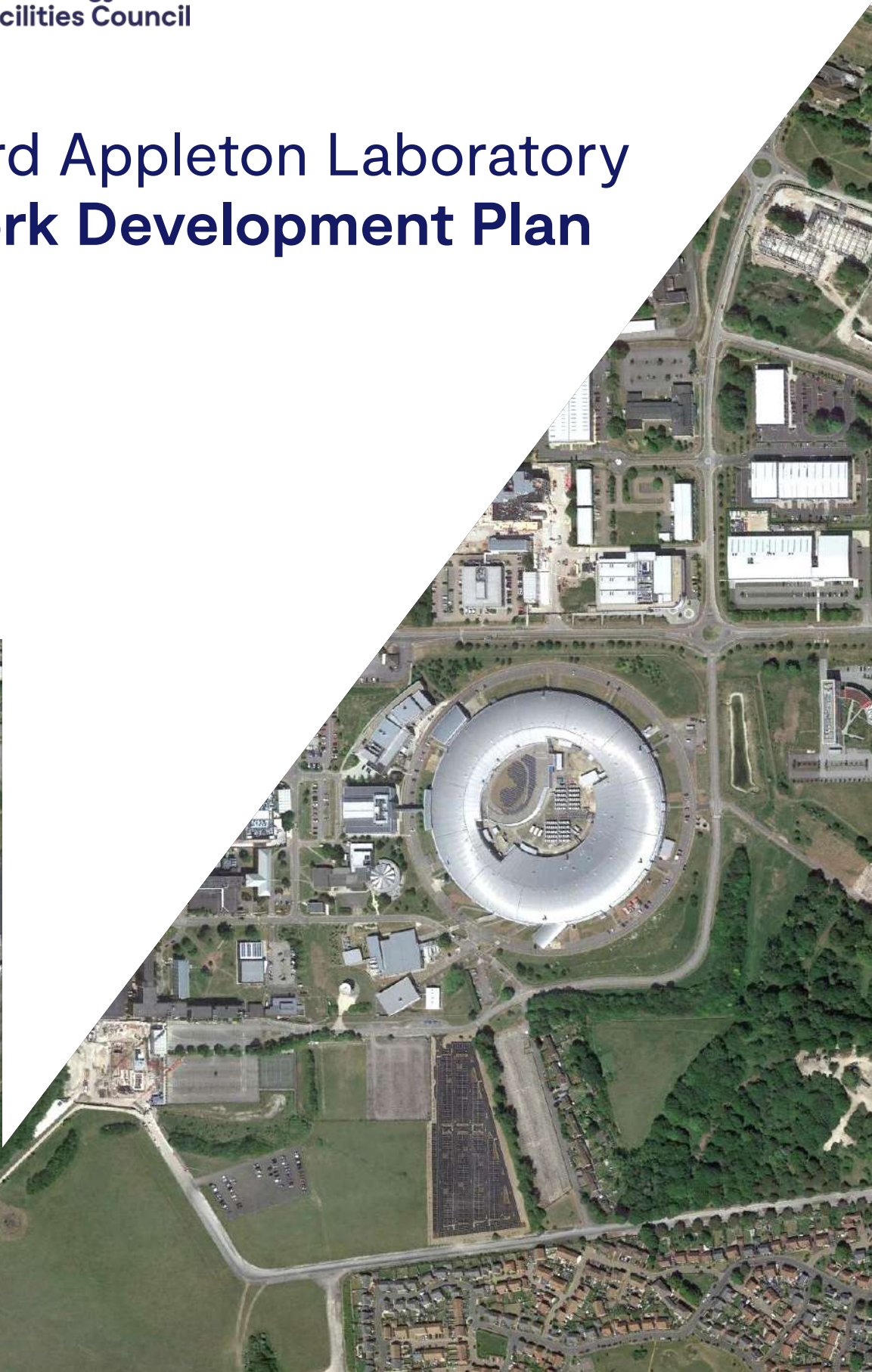




Science and
Technology
Facilities Council

Rutherford Appleton Laboratory Framework Development Plan



August 2022



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Introduction

Rutherford Appleton Laboratory (RAL) is the UK's largest scientific research site, hosting a number of national research facilities and employing over 2000 people. It is owned and operated by the Science and Technology Facilities Council (STFC), part of UK Research and Innovation (UKRI), and has been operational since 1957. It has been responsible for breakthroughs in science over many decades.

Located in Oxfordshire, RAL is a core part of the wider Harwell Campus, which hosts innovative companies and organisations who are attracted by the proximity to other leaders in innovation, and the deep talent pool of the local economy.

To support its continued function and growth in this competitive and innovative field STFC has commissioned a Framework Plan to ensure that the estate can continue to enable world-leading science at the site into the future.

The Framework Plan also aims to provide the basis for a long-term transformation of RAL into an even better place to work, improving the physical environment, public realm and staff facilities provision, attracting and retaining people and business from across the world.

The primary objectives of this document are to clearly establish a framework for development on site in the future, ensure futureproofing and efficient use of land, set out a vision and the required spatial and infrastructure safeguards and provisions that need to be put into place to make this happen.

The Framework Plan sets out the key principles for future development in landscape, mobility, built form, placemaking and infrastructure. It is intended to inform future discussions on planning applications, to provide a level of certainty and understanding on STFC's ambitions and vision for the site, and to safeguard the key infrastructure and land necessary to realise this vision. This resulting document is based on technical and design work undertaken by STFC covering a wide range of disciplines, the most important of which were shared with and consulted upon with Vale of White Horse District Council during early 2022.

Harwell Campus and RAL

Harwell Campus extends in all to around 282 hectares (700 acres) and is already one of the leading Science & Innovation Campuses in Europe. It provides employment for around 6,500 people working in over 225 organisations. Every major industry sector in which the UK economy is actively involved either resides at Harwell in some form or visits the Campus to conduct research and product development.

RAL is the scientific beating heart of Harwell, a nucleus and incubator of cutting-edge ideas and science, that attracts the best and brightest to work there. It is an essential part of the innovation ecosystem based at Harwell and across the wider region.

