CALLED IN PLANNING APPLICATION:

CORRIDOR BETWEEN THE A34 MILTON INTERCHANGE

AND

THE B4015 NORTH OF CLIFTON HAMPDEN

PINS REFERENCE: APP/U3100/V/23/3326625

PROOF OF EVIDENCE OF

PROFESSOR SIR IAN CHAPMAN FREng FRS

ON BEHALF OF

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY

JANUARY 2024

UK Atomic Energy Authority

CONTENTS

1.0 INTRODUCTION

1.1 My name is Prof Sir Ian Chapman, and I am employed by the United Kingdom Atomic Energy Authority[1] (UKAEA) as Chief Executive Officer. I have served in this capacity since October 2016, although I have worked for UKAEA since 2004 holding several different roles. I hold an MSc in Mathematics and Physics from Durham University and a PhD in Plasma Physics from Imperial College London.

1.2 I became a Fellow of the Institute of Physics in 2013, the Royal Academy of Engineering in 2022 and the Royal Society in 2023. My work in Fusion has included holding various international roles, currently including the Advisory boards for Princeton Plasma Physics Laboratory and the Chinese Academy of Sciences Institute of Plasma Physics as well as chairing the International Fusion Research Committee for the International Atomic Energy Agency.

1.3 Culham Campus (previously Culham Science Centre), formerly known as the Royal Naval Air Station HMS Hornbill, has a rich history dating back to its commissioning in 1944. In the late 1950s, the United Kingdom Atomic Energy Authority selected Culham as an ideal location for a state-of-the art laboratory dedicated to plasma physics and fusion research. Construction began in the early 1960s, and the laboratory officially opened in 1965.

1.4 Today, Culham Campus is at the centre of fusion development globally. UKAEA has supported the creation of the 'Fusion Cluster' which already boasts 200+ members in its first year as we aim to secure the well-known benefits of clustering such as enhanced inward investment, accelerated delivery and dispersion of ideas within the ecosystem.

1.5 Several leading fusion companies have announced plans to build their next fusion facility at Culham. The co-location of private fusion companies and the largest fusion research organisation in the world, with a range of globally unique facilities, makes the UK the "go-to" place for fusion. Our engagement with partners continues to expand at pace with over 4,500 companies now working with UKAEA. Integral to this cluster is the evolution of UKAEA from an organisation that five years ago was utterly dominated by operating the Joint European Torus (JET) to one which supports seven Centres of Excellence that work across the full fusion lifecycle, from invention and research to powerplant design, to operation of facilities, and finally to sustainable decommissioning and reuse. These Centres of Excellence are in Plasma Physics, Materials, Technology, Tritium Fuel Cycle, Robotics, Computing and Integrated Engineering. This breadth of capability is not found in any other single organisation.

[1] UK Atomic Energy Authority - GOV.UK (www.gov.uk)

2.0 THE FRAMEWORK MASTERPLAN FOR CULHAM CAMPUS

2.1 As CEO of UKAEA in recent years I have overseen the development of a Framework Masterplan for Culham Campus that sets our ambitious vision for the future of the campus to help achieve further scientific breakthroughs and generate positive economic growth for the area. This is a publicly available document which can be found on our website[2]. It is also a document that South Oxfordshire District Council (the Local Planning Authority) and Oxfordshire County Council (in its role as Highway Authority) have regard to in considering UKAEA's applications for planning permission. For ease of reference, the Framework Masterplan can be found at my **Appendix 1**.

2.2 The Framework Masterplan sets out the UKAEA's high level ambition for the development of Culham Campus, provides an overview of its context, communicates the key infrastructure requirements necessary to facilitate development and growth and sets out a placemaking strategy to ensure that we create a cohesive campus.

2.3 The Framework Masterplan culminates in a spatial plan that illustrates how the site can grow to 2025; from 2025-2035; and from 2035-2050. This end date is intentionally aligned with the UK's Climate Change Act, which has a legal duty to reach net carbon zero by 2050. This Act has directly shaped the positioning of Clean Growth at the heart of the UK's Industrial Strategy, which has been a notable influence in the preparation of this 2050 Framework Masterplan document.

2.4 The Framework Masterplan's spatial strategy is predicated on the successful delivery of the HIF1 infrastructure. This is on the basis that:

a) the planned growth at Culham Campus requires the construction of a second entrance/exit the location of which has been agreed with the Highway Authority as part of the HIF project – the new entrance/exit is off the Clifton Hampden by-pass element of the scheme;

b) UKAEA is committed to encouraging its staff and visitors to use non-car modes to access the campus but in order to achieve a meaningful modal shift, we need the totality of the transport infrastructure that HIF will deliver, including dedicated cycling and walking provision and sufficient highway capacity to accommodate improved bus services that can properly link the campus to Didcot, Abingdon, Oxford and other settlements in its hinterland; and

c) it will enable the UKAEA to realise its plans for a new main entrance more befitting of its status as a world-leading science and technology campus – planning permission has been secured for a new Main Gate and associated infrastructure but the development needs HIF to be completed if it is to be realised in full (because the two projects share land and should to be delivered in a mutually acceptable timescale);

[2] Framework Masterplan - Culham Campus

2.5 My Proof of Evidence provides further details of the importance of the "the Didcot Garden Town HIF road scheme" (the HIF1 project) to the successful delivery of the UK Government's Fusion Strategy and UKAEA's goals to continue to lead the world in this ground-breaking science and technology. It also highlights the impact that a failure to deliver this project will have. Before providing that detail, I first explain the global significance of the Culham Campus and of Fusion Energy.

3.0 WHAT IS FUSION?

3.1 Fusion is the process which occurs at the centre of stars. It is the source of light and heat emitted by the Sun. When the nuclei of two light elements are 'fused', they form a heavier element and release excess energy. Fusion energy can be generated in a variety of ways including but not limited to Magnetic Confinement and Inertial Confinement. All methods need to create an environment with sufficient heat and pressure.

3.2 The most common fuels considered for fusion power plants are deuterium and tritium, both of which are isotopes of hydrogen. In a deuterium-tritium fusion reaction, the nuclei of deuterium and tritium fuse, producing a helium nucleus and a highly energetic free neutron, whose energy can be harnessed to produce heat and electricity.

3.3 The generation of usable energy using fusion would have 6 distinct advantages:

1. **Fuel abundance**: the fuels used in fusion reactions are readily available. Deuterium is readily extracted from seawater, and tritium is produced using lithium;

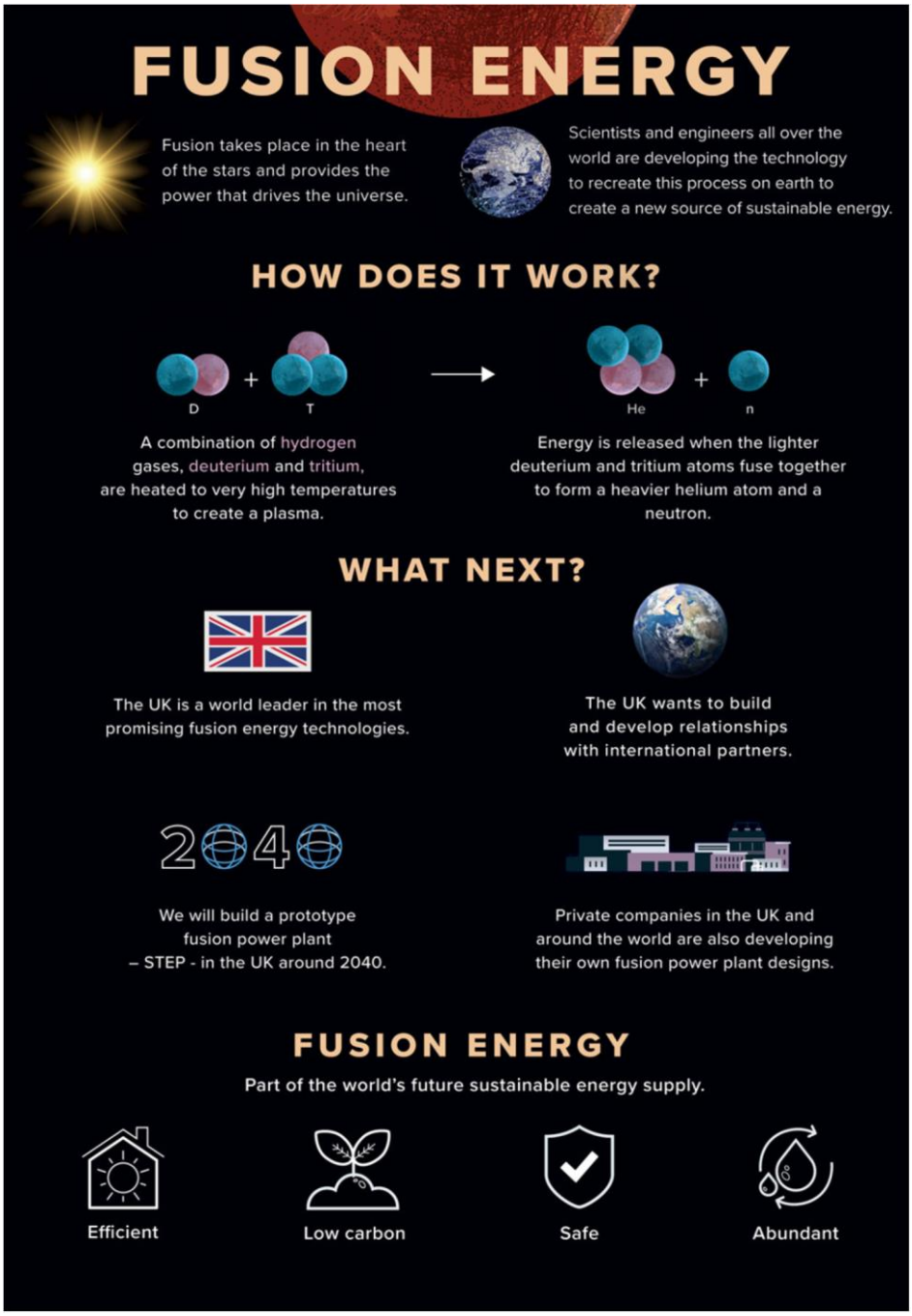
2. **Baseload power**: fusion energy does not depend on external factors such as wind or sun, making it continuously deployable at point of need;

3. **High fuel efficiency**: fusion produces more energy per gram of fuel than any other process that could be achieved on Earth;

4. **Carbon-free**: helium is the product of the fusion process – no carbon or other greenhouse gases are produced in the reaction;

5. **No chain reaction**: fusion is not based on a chain reaction; specific conditions of heat and pressure need to be maintained for fusion to occur. Therefore, if there were any technical problems, a fusion facility could be immediately switched off and the process would stop within seconds;

6. **Shorter lived waste**: fusion power plants are not expected to produce the very long lived, high level radioactive waste associated with nuclear fission.



4.0 CLIMATE CHANGE AND THE IMPORTANCE OF FUSION

4.1 The impacts of climate change are well known. The emerging climate crisis is having an impact around the world. The final text agreed at the recent COP28 conference[3] calls on nations to transition "away from fossil fuels" in a "just, orderly and equitable manner". Ahead of the Dubai summit, the UN said that under current policies, global temperatures were on track to rise 2.9C above pre-industrial levels – nearly double the goal cited in the climate summit final declaration.

[3] Outcome of the first global stocktake. Draft decision -/CMA.5. Proposal by the President | UNFCCC

4.2 The scale of this challenge cannot be overstated. In 2020 the UK's total generated electricity was 312.8TWh, of which 59% was generated from low-carbon technologies. By 2050, as a result of the rising use of electric vehicles and electric heating, alongside population growth, the UK's total electricity demand is expected to rise to between 570-630TWh – roughly double the current electricity demand. This UK trend will be played out globally owing to the electrification of the world economy. This also does not reflect the anticipated increase in nonelectrical future energy requirements, such as industrial heat. As part of its net zero targets, the UK Government is aiming for a fully decarbonised power system in the UK[4]. Ensuring the system is also reliable means that intermittent renewables need to be complemented by technologies which can provide power when the wind is not blowing, or the Sun does not shine.

4.3 While fusion research facilities have been in operation around the world for many decades, no facility has yet demonstrated net energy gain from fusion[5]. The scientific and engineering challenges in delivering fusion energy are considerable. The design and development of the complex components and systems required remains ongoing – and the integration of these into a highly sophisticated facility that can be operated and maintained at commercially viable levels of productivity and availability will be very challenging.

4.4 However, advances in fusion science and technology over recent years, coupled with advanced manufacturing and computing capabilities now available, mean that fusion energy is closer than ever before. It will be worth the hard work – the average of recent economic analyses of the scale of the fusion market of the future estimates this at £7Tn, making it a sizeable economic opportunity as well as an imperative to help to address climate change.

4.5 Fusion energy research is a global endeavour. 35 nations including the UK are collaborating on ITER (International Thermonuclear Experimental Reactor), the world's largest fusion project that aims to demonstrate fusion energy generation at an industrial scale. Partner nations of ITER[6] represent 50% of the global population and around 90% of the world economy. Alongside ITER, there are a significant number of governments with national initiatives in fusion energy. There are also more than 40 private fusion companies globally which have raised over $6bn in investment to date[7].

4.6 The Government wants the UK – as a pioneer in fusion science and research – to lead the development of this low-carbon energy technology and secure the economic opportunities of a future global fusion energy market. The UK is well placed to do so, having hosted the largest fusion experiment in the world, and being home to the largest fusion organisation in the world, at Culham Campus. This makes Culham Campus a globally-unique facility of international – as well as national – importance.

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[4] Powering Up Britain - The Net Zero Growth Plan (publishing.service.gov.uk)

[5] The National Ignition Facility in the US demonstrated a net *thermal* energy gain in 2022, but the first net *total* energy gain is expected in the next decade.

[6] China, EU, India, Japan, Korea, Russia, US. See www.iter.org

[7] Fusion Industry Investment Passes $6bn - Fusion Industry Association

5.0 UK GOVERNMENT FUSION STRATEGY

5.1 Towards Fusion Energy – The UK Government's Fusion Strategy[8] was launched from Culham Campus in October 2021. It set out the ambition to deliver the ultimate clean power solution, representing a low-carbon, safe, continuous and effectively unlimited source of energy through leveraging scientific, commercial and international leadership. This strategy was updated in 2023 to set out how we will build on the vision set out in 2021 (including the Culham Framework Masterplan) to expand our world-leading R&D capabilities, deliver new cutting-edge facilities and do more than ever before to support a diverse and vibrant fusion sector. To support the delivery of the Fusion Strategy investment of more than £1.35bn has been provided by Government.

5.2 Whilst it is not within the scope of this document to provide the full details of the strategy the key objectives are:

1. For the UK to demonstrate the commercial viability of fusion by building a prototype fusion power plant in the UK that delivers net energy.

2. For the UK to build a world-leading fusion industry that supports different fusion technologies and is capable of exporting fusion technology in subsequent decades.

5.3 As the current home of UK Fusion, the redevelopment and growth of Culham Campus plays an essential role in achieving these objectives. As evidence that this strategy is working, three fusion companies – General Fusion[9], Tokamak Energy[10] and First Light Fusion[11] – which between them have raised more than $650M, have all declared their intention to build their next facilities at Culham Campus. Any limitations placed on that development due to poor transport infrastructure in the local area will put this at risk.

6.0 UKAEA MISSION AND GOALS

6.1 Implementing the UK Fusion Strategy is a core role for UKAEA. Our mission is to lead the delivery of sustainable fusion energy and maximise the scientific and economic benefit. To achieve this, we have set five corporate goals:

1. Solve challenges of sustainable fusion energy - from design through to decommissioning - with world-leading science and engineering

2. Enable partners to design, deliver, and operate commercial fusion powerplants

3. Drive UK economic growth and a thriving industry that exports fusion technology around the world

[8] Towards fusion energy: the UK fusion strategy - GOV.UK (www.gov.uk)
[9] Bringing Fusion Energy to Market - Fusion Power | General Fusion
[10] Commercial Fusion Energy - Tokamak Energy
[11] Projectile Based Inertial Fusion | Fusion Power | First Light Fusion

4. Create clusters that accelerate innovation in fusion and related technologies

5. Develop the talented, diverse people needed to deliver fusion energy

7.0 THE IMPORTANCE OF CULHAM CAMPUS AND THE HIF1 SCHEME

7.1 The importance of Culham Campus to achieving our mission and goals cannot be underestimated and it is pivotal that we grow the UK fusion community based there. The site has a strong legacy with skills, knowledge base and a global network of strategic alliances built up over generations that cannot be replicated elsewhere.

7.2 At present the site employs around 3,000 people in a variety of scientific and support roles. As well as being the HQ for UKAEA, Culham Campus is also home to around 40 private companies all of whom will also benefit from the successful delivery of the HIF1 scheme and improvements to the transport network in the area. This includes start-up companies - based in our Innovation Centre - to established local, national and international businesses such as Commonwealth Fusion Systems, Jacobs, Johnson Matthey, Oxa as well as the on-site Ofsted outstanding Nursery facility and our recently expanded skills facility. In line with our Framework Masterplan, it is our ambition to grow the campus through a combination of the redevelopment of existing facilities and the development of new experimental facilities in addition to bespoke fusion demonstration plants built in collaboration with private sector fusion companies.

7.3 To achieve the scale of growth and development we aspire to will require the wider supporting infrastructure to be fit for purpose. The need for the road scheme between the A34 Milton Interchange and the B4015 north of Clifton Hampden first emerged through the Local Plan drafting exercises in South Oxfordshire and the Vale of White Horse around 10 years ago. The Didcot Garden Town HIF road scheme is intended to relieve development pressures, which are a legacy of the previous Local Plan (the Core Strategy) in South Oxfordshire. It is also required to support new growth as allocated in the extant South Oxfordshire Local Plan 2034 and the Vale of White Local Plan 2031 - in all, the delivery of around 14,000 homes, and several thousand jobs.

7.4 Culham Campus is 'inset' from the Oxford Green Belt and is allocated under Policy STRAT8 for significant growth in the extant South Oxfordshire Local Plan (2011-2034). The Culham Campus also forms a key part of two regional employment strategies: "Science Vale" and the "Knowledge Spine," and is one of the largest employment centres in Oxfordshire.

7.5 The supporting text to Policy STRAT8 states that:

The delivery of the following infrastructure is expected to be complete in 2024, as it is to be forward funded by the Government's 'Housing and Infrastructure Fund' and other existing funding:

- *the Didcot to Culham River Crossing; and*
- *the Clifton Hampden Bypass.*

7.6 The land for the road scheme is also ‘safeguarded’ through Local Plan Policy TRANS3: Safeguarding of Land for Strategic Transport Schemes.

7.7 UKAEA worked closely with South Oxfordshire District Council and Oxfordshire County Council, in its role as highway authority, to secure the Policy STRAT 8 allocation. The Inspector appointed to examine the then emerging Local Plan commented in his report [at his paragraph 112] that:

> *“[Culham Campus] is internationally important for research, and it is essential that change and growth can be accommodated in the future. The purpose of the allocation is to enable the site in its entirety to realise its full potential as a science campus where publicly funded science research and commercial technology growth can flourish.”*

7.8 Crucially, the Inspector also concluded [again at his paragraph 121] that accompanying infrastructure was necessary to help facilitate growth at Culham Campus and the adjacent housing allocation for 3,500 new homes and associated services and facilities (Policy STRAT9: Land adjacent to Culham Science Centre):

> *“Policy STRAT9 [Land Adjacent to Culham Science Centre] requires contributions towards a new crossing of the River Thames between Culham and Didcot and a bypass of Clifton Hampden (as clarified by MM12) and they must be delivered prior to any significant development at Culham. The intention is that the transport schemes will be delivered by 2024. The site is particularly well located in respect of the planned Didcot to Culham River Crossing and the Clifton Hampden Bypass, which are not only road links but also include pedestrian and cycle links and will help to facilitate new bus services, and there are also other opportunities for sustainable transport modes; in the interests of creating a sustainable development, MM12 requires high quality walking and cycling facilities and infrastructure to support public transport within the site.”*

7.9 The delivery of the Didcot Garden Town HIF road scheme is designed to improve active and sustainable travel; it is not a road scheme simply to support more car journeys - the intention is that improved bus services, rail services and cycle and pedestrian connections will be provided alongside the road construction programme as part of a wider package of S106 measures linked to the proposed growth in housing.

7.10 The employment development at Culham Campus, which the Didcot Garden Town HIF road scheme can ‘unlock’, is central to the delivery of the UK’s Fusion Energy Strategy. A failure by the County to upgrade the road network in the area, tackling long-standing traffic issues, will make realising the development potential of the site very challenging. It will also place in jeopardy UKAEA's mission to lead the delivery of sustainable fusion energy and the scientific and economic benefit. This has not only national but global significance which must be closely considered during the inquiry.

7.11 Put simply, the delivery of the Didcot Garden Town HIF road scheme is necessary to ensure that Culham Campus is able to grow to meet the needs of UKAEA and the

aspirations of national policy promoting UKAEA's work. This is a benefit at a national level. Conversely, the non-delivery of the Didcot Garden Town HIF will hinder UKAEA's nationally (and internationally) important work, and would be at odds with clear national policy which supports the development of the Culham Campus.

