development has limits due to the spacing of trees (6m apart to allow space for them to reach maturity) and finite area of the Fallowfield site.
The site capacity for replacement tree planting was tested through the Masterplan development process. This shows that the site has space for up to 70 new trees. (this will vary according to the final layout – smaller footprint buildings will allow more space for tree planting)

5.3.6 Off-site tree replacement

Where the site has insufficient capacity to provide space for replacement trees, it is acceptable to plant off site, within the wider Fallowfield campus area, at the following ratio:
for the loss of each tree, 3 will be provided as replacement;
of these 3, it acceptable to plant 1 off-site within the wider Fallowfield Campus area.

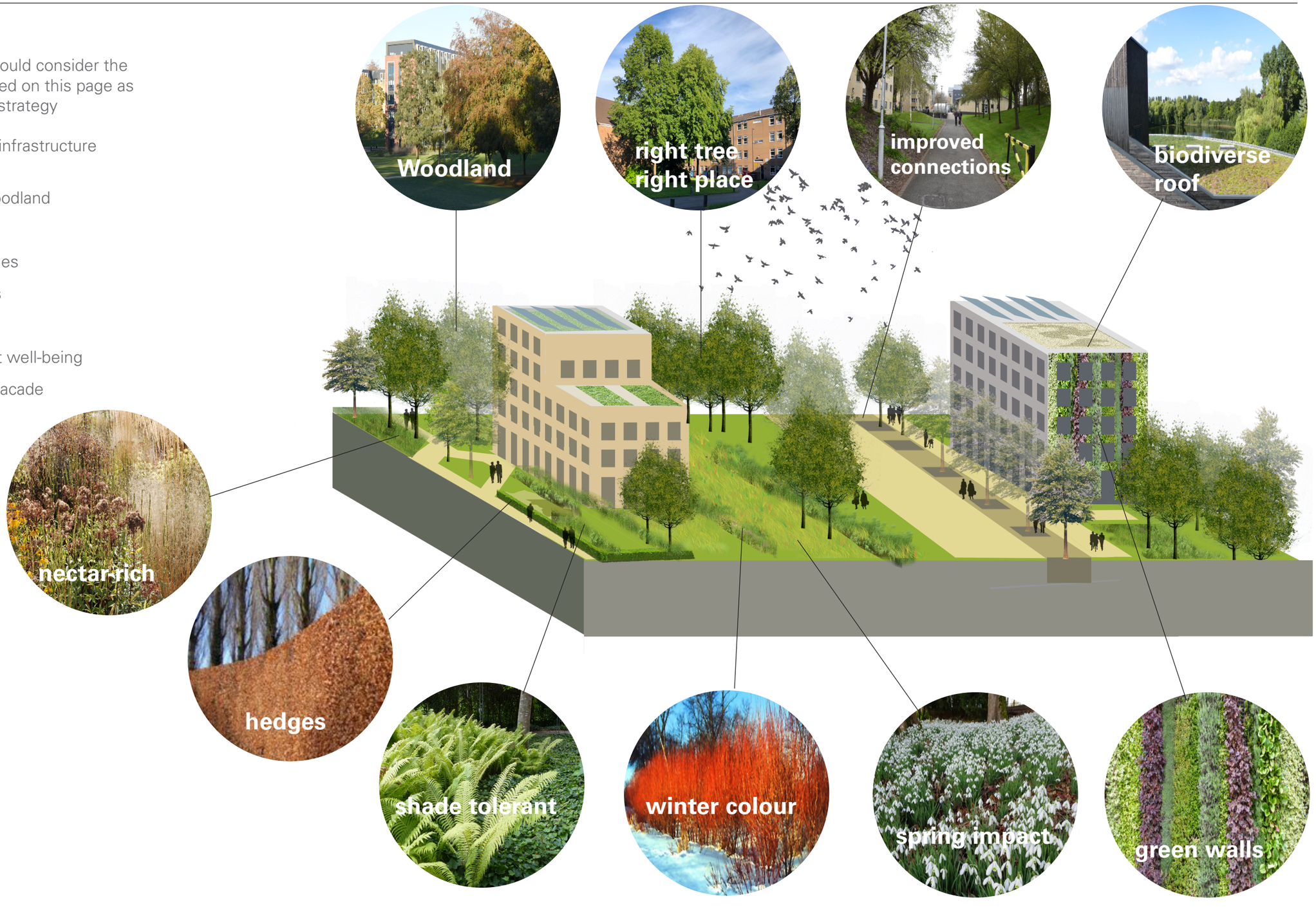
Tree Evaluation
It is helpful to establish whether one tree or tree group is more valuable than another, so that the most valuable can be protected and retained.