RAL is STFC's largest site, and the home of many current (and potentially future) national scientific facilities. STFC has a stake in the joint venture that runs and develops the wider Harwell Campus, and it represents a leading example of a successful private and public collaboration.

Harwell Campus has an up-to-date Framework Masterplan (April 2022), which sets out parameters that governs the wider campus. This framework plan 'fills in the gaps' for key parameters on the STFC site. The Harwell FMP is taken as an agreed starting point. This approach ensures that the distinctive needs of RAL are treated in a bespoke manner – for example, the need for significant flexibility on built form due to the specific needs of the science contained within. Many of the facilities that RAL will host are 'one-offs' in the truest sense – unique global facilities that enable world-leading research.

This document covers the existing STFC RAL site, and also considers the needs for land identified as 'STFC Big Science Land' in the Harwell FMP. This land is owned by UKAEA and is held in reserve for UK large-scale scientific facilities. A number of potential big science uses for this land are in the process of being examined, and understanding the development considerations, key infrastructure and how to make the best use of this land has been a key reason for the development of this Framework Plan.

**HARWELL CAMPUS
CP6 & CP15 ALLOCATIONS**

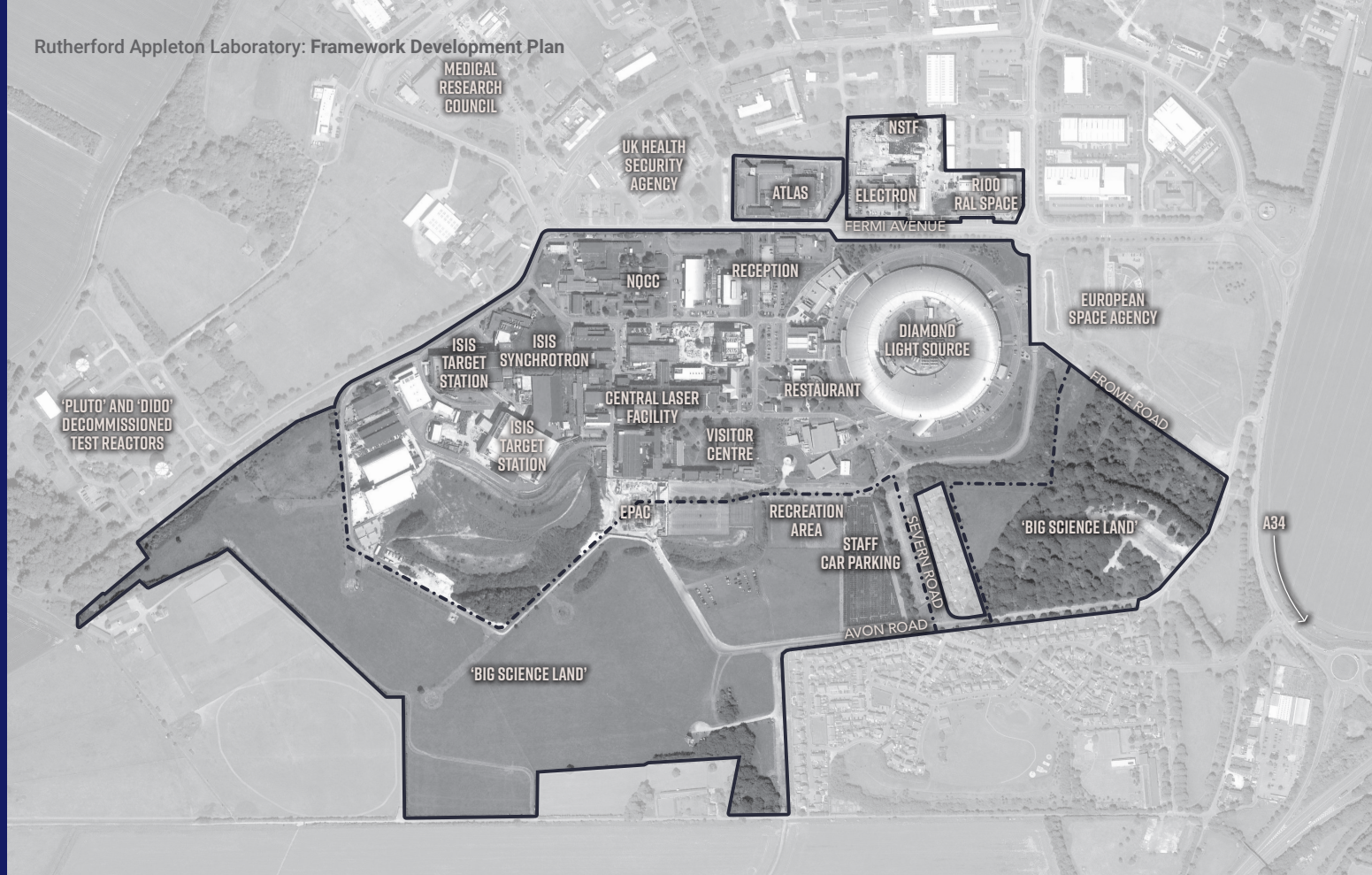
AREA COVERED BY STFC RAL
FRAMEWORK PLAN

DIAMOND LIGHT
SOURCE (DLS)

STFC - RUTHERFORD
APPLETON LABORATORY

'BIG SCIENCE
LAND'

'BIG SCIENCE
LAND'



▲ Figure 2
Rutherford Appleton Laboratory existing site plan

UKRI and STFC’s Strategy

STFC’s mission is to deliver world-leading national and international research and innovation capabilities and, through those, discover the secrets of the Universe. Our major research and innovation campuses including at RAL and our research facilities across the UK support fundamental research in astronomy, physics and space science.

Our goal is to deliver economic, societal, scientific and international benefits to the UK and its people – and more broadly to the world. Our strength comes from our distinct but interrelated functions.

Our scientific facilities provide access to world-leading, large-scale facilities across a range of physical and life sciences, enabling research, innovation and skills training in these areas.

On our national campuses, including RAL, we work with partners to build National Science and Innovation Campuses based around our National Laboratories to promote academic and industrial collaboration and translation of our research to market through direct interaction with industry.

We support university-based research, innovation and skills development in astronomy, particle physics, nuclear physics, and space science.