7.12 UKAEA's Framework Masterplan clearly articulates the vision for redevelopment of Culham Campus. It is ambitious and, with the right supporting road infrastructure, will deliver significant growth on site both in terms of building density and job creation. Consistent with the Government's Plan for Growth and its support for the science and technology sector, and in particular Fusion-related research and development, these high-quality jobs - bringing together those working directly in the private Fusion sector and those in its wider supply chain - will support the local and national economy, and the global endeavour, as the transition to Net Zero continues.

APPENDIX 1: THE FRAMEWORK MASTERPLAN FOR CULHAM CAMPUS

CULHAM SCIENCE CENTRE

UK Atomic Energy Authority

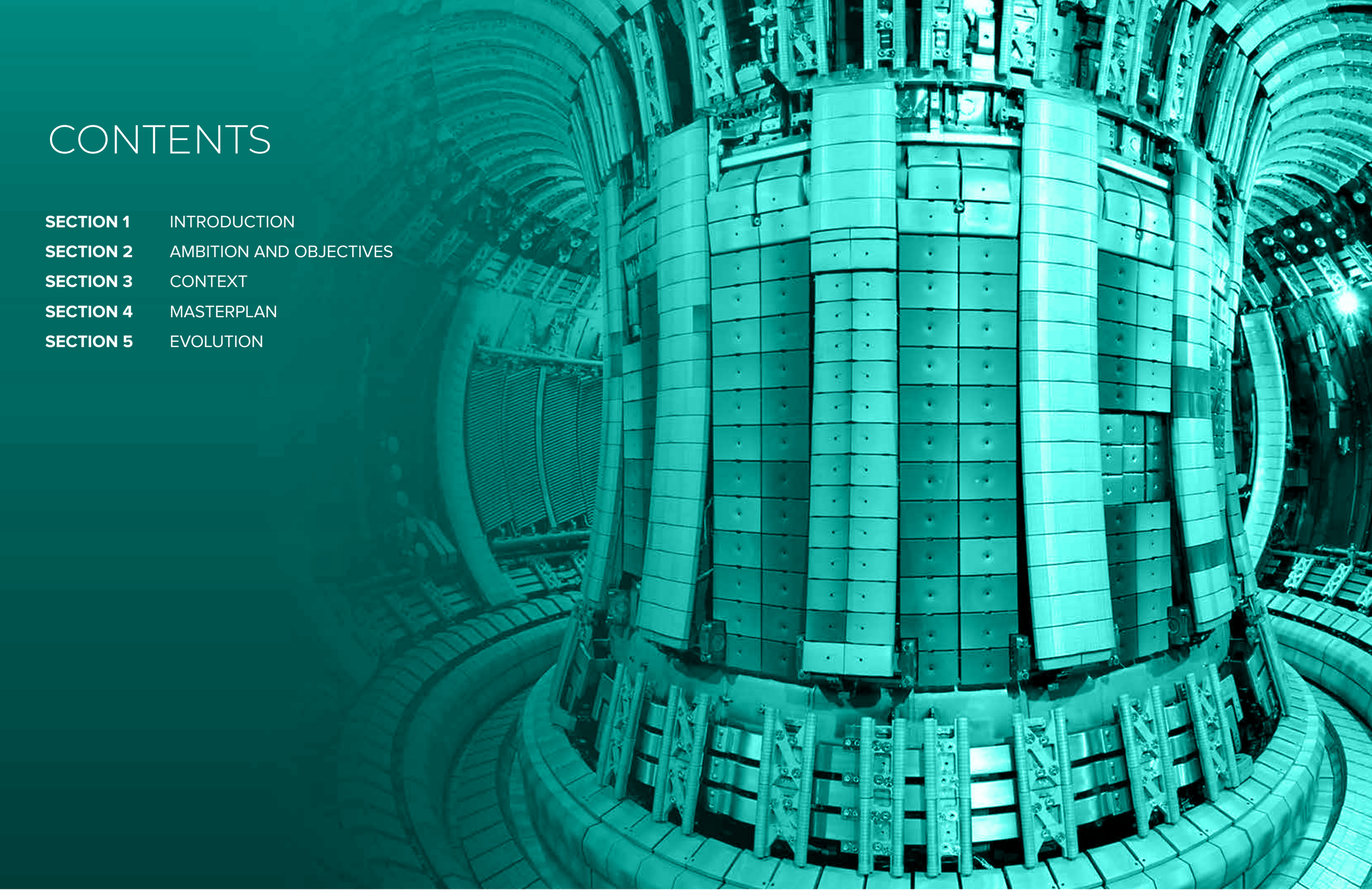
HOSTING THE PURSUIT OF FUSION ENERGY

GROWING SUSTAINABLY

FRAMEWORK MASTERPLAN

JANUARY 2022

CONTENTS



SECTION 1
INTRODUCTION

1.1. Structure

This document sets out the UKAEA's high level ambition for the development of its campus at Culham (currently known as Culham Science Centre), provides an overview of its context, communicates the key infrastructure requirements to facilitate development and growth, alongside setting out a Placemaking strategy to create a cohesive campus. It culminates in a spatial plan that illustrates how the site might grow to 2025; from 2025-35; and from 2035-2050. This end date is intentionally aligned with the UK's Climate Change Act, which has a legal duty to reach net carbon zero by 2050. This Act has directly shaped the positioning of Clean Growth at the heart of the UK's Industrial Strategy, which has been a notable influence in the preparation of this 2050 Framework Masterplan document.

Whilst the UKAEA's needs at the campus will evolve with time and it is not possible to predict what those needs are or how the campus should best develop to meet them, it is possible to set out ways in which the campus can feasibly and reasonably develop in anticipation of likely needs having regard to the physical characteristics of the campus and planning and development policy and practice. A Masterplan is a working document and requires regular review and updating.

1.2. Purpose

What This Document Is For

This document:

- provides the framework for the physical development of the UKAEA's Culham Science Centre based on the UKAEA's ambitions, an understanding of the existing campus and current development policy and national policy guidance;

- indicates how the physical development of the campus will contribute to the achievement of sustainability objectives, setting trajectories for clean growth, improved mobility and place-making consistent with national and corporate policy;

- projects three timeframes for that development:

    - **to 2025;** consistent with the current timescale for the major developments associated with the Fusion Foundations Programme and the external HIF Programme which will deliver a major change in the transport infrastructure in the immediate vicinity of the campus. The development of the adjacent proposed 'Culham Science Village' is also expected to commence within this period following the adoption of the South Oxfordshire Local Plan 2034.

      Furthermore, there is a significant possibility that at least one, possibly two, major fusion facilities could be constructed and operated on campus by independent enterprises;

    - **2025-35;** during which time, it is anticipated that major redevelopment of existing CSC buildings will occur and there will re-use or re-development of the JET buildings/ facilities following anticipated closure of JET. It also reflects the end point of the new Local Plan;

    - **2035-2050;** looking to the long term realisation of the full potential of the existing campus and the achievement of significant milestones in the sustainability of the campus whilst also reflecting the emerging Oxfordshire Plan 2050.

- presents the planned evolution of the campus in terms of:

    - 'yellow infrastructure' – movement;
    - 'green infrastructure' - landscape/ecology/biodiversity;
    - 'blue infrastructure' - the strategy for surface water and drainage.

- provides visualisations of the developed state of the campus after the selected timeframes;

What This Document Is Not For

This document:

- does not provide guidance for the design of buildings other than in respect of their location, massing, access and related campus infrastructure;

Notes/Assumptions

1. A number of site plans are included throughout the document to illustrate different principles. In all cases these plans recognise the anticipated changes to the external highway network which are expected to be in place by 2025.

SECTION 2
AMBITION AND OBJECTIVES

2.1. Ambition

This document outlines the UKAEA's ambitions for the development of its campus near Culham, Oxfordshire, continuing and accelerating its transition from the UK's national fusion laboratory to a world leading centre for fusion technology. Fusion energy offers huge potential be a safe and sustainable contribution to the world's future energy supply, and work at the Culham campus plays a crucial role in its realisation. As well as being a key objective of the Government's industrial and energy strategy, the commercial realisation of fusion energy is a major economic opportunity, attracting substantial investment from the UK and elsewhere.

To achieve this goal, the campus will need to develop and grow:

- in a way that supports an increasingly diverse range of facilities and organisations;
- to attract the best talent to drive the endeavours of the UKAEA and other occupiers;
- in a responsible and environmentally sustainable, safe and secure way.

The UKAEA, owner and operator of Culham Science Centre, has a clear strategy to develop the campus as a leading global centre for the development and the realisation of fusion energy. Already an internationally recognised centre for fusion research and development and home to a community of related businesses, a major programme of development and investment is now underway at the campus that forms the centrepiece of the UK's ambitions to deliver sustainable fusion energy with associated scientific and economic impact. The Culham campus also has significance as a national asset which could be used for national infrastructure connected to the fusion programme - for example perhaps making use of the extraordinary electrical power connectivity of the site for future national high-performance computing facilities.

Accordingly, the campus at Culham needs to provide an environment:

- that is home to the UKAEA's headquarters and the bulk of its key national programmes and major facilities;
- in which innovation and collaboration between the UKAEA's programmes, companies and universities will thrive;
- that attracts and provides a good working environment for all employees;
- that attracts organisations to the campus which contribute to a successful cluster.

The Oxford area is increasingly recognised as a powerhouse of innovation, with a breadth and depth of research infrastructure and knowledge that play on a global stage. These include Oxford University, the Harwell Campus and the Culham campus. Further, the role of Culham is recognised in a wide range of the ambitions set out in Oxfordshire's Local Industrial Strategy.

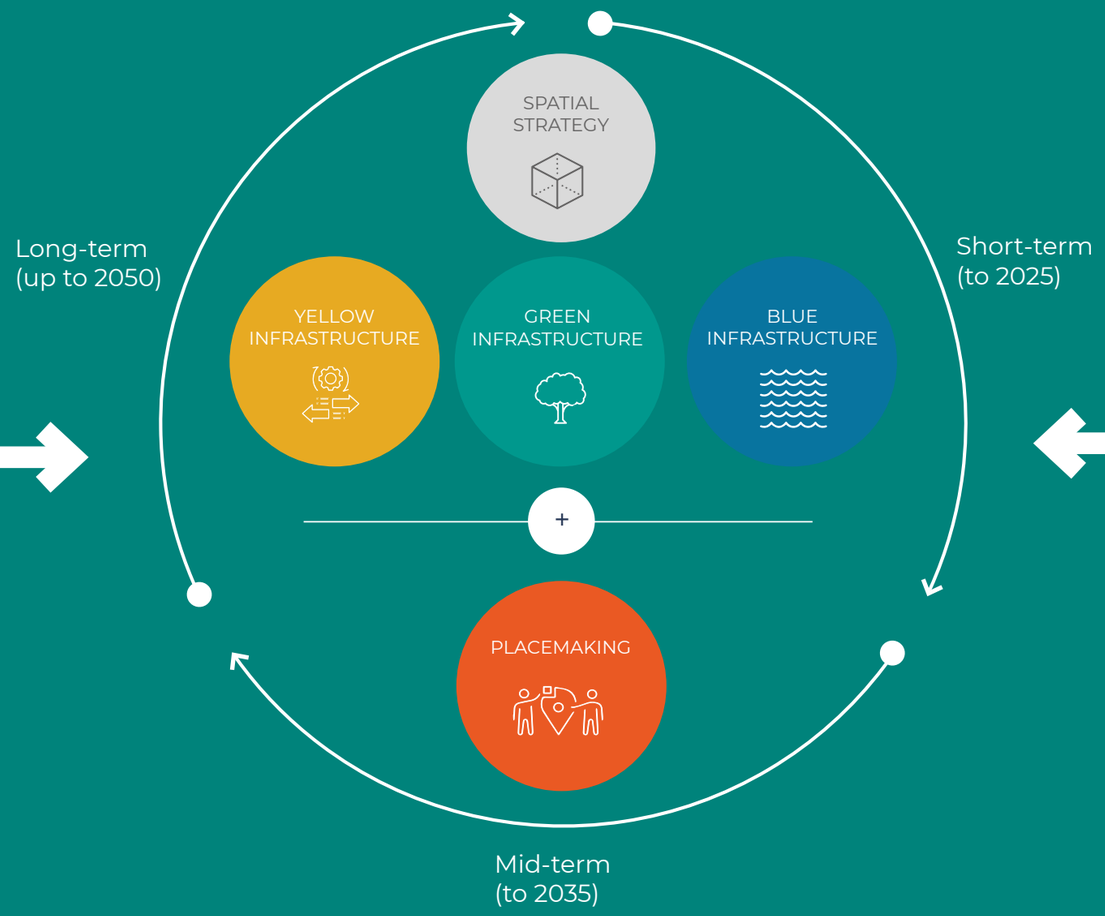
AMBITION, OBJECTIVES AND SPATIAL STRATEGY

Campus Objectives

Purpose
Developing the campus to accommodate facilities and people to build cluster in policy compliant way.

People
Creating an effective, well-serviced, attractive environment that attracts/retains talent and contributes to well-being.

Placemaking
Developing the campus in a way which seeks to minimise the adverse impacts of development and contributes where possible to improved sustainability.



Thematic Objectives (UK National Policy)

Clean Growth / Net Carbon Zero
The Climate Change Act requires a net carbon zero outcome by 2050. This requirement has directly shaped the UK's Industrial Strategy, in particular the positioning of Clean Growth it its Grand Challenges. This requires a move to clean economic growth through low carbon technologies and efficient use of resources.

Place
Creating environments that are great for business and the prosperity of the communities that use them.

Mobility
Pursuing profound change in how we move people, goods and services around driven and enabled by extraordinary innovation in engineering, technology and business models and delivering environmental and other benefits.

2.2. Objectives

This Masterplan is fundamentally a plan for the spatial development of the UKAEA's campus at Culham; the making of a distinct place that supports the ambition to become the world leading centre for fusion technology and the evolution of the infrastructure that is needed to support this outcome.

The Masterplan has three objectives:

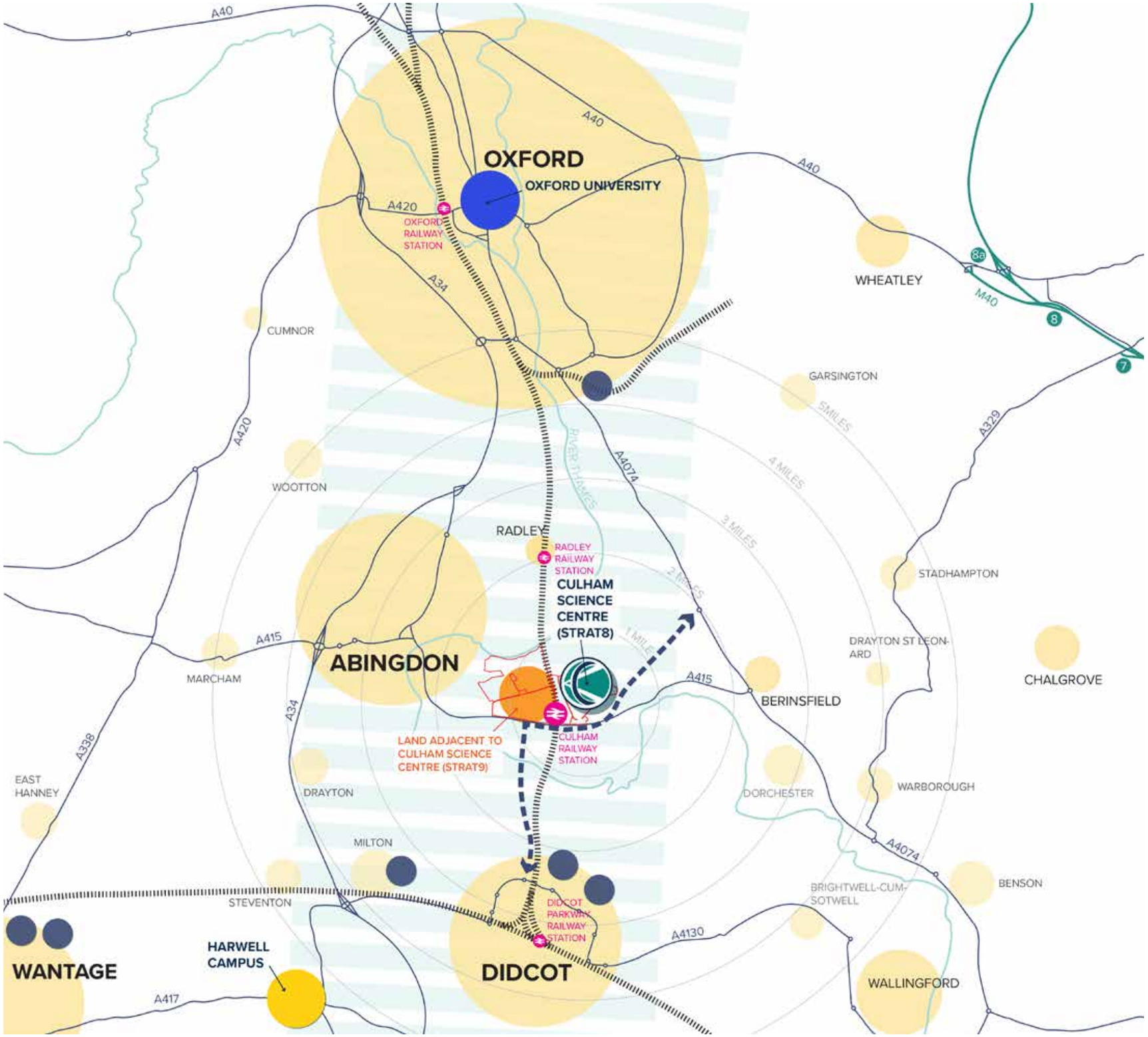
- to help deliver its **purpose** in advancing the realisation of fusion energy through hosting a world leading cluster of fusion technology;
- to create an attractive an interactive place that attracts and retains the **people** with the talent needed to deliver the purpose;
- to develop the campus as an effective sustainable environment through comprehensive **place-making.**

And, in doing so, the UKAEA wishes to address wider societal challenges as far as possible by also pursuing:

- coherence with the government's innovation/industrial strategy at national and local level;
- low-carbon emissions and resource efficiency through a clean growth strategy;
- modern mobility strategies to improve sustainability in home-to-work and business-related transport.

2.3. Masterplan Components

To help meet the objectives above, this Masterplan seeks to integrate a spatial strategy for the campus with strategies for key infrastructure and placemaking objectives. The spatial strategy is derived to a significant extent from the local context and local constraints. The infrastructure strategies are similarly influenced and constrained by the existing developed nature of the site and its operations. Placemaking will be a particularly important consideration in evolving an environment much of which was built 50-60 years ago and the use of which has changed significantly. These elements, which will help shape the campus for the future are described in more detail in Section 4 and 5 below.



LEGEND

- Culham Science Centre (STRAT 8)
- Land adjacent to Culham Science Centre (STRAT 9)
- Main Settlements
- Harwell Campus
- Oxford University
- Oxfordshire Knowledge Spine / Innovation Corridor
- Oxfordshire's critical economic sectors, assets and growth opportunities within the innovation ecosystem as set out by OXLEP including:
  - *Culham*
  - *Motorsport Valley key sectors*
  - *Oxford Science Park*
  - *Milton Park / Didcot Garden Town*
  - *Williams Innovation & Technology Campus*
  - *Living Labs Testbeds*
- Railway lines and key stations
- Motorway
- Major Road
- Clifton Hampden Bypass and Thames Crossing now under development

SECTION 3
CONTEXT

3.1. Background

Culham Science Centre's origins lay in its former use as a naval airfield. In 1959, the UKAEA began to look for a site for a new laboratory for plasma physics and nuclear fusion research. The site needed to be within easy reach of the UKAEA's existing facilities at Harwell and Aldermaston and in close proximity to Oxford University. The old naval airfield at Culham came nearest to meeting those requirements and on 29 January 1960, the UKAEA secured planning permission from Oxfordshire County Council (OCC) for the development of the site as a research establishment with access.

The laboratory, which covers circa 80 hectares, was conceived, planned and built as a whole, and today large parts remain largely as they were when construction was completed in the mid 1960's. The original complex of buildings extended to approximately 59,000 square metres.

The UKAEA's campus at Culham now forms a key part of Science Vale and the Oxfordshire Knowledge Spine and is one of the largest employment centres in the county (covering approximately 80 hectares).

Employment levels, which have been stable and in excess of 2,000 for many years, are now rising with a growing community of commercial science and technology enterprises and the significant investment in the UKAEA's programmes and facilities.