Value of Trees
In recent years tree evaluation techniques have become established which are increasingly being used to ascribe value to trees, such as iTree and CAVAT. The CAVAT (Capital Asset Value for Amenity Trees) has been developed by the London Tree Officers Association and is now used by over half of the UK's local authorities. CAVAT uses a range of criteria, including visibility from publically-accessible land, tree structure and canopy shape, tree condition and expected life span, to arrive at a monetary valuation. It is, according to the MCC webpage on Tree Management, used by Manchester City Council to evaluate trees on their land. As far as is known, CAVAT is not used by University of Manchester to evaluate trees on their land.
It is recommended that University of Manchester apply CAVAT to evaluation of the trees at Fallowfield

6. Green Infrastructure Strategy

The Fallowfield development should consider the inclusion of the elements outlined on this page as part of the green infrastructure strategy

- connections to wider green infrastructure network
- enhancement of existing woodland
- right tree right place
- nectar rich planting and swales
- biodiverse green / blue roofs
- raingardens and ponds
- seasonal interest for student well-being
- green walls as a biodiverse facade



5.4 Objective 4 : Healthy Living

The redevelopment of the Fallowfield Site provides an opportunity to help people improve their health and wellbeing by securing more access green and blue spaces and engage with nature..

The relationship between access to nature and improved public health and wellbeing is well established.

Numerous recent studies have shown significant health and well-being benefits for people involved in both creating and managing GBI assets, and from access to good quality greenspace. For example, Natural England's People and Nature Survey 2020 found that almost nine in 10 adults in England report that being in nature made them very happy. The review of health and well-being evidence for green infrastructure published by Natural England in 2020 provides further information

Regular contact with nature and outdoor activity can have substantial benefits for people's physical and mental health and wellbeing.



Physical Health & Wellbeing Benefits of Access to Nature

Access to green space for exercise can help to improve peoples physical health and address issues such as obesity and cardiovascular disease. Regular exercise and healthy lifestyle choices can significantly reduce the impacts of obesity, cardiovascular disease and other serious health problems.

Studies have found that a relationship exists between proximity of access to GBI and physical health – the further away from open space or a rights of way network that people live, the more likely they are to suffer health problems. Evidence also suggests that the quality of green spaces are also a major influence on the wellbeing of local communities.

Mental Health & Wellbeing Benefits of Access to Nature

Access to natural green space can create circumstances where people spend time together, thereby strengthening social networks and reducing isolation and loneliness.

Connecting people to green space, outdoor exercise and green activities, such as gardening or habitat conservation, can have positive impacts on people with mental ill health issues such as chronic stress, depression and anxiety.

Natural green spaces and access to open, green environments provide opportunities for relaxation, relative tranquillity and meditation.

For young people, including students, the effectiveness of green space to promote improved mood, improved attention, reduced stress and anxiety and reduced severity of attention deficit hyperactivity disorder are well documented.

5.5 Objective 5 : Healthy Eating

The redevelopment of the Fallowfield Site provides an opportunity to help people improve their health and wellbeing by providing opportunities for local food-growing...

Sustainable Local Food Systems
The UK is far from self-sufficient in food, not least in a context of climate change and its impacts on global food prices and food security.
Sustainable local food systems at Fallowfield could encourage healthy eating and community food-growing on mini-allotments and community orchards

Embedding sustainable local food systems into plans for Fallowfield can provide a wide range of benefits such as:

- Health & wellbeing benefits - increased physical activity; healthy consumption/lifestyles; improved mental health/well-being; greater nutritional value.
- nclusive community benefits - improved community interaction/ social cohesion; reduced food poverty.
- Environmental sustainability benefits - reduced food miles/ carbon footprints; enhanced GBI/ecosystem services; climate change resilience; improved soil quality, which in turn sequesters more carbon.
- Economic benefits – learning/education; green economy; attractive places; employment opportunities; less waste.