Our large-scale scientific facilities in the UK and Europe are used by more than 3,500 users each year, carrying out more than 2,000 experiments and generating around 900 publications. Our facilities provide a range of research techniques using neutrons, muons, lasers and X-rays, and high performance computing and complex analysis of large data sets.

They are used by scientists across a huge variety of science disciplines ranging from the physical and heritage sciences to medicine, biosciences, the environment, energy, and more. These facilities provide a massive productivity boost for UK science, as well as unique capabilities for UK industry.

We help to inspire and involve a future pipeline of skilled and enthusiastic young people by using the excitement of our sciences to encourage wider take-up of STEM subjects in school and future life (science, technology, engineering and mathematics).

UKRI's strategy, and by extension STFC's strategy sets out long-term, high-level priorities for how we will deliver our vision for an outstanding research and innovation system in the UK that provides everyone with the opportunity to contribute and to benefit, enriching lives locally, nationally and globally. It is underpinned by four principles for change:

- » Diversity;
- » Connectivity;
- » Resilience; and
- » Engagement.

These principles are fundamental to how we work as an organisation and will help to create the conditions for the UK's research and innovation system to flourish.

In addition, the strategy outlines six objectives for how UKRI will deliver on its ambitions. Working with government and partners across the sector, to foster world-class people and careers, places, ideas, innovation and impacts, supported by STFC as a world-class organisation.

Structure

This document sets out a clear narrative and reasoning for the overall framework, responding to the site, context and specific design and planning issues present at RAL. It covers:

- » Overall Vision for RAL, in terms of scientific research, placemaking, sustainability and overall ambition;
- » Planning Context, a review of relevant planning policy, the key issues that the Framework Plan addresses, and the overall approach to those issues; and
- » Framework Plan, with an analysis of the present situation and issues, and strategies and principles for each of the following detail layers:
 - › Landscape, Views and Biodiversity;
 - › Movement and Access;
 - › Built Form;
 - › Placemaking and Public Realm; and
 - › Infrastructure.

Vision

‘A World-Class Place’

STFC’s vision and ambition, as part of UK Research and Innovation is to take a key role in UKRI’s key role in delivering the government’s ambitions for the UK as a global leader in research and innovation, and priorities set out in the:

- » plan for growth;
- » research and development (R&D) roadmap;
- » innovation strategy;
- » the R&D people and culture strategy;
- » integrated review; and
- » levelling up white paper.

Innovation is the lifeblood of the UK’s future economic growth. It boosts productivity, helps businesses grow and scale and drives the creation of a wide range of high-quality jobs. The future development of RAL will be a key driver of that economic growth.

The “World Class Places” objective of UKRI’s strategy recognises the vital importance of place within the research ecosystem, bringing together people and facilities within an environment that enables innovation to thrive. The Framework Plan at RAL supports this objective and enables delivery of this vision while respecting the AONB and surrounding area.

This plan will ensure that the overall quality of placemaking, common infrastructure provision, and comprehensive forward planning is secured at RAL, with a clear forward spatial framework within which development can come forward. It will ensure that as well as the research inside the buildings, the spaces between buildings and the infrastructure that serves them is not forgotten and is provided to the same standard.



Extract from UKRI Strategy



Recent Projects

Recent projects delivered, or being delivered at RAL include:

- » Rosalind Franklin Institute (RFI): a national research institute dedicated to developing new technologies to tackle important health research challenges;
- » Extreme Photonics Applications Centre (EPAC): a national facility that will bring together world-leading interdisciplinary expertise to develop and apply novel, laser based, non-conventional accelerators and particle sources which have unique properties;

- » National Quantum Computing Centre (NQCC): a new research centre which is dedicated to accelerating the development of quantum computing by addressing the challenges of scalability; and
- » National Satellite Test Facility (NSTF): will support the assembly, integration and testing of space payloads and satellites weighing up to seven tonnes. The NSTF is the UK's first comprehensive set of space test facilities at this scale, and will enable UK industry to build bigger, more technologically advanced satellites and test them in the UK.

Rosalind Franklin Institute
Completed



Extreme Photonics Application Centre
Under Construction



National Satellite Test Facility
Under Construction



National Quantum Computing Centre
Under Construction



Peers and Precedents

RAL is rightly proud of its world-class status in scientific research, and its pre-eminence in hosting the UK's major scientific facilities. Countless breakthroughs have occurred at the laboratory, and its leading role continues today and will do into the future. This scientific research lead will continue to attract leading research talent attracted to the science, but the facility they work at should also lead in terms of quality of place and the quality of their working environment.

When competing in an international research world for talent, funding and facilities, it is important to refer to other similar facilities elsewhere so that it can learn best practice in terms of placemaking, public realm and architecture to incorporate this into its own plans. Learning from other campus both in the UK and internationally, inside and outside the industry can allow designers to draw out key themes and establish benchmarks.

These pages set out a series of examples for comparison with RAL, with a scale comparison and key design lessons learnt for each. Some are research facilities, and some are campus environments of similar scale and form.

Emerging themes have been distilled:

- » Clear layouts that are easy to navigate.
- » Planting and biodiversity.
- » Approach to parking.
- » Main central spines.
- » Clusters of uses.
- » Fronts and backs.
- » Consistent massing heights.
- » Maximised plot density.
- » Visitor engagement.

These principles have informed the design approach to creating a more cohesive, attractive and sustainable campus-style environment that can compete with the best facilities in the world.