3.2. Existing Operations & Planning Context

In addition to the laboratory buildings constructed in the 1960s, other existing buildings and infrastructure within the campus include:

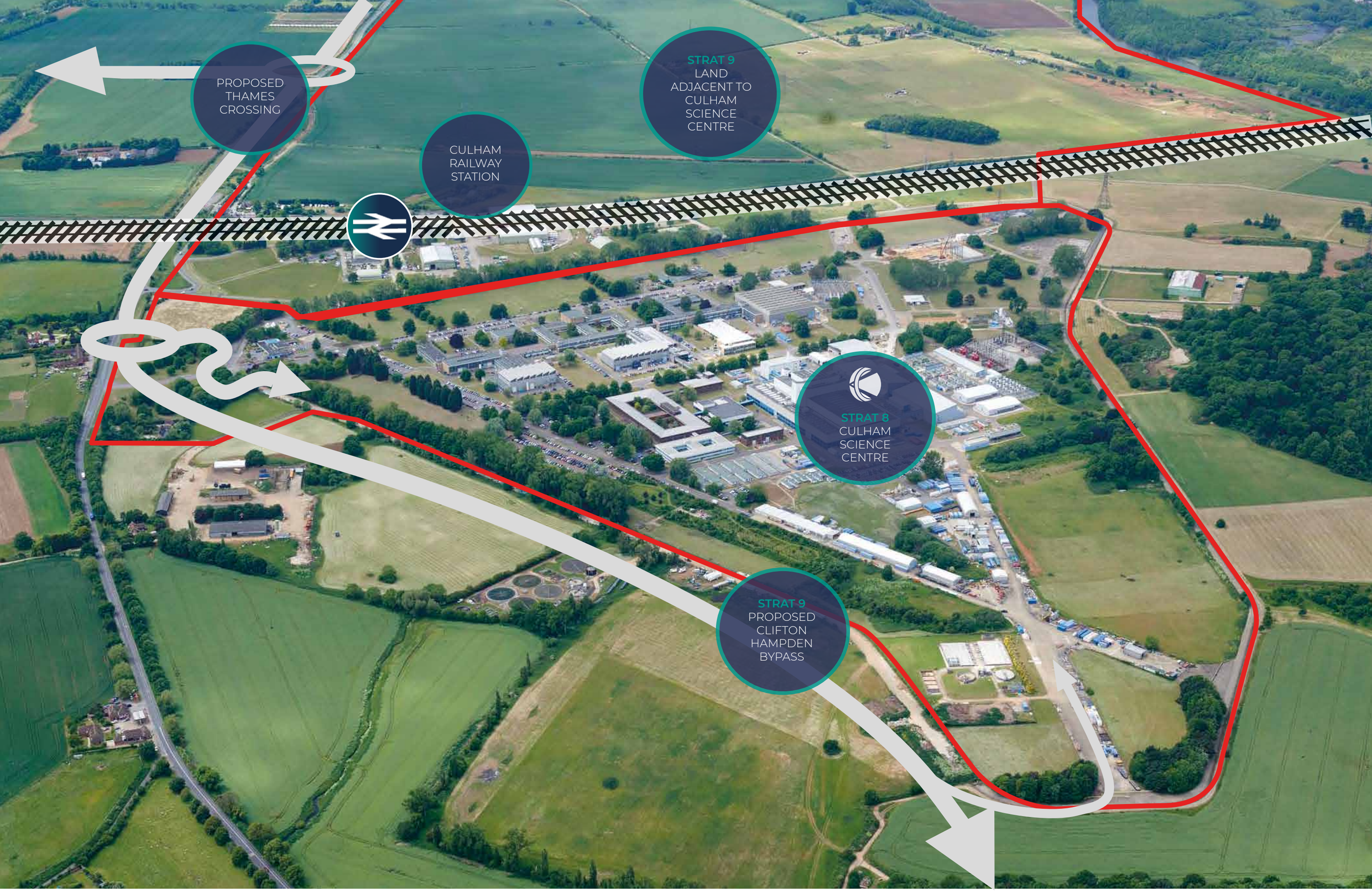
- Joint European Torus (JET): the eastern part of the Culham Science Centre (CSC) is occupied by buildings and infrastructure connected with the JET project. This project was conceived as the largest project in the co-ordinated fusion programme of the European Atomic Energy Community. The programme's long-term objective is the creation of safe, environmentally sound, prototype fusion reactors. The JET buildings extend to approximately 37,000 square metres;

- Remote Applications in Challenging Environments (RACE): the north western part of CSC is occupied by buildings associated with the RACE project. This includes state of the art testing facilities, remote handling equipment and expertise to design, implement and operate complete robotic and autonomous solutions;

- Materials Research Facility (MRF): centrally located within CSC, the MRF building accommodates research into material properties in support of fission and fusion research. It is part of the National Nuclear User Facility (NNUF) initiative;

- Oxfordshire Advanced Skills (OAS): located on the western flank of CSC, the OAS training facility delivers over 100 advanced engineering apprenticeships a year for the UKAEA. The facility includes classrooms, workshops and equipment to support training in a range of engineering and technology disciplines;

- National Fusion Technology Platform (NFTP): planning permission was granted in July 2020 for a new NFTP Energy Centre which will accommodate further research related to fusion technology and will play a crucial role in delivering fusion for decades to come. Construction is underway.


PROPOSED THAMES CROSSING
CULHAM RAILWAY STATION
STRAT 9
LAND ADJACENT TO CULHAM SCIENCE CENTRE
STRAT 8
CULHAM SCIENCE CENTRE
STRAT 9
PROPOSED CLIFTON HAMPDEN BYPASS

3.3. Future Development Aspirations & Planning Context

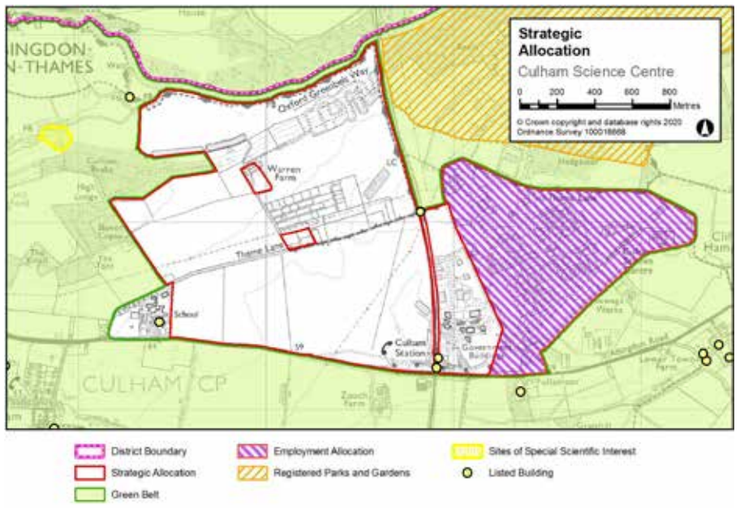
The UKAEA has a clear strategy to develop the campus as a leading global centre for fusion technology and the realisation of fusion energy. Already an internationally recognised centre for fusion research and development, and home to a community of related businesses, a major programme of development and investment is now underway at the campus. This forms the centrepiece of the UK's ambitions to deliver sustainable fusion energy and maximise scientific and economic impact with a clear and direct potential to shape the achievement of net carbon zero by 2050.

Over the period to 2025 and beyond , the Government is investing in the UKAEA to deliver a wide range of programmes at the campus. These programmes require new infrastructure and facilities, building on what has already been developed. Some notable examples due to be complete and in operation by 2025 include:

- a major extension to the RACE facility - itself only 4 years old - reflecting the success in restructuring and refocusing the UKAEA's robotics expertise;
- a major new Rig Hall and Office building to accommodate the conceptual design and experimental testing associated with a prototype fusion power station as part of the Spherical Tokamak for Energy Production (STEP) Programme;
- a major extension to the successful OAS facility to expand its capacity and research and teaching space to increase the number of apprenticeship opportunities.

The recently adopted South Oxfordshire Local Plan provides in-principle planning policy support for the intensification of CSC, in line with the UKAEA's aspirations to develop the campus as a leading global centre for the development and realisation of fusion energy.

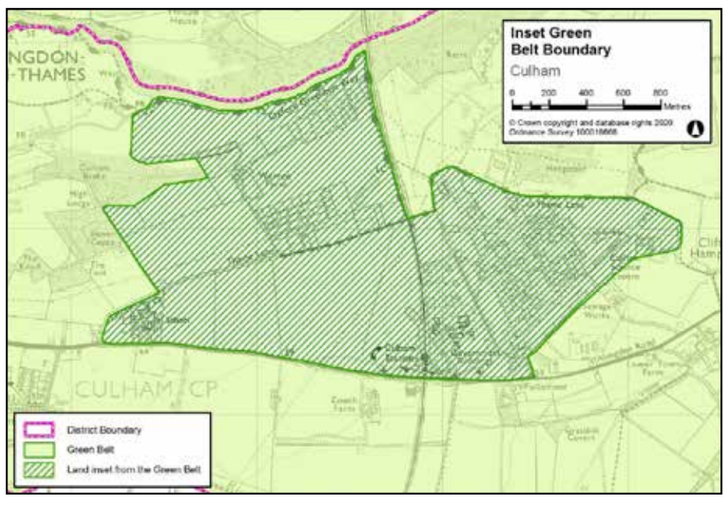
The site is defined as a Strategic Allocation in the Adopted Local Plan, identified by the reference STRAT 8 (see below left) and is now fully 'inset' from the Green Belt (see below right).



The new Local Plan does establish some challenges to development at CSC. For example, Policy STRAT8 requires all development at CSC to "seek to achieve" a net gain in biodiversity and requires that where there is a loss, for this to be offset through a recognised offsetting scheme. Given the scale of the new buildings proposed at CSC, many of which are proposed on areas of existing grassland, it is inevitable that there will be some loss in biodiversity as a result, which in turn will require on or off-site mitigation. On site mitigation presents challenges for future masterplanning in that any campus set aside for that use will have to be kept free from built development for a minimum of 30 years period.

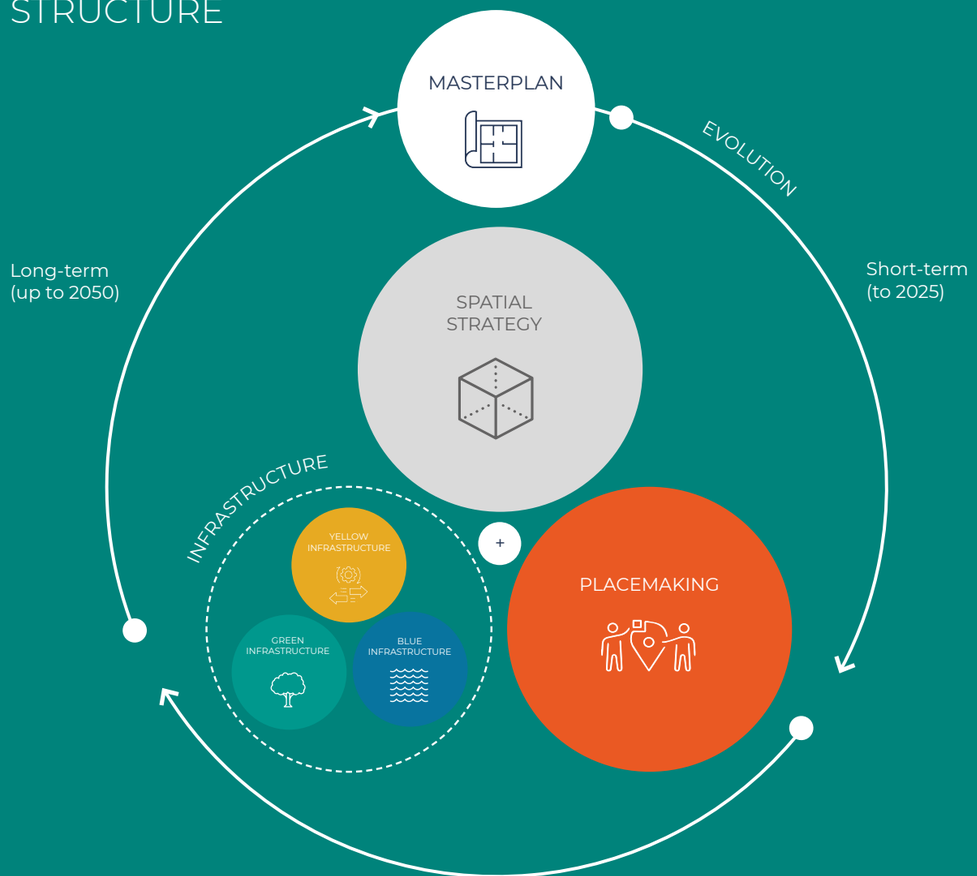
Policy STRAT8 also requires new development to deliver low carbon development and renewable energy. The UKAEA aspires to meet this goal across the campus. Policy DES10 is also relevant in this regard and requires a 40% carbon reduction as part of each individual development over 1000m^2, including meeting BREEAM Excellent standard. This could be challenging in so far as some types of development at CSC are concerned. For example, the likely height of new Rig Hall type buildings for testing means that daylight and heat requirements cannot be met to achieve BREEAM Excellent. Similarly, the structure and scale of some new buildings could well mean that measures such as green roofs are not feasible. Planning applications are determined in accordance with the Development Plan unless material considerations indicate otherwise. One such "material consideration" is where development is required in the national interest or nationally or internationally significant. It is quite possible therefore that there will be instances where the Local Planning Authority will be asked to exercise its judgment and to weigh in the balance its policy aspirations for low carbon sustainable development against broader industrial strategy/economic benefits for 'UK PLC'.

In addition, STRAT 8 requires development at CSC, in combination with STRAT9 (the adjacent Culham Science Village), to provide a net increase in employment land of 7.3 hectares.



SECTION 4
MASTERPLAN

MASTERPLAN STRUCTURE



4.1. Introduction

The Masterplan seeks to ensure that the campus develops in a coherent way and can accommodate growth to a functionally and aesthetically acceptable capacity consistent with on and off site considerations and constraints. It identifies where buildings can and should be developed and the general form and massing of development, including integration within the campus. However, it is not about the design of buildings. Buildings will need to be designed to address functional and occupational needs as they arise, taking into account good/best practice in design, technology and sustainability available at the time. A long term view of the campus's evolution needs to be maintained to promote policy support, inform the immediate and short-term development of the campus and its infrastructure and to identify investment requirements.

Accordingly, the Masterplan focuses on spatial utilisation, infrastructure and the creation of an effective and attractive working environment. In each case, the Masterplan aims to set out trajectories for each of these components which both encourage and help deliver policy and sustainability ambitions.

The Spatial Strategy, Infrastructure and Placemaking elements address change and growth over time, relate to the key influences identified above and form the overall Masterplan. These elements act to shape the overall campus's evolving arrangement and function in a spatial way, as described below.

The Spatial Strategy (see section 4.2) responds directly to the campus's existing features and constraints and its external planning, landscape, movement and historic influences.

Infrastructure is considered in three components at section 4.3, each having distinct functions and characteristics and each contributing to enabling the successful development of the campus. The following types of infrastructure are considered to be essential to the spatial planning of the campus's growth, and are supported separately by detailed strategies.

The following pages summarise these specific infrastructure strategies, with a separate schedule and plan per infrastructure type to explain how each respective infrastructure will evolve to enable and shape campus development and performance (diagrams, text, schedules and plans should be read as a whole).

- Yellow Infrastructure (how staff, visitors and construction teams access the campus, how vehicles are managed, how walking and cycle is enabled and how modal shift takes place over time to ensure operations remain effective, but to change movement patterns towards public and self-propelled vehicular modes).

- Green Infrastructure (landscape and open space).

- Blue Infrastructure (managing water and drainage).

Placemaking

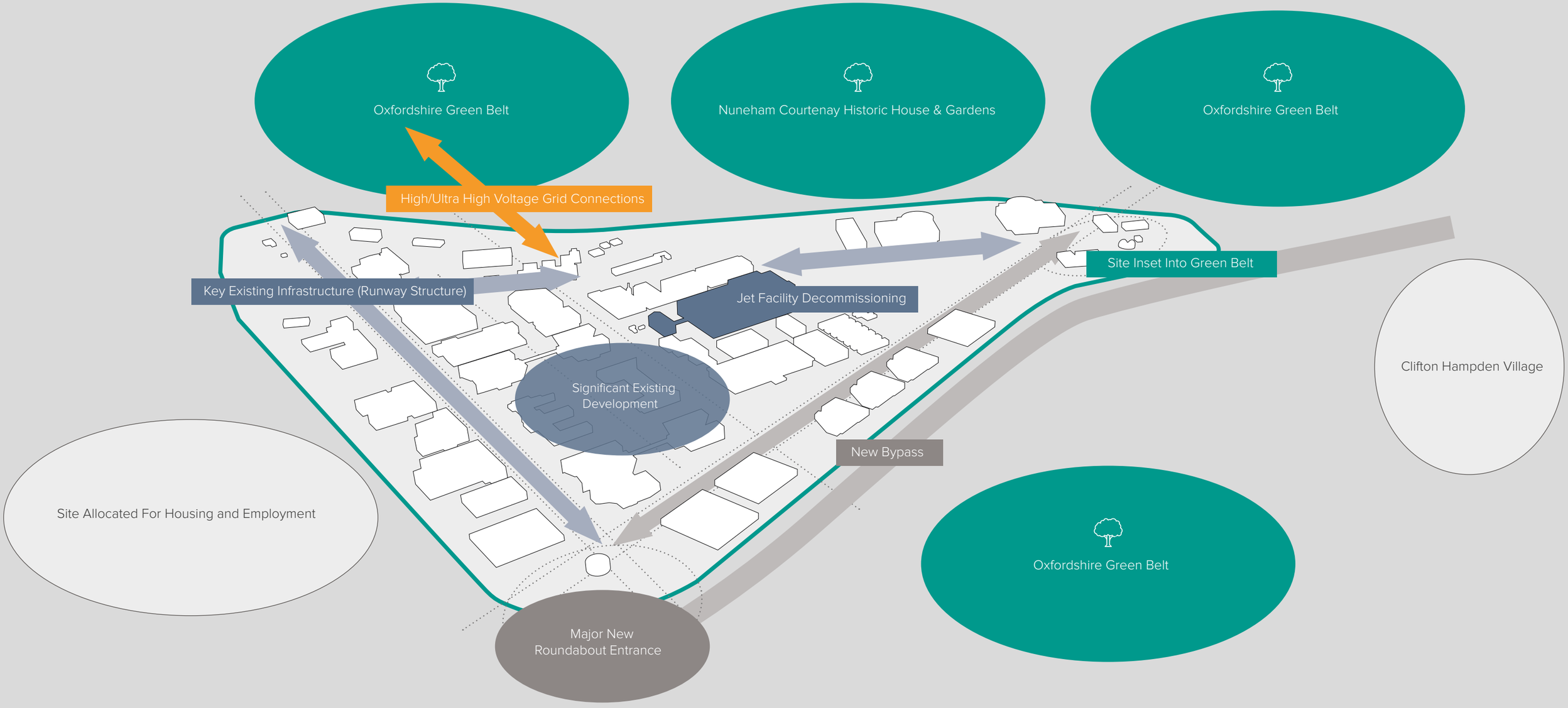
The third element relates to Place, specifically how a legible, attractive, world class campus can be created through a series of Spatial Foci, woven together by a Green Grid to maximise how people interact on campus, whilst also enhancing health and wellbeing. We set out below at section 4.4 a plan, images, 3D visualisations and key design principles for each of these Spatial Foci or Green Grid elements.

Evolution

Finally, how these elements evolve and interact are considered in relation to time. How the campus performs at present, how it will change over the short-term (to 2025), how this changes over the mid-term (between 2025 and 2035), and how this continues into the long term (2035-2050). Importantly, the level of prescriptions reduces into the future to allow technological innovation to shape and evolve the Spatial Plan. The schedules referred to above that chart the intended evolution of the campus's infrastructure during these stages, whilst section 5 pulls the Spatial Plan elements together and illustrates the key changes during each period.

4.2. Spatial Strategy

The spatial strategy for the campus is guided by a range of extrinsic and intrinsic factors and constraints. In the former category, the policy context begins at national level (e.g. with the National Planning Policy Framework) which cascades down to local level – see Context at Section 3 above. This context also includes national and local industrial/economic strategy, transport, investment and growth plans. In the latter category, the campus is already heavily developed having evolved from a naval air station constructed in a sensitive location within southern Oxfordshire. Accordingly, the geology, geography and topology of the campus and its immediate environs and the extensive existing infrastructure and development (and the way in which it works), as well as the policy environment, strongly influence how the campus can and should develop.