6. GB Infrastructure Strategy

6.1 Green Infrastructure Strategy

The application of the Green Infrastructure elements outlined in section 5 was explored through the development of a Technical Masterplan; this plan shows how Green Infrastructure can be incorporated in one possible iteration of building and landscape design which will conform to the site development parameters and constraints, and effectively deliver improved Green Infrastructure; it features :

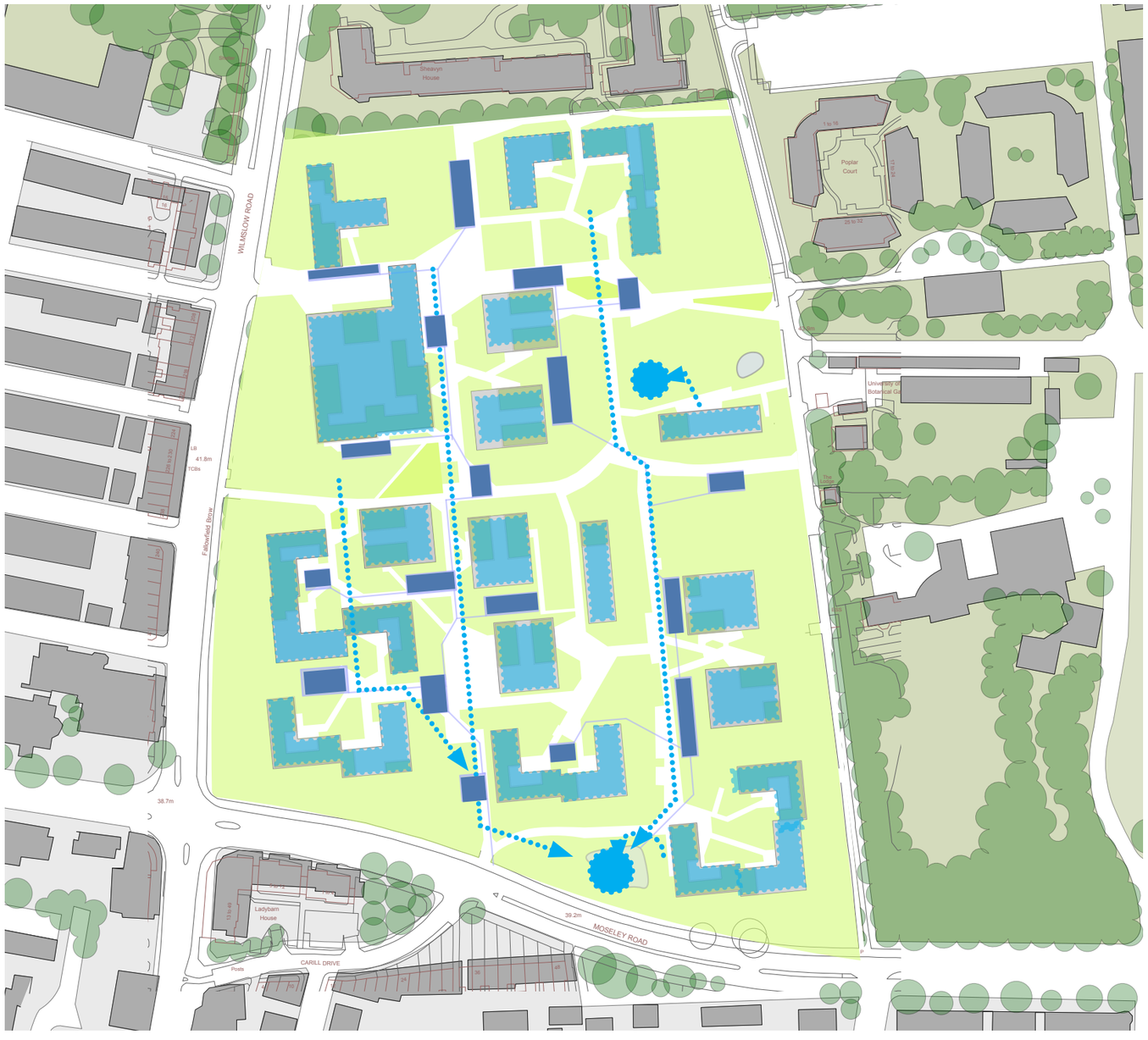




6.2 Blue Infrastructure Strategy

The application of the Blue Infrastructure elements outlined in section 5 was explored through the development of an Technical Masterplan; this plan shows the Blue Infrastructure network in one possible iteration of building and landscape design which will conform to the site development parameters and constraints, and effectively deliver improved Blue Infrastructure; it features:

- wider surface water infrastructure : improvements to Fallowfield Brook
- levels and surface water flows : shaping and grading the terrain to ensure surface water flows to porous areas for infiltration
- porous surfaces : ensuring surface water can infiltrate hard surfaces, or drain to below ground attenuation tanks
- green / blue roofs : making roofs which can attenuate water, as well as support biodiversity
- swales and raingardens : dished surfaces which can hold excess water during storm events, then release it slowly by infiltration into the ground water
- ponds : surface waterbodies, with capacity for attenuating rainwater, and highly biodiverse.



KEY

Blue Roof

Pond

Below ground attenuation

Porous ground

7. Technical Masterplan

7.1 .Technical Masterplan

The application of the Green-Blue Infrastructure strategy elements outlined in section 6 will achieve the three goals of:

1 Resilience to climate change

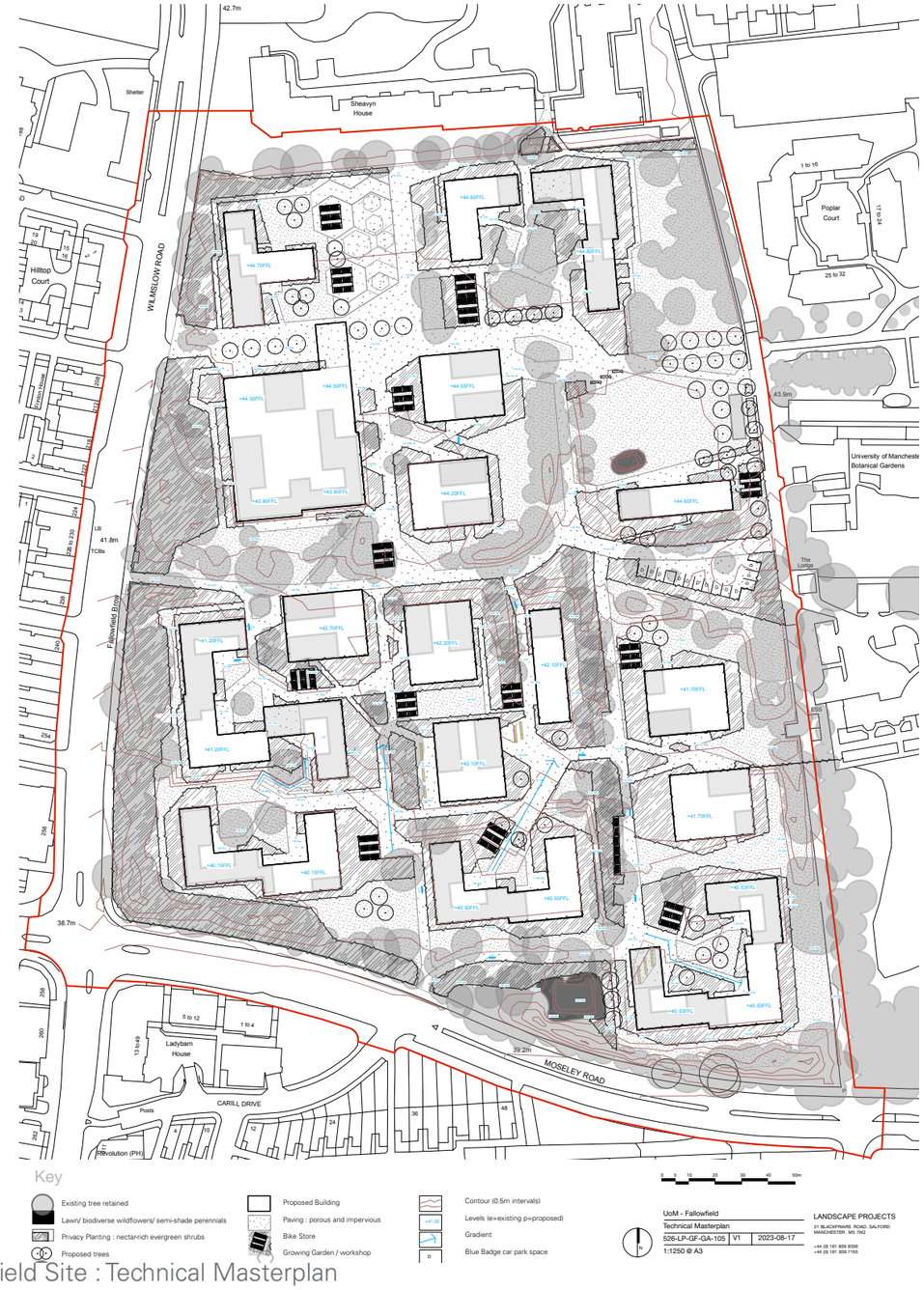
2. Slow or Halt loss of biodiversity

3. Contribute to well being and health

as summarised in this Technical Masterplan; this plan shows the combined Green-Blue Infrastructure network in one possible iteration of building and landscape design which will conform to the site development parameters and constraints.
The Technical Masterplan incorporates the following blue and green infrastructure:

- Woodland perimeter enhancement - making use of native-species of forest and woodland edge trees to reinforce the tree belts, and provide a new generation of replacement trees which will maintain the resilience of the site in the face of environmental stresses associated with climate change
- Understory woodland planting - Introducing shade-tolerant native species of under-storey shrubs and small trees which will increase the foliage canopy and biodiversity
- Enhanced grassland: Enhancing grassland through wildflower planting establishing a varied sward height to increase biodiversity.
- Green roofs - Integrating green roofs into the landscape infrastructure, so that they can provide a continuous high-level habitat which connects with tree belts and groups whilst providing drainage and attenuation opportunities.
- Habitats and animal refuges - to encourage biodiversity, such as ponds and bird houses.
- SUDS : surface water management measures, including permeable paving, green and blue roofs, swales and raingardens, below ground attenuation and ponds.