InStitute Laue-Langevin, Grenoble, France



Scale Comparison with RAL

- » Defined edges with River on two sides
- » Legible grid layout
- » Main central boulevard
- » Mature planting
- » Clear street hierarchy
- » Good relationship with surrounding business park

European Spallation Source, Lund, Sweden



Scale Comparison with RAL

- » Main route terminates at visitors centre with public and admin buildings clustered together
- » Legible circular layout
- » Flexibility to grow outwards
- » Front facing buildings appear to have more elaborate façades differentiating them from the more functional buildings

Vitra, Weil Am Rhein, Germany



Scale Comparison with RAL

- » Bread crumbs of architecture to sell design around larger 'shed' buildings that house the manufacturing
- » Clear differentiation between buildings of different function

WISTA, Adlershof, Germany



Scale Comparison with RAL

- » Clear zones of development
- » Green roof to synchrotron
- » Clear defined boulevards with mature planting
- » Consistent massing height - maximised plots
- » Good relationship with surrounding business park

Paul Scherrer Institute, Villigen, Switzerland



Scale Comparison with RAL

- » Focus and amenity buildings located along main route
- » Appears to be different material characters for the larger/less active buildings to the more front of house facing ones.
- » PSI East screened by mature woodlands

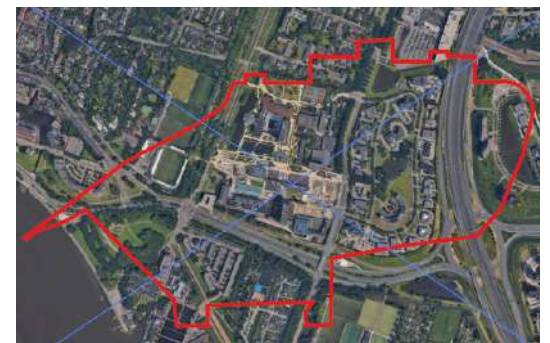
Granta Park, Cambridge, UK



Scale Comparison with RAL

- » Clear main boulevard creating a ring around site
- » Parking to rear of buildings or outside main route
- » Integration of planting along routes
- » Introduction of cricket pitch and lake to provide additional amenity for well being
- » Building fronts face onto outer boulevard making it easily navigable

Campus woudestein, Rotterdam, Netherlands



Scale Comparison with RAL

- » Clear central spine with logical access points
- » Multi-functional open space at heart
- » Disjunct modernist campus brought together by new infill development, public realm and hierarchy of streets

Sustainability in Science

UKRI has a corporate strategic goal of achieving Net Zero Carbon as an organisation by 2040. RAL, as the largest UKRI site, has a pivotal role to play.

Additional sustainability goals for the site include biodiversity net gain, through the provision of new and improved habitats.

The Framework Plan has been prepared in line with a comprehensive set of sustainability principles, which will be implemented throughout all forthcoming proposals. These are divided into site-wide sustainability principles, and principles specific to building design.



Site Sustainability Principles

Movement:

- » Cycle parking and micro-mobility parking should be prominent, secure and covered, near all main buildings;
- » Entrance points should be accessible to bicycles;
- » Provision of last-mile solutions such as bike or micro-mobility sharing services with dedicated stations;
- » Bus stops should be overlooked, covered and sheltered from wind and rain; and
- » Walking distances from access points to main points of activity should be minimised, through the choice of plot locations close to RAL Avenue and Heart of RAL for major new developments.

Biodiversity:

- » All opportunities to integrate native, diverse habitats within public realm and buildings will be taken;
- » Native species will be prioritised;
- » Habitat creation will be undertaken on land that will not be disturbed for the period required by the Environment Act;
- » Opportunities for carbon sequestering habitats will be explored, to secure biodiversity gain benefits;
- » Successful green infrastructure often requires minimal maintenance when carefully located and planted - specialist input will be sought on all developments;
- » Grass lawns will generally be avoided as high-maintenance and low-biodiversity solutions;
- » Implementation of small habitat features such as bird boxes, bee hives, bug hotels; and
- » Use of integrated Sustainable Drainage Systems (SuDS) with the aim of achieving green field run off rates, while contributing to increased biodiversity and improving water quality of surface water run-off.

STFC will enhance and improve biodiversity where projects have unavoidable impact upon the natural environment.

Where Biodiversity Net Gain is required, this shall be achieved through the following hierarchy of priority:

1. On site
2. Locally (i.e. adjoining to site or nearby corridor creation)
3. Within Planning Authority area
4. Within STFC's land portfolio
5. Via government BNG credit scheme

Building Sustainability

Sustainable development principles:

- » Maximise the reuse and recycling of materials including materials existing on site;
- » Optimise the orientation of buildings to utilise solar gain and shading;
- » Optimise natural ventilation techniques to improve the well-being and comfort of internal environments and further reduce energy needs; and
- » Include water harvesting and storage provision.

Standards and Certifications:

- » Prioritise a fabric-first design approach for the built form and its envelope, focusing on airtightness, high insulation, passive ventilation and the incorporation of renewable energy systems and technologies where possible;
- » Modern methods of construction (MMC) are prioritised for the built form and its envelope;
- » Specify highly efficient and ultra-low energy fixed building services or infrastructure to help reduce regulated emissions;
- » All developments should aspire to go beyond Part L Assessment under the Building Regulations (in line with Note: DES10 of the adopted SODC Local Plan); and
- » Aspire to meet BREEAM Excellent standard.

Reducing embodied carbon:

- » use sustainably sourced and accredited, low embodied carbon materials;
- » use naturally sourced materials;
- » reduce materials with high carbon footprints (materials whose production process have high carbon emissions);



Planning Context

Planning Policy

National Planning Policy

The National Planning Policy Framework 2021 (NPPF) sets out the Government's planning policies for England. At the heart of the NPPF is a presumption in favour of sustainable development. The objective of sustainable development is summarised by Government as meeting the needs of the present without compromising the ability of future generations to meet their own needs.

RAL lies within the northern part of the North Wessex Downs AONB, an area of countryside that is of national importance in terms of its outstanding natural beauty and distinctive character. The NPPF seeks to protect the landscape and scenic beauty of AONB.

Paragraph 176 states:

“Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas, and should be given great weight in National Parks and the Broads. The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas.”

Paragraph 177 states:

“When considering applications for development within National Parks, the Broads and Areas of Outstanding Natural Beauty, permission should be refused for major development other than in exceptional circumstances, and where it can be demonstrated that the development is in the public interest. Consideration of such applications should include an assessment of:

- a. the need for the development, including in terms of any national considerations, and the impact of permitting it, or refusing it, upon the local economy;*
- b. the cost of, and scope for, developing outside the designated area, or meeting the need for it in some other way; and*
- c. any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated.”*

In the consideration of recent applications, the long established brownfield nature of the wider Harwell Campus and RAL's national importance for science and innovation has meant that the whole site has been recognised by planning policy as an employment site within the AONB where major development is encouraged, but where particular care has to be taken in the design and delivery of that development where it impacts particularly on the wider AONB. This approach to protection and consideration of the wider landscape has particularly informed the Framework Plan.