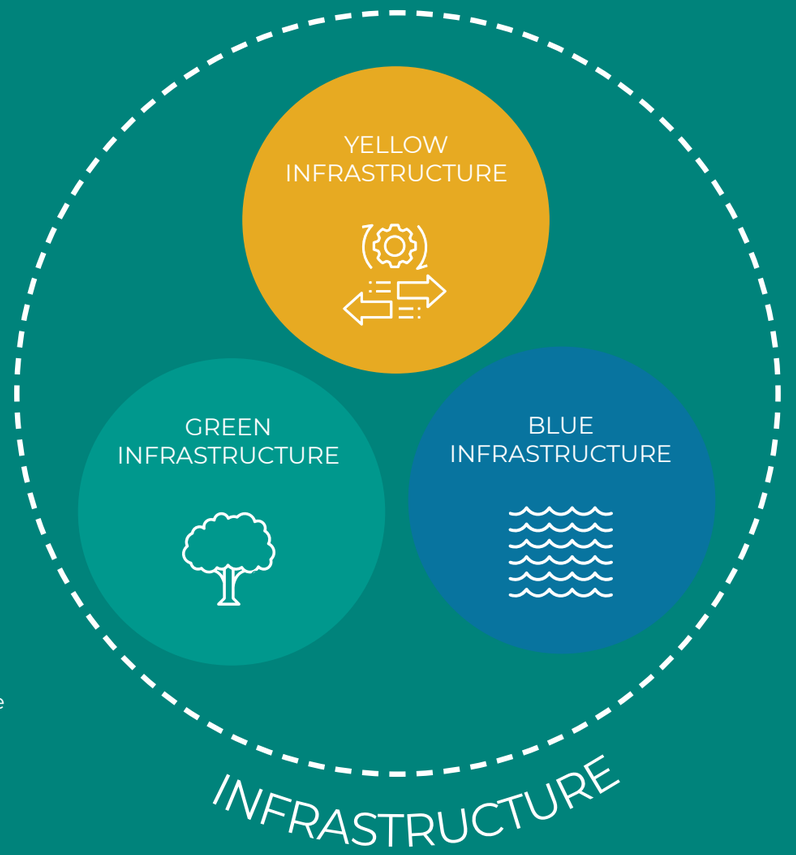


4.3. Infrastructure

Infrastructure is considered in three ways as set out below:

Yellow Infrastructure

That infrastructure and those design features that enable staff, visitors and contractors to access the campus, vehicles to move around the campus, enable walking and cycle is enabled, encourage and adapt to modal shift over time.



Green Infrastructure

That infrastructure and those design features that provide structural landscaping, effective and attractive green and open spaces and improve biodiversity.

Blue Infrastructure

That infrastructure and those design features that optimise the use of land by adapting drainage solutions, promote sustainable drainage and maximise ecological value.

4.3.1 Yellow Infrastructure

The principle role of the Yellow Infrastructure is to:

- enable and maintain accessibility to all areas of the campus for all valid movements of employees, visitors and contractors, and for maintenance, deliveries and emergencies (and for all valid modes of movement/ transport);
- encourage and accommodate modal shift to more sustainable transport modes (on- and off- campus) within an enhanced environment;
- reduce the negative impacts of movement and increase its positive impacts.

The principles and strategies relating to this role is set out below and on the following schedules and plans.

Principles for the Yellow Infrastructure

The following key design principles have been agreed to guide the movement, access and car parking strategy and, thus, guide the Masterplan for the campus:

1. the movement network should be designed to meet the needs of all users by embodying the principles of inclusive design, e.g. it places people at the heart of the design process, it provides for flexibility in use, and provides an environment that is convenient and enjoyable to use for everyone;
2. pedestrians will require safe and, as far as possible, attractive access as close to reasonable desire lines as possible between the main gate, campus entrances, buildings, car parks and amenities;
3. cyclists will require safe and, as far as possible, attractive access as close to reasonable desire lines as possible between the main gate, campus entrances, buildings and amenities;
4. vehicle access will be needed to all buildings for disabled parking (where applicable), drop-off, emergency, delivery and maintenance/works purposes as a minimum;
5. access to the campus will predominantly be via Main Gate, with secondary accesses from Perimeter Road and the new bypass. Additional pedestrian access gates should also be considered along desire lines;
6. as far as reasonably possible, employee car parking should be positioned close to the boundary of the campus but away from buildings and facilities;
7. employee vehicle movements should be minimised within the campus;
8. disabled parking should be reasonably close to (and preferably within 50m of) the facilities they serve, with level or ramped access (preferred gradient 5%), and under cover if possible;
9. where possible car parking should be concentrated in manageable ‘hubs’ on campus or in facilities which can be re-purposed if and when parking requirements decline;
10. charging points are to be provided as required in line with the changing technology of vehicles;
11. design should take account of security requirements;
12. visitor car parking will be provided by a combination of local, clustered and centralised facilities appropriate to need;
13. construction traffic should be routed, as far as possible, to avoid/minimise conflict with other road users.

Strategy for the Yellow Infrastructure
Consistent with the above principles, Yellow Infrastructure component strategies are as follows:

Campus Access Strategy
It is prudent to continue to use existing infrastructure where possible in order to avoid any prohibitive costs of new construction (e.g. associated with diversion or protection of services, drainage issues, high construction costs etc.). The Main Gate will continue to be the primary access point for the campus, together with a secondary access point off Perimeter Road. A proposed new eastern exit to the new Clifton Hampden bypass will be established to allow effective internal traffic management.

Employees will park in the parking hubs close to the campus entrances, and will then walk or use alternative sustainable transport to access their place of work. On-campus facilities for walking, cycling and other sustainable modes will be improved in order to facilitate and encourage the use of sustainable travel.

Cyclists and pedestrians will use Main Gate in the short term, with additional entrances being provided at secondary access points as they come on-line, and a potential further pedestrian/cycle entrance being provided at a future date on the western flank of the campus.

Visitors will access campus via Main Gate, from where they will either park in one of the parking hubs or travel direct to the appropriate building.

Construction traffic will generally enter and exit the campus via one of the secondary entrances.

Campus Movement Strategy
The overarching objective of this strategy is to restrict private vehicle movements to accessing the parking hubs, with vehicular use beyond this point being largely reduced to service functions and during abnormal events (at reduced speeds of 10-20mph). This strategy will directly promote modal shift through placing walking, cycling and e-modes central to the movement routes in an enhanced, positive environment. These activities will often take place in shared surfaces, that encourage sustainable movement alongside social interaction, maximising the positive role of movement in the character and use of routes.

Vehicle Strategies
Car Parking Strategy
Car parking hubs will be located close to the campus access points, so that employees arriving in vehicles will park as soon as possible after entering campus and will not need to drive within the campus. Employees will then need to walk, or use other sustainable travel modes, for the leg of their journey between the parking hubs and their place of work.

The main bulk of parking will be developed close to the Main Gate/ Entrance Area, with further potential hubs being located close to the secondary access off the new bypass. The demand for parking will reduce with an increased use of sustainable modes of travel and parking hubs can be re-purposed in time for other uses. In the short term however, the increase in campus population may outstrip the reducing percentage of vehicle drivers, and hence parking demand may well increase during this period.

The car parking strategy, and the aim to reduce vehicle movements within the campus, applies irrespective of the type of fuel used for individual vehicles, which is acknowledged will change during the period of the vision.

Internal Distribution and Route Hierarchy
Main Avenue and Farm Way will be maintained as primary routes, as these will be the most regularly used routes

A network of secondary and tertiary routes will spread out from these primary routes, in order to provide access to all buildings and plots for disabled, service, delivery, emergency and some visitors in an efficient and cost-effective manner. Primary and secondary routes may nevertheless be provided by low speed, mixed use transport infrastructure

Walking and Cycling Strategies
Pedestrian and cycle priority routes will be promoted, not only linking the car parking hubs with destinations, but also to create a permeable movement network across the campus using the primary and secondary ‘Green Grid’. These are proposed to be rolled out in line with the aspirations shown under Placemaking, where sections of previous carriageway will be upgraded into people friendly, shared surface spaces, and speed limits could be reduced to say 10 or 20mph in these areas.

Strategy for Construction Traffic
Construction traffic will generally avoid the Main Gate (primary) access, and will instead use the secondary access points off Perimeter Road. This will help minimise any on-campus disruption due to construction traffic.

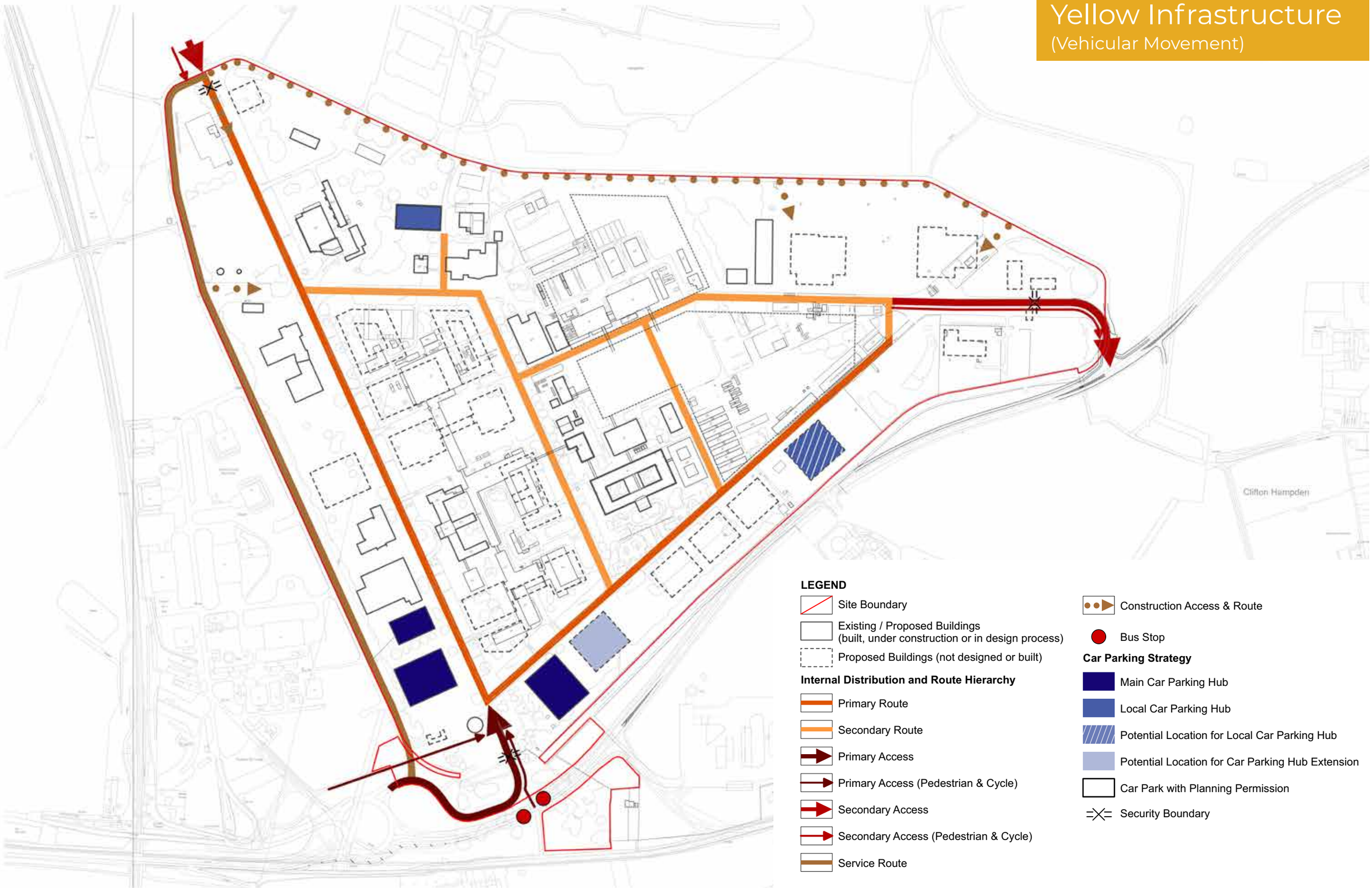
YELLOW INFRASTRUCTURE

DEVELOPMENT SUB-STRATEGIES, AIMS & OBJECTIVES

Site Level	Now	Short-term (to 2025)	Mid-term (to 2035)	Long-term (up to 2050)
On Site				
Pedestrian	All pedestrians enter via Main Gate; Pedestrian routes almost all along roads with conventional crossing features and access paths to building entrances; Key 'through-building routes' due to original linked-building complex design.	Enhanced pedestrian routes enabling direct, safe, pleasant and legible routes between buildings, and in particular to / from key destinations - sports, facilities, entrance and parking hubs.	Further enhancement in line with the movement strategy. Establish additional pedestrian routes within the heart of the redeveloped campus to improve permeability and add accesses to the west and southeast of the campus.	Further enhancement in line with the movement strategy, along the remainder of the desire lines within the campus, and improved amenity provision.
Cycle	Some dedicated provision over entrance area but no dedicated routes on campus; cycle storage facilities near most buildings; etc.	All building projects deliver policy requirements re. cycle storage and ancillary facilities (showers..etc.). Enhanced cycle routes.	Further enhancement in line with the movement strategy. Establish additional cycle access points to the west and southeast of the campus.	Further enhancement in line with the movement strategy, along the remainder of the desire lines within the campus, with potential for cycle hubs to improve facilities for cyclists. Adaption for technology advances.
e-Mode	No dedicated provision for personal transport innovations (e-scooters).	E scooters / other mobility solutions to share enhanced cycle routes, subject to policy evolution.	Further enhancement in line with emerging technology.	Further enhancement in line with emerging technology.
Vehicle (employee, work-related, deliveries, emergency)	Internal road distribution and access network analogous to conventional urban environment with general largely unfettered access; no significant segregation or zoning.	Retain zoned approach to deliveries and emergency routes. Facilitate parking hubs at key locations (see private vehicle below).	Retain zoned approach to deliveries and emergency routes. Facilitate parking hubs at key locations (see private vehicle below).	Retain zoned approach to deliveries and emergency routes. Repurpose parking hubs as modal shift increases (see private vehicle below).

NB. Please also refer to the Placemaking Strategy at section 4.4 / page 27. The ambition to enhance pedestrian, cycle and e-mode travel, whilst accommodating and enabling vehicular access has a direct relationship to enhanced Placemaking, in particular 'humanising' streets for people, accommodating vehicles but not being dominated by them.

Yellow Infrastructure
(Vehicular Movement)



LEGEND

- Site Boundary
- Existing / Proposed Buildings (built, under construction or in design process)
- Proposed Buildings (not designed or built)

Internal Distribution and Route Hierarchy

- Primary Route
- Secondary Route
- Primary Access
- Primary Access (Pedestrian & Cycle)
- Secondary Access
- Secondary Access (Pedestrian & Cycle)
- Service Route
- Construction Access & Route
- Bus Stop

Car Parking Strategy

- Main Car Parking Hub
- Local Car Parking Hub
- Potential Location for Local Car Parking Hub
- Potential Location for Car Parking Hub Extension
- Car Park with Planning Permission
- Security Boundary

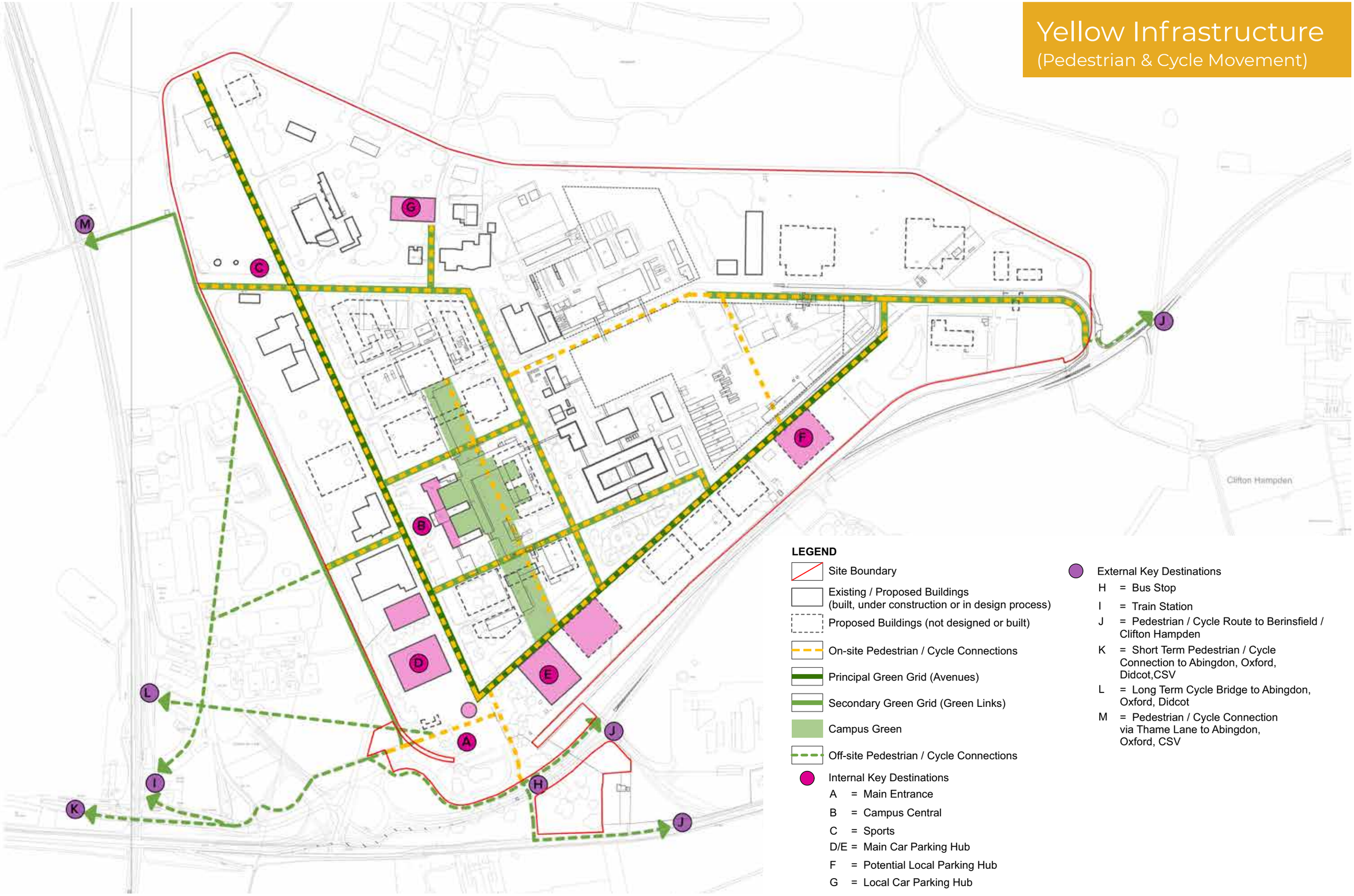
YELLOW INFRASTRUCTURE

DEVELOPMENT SUB-STRATEGIES, AIMS & OBJECTIVES

Site Level	Now	Short-term (to 2025)	Mid-term (to 2035)	Long-term (up to 2050)
Off Site				
Active Travel - Pedestrian	Only significant pedestrian arrivals are from Culham Station; Footpath access from Abingdon, Culham Village and Clifton Hampden.	Improve/increase access to main entrance/ western perimeter from Culham Station and adjacent settlement.	Further pedestrian access at west of campus, linking to CSV/train station and providing route between CSC and Abingdon/Oxford via new bridge over River Thames. 2.5% target for walking.	5% target for walking.
Active Travel - Cycle and Other	Key routes mainly between CSC and Abingdon / Oxford / Didcot. 7.8% current modal split.	10% target. Links to Abingdon / Didcot / Berinsfield and Oxford established (the latter via Abingdon not via Thames bridge) by OCC	12.5% target. Additional link to Abingdon / Oxford established via a new Thames bridge.	15% target for cycling.
Shared Travel - Bus	Key routes mainly between CSC and Abingdon / Didcot. 1.2% current modal split.	Expand bus services and increase frequencies between CSC and Abingdon / Didcot / Berinsfield / southern Oxford. 7.5% target.	Further enhancements to service frequencies and destinations. 15-20% target.	25% target for bus/mass transit.
Shared Travel - Train	Key routes mainly between CSC (Culham Station) and Oxford / Didcot. 10.4% current modal split.	Possible AV link/loop to train station. New more direct path to train station. 12.5% target.	Further enhancements to service frequencies. 15% target.	20% target for train.
Private Vehicle	79% existing modal split in vehicles, including 7.8% vehicles share. Approx 50% of staff live within 10 miles of the campus. Circa 1500 parking spaces at CSC.	First phase of peripheral / flexible deck car parks provided. Target 60% private vehicle drivers + 10% vehicle share (70% total in vehicles). Parking demand = 2,700 spaces.	The forecasts for future modal shift are incredibly varied, as the evolving societal and technological changes which may arise to 2035 and beyond are too difficult to predict at this stage. The use of private vehicles however could fall to within a range of between 35% and 50% reducing the parking demand to 1750 to 2500 spaces (based on 5000 staff).	Similar difficulties with predictions to 2050, however, drivers of private vehicles could further reduce based on increased use of sustainable travel above (also including vehicles sharing) and future hybrid working patterns, to a range of between 25% and 45%. This would reduce parking demand to 1250 to 2250 spaces (based on 5000 staff). An increase in the proportion of vehicles using green energy in the future may prolong significant private vehicle use with the attendant level of parking provision continuing to be required.

NB. Please also refer to the Placemaking Strategy at section 4.4 / page 27. The ambition to enhance pedestrian, cycle and e-mode travel, whilst accommodating and enabling vehicular access has a direct relationship to enhanced Placemaking, in particular ‘humanising’ streets for people, accommodating vehicles but not being dominated by them.