- Tree-lined pathways connecting to greenspace across the site, beyond to the campus and the wider greenspace network
- Growing gardens in sunny, accessible locations

TECHNICAL MASTERPLAN



Fallowfield Site : Technical Masterplan

8. Green-Blue Infrastructure Management

8.1 University and Blue Green Infrastructure Management

The integrated nature of blue and green infrastructure make it important that strategies are related to the long-term management of the site. Landscape management techniques should follow Nature-Based Solutions, and aim develop the Fallowfield site as a nature hub, from which to influence the greening of the wider area. This should encourage environmentally sensitive landscape management practice in ways that enhance soil quality, sequester carbon, encourage wildlife, produce food and provide employment.

Before completion of the project, the following management plans should be in place:

- Tree Management Plan
- Biodiversity Management Plan
- SUDS Management Plan
- Hard Landscape Management Plan
- Soft Landscape Management Plan



Fallowfield development as hub for greening wider area

Glossary

Amenity: Landscape component or components that contribute to the overall character or enjoyment of an area. For example, open land, trees, well-designed buildings and the inter-relationship between them, or less tangible factors such as tranquillity.

Attenuation : the process of slowing rainfall run-off during and after rainfall events, by holding the water in local reservoirs eg blue roofs, and releasing it slowly, thereby reducing the immediate risk of flooding.