Local Planning Policy

The Development Plan for the Campus comprises the adopted Vale of White Horse District Council Local Plan 2031, Part 1, Strategic Sites and Policies and Part 2 Detailed Policies and Additional Sites.

Vale of White Horse District Council Local Plan 2031, Part 1, Strategic Sites and Policies

On 14th December 2016 the Vale of White Horse District Council adopted its' Local Plan 2031, Part 1, Strategic Sites and Policies (“LP1”). This sets out the spatial strategy for the District for employment and housing needs.

Paragraph 4.23 states that:

“Overall demand for employment land in the Vale is strong due to a combination of local facilities, including: excellent quality of environment; high quality research and science facilities; a large catchment pool of skilled labour;

and existing science and business parks with growth aspirations and where the demand for growth is expected to remain buoyant throughout the plan period.”

Paragraph 4.25 states that:

“Employment provision within the Vale is led by Science Vale, and in particular, the Enterprise Zone sites at Milton Park and Harwell Campus... Harwell Campus is home to a number of world leading science research facilities including, for example, the Rutherford Appleton Laboratory and the European Space Agency. Milton Park and Harwell Campus account for 157 hectares of identified demand for new employment land.”

Core Policy 6 of the Vale of White Horse Local Plan Part 1 (LPP1) identifies 218 hectares of land for future employment development, 128 hectares of which is allocated for delivery at Harwell Campus.

Vale of White Horse District Council Local Plan 2031, Part 2 Detailed Policies and Additional Sites.

On 9th October 2019 the Vale of White Horse District Council adopted its' Local Plan 2031, Part 2, Strategic Sites and Policies (“LP2”).

Policy 15b sets out the requirements for a comprehensive development framework at the Harwell Campus and states that:

“All new development at Harwell Campus will be guided by a comprehensive development framework Development will come forward in accordance with Core Policies 15 and 15b.

Sufficient land is made available at Harwell Campus for research, innovation and economic development to accommodate at least 3,500 net additional jobs in the plan period up to 2031 within the designated Enterprise Zone.

Proposals for development within the Campus must demonstrate how they contribute towards a comprehensive approach to development.

The Council will continue to work with Harwell Campus, the LEP, the AONB Management Board and other relevant stakeholders to prepare a comprehensive development framework for the Campus. Development proposals will be considered in the context of a comprehensive approach to the whole Campus, in accordance with the criteria set out below.

Additional guidance will be provided by a comprehensive development framework that will be published as a Supplementary Planning Document and include:

i. development is in accordance with and meets the requirements of a travel plan for the whole campus to make the necessary contributions in order to implement sustainable transport initiatives, including minimising car usage and increasing the use of public transport, walking and cycling

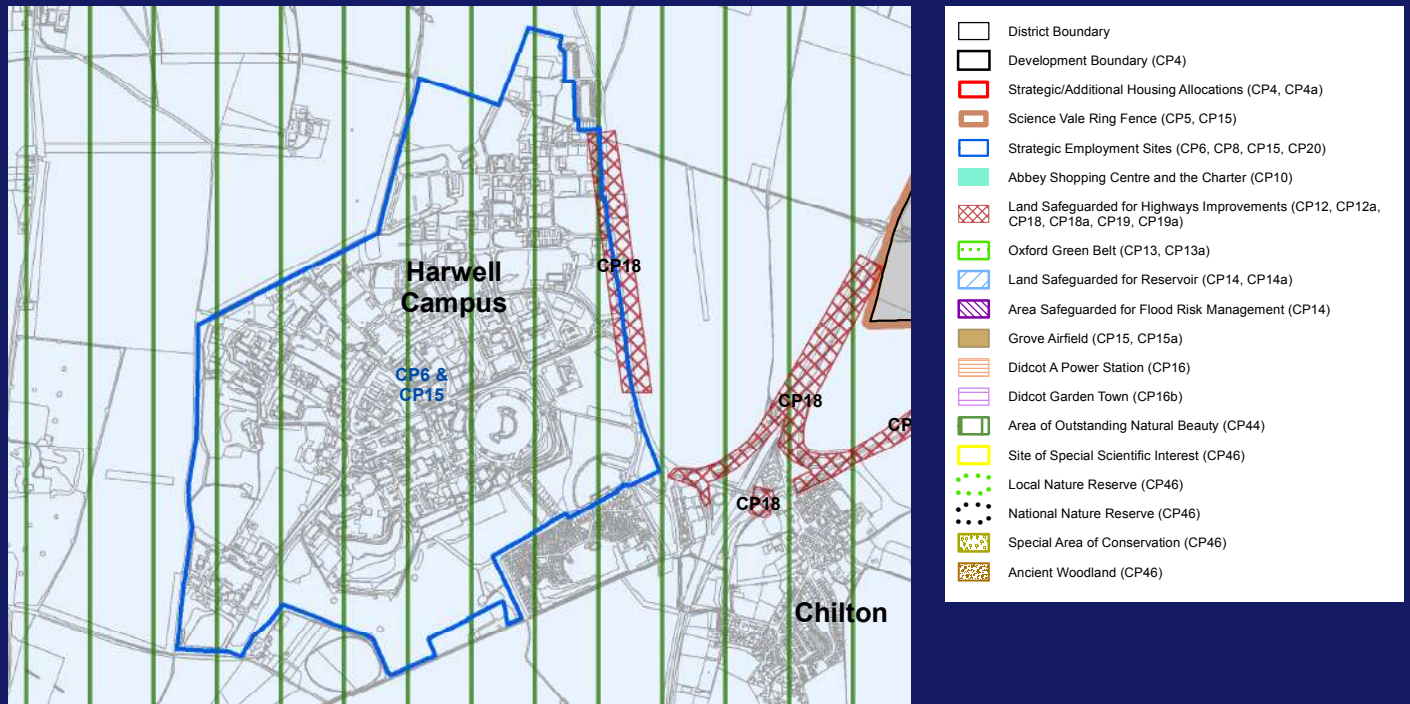
ii. development is in accordance with and makes the necessary contributions to a comprehensive landscape plan for the whole campus. No development will be permitted within structural areas of open space and perimeter landscaping. In considering proposals for new development and redevelopment, a high quality of landscaping will be required, existing important wildlife habitats will be retained and opportunities for the creation of new wildlife will be taken, where possible,

iii. proposals for buildings and structures (including their extensions) will not unacceptably harm the character and appearance of the surrounding area, taking into account their location, scale, bulk and height, and

iv. any external lighting scheme must have a minimal impact in terms of light pollution.”