Yellow Infrastructure
(Pedestrian & Cycle Movement)



LEGEND

- Site Boundary
- Existing / Proposed Buildings (built, under construction or in design process)
- Proposed Buildings (not designed or built)
- On-site Pedestrian / Cycle Connections
- Principal Green Grid (Avenues)
- Secondary Green Grid (Green Links)
- Campus Green
- Off-site Pedestrian / Cycle Connections
- Internal Key Destinations
  - A = Main Entrance
  - B = Campus Central
  - C = Sports
  - D/E = Main Car Parking Hub
  - F = Potential Local Parking Hub
  - G = Local Car Parking Hub
- External Key Destinations
  - H = Bus Stop
  - I = Train Station
  - J = Pedestrian / Cycle Route to Berinsfield / Clifton Hampden
  - K = Short Term Pedestrian / Cycle Connection to Abingdon, Oxford, Didcot,CSV
  - L = Long Term Cycle Bridge to Abingdon, Oxford, Didcot
  - M = Pedestrian / Cycle Connection via Thame Lane to Abingdon, Oxford, CSV

4.3.2 Green Infrastructure

The principle role of Green Infrastructure is to:

- provide structural landscaping which addresses key visual impacts externally (in/out) and internally;
- reinforce the spatial plan and create environmental amenity for users of the campus;
- provide ecological protection, mitigation or enhancement in relation to the extensive development of the campus having particular regard for biodiversity and sustainability;

The green infrastructure proposals aim to provide a resilient and robust ecological framework within which the functions of the CSC can operate. Proposals are responsive to the existing and emerging character of the campus and its setting. Furthermore, proposals seek to retain and bolster the distinctive elements of the existing green infrastructure, incorporate features which are responsive to the locality and which are ecologically appropriate.

Key components of the Green Infrastructure, each assisting in delivering the above roles in different ways, include:

- new woodland belts;
- linear tree belts;
- understory planting;
- native hedgerows;
- long grassland / meadow.

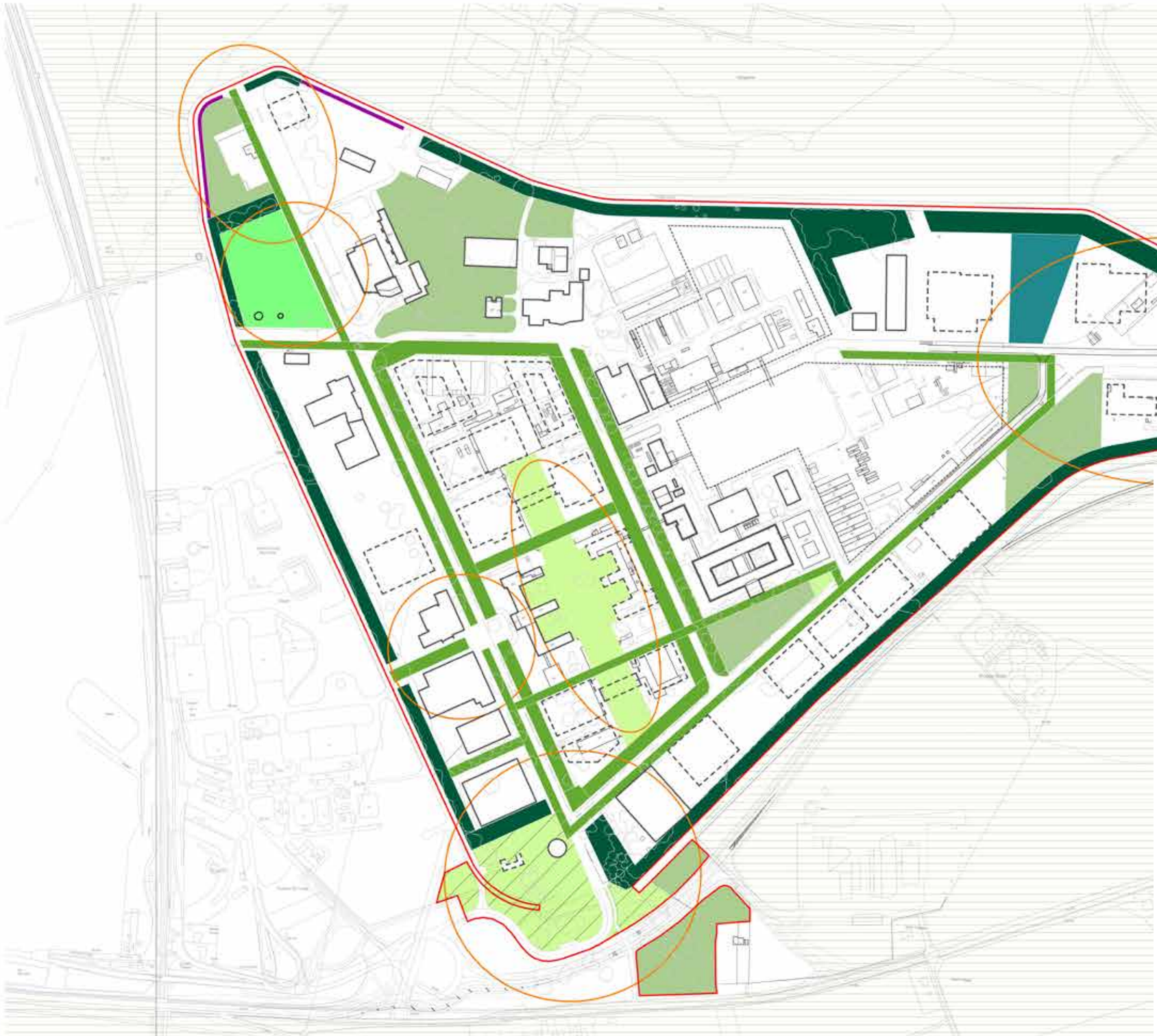
In addition to the above, locations for biodiversity mitigation are identified, and a framework is established for incorporating the green infrastructure principles into the emerging development plots, public realm locations, key spatial foci and as part of the overall wellbeing strategy for the campus.

In accordance with the strategic site allocation and SODC policies relating to landscape and ecology, the green infrastructure proposals therefore seek to:

- retain and bolster, plus extend the character of the existing vegetated edge between the campus, the adjacent countryside and Nuneham Park, to filter the views of the existing and proposed built form;
- increase tree canopy cover and vegetation throughout the campus and along the boundaries to integrate the campus into the surrounding landscape by providing a (strengthened) green foil;
- create a robust landscape structure which can accommodate future development and incorporate opportunities for positive view corridors at key gateway locations, to provide a soft landscape interface with and visual enhancements between the countryside, the adjacent strategic allocation and the campus;
- contribute towards the campus's varied biodiversity with the provision of sympathetic landscape features and habitat types which will contribute towards biodiversity.
- provide verdant connectivity across the campus, incorporating existing and proposed vegetation to strengthen habitat corridors;
- contribute towards an improved landscape character, sense of place and wellbeing, through enhancements to street scenes and key spatial foci, incorporating additional formal tree planting and creating integrated infrastructure strategies and multi-functional spaces;
- inform the structure for a Landscape and Ecology Maintenance and Management Plan. This is to be prepared, as recommended by SODC Policy ENV5, to ensure the ongoing maintenance and management of the campus.

Site Level	Now	Short-term (to 2025)	Mid-term (to 2035)	Long-term (up to 2050)
Green Infrastructure - landscape, ecology/ biodiversity, visual impact/aesthetic, well-being etc.	Existing landscape features and habitat types include: • small pockets of woodland; • linear tree belts; • areas of young woodland; • scrub vegetation; • parkland trees set within large amenity grassland areas; • ornamental trees and shrub planting within more formal courtyards between buildings, plus; • areas of long grassland. With the exception of JET, existing views of the campus are experienced from its immediate setting and local area. The campus is framed by a generous quantum of open space, which contributes to the existing visual aesthetic and sense of wellbeing.	Facilitate / promote the retention and bolstering of existing vegetation, through the provision of characteristic landscape features and habitat types that will: • contribute towards the campus' varied biodiversity and character; • provide visual mitigation. Accommodate biodiversity offsetting provision (where possible) which will counteract landscape and visual residual effects resulting from developments. The existing campus character will be retained and enhanced, with the design of key spatial foci being responsive to their setting. Improvements to wellbeing through the implementation of the positive circulation networks which cross the campus and connect the built form and key spatial foci's to more naturalistic areas.	Robust vegetated framework established with an increase in canopy cover from 2025. Vegetation provides continued visual enclosure assuming that buildings are no taller than 3 - 4 storey and that positive maturation of landscape proposals occurs from previous phase. Further biodiversity offsetting accommodated where possible, if and as required. High quality campus landscape character further enhanced through the implementation of the internal landscape and areas of amenity. Additional improvements to wellbeing through the implementation of the positive circulation networks which cross the campus and connect the built form and key spatial foci's to the more naturalistic areas.	Vegetated framework maturing and well established. Canopy cover further increased. Continued positive management and replacement planting to ensure longevity of landscape framework. Vegetation provides continued visual enclosure. High quality landscape character retained and enhanced further through the implementation of the second phase of the internal landscape and areas of amenity. Further biodiversity offsetting accommodated where possible, if and as required. Improvements to wellbeing maintained through the retention and bolstering of the positive circulation networks which cross the CSC and connect the built form and key spatial foci's to the more naturalistic areas.

Green Infrastructure



LEGEND

- Site Boundary
- Existing / Proposed Buildings (built, under construction or in design process)
- Proposed Buildings (not designed or built)
- New Local Plan Green Belt Boundary
- Structural Landscape
  Vegetation enhancing existing boundaries, consisting of a large mix of native trees and understorey. Enhancing existing vegetation with additional species in line with ecological recommendations.
- Internal Green Grid
  Linear landscape with ecological value creating connections between larger Green Infrasructure. These occur where space might be limited such as along pathways but will ultimately help to create corridors for wildlife. Landscape could be native hedgerows, ditches, tree avenues with grass maintained as meadows etc.
- Areas of Open Ecological Enhancement
  Landscape Areas where potential ecological enhancement could occur and be managed. Although some tree cover might be recommended these areas offer alternative habitat where structural landscape is not essential or in some cases even desirable.
- Mixed Infrastructure Area with the Potential to Include Culvert / Swale Realignment
- Formal Green Space
  Areas designed and managed formally with an emphasis on human activity and predominantly mown lawns for picnics and socialising etc.
- Proposed Native Hedge
- Sports Area
- Entrance / Exit Hard and Soft Landscape
- Spatial Foci

4.3.3 Blue Infrastructure

The role of blue infrastructure at the campus includes:

- identifying drainage solutions that enable the planned development through likely changes to drainage requirements;
- optimise the use of land by adapting drainage solutions where appropriate;
- promote sustainable drainage solutions as part of the wider campus changes;
- maximise the ecological value of drainage solutions, subject to the above.

Drainage Proposals – Main Strategy
As the campus already comprises a significant amount of existing development, the Masterplan should be implemented on the basis that SuDS (sustainable urban drainage systems) will be incorporated where all new developments occur, moving towards a retrofit SuDS for the existing developments of the campus.

Short Term
In the short term, the drainage of surface water runoff should be dealt with on a plot-by plot basis as new developments are brought forward. Existing recent developments on-campus have proposed to attenuate surface water within the plot where required, with a restricted discharge to the existing campus wide surface water sewer network.

This is in-line with the NPPF, and current guidance from DEFRA and CIRIA and should form the basis of any further short-term developments. In general, new developments in the short term should be seeking to attenuate within the plot at surface level where possible, with options such as ponds and basins.

Where space is constrained, sub-surface options for storage should be explored. Developments should be considering options such as permeable paving for car parks and external hardstanding in order to provide water quality benefits in addition to slowing the rainfall-runoff response time.

Medium Term
In the medium-term context of the Masterplan, new plot developments should continue to provide attenuation on-plot, though SuDS options should be given consideration for conveying flows before discharge to the existing surface water sewer network on-campus. Where possible, these new plot developments should collectively drain via surface conveyance options (e.g. swales) to shared attenuation volumes before a combined discharge out of the campus, but this should not be considered essential. In addition, opportunities for retrofitting SuDS in low-cost, low-risk locations should be considered, such as swales and rain gardens implemented within soft landscaping and, in particular, along existing highways.

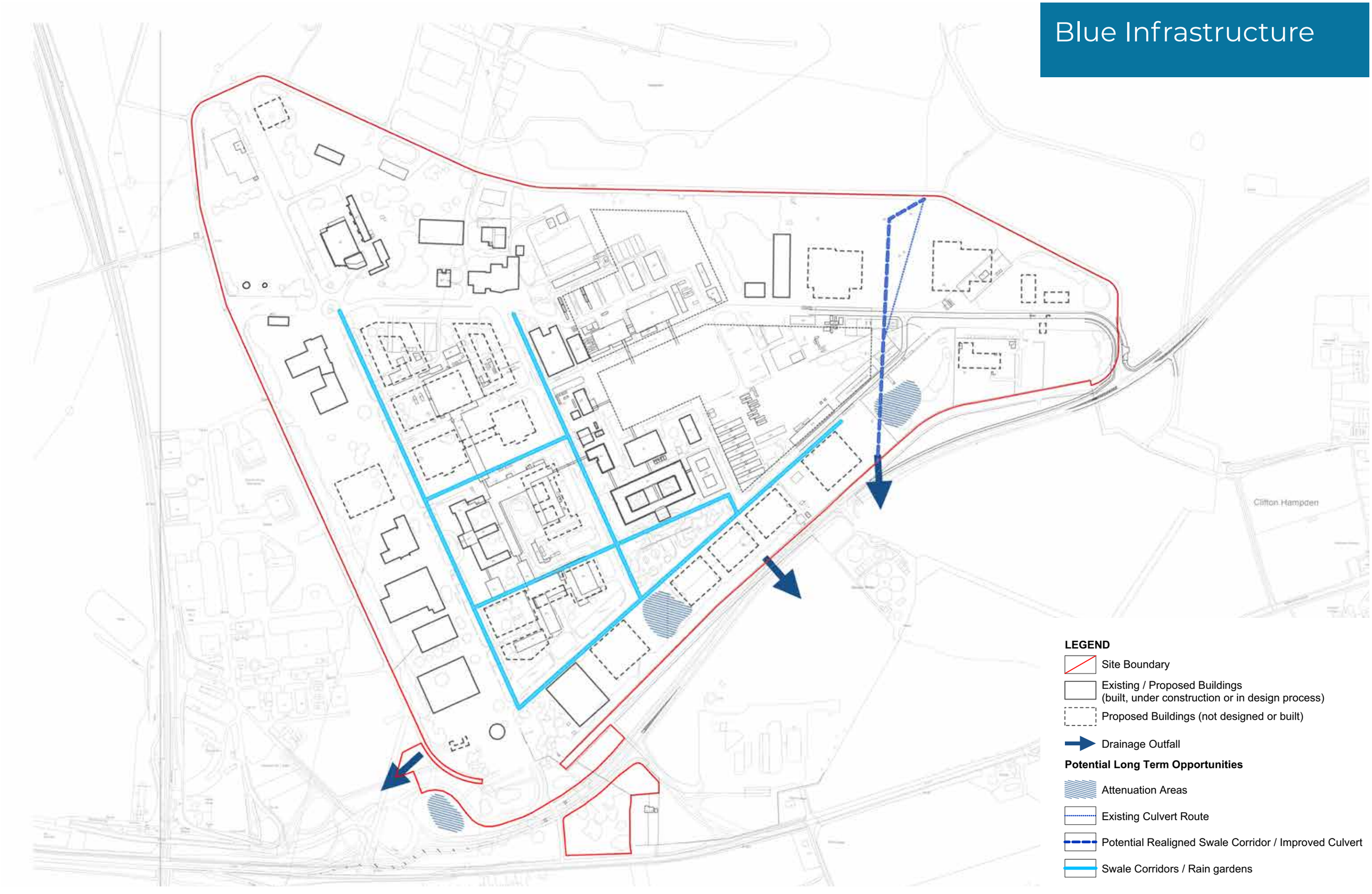
Long Term
In the long term, the retrofitting of SuDS throughout the wider campus is encouraged to provide greater amenity value, improve water quality and enhance flood resilience. This will comprise the removal of existing infrastructure and replacement with conveyance features such as swales and rills. Where new pedestrianised routes through the campus are created, these should also comprise rain gardens to collect surface water runoff from pavements. Rills can be implemented around existing buildings to be fed by downpipes, instead of taking roof drainage straight to a sewer. Water recycling options, such as the reuse of rainwater for wash basins, cisterns and for landscaping should be implemented. Where existing car parks are being retained, these should be resurfaced to comprise permeable paving.

BLUE INFRASTRUCTURE

DEVELOPMENT SUB-STRATEGIES, AIMS & OBJECTIVES

Site Level	Now	Short-term (to 2025)	Mid-term (to 2035)	Long-term (up to 2050)
Blue Infrastructure (Surface Water - run-off,rivers, aquifers, etc.)	On-plot attenuation of new developments in line with policy requirements. Discharge (no greater than existing) to continue to sewers where infiltration not possible.	More sustainable on-plot drainage. Identify easy opportunities for introducing SuDS. New plot developments to continue utilising sewer system. Offer marginal reductions in surface water runoff going beyond existing rates (e.g. new plots only).	Shared attenuation and conveyance to the sewer system via SuDS for new plots, potential integration with 'green infrastructure'. Potential contribution of 'wetland' provision. Identify easy opportunities for retrofitting SuDS to existing infrastructure. Greater reductions in surface water runoff and water quality improvements (e.g. new plots and some existing).	Wider retrofitting of SuDS to capture existing buildings and infrastructure, offering greater reductions in runoff and further water quality benefits (e.g. new plots and most existing).

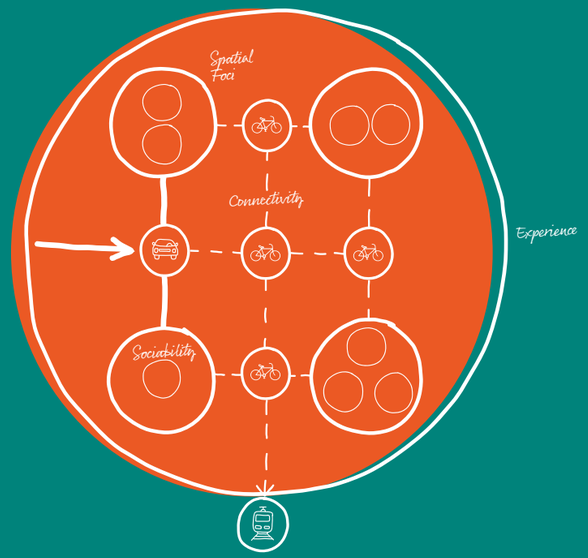
Blue Infrastructure



4.4 Placemaking

This section identifies what makes a great place in the context of the aspirations of the UKAEA for the campus to be a great place to work. It goes on to establish a Placemaking Framework with a series of key principles that underpin the Masterplan, to ensure these high level aspirations are met. Central to this Placemaking Strategy is creating conditions that allow people to thrive. To achieve this ' Spatial Foci' are created which have a more intense character, with increased activity, legibility and social interaction. This element is supported by enhanced user experience and increased connectivity all of which act to encourage sociability. These elements are focused on people, encouraging efficiency and interaction. It aims to accommodate vehicles and servicing, but for the Placemaking experience to allow such uses (and how these uses evolve), not to be dominated by them.

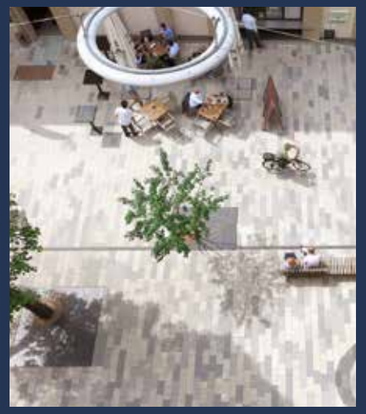
What makes a great place?



Experience

Initial perceptions of a place can go a long way to making it successful. If it is attractive, clean and makes the user feel safe, a level of comfort can be achieved which, in turn, can encourage stays to become longer and more frequent.

Surrounding natural features or local character can also be utilised to help reinforce identity and morphology.

Connectivity

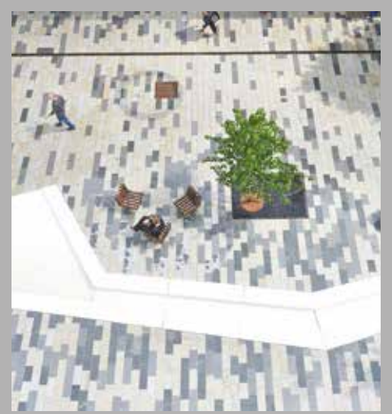
A successful place must be well connected, both internally and externally, allowing its users to go about their daily journeys efficiently and safely within a visually stimulating environment. Walking, and cycling should be encouraged with dedicated cycle lanes and ample seating along routes. Over time, vehicular routes and provisions (parking) should adapt accordingly to support ongoing sustainable travel targets.