Benefits: Positive advantage for people and wildlife derived from green infrastructure and natural capital

Biodiversity: The variation among living organisms in all environments, including terrestrial, marine and other aquatic ecosystems, and the ecological systems of which they are part. Includes diversity within and between species, and ecosystems.

Biodiversity net gain: When Development of land, buildings, infrastructure etc leaves a place with more biodiversity than before it started. Also the name given to the process of using ecological survey data and metrics to predict and compare before and after

Blue infrastructure: The physical systems in which water moves within a green infrastructure network, including rivers, streams, ditches, swales, ponds, raingardens and blue roofs.

Blue roof : a form of roof construction which incorporates a waterproof membrane and edges which is capable of holding rainwater during a rainfall event, and releasing the water slowly afterwards, thereby reducing the immediate risk of flooding.

Carbon sequestration: The uptake and storage of carbon, primarily from atmospheric sources; for instance by absorption of carbon dioxide from the air by trees and plants through photosynthesis

Climate change: The large-scale, long-term shift in weather patterns and average temperatures across the world due to the release of greenhouse gases (most notably carbon dioxide) into the air since industrialisation
by humans – leading to temperature rise and changes to the climate, affecting people through flooding and damage to ecosystems.

Climate change adaptation: Alterations in natural or human environmental systems in response to the actual or anticipated impacts of climate change.

Climate change mitigation: Action to reduce the impact of human activity on the systems which contribute to climatic cycles, mostly associated with reductions in greenhouse gases

Community orchard: An area of fruit trees planted among grass for the use of students and staff, which provide places in which people can meet and plant/ cultivate local food.

Conservation: The use, protection and enhancement of natural resources in line with principles that ensure the highest economic or social benefits for people and the environment

Ecological stepping stones: Pockets of habitat that, while not necessarily connected, facilitate the movement of species across otherwise fragmented and often intensively urbanised landscapes

Ecosystem: A dynamic community of living organisms – animals, plants, fungi and micro-organisms – and their physical environment that interact as a functional system.

Ecosystem services: The functions of the natural environment that directly or indirectly provide benefits for people. Ecosystem services include:

- Provisioning services: The products obtained from ecosystems, for example food, fibre and fresh water
- Regulating services: The benefits obtained from the regulation of ecosystem processes, for example, the regulation of climate, water, air quality, human diseases and erosion control
- Cultural services: The non-material benefits people obtain from ecosystems for instance through spiritual enrichment, cognitive development, recreation, and aesthetics
- Supporting services: Ecosystem services that are necessary for the production and maintenance of all other ecosystem services. For example soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat. These services often reflect the function and condition of natural capital stock

Environmental net gain: When Development achieves the improvement of all aspects of environmental quality, starting with biodiversity net gain, and going further to achieve net increases in the capacity of affected natural capital to deliver ecosystem services

Green corridor: A linear area of land with plentiful trees and planting which connects green areas or hubs and allows the movement and dispersal of wildlife, usually through urban landscapes. Green corridors can also be used to link housing areas to, for example, cycle networks, places of employment, town centres and community facilities, thus promoting walking and cycling.

Green infrastructure: A network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity (National Planning Policy Framework, 2021)
Green (or living) wall: A vertical wall (partially) covered in greenery, often planted in soil at the base, but sometimes using wall-mounted containers which are artificially irrigated. Green walls contribute to heat retention in winter and cooling in summer, storm water retention and capturing pollutants.

Green roof: a form of roof construction which incorporates a growing medium installed over a waterproof membrane, which allows plants to grow. Intensive green roofs incorporate deep (>150mm +) build-up of lightweight topsoil or compost, usually in small areas of a roof, and allow deeper rooted grasses and herbaceous plants to grow. Extensive green roofs have a shallow (<80mm) build-up and are low maintenance . Green roofs can be planted with species to improve biodiversity

Green space: Patch of vegetated land within the urban fabric ranging from pockets of amenity grassland to large parks.

Green space creation: The creation, in an area that was previously built infrastructure, of public open space comprising areas of grass, trees and other planting, an otherwise urban environment.

Green space enhancement: Improvement to existing green space to increase its biodiversity, and make it more attractive and safe. Includes changes to management and stewardship of green spaces.