An extract of the Local Plan Proposals Map covering the Campus is shown below:

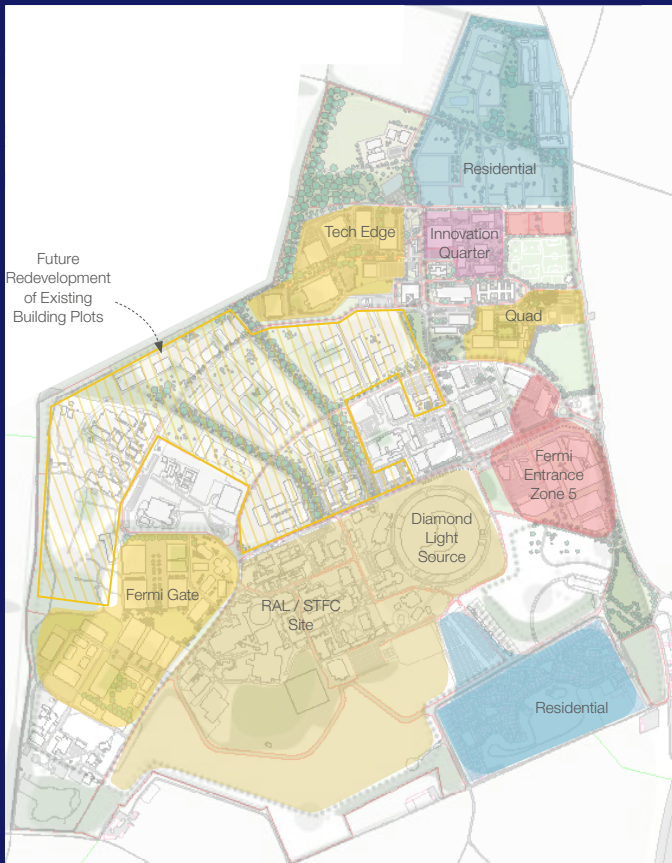
Design Guide SPD (2022)



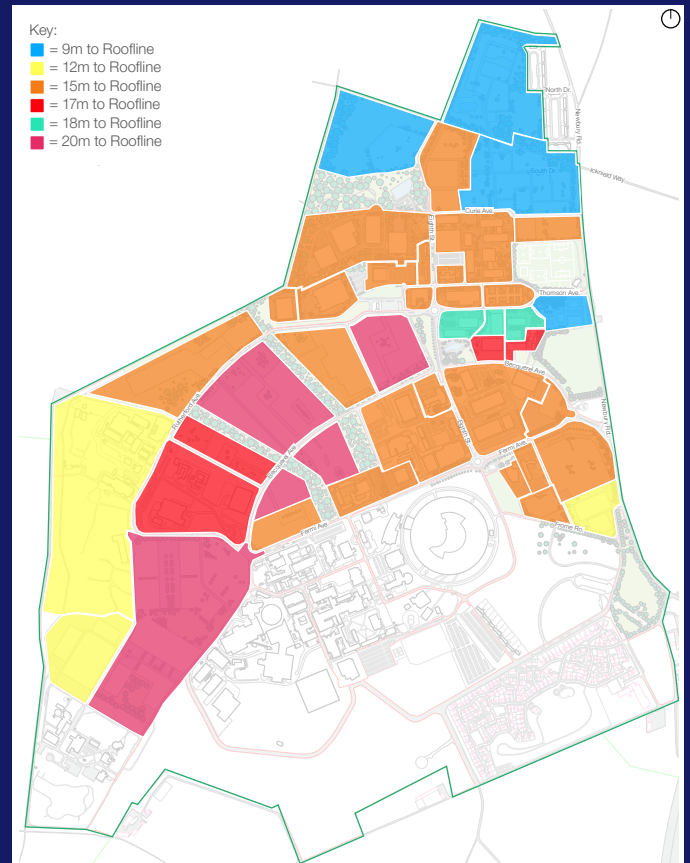
▲ Figure 3
Local Plan allocations map

The Design Guide SPD seeks to ensure the delivery of high-quality, well-designed buildings, streets and spaces and encourages sustainable development across the Vale. The Joint Design Guide has been prepared in conjunction with South Oxfordshire District Council.

The Design Guide SPD provides a greater level of detail for employment developments than that proposed in this Framework Plan; this will be directly addressed by individual development proposals at RAL as they come forward.



▲ Figure 4
Key clusters identified within Harwell FMP



▲ Figure 5
Heights guidance in Harwell FMP

Harwell Campus Framework Masterplan

The Harwell Campus Framework Masterplan (“FMP”) was prepared between the Harwell Campus Joint Venture (“JV”) and the Vale of White Horse District Council (“Vale”). It is not adopted as a Supplementary Planning Document (SPD) but it is a material consideration in decision making. The Council use it for guiding the heights of development on the Campus following the landscape impact work that was carried out during its preparation to assess the impacts of various heights on the AONB and particularly views from the Ridgeway to the south.

Figure 4 above is figure 8 from the FMP which shows key clusters diagram and figure 5 above is figure 11 of the FMP that identifies the proposed heights across the Campus.

The RAL Framework Plan seeks to augment the comprehensive approach taken for the Harwell FMP, by providing additional detail within the RAL site. It takes the FMP as the starting position and develops further, site-specific detail within the RAL boundary. As it has been prepared by STFC it gives more certainty to the local authority on the future direction and needs of the site, while remaining compliant with the overall FMP.

Planning Issues and Approach

A number of key issues have been considered and addressed as part of the development of the RAL Framework Plan. This section sets out a brief summary of the issues, and the approaches taken to address the issue.