Spatial Foci

Specific features of a place can contribute to users feeling meaningfully involved as they interact with the environment over time. This can either be the spaces in between buildings, or the buildings themselves.

These Spatial Foci, not only act as individual places of identity, but can give people a sense of pride in where they work/spend time.

Sociability

Within the Spatial Foci it is essential to create opportunities that allow people to meet, sit and interact to nurturing a social environment.

It can encourage interaction, inspire creativity and promote gender and ethnic equality.

Access to the existing and enhanced on site sports facilities also provides a highly valuable means of promoting social interaction.

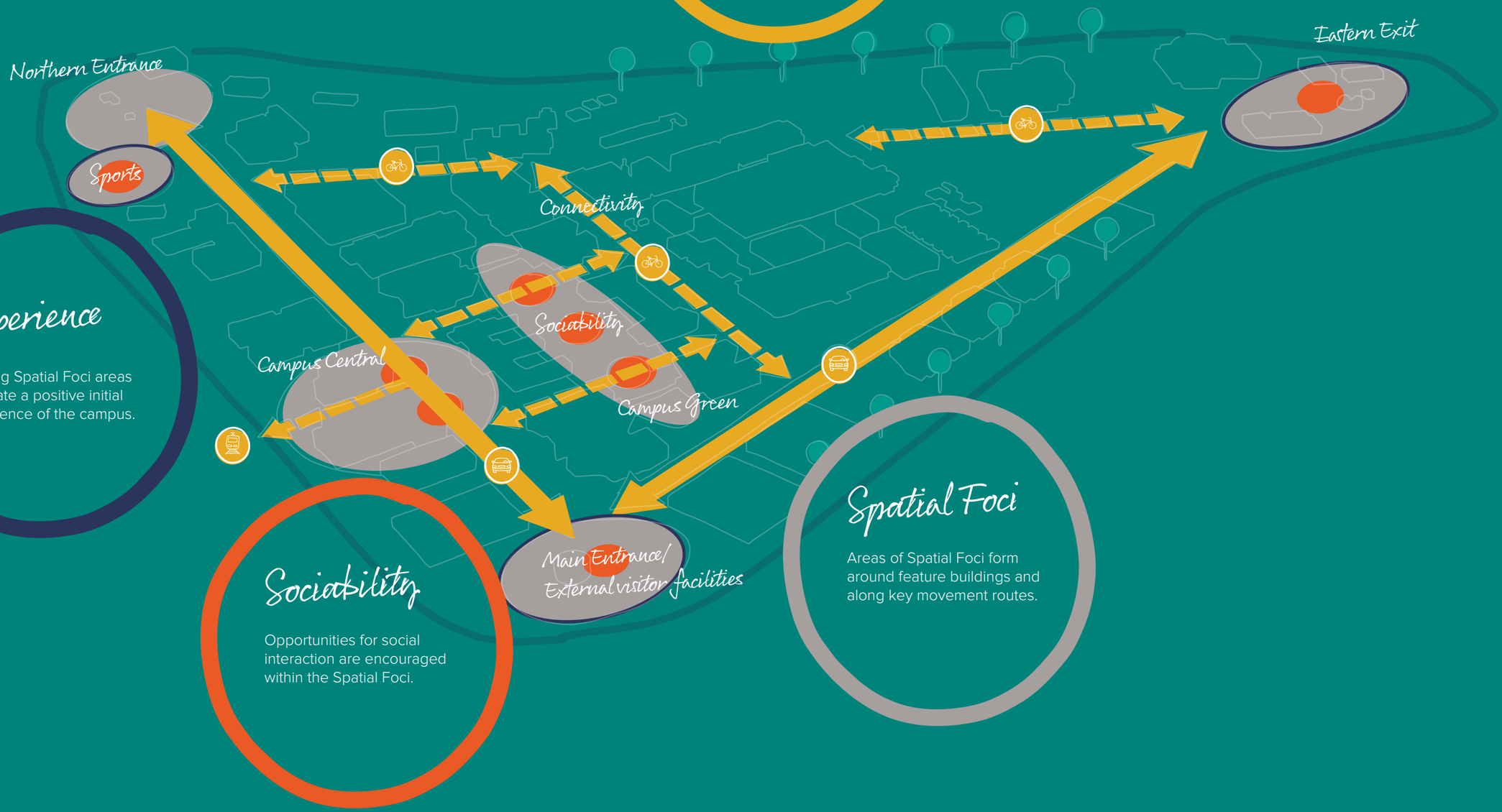




Application of Placemaking principles to create a framework for the campus

Connectivity

Sustainable movement routes are established between the Spatial Foci with vehicular traffic utilising the existing runways.



Experience

Utilising Spatial Foci areas to create a positive initial experience of the campus.

Sociability

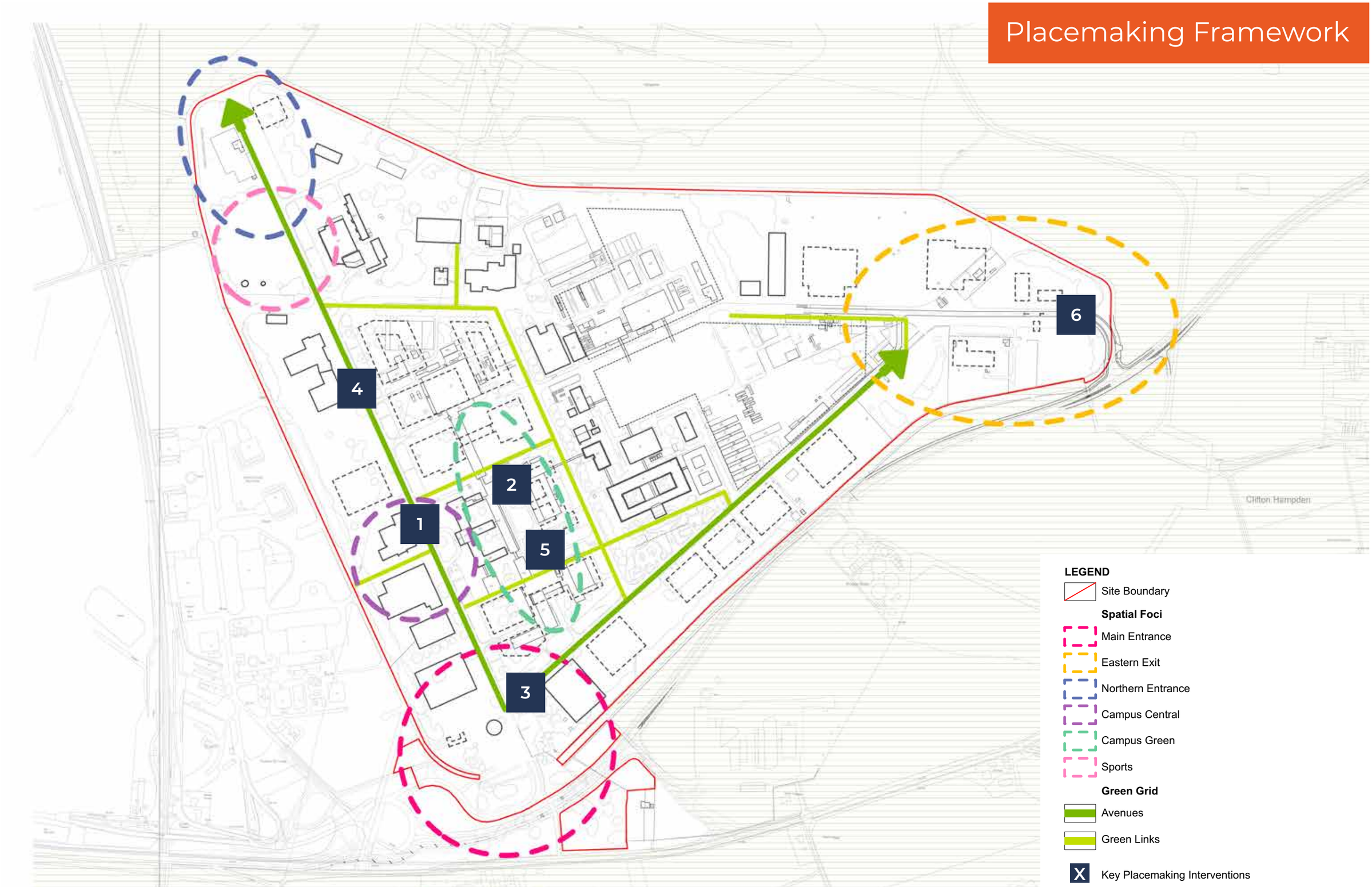
Opportunities for social interaction are encouraged within the Spatial Foci.

Spatial Foci

Areas of Spatial Foci form around feature buildings and along key movement routes.

PLACEMAKING FRAMEWORK	DEVELOPMENT SUB-STRATEGIES, AIMS & OBJECTIVES			
Spatial Foci	Now	Short-term (to 2025)	Mid-term (to 2035)	Long-term (up to 2050)
Campus Central	Vehicular focused arrival space flanked by surface car parking on both sides.	Campus Central implemented as part of the UKAEA Offices and R&D Building.	Additional connections to new buildings within Campus Green area.	Additional connections made to the development area to the north east.
Campus Green	Existing green space with occasional spillout and small social events from campus restaurant.	No anticipated change.	Whole area is developed with replacement of existing buildings to create a larger framed space that will become the Campus Green, activated with through movement and a larger Science Centre population.	Complete Green Grid across the Campus.
Main Entrance	Traditional, vehicle and security focussed entrance to 'works campus'.	New Entrance Facility focusing on establishing a distinct destination with active travel emphasis but providing for private vehicle / bus movements.	Further adaptation to reflect future access movements.	Further adaptation to reflect different access movements 95% PT or Active Travel = far fewer vehicles, more people walking / cycling.
Sports	An established Culham Sports and Social Association (CSSA) organises a wide range of events and facilities. This utilises the existing on site sports pitch,outdoor gym and new sports pavillion.	Ongoing enhanced sports and social activities and facilities on and off site as arranged by CSSA in response to employees interests.	Ongoing enhanced sports and social activities and facilities on and off site as arranged by CSSA in response to employees interests.	Ongoing enhanced sports and social activities and facilities on and off site as arranged by CSSA in response to employees interests.
Eastern Exit	No exit from the secure campus available.	Provision of a new site exit connecting to the New Clifton Hampden bypass.	Further adaptation to reflect future access movements.	Further adaptation to reflect future access movements.
Green Grid				
Avenues	Old runway structure functional for movement but dominated with vehicles, car parking and minimal ecological benefit.	Improvements within the Campus Central Area with a proposed shared surface and removal of surface car parking.	Surface parking replaced with decked car parking closer to campus entrances. Replaced with linear landscape consisting of dedicated cycle lanes, footpaths, SUDS network and avenue tree planting.	Avenues are completed alongside further development parcels.
Green Links	Pedestrian movement limited to existing avenues with illegible movement through the centre of the campus.	Future location of green Links used to determine development in this work stage.	New links created through Campus Green and Campus Central, creating a mesh of active movement through the campus.	Green Links become a vital part of the active movement around the campus and provide better connections to any future developments.

Placemaking Framework



1 CAMPUS CENTRAL

2 CAMPUS GREEN

3 MAIN ENTRANCE

4 AVENUE

5 GREEN LINKS

6 EASTERN EXIT

Composite Masterplan

LEGEND

- Site Boundary
- New Local Plan Green Belt Boundary
- Potential Land Transfer to OCC
- Existing / Proposed Buildings (built, under construction or in design process)
- Proposed Buildings (not designed or built)
- Post Jet Flexible Research and Development Zone
- Structure Planting
- Green Grid (Avenues and Green Links) / Canopy Walkway
- Internal Landscape / Amenity / Recreation
- Open Space / Potential for Biodiversity Enhancement / SUDS
- Mixed Infrastructure Area with the Potential to Include Culvert / Swale Realignment
- Places (Main Entrance / Campus Central / Campus Green / Eastern Exit)
- Potential Attenuation Areas
- Existing Culvert Route
- Potential Realigned Swale Corridor / Improved Culvert
- Potential Swale Corridors / Rain gardens
- Vehicular Access Routes

THE FUTURE OF THE CAMPUS

The UKAEA is evolving Culham Science Centre from a renowned international centre for fusion research and development into a major campus to support a globally significant fusion technology cluster comprising organisations and facilities focussed on realising fusion energy to help address the world's energy challenge.

The following pages illustrate the key placemaking interventions and the principles underpinning these.

* R&D buildings to respond to future technology programmes are indicative.

** Decked car parking hubs are shown as car parking and are not shown as being re-purposed for a different use.

Campus Central

Campus Central will be the primary location in the campus and it will reflect the image of the campus and its importance on the world stage as the UK's world leading centre for fusion technology and a key national asset. Central to this will be a large plaza that connects the existing and future UKAEA buildings, creating a vibrant public realm environment suited to working lives. People can park their bikes here, take refreshments and discuss their projects whilst looking out across the square. This space will be vibrant and active, it will be people focused, whilst allowing space for servicing and vehicular access.

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1 Shared surface plaza connecting key UKAEA buildings, creating public realm area and facilitating the movement of people, cyclists and vehicles.

2 Cycle hubs created in intersection points on the green grid.

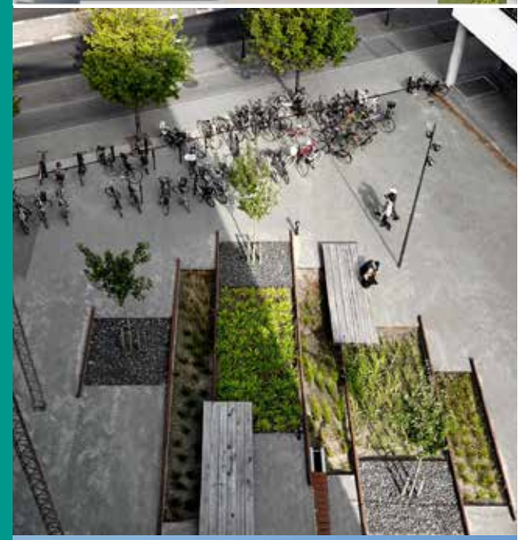
3 Focal point central to space with art/sculpture opportunity.

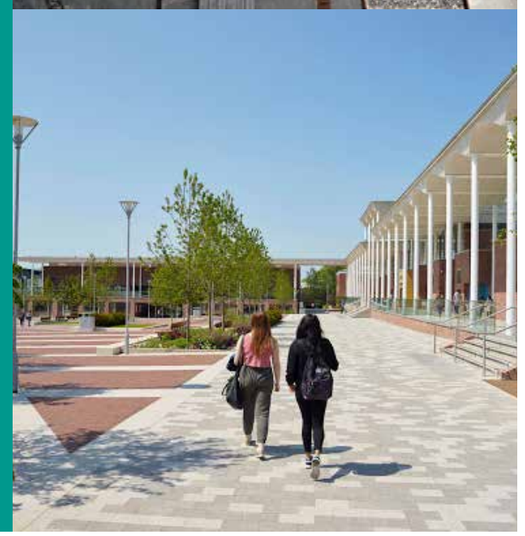
4 Existing vegetation retained and incorporated into the space.

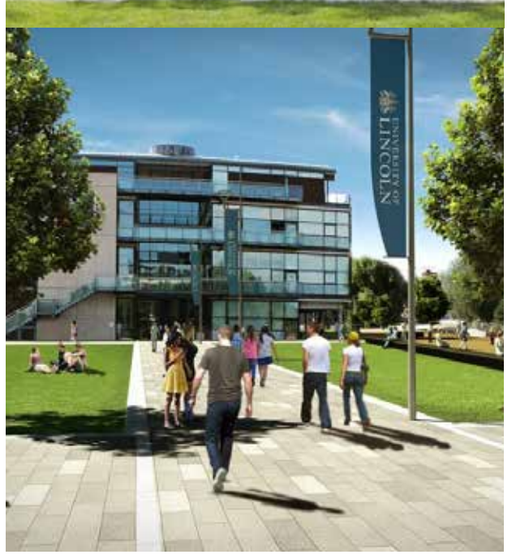
5 Seating areas located within the space provide resting areas or places to mingle.

6 Bespoke lighting masts provide vertical structure and help to identify to the space.

7 3m wide cycle network segregated with bollards to manage the safety of pedestrians and avoid conflict with vehicle use.






UNIVERSITY OF LINCOLN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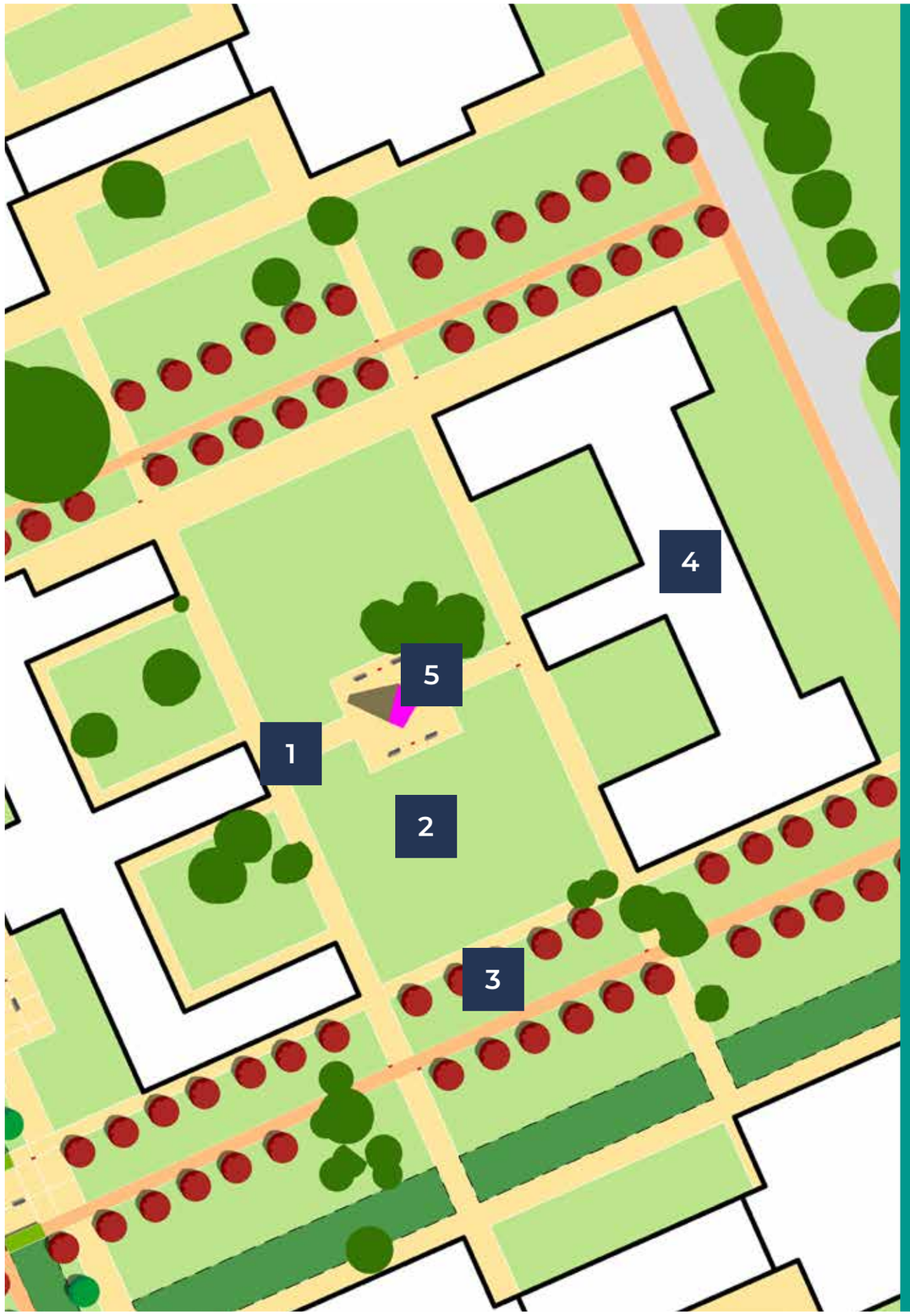


Campus Green

Campus Green will be a calm green space that offers a place to enjoy some tranquillity within the campus (it will be CSC equivalent of the ‘University Quod’). The Green will be framed by the surrounding buildings and shaped by the wider Green Grid. The space will be developed with no car parks or vehicular movement and will create a multi-functional landscape capable of hosting events on some days whilst creating a lunchtime retreat on others. The designs will enhance existing connectivity across the centre of the campus through bold avenues, key vistas and geometric SUDS features that gather surface water and disperse it throughout the wider campus. New buildings that frame this space will be taller to create optimised density through increased height and enclosure - not via loss of open space.