Mini-Allotments: An area of land provided by the University for students and staff for growing fruit and vegetables, and for composting. The land may also be used to grow ornamental plants and keep hens and bees etc.

Mental health benefits: Improvements to peoples mental health through connecting to a healthy environment. Access to green space, outdoor exercise and green activities, such as gardening or habitat conservation, can have positive impacts on people with mental health issues such as chronic stress, depression and anxiety.

Multi-functionality : The ability of land to provide multiple functions by integrating different activities and land uses on individual sites and across a green infrastructure network.

Natural capital: The collection of natural ecosystems that produces a flow of valuable ecosystem goods or services, directly or indirectly, to people, including ecosystems, animal and plant species, fresh water, land, minerals, the air and oceans, as well as natural processes and functions. Natural capital includes many different components of the natural environment, as well as the processes/ functions that link these and sustain life.

Natural capital asset: A natural resource that provides a flow of ecosystem services and benefits over time

Natural flood management: Managing flood risk by protecting, restoring and mimicking the natural 'regulating' function of catchments, rivers, floodplains and coasts.

Nature-based solutions: Actions that are inspired or supported by natural processes and which provide environmental, social and economic benefits. Such solutions bring natural features and processes to cities and landscapes.

Nature recovery network: An expanding, increasingly connected, network of wildlife-rich habitats supporting species recovery, alongside wider benefits such as carbon capture, water quality improvements, natural flood risk management and recreation.

Open space: All open space of public value, including not just land, but also areas of water (such as rivers, canals, lakes and reservoirs) which offer important opportunities for sport and recreation and can act as a visual amenity

Park: A publicly accessible area of natural, semi-natural or planted space intended for human enjoyment and recreation and often for the protection of wildlife or natural habitats. Parks often host facilities for play and rest.

Physical health benefits: Improvements to peoples physical health through access to green space. Regular exercise, including walking, can reduce the negative effects of health threats such as obesity, coronary heart disease and respiratory disorders.

Rewilding: A form of ecological management which supports nature recovery by restoring natural processes that allow the natural succession of habitats and species to occur.

Right Tree Right Place : ensuring the right tree is established in the right place, using the right method, for the right reasons, and with the right aftercare. This means increasing tree cover whilst protecting and enhancing what is special and valued in the landscape and keeping the environmental benefits already being delivered. New trees in the wrong locations could result in unintended negative consequences for biodiversity, landscape character and heritage assets, and also reduce resilience to climate change.

Sustainability: Meeting the needs of the present without compromising the ability of future generations to meet their own needs

Sustainable urban drainage system (SuDS): An approach to managing surface water run-off from rainfall close to where it falls that replicates natural drainage by slowing and holding back run-off, reducing pressure on existing piped systems and reducing risk of flooding. Where designed as vegetated/green systems, SuDS can help to moderate microclimate, benefit ecology, improve water quality and provide amenity spaces with opportunities for recreation.

Sustainable transport: Environmentally sustainable modes of travel, including walking and cycling, low and ultra-low emission vehicles, car sharing and public transport.

Swales: Linear grass covered depressions which lead surface water overland from the drained surface to a storage or discharge system, typically using road verges.

Urban tree planting: The process of planting young trees in towns and cities. As urban sites may not be the natural habitat for trees, tree choice and location are vital if trees are to grow and flourish. Planting trees in urban areas can yield many benefits in addition to their aesthetic value, such as reductions in air pollution and noise levels.

Wellbeing: The state of being comfortable, healthy and happy. Close contact with nature can reduce anger, fear, and stress and increases pleasant feelings. Exposure to nature not only make people feel better emotionally, it can contribute to physical well-being, reducing blood pressure, heart rate, muscle tension, and the production of stress hormones.

Wildlife corridor: linear features that enable migration and dispersal or otherwise act to link habitats in ways that reduce the isolation of wildlife populations.

Woodland creation: The planting of new trees to form woodland or low-density forest, providing open habitats with plenty of sunlight for inhabitants and some limited shade at ground level. It can help in urban cooling, in providing shade and shelter, in minimising run-off from fields, and in reducing the impact of flooding.

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