AONB Landscape Impact

The Framework Plan looks to create a balance between ensuring development can occur and appropriate mitigation. A Landscape Framework has been developed for 'Big Science Land', especially the most visually exposed area between the current Visitor Centre and Avon Road. This takes an approach of 'rings' or layers of structural planting, moving from more formal to more natural character moving out from the current site into Big Science Land.

Local Landscape and Amenity Impact

The Framework Plan acknowledges the potential impact on localised views and local amenity of nearby homes, such as those at Chilton Field and Severn Road. The Landscape Framework, set out above, aims to provide screening and mitigation for both long (AONB) and localised views (from homes), as the most sensitive areas of land for both issues coincide in the area to the south of the current RAL sports fields.

The boundary along Avon Road is considered for advance planting and an improved section that provides better screening for existing residents. Uses likely to generate vehicle movements and noise, such as parking and logistics/goods-in are located closer to the existing RAL site.

Car Parking and Access

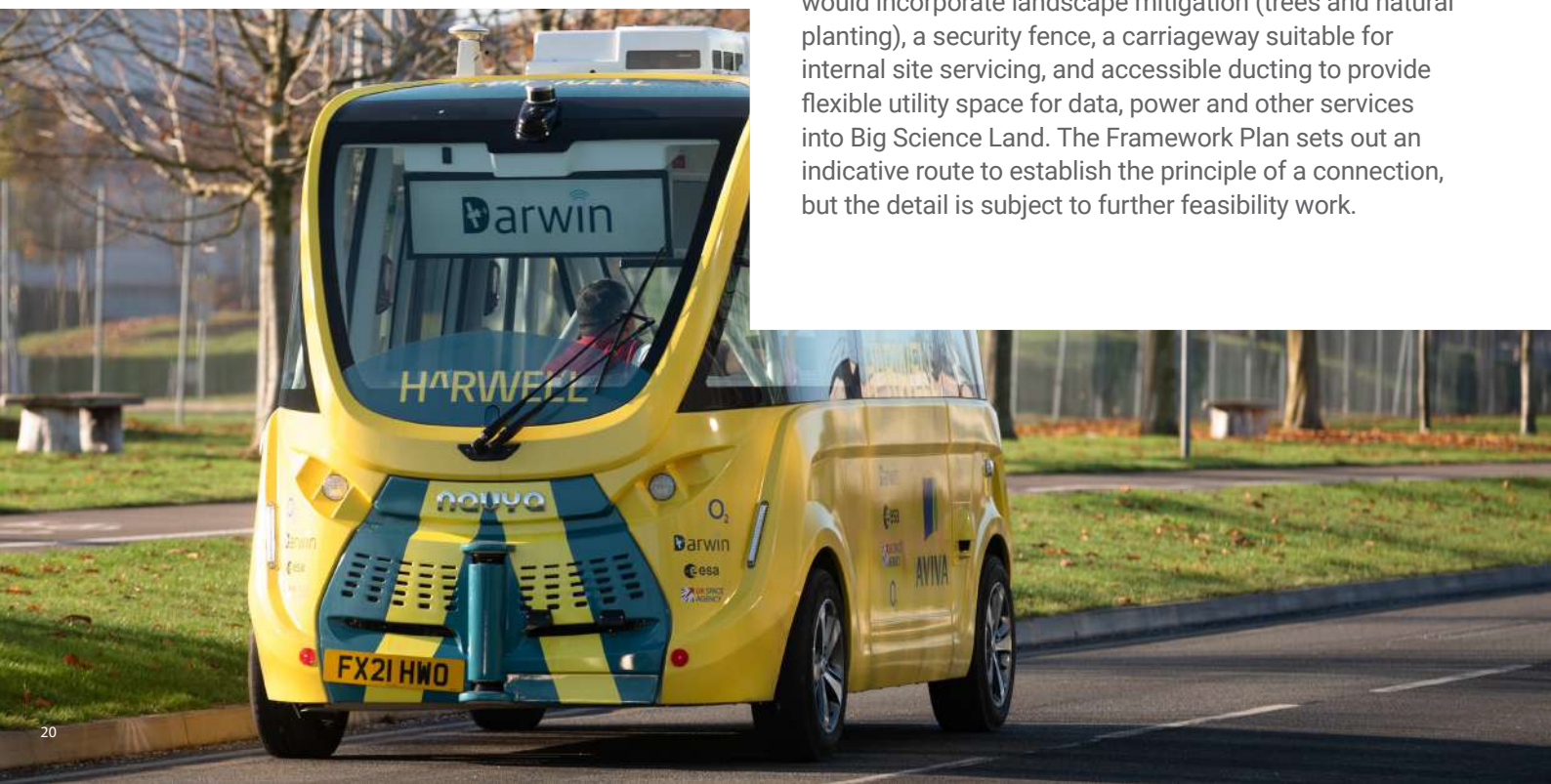
At present most staff and visitors access RAL by private car. This creates traffic movements on the local network, and uses significant land to provide parking, much of which is scattered inefficiently around the site. Without efforts to achieve sustainable modal shift, proposed expansion of the site's employment is likely to exacerbate these issues.

The Framework Plan approaches this issue by supporting STFC's attempts to move people onto public transport. Car parking within the site will be reduced to only essential and operational spaces, to free up land for densification of built form. An improved network of pedestrian-friendly routes will enhance movement within the site, connecting to public transport stops.

The Framework Plan sets out a footprint for future car parking, to be delivered through decked parking (at up to 2 decks plus ground in places), that can cope with a 'worst case' scenario, currently assessed at 2,665 spaces for the whole RAL site including Diamond. Should modal shift measures be successful, this footprint or full decking will not be needed, but the Framework Plan safeguards it as a strategic consideration.

Car parking will be considered as a 'pathway' towards the goal of a mostly internally car-free site, except for disabled and other essential operational parking and vehicle movements.

A key enabler of future new facilities within Big Science Land, is the need for a new perimeter road around the southern edge of Big Science Land, connecting to Avon Road and the internal RAL network. This corridor would incorporate landscape mitigation (trees and natural planting), a security fence, a carriageway suitable for internal site servicing, and accessible ducting to provide flexible utility space for data, power and other services into Big Science Land. The Framework Plan sets out an indicative route to establish the principle of a connection, but the detail is subject to further feasibility work.