---

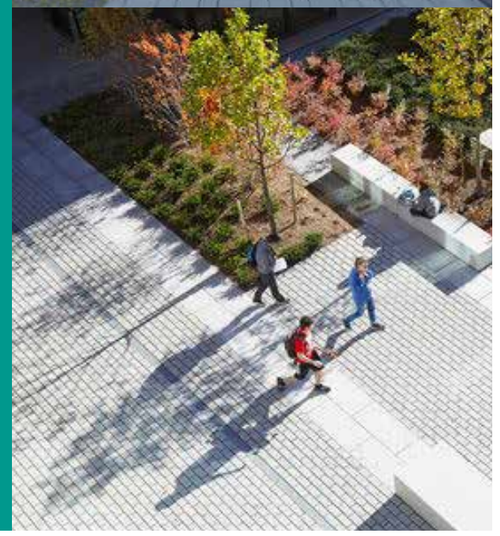
1 Direct pedestrian movement routes permeate the area through 'green' corridors, connecting buildings to main car parking hubs and wider areas of the campus such as the restaurant and conference centre.

2 Lawn areas provide areas for small events with space for marquees.

3 Spaces are organised through lines of tree planting.

4 New buildings are aligned on the existing campus grid and geometry.

5 Focal points in the landscape provide opportunity for public art or bespoke wayfinding.

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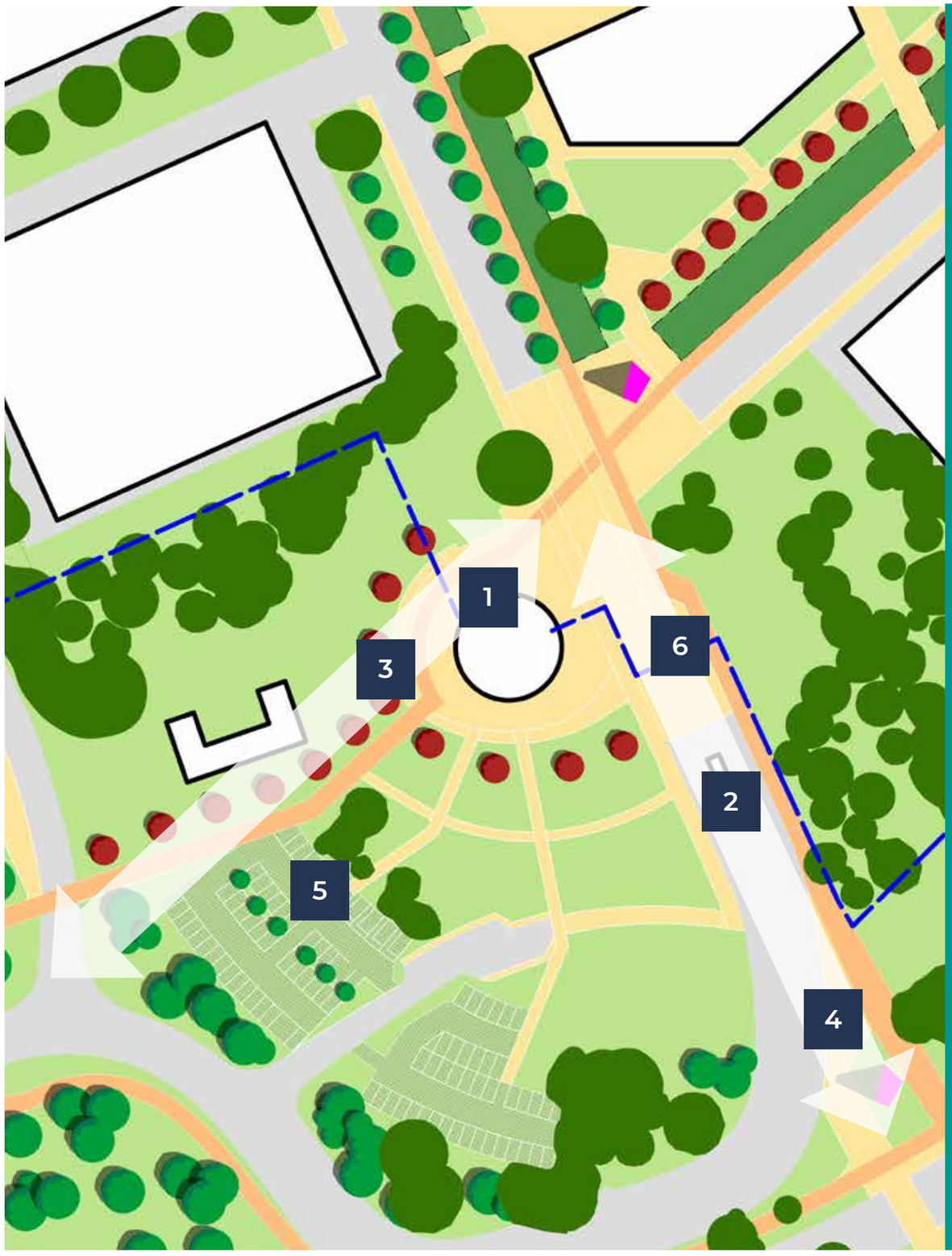


Main Entrance

The Main Entrance will create a much improved arrival experience for the campus. Striking vistas towards the new Main Gate building will be framed by the surrounding landscape, creating a representation for the UKAEA's campus that is fit for a leading international centre for energy technology. The space will create a legible and direct route for pedestrians and cyclists, encouraging the use of sustainable transport in readiness for the improvements to Culham Train Station and the future allocated residential development to the west.

1 New focal building creates important entrance feature, reception and conference facility.

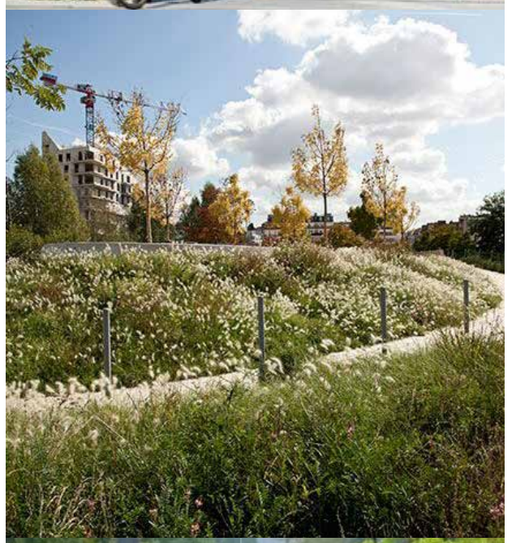
2 Key vistas from approach to main entrance are framed and left unobstructed, aligned on existing internal campus axis.

3 New footpath and cycle connection creates legible and direct route through the entrance experience whilst vehicles are taken on a more indirect route round to the main security barriers.

4 Focal points in the landscape provide opportunity for public art or bespoke wayfinding.

5 Car parking designed to incorporate existing vegetation and environmentally sensitive surfacing.

6 3m wide cycle network segregated with bollards to manage the safety of pedestrians and avoid conflict with vehicle use.

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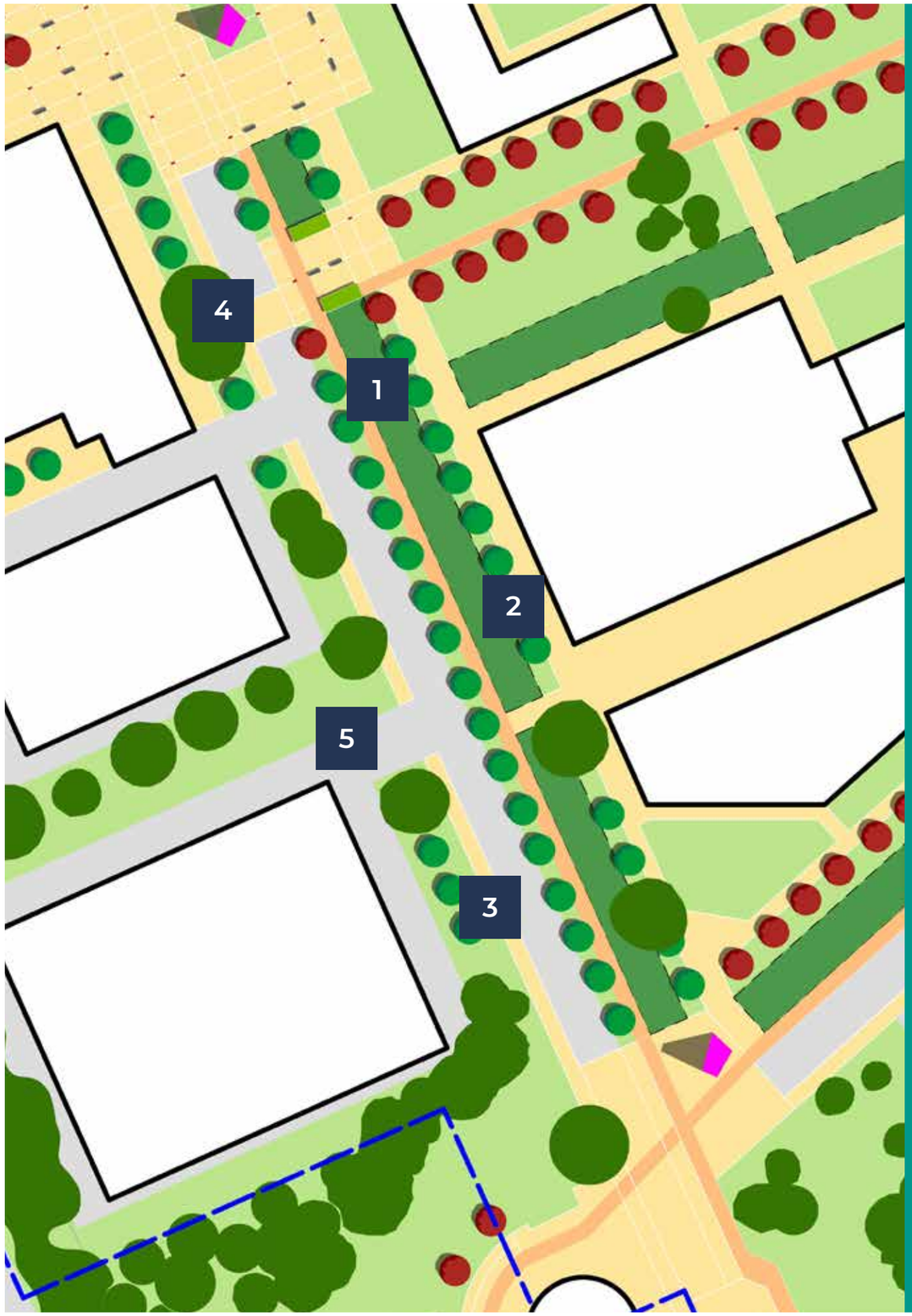

Avenue

The avenues will continue to be the primary movement and infrastructure routes within the campus. As vehicular movements within the campus reduce, large swathes of surface car parking will be replaced with new tree lined movement routes, important surface water drainage systems and ecological corridors. The avenues will establish significant walking, cycling and e-mode routes, they will be designed to gradually phase out the dominance of the vehicle, whilst always being able to accommodate these for access, servicing and emergency use.

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1 The re-purposing of surface car parking (as reduced over time) will serve a variety of functions, e.g. swales/ ecological diverse corridors.

2 Formal tree avenues are enhanced and create hierarchy within the Masterplan of the campus.

3 Footpath and cycle lanes connect to decked car parks and campus entrances encouraging active travel.

4 Pedestrian crossings are aligned with green links.

5 3m wide cycle network segregated with bollards to manage the safety of pedestrians and avoid conflict with vehicle use.


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Green Links

The Green Links will provide a pedestrian and biodiversity ‘mesh’ for movement throughout the campus, improving connectivity between buildings and key spaces. The alignment of the Green Links will create vistas onto important buildings, protect and enhance the campus infrastructure and improve the campus’s legibility.

1 Distinct pedestrian routes created between the existing Avenues.

2 Opportunities for blue infrastructure network to carry surface water through swales.

3 Tree avenues create legibility within the campus and divide up the Central Green landscape.

4 3m wide cycle network segregated with bollards to manage the safety of pedestrians and avoid conflict with vehicle use.


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Eastern Exit

The Eastern Exit will facilitate the efficient exiting of the site by staff and visitors, whilst creating a high quality setting for major large scale fusion facilities.

1. New building creates important feature and meeting / amenity facility.
2. New Fusion Facility addressing a new square.
3. Focal points in the landscape provide opportunity for public art or bespoke wayfinding.
4. Car parking designed to incorporate environmentally sensitive surfacing.
5. 3m wide cycle network segregated with bollards to manage the safety of pedestrians and avoid conflict with vehicle use.
6. Highway signage


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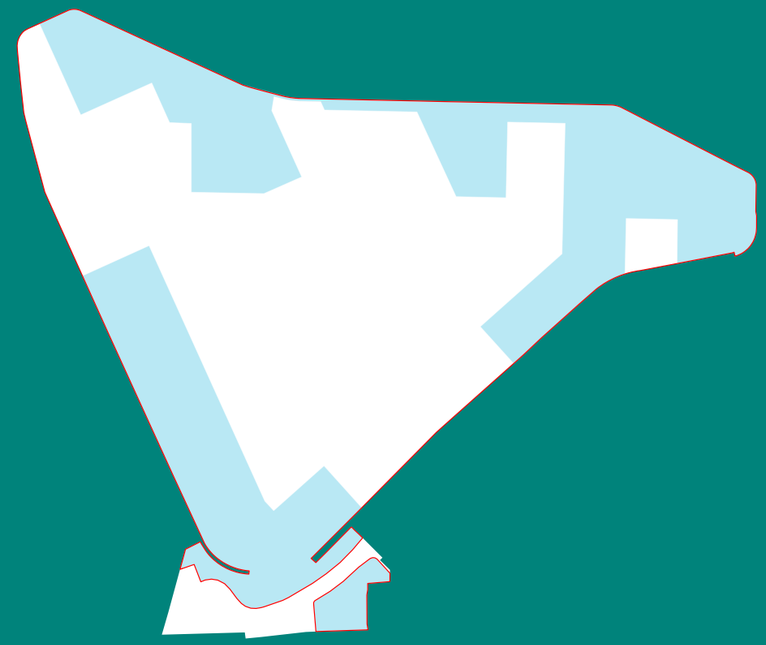
SECTION 5
EVOLUTION

5.1. Three Stages of Evolution

The following pages set out how the campus is anticipated to evolve over the three time periods established, providing a Masterplan and Visualisation for each time frame. The diagrams below simplify and explain the focus for each specific stage.

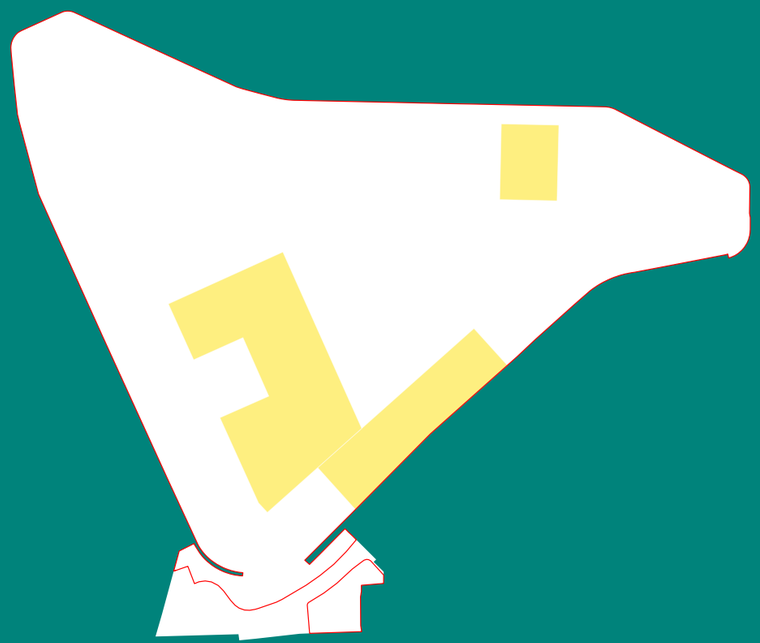
SHORT-TERM (BY 2025)

- Office buildings at the western flank of the campus served by decked and surface car parks at key locations.
- Step Rig Hall, Fusion Facility 1 and new exit at the east of the campus.
- Enhanced pedestrian / cycle route along the Avenue.
- ‘Main Entrance’ and ‘Campus Central’ as key spatial foci of the campus.
- Structural planting along the perimeter of the campus.



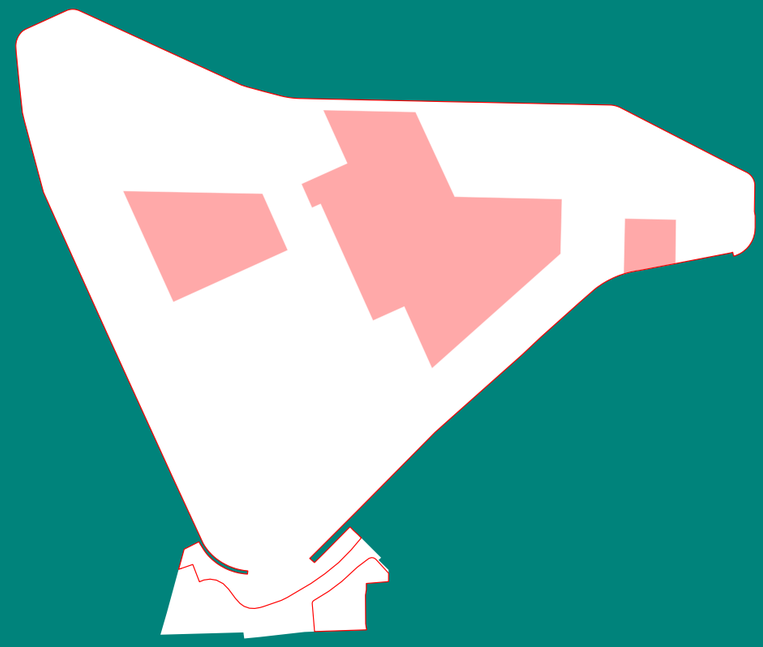
MID-TERM (BY 2035)

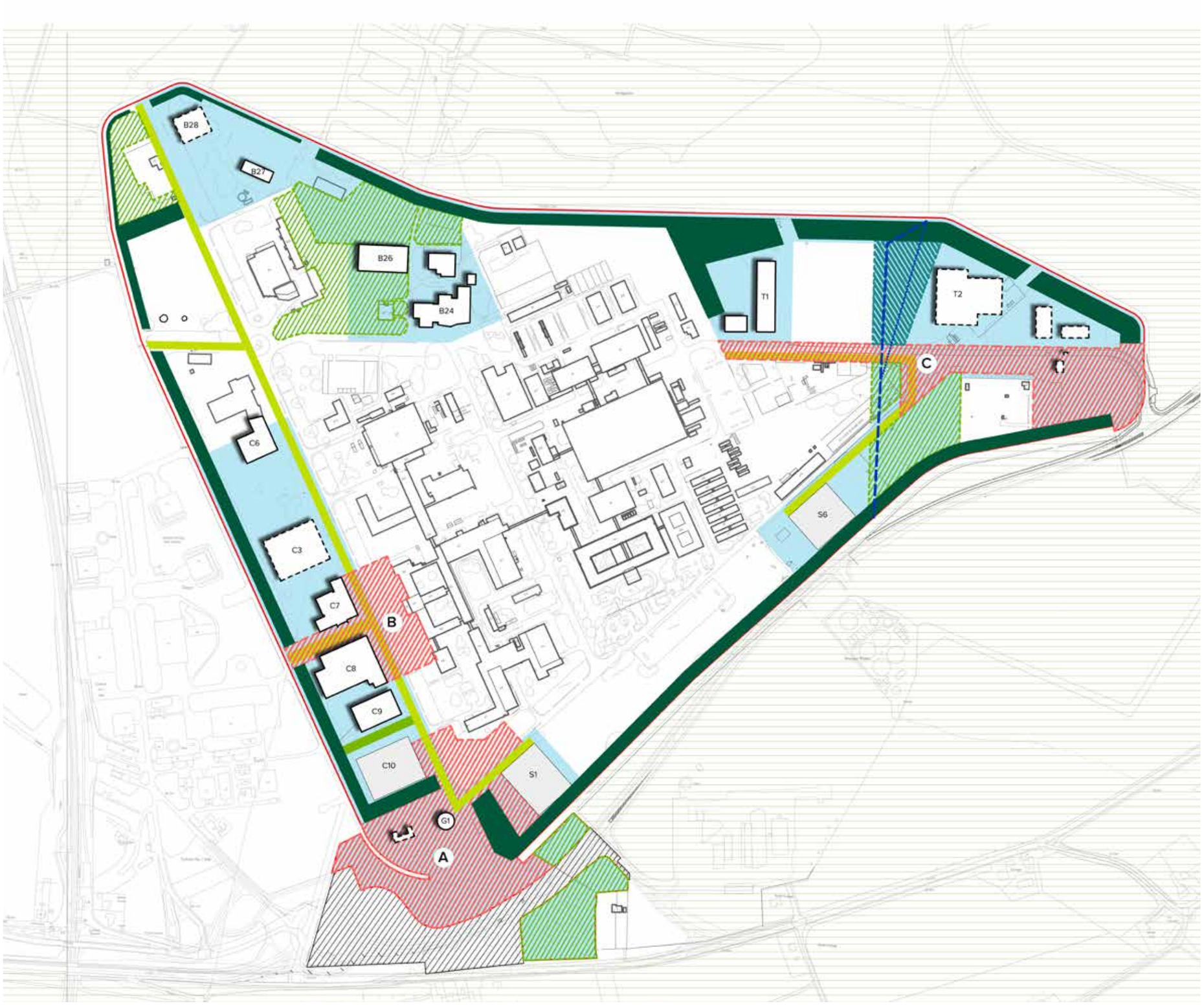
- Modal shift to allow for existing parking along the avenues to be gradually replaced by green and blue infrastructure.
- Surface car parks to the south of the campus to be decked.
- Office buildings to the south flank.
- Research, development and demonstration campus at the heart of the campus.
- Fusion Facility 2 at the east of the campus.



LONG-TERM (BY 2050)

- Decked car parks to be re-purposed, subject to modal shift.
- Research campus to be extended to the north.
- Existing buildings including JET to be removed / re-purposed to make way for future research zone.
- Green grid network and blue infrastructure to be fully established.





SHORT TERM
TO 2025

LEGEND

Site Boundary

New Local Plan Green Belt Boundary

Potential Land Transfer to OCC

Places

A = Main Entrance
B = Campus Central
C = Eastern Exit

Infrastructure

Structure Planting

Green Grid (Avenues and Green Links) / Canopy Walkway

Internal Landscape / Amenity / Recreation

Mixed Infrastructure Area with the Potential to Include Culvert / Swale Realignment

Open Space / Potential for Biodiversity Enhancement / SUDS

Existing Culvert Route

Potential Realigned Swale Corridor / Improved Culvert

Buildings

Existing / Proposed Buildings (built, under construction or in design process)

Proposed Buildings (not designed or built)

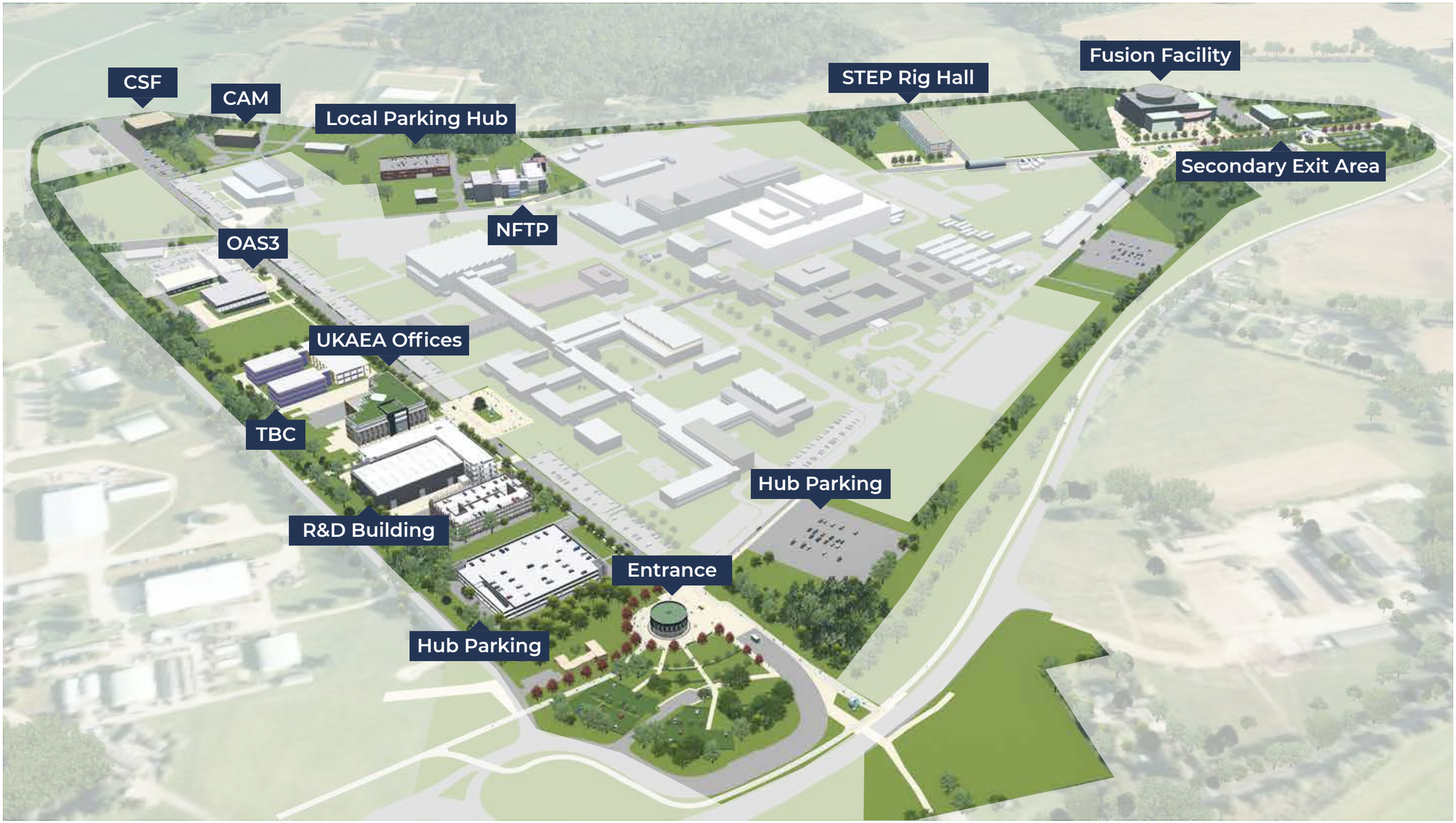
Proposed Surface Parking (to become deck in the mid term)

Building No / Name		GIA (sqm)	Likely Date of Completion
C6	OAS 3	2474	2023
C7	UKAEA Office	6753	2024
C8	R&D Building	9000 tbc	2023
C9/C10	Car Parks		2024/5
G1	Entrance	tbc	2024/5
S1/S6	Car Parks		2024/5
T1	STEP Rig Hall	2293	2024/5
B24	NFTP	tbc	2022
C3	R&D Building Phase 2 - tbc	9600	
B26	Local Car Parking Hub		2022
T2	Fusion Facility	14190	2024/5
B27	CAM Building	1500	2022/3
B28	Central Support Facility	3373	2024/5

Short Term Overall Area (~30.2Ha)

5.2. Short Term (to 2025):

During the first period, the focus will be the main entrance, the western part of the main avenue, a new northern entrance, the development of the Step Rig Hall and a new Fusion Facility to the north east. Structural planting will be introduced to the perimeter of the campus and new parking hubs will be established. Campus Central will be established at the heart of the campus, including refreshing existing building façades and replacing parking spaces with a plaza.



MID TERM
TO 2035

LEGEND

- Site Boundary
- New Local Plan Green Belt Boundary
- Potential Land Transfer to OCC
- **Places**
  - D = Campus Green
- **Infrastructure**
  - Structure Planting
  - Green Grid (Avenues and Green Links) / Canopy Walkway
  - Internal Landscape / Amenity / Recreation
  - Open Space / Potential for Biodiversity Enhancement / SUDS
  - Potential Swale Corridors / Rain gardens
- **Buildings**
  - Proposed Buildings (not designed or built)

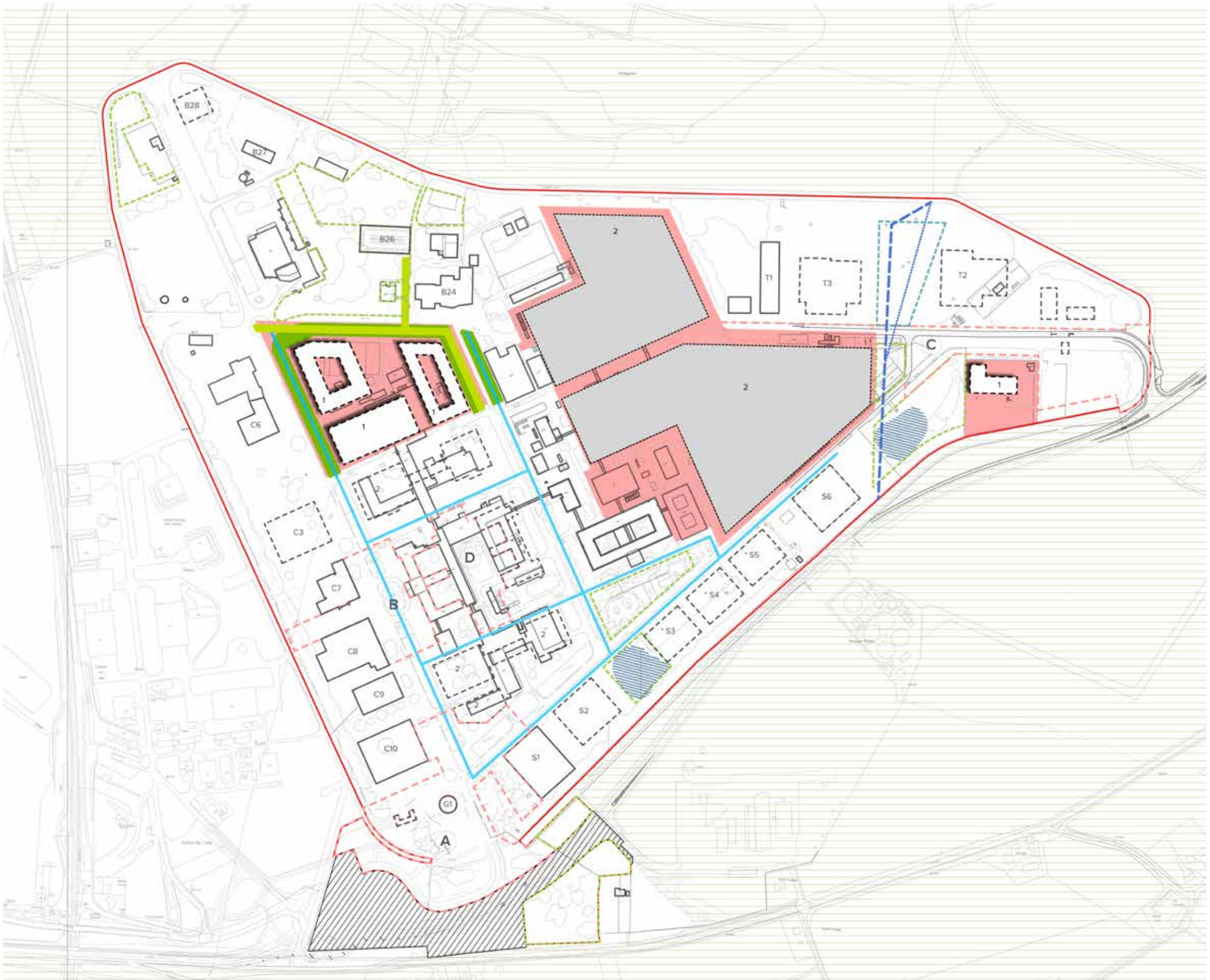
Building No / Name		GIA (sqm)
T3	Fusion Facility 2	14178
2	Miscellaneous Office / Research	44000
S3/S4/S5	Miscellaneous Office / Car Park (Subject to Modal Shift)	19575
*	Flexible Footprint / Size / Shape	
S2	Potential S1 Car Park Extension	

- Mid Term Overall Area (~12.6Ha)

5.3. Mid Term (2025 to 2035):

As the short term interventions become established, parking along the avenues will be removed and replaced by green and blue infrastructure. This stage commences the re-development of existing buildings, with the E and F building groups being re-modelled to optimise density and provide additional accommodation and the Campus Green, which will establish a world class recreational open space at the centre of the Campus. Further development of Fusion Facilities take place to the north east, whilst surface car parks on the western and southern flanks will be decked and new office buildings introduced to the south flank. During this period the Green Grid (avenues and green links) will be expanded, including pedestrian and cycle routes and a green and blue infrastructure network.

LONG TERM
TO 2050



LEGEND

- Site Boundary
- New Local Plan Green Belt Boundary
- Potential Land Transfer to OCC

Infrastructure

- Structure Planting
- Green Grid (Avenues and Green Links) / Canopy Walkway
- Internal Landscape / Amenity / Recreation
- Open Space / Potential for Biodiversity Enhancement / SUDS
- Potential Attenuation Areas
- Potential Swale Corridors / Rain gardens

Buildings

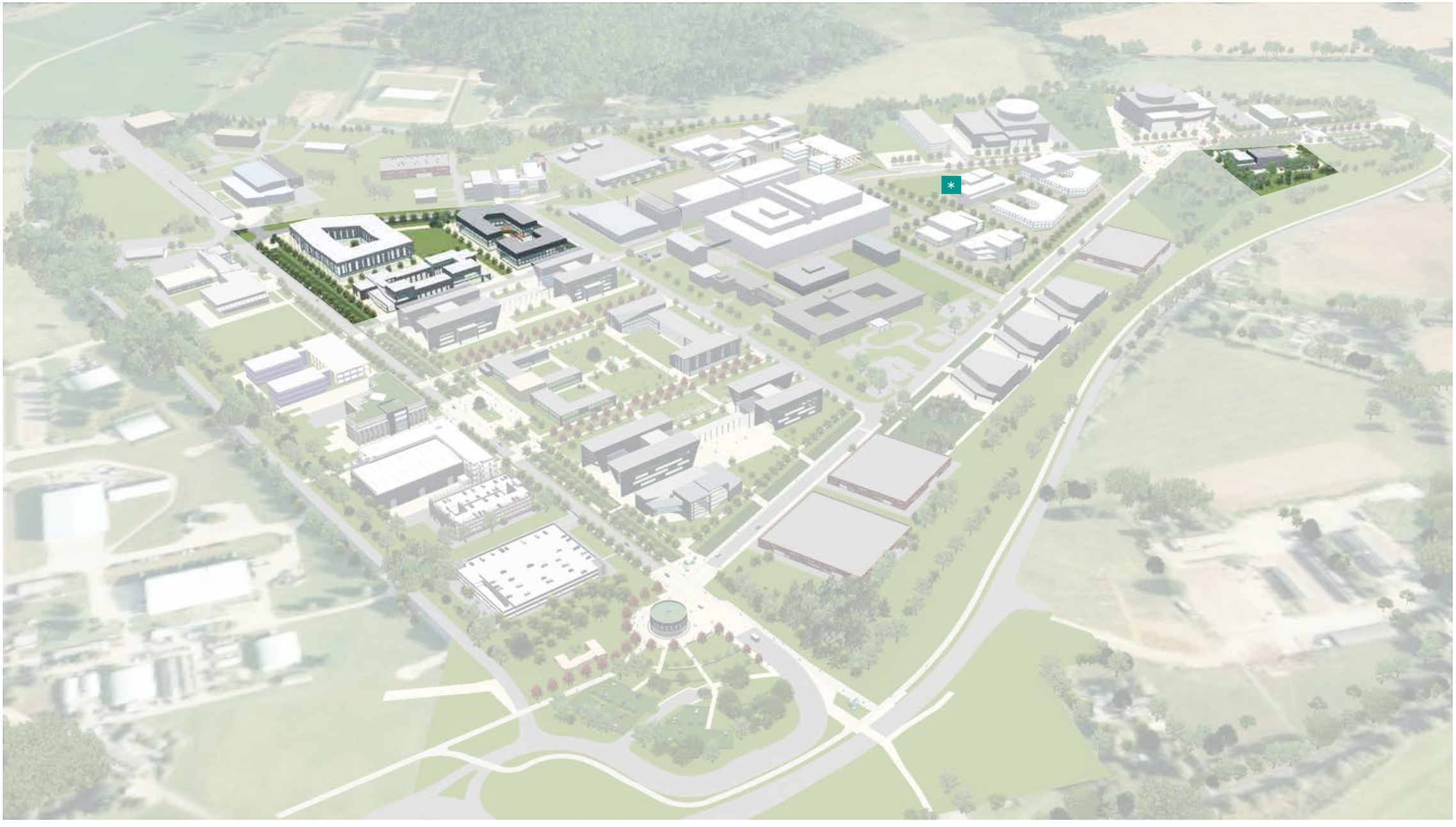
- Proposed Buildings (not designed or built)
- Post Jet Flexible Research and Development Zone

Building No / Name		GIA (sqm)
1	Miscellaneous Office / Research	36685
2	Research Zone (Flexible)	6Ha

- Long Term Overall Area (~17.4Ha)

5.4. Long Term (2035 to 2050):

In the long term, JET and other existing buildings in Areas J and K are expected to be removed or re-purposed to provide new research, development and demonstration facilities expanding the role of the campus further. The green grid network and blue infrastructure will be fully established at this point and this could include incorporation of the culvert, possibly diverted or deculverted, into new green space in the vicinity of the new eastern exit. Modal shift may allow for decked car parks to be gradually replaced over this period by research and technology uses, and redevelopment of the D building group is anticipated as key existing fusion facilities reach the end of the current/foreseeable programmes and lifetimes.

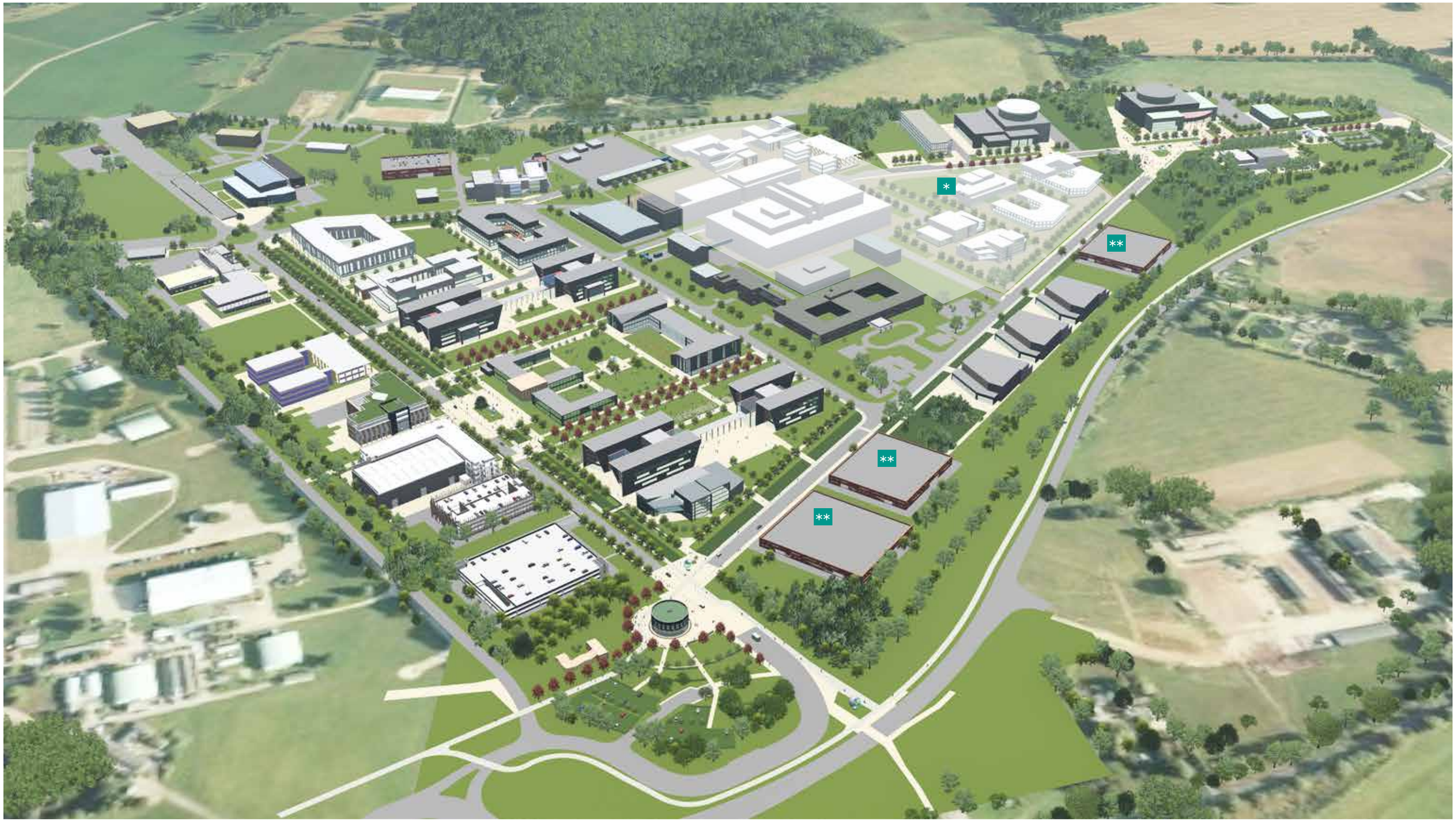


* R&D buildings to respond to future technology programmes are indicative.

Short Term (to 2025)

Mid Term (2025 to 2035)

Long Term (to 2050)



* R&D buildings to respond to future technology programmes are indicative.

** Decked car parking hubs are shown as car parking and are not shown as being re-purposed for a different use.

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