Lighting

Following the lead set out by the Harwell Framework Masterplan, the RAL Framework Plan sets out lighting principles that reflect the aspirations set out by the North Wessex Downs' 'Dark Skies of the North Wessex Downs, A Guide to Good External Lighting', as well as giving guidance on how essential lighting requirements for new buildings can be incorporated with the minimum of light spillage at sensitive edges.

Biodiversity Net Gain

The draft Environment Act will require new developments to deliver a minimum of 10% net gain in biodiversity, which is also required today by VoWH planning policy.

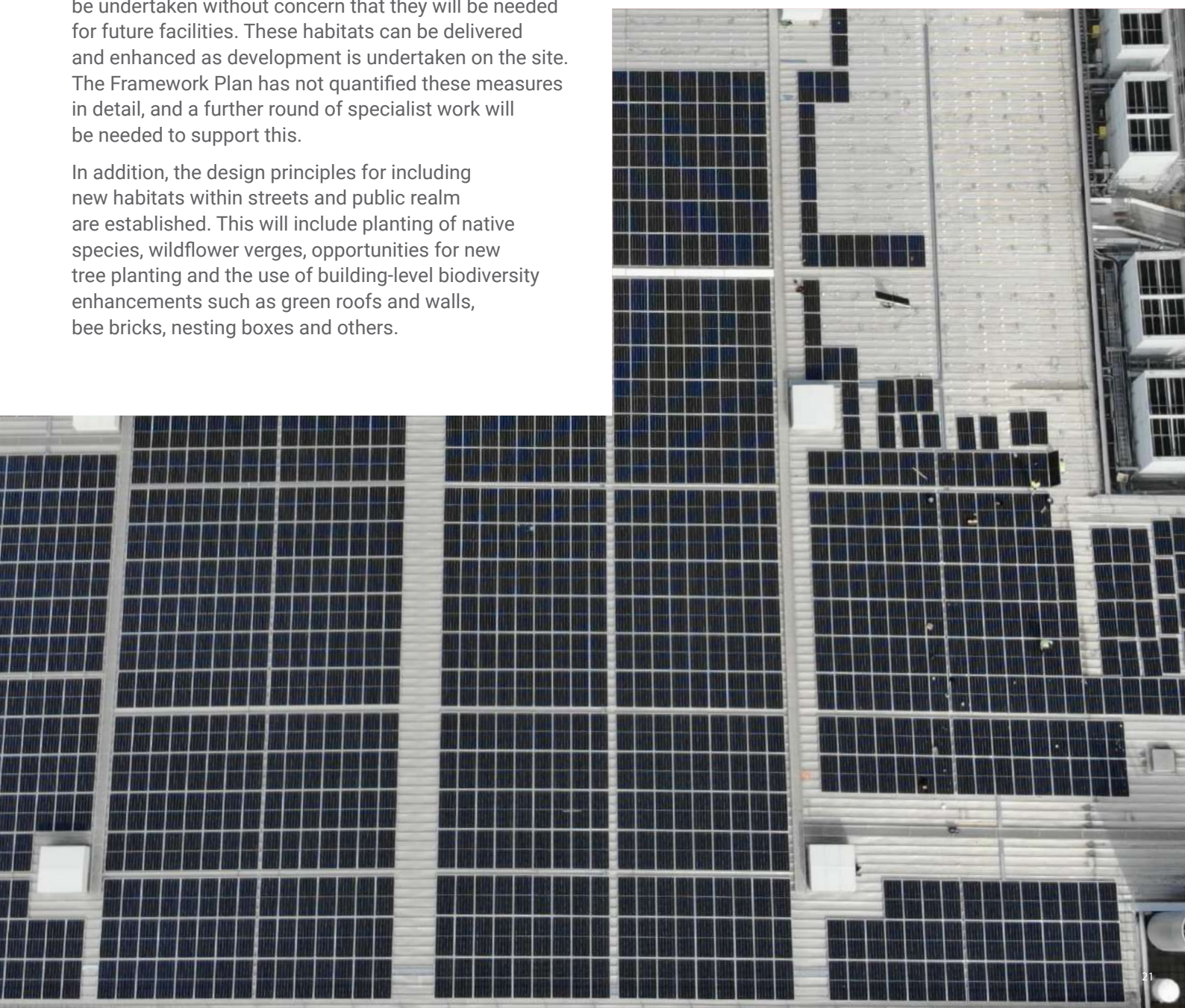
The Framework Plan identifies areas for biodiversity net gain, within the existing site and across Big Science Land, where long-term habitat creation can be undertaken without concern that they will be needed for future facilities. These habitats can be delivered and enhanced as development is undertaken on the site. The Framework Plan has not quantified these measures in detail, and a further round of specialist work will be needed to support this.

In addition, the design principles for including new habitats within streets and public realm are established. This will include planting of native species, wildflower verges, opportunities for new tree planting and the use of building-level biodiversity enhancements such as green roofs and walls, bee bricks, nesting boxes and others.

Climate Change

The Framework Plan provides the basis for new power provision infrastructure on the site to support any new scientific facilities. It is anticipated that such power provision will enable a transition to low-carbon energy. The certainty provided by the Framework Plan will support the funding and delivery of this transformative new infrastructure.

Already in 2022 we have brought online at RAL over 8,000 solar panels with the ability to generate 3,450 megawatt hours (MWh) of energy each year. This is the equivalent to enough electricity to power around 1,100 homes for a year. This will allow us to make a carbon reduction equivalent to 700 tonnes of carbon dioxide emissions per year.



Framework Plan

Overview

The Framework Plan has been informed closely by an analysis of constraints, capacities, issues and opportunities available at RAL, and in the associated STFC 'Big Science Land' to the south. It takes as its starting point the overall Harwell Framework Masterplan (FMP), which sets broad parameters and establishes campus-wide observations. This document provides further detail on the future spatial development of the RAL site within Harwell.

The RAL site needs to be prepared and enabled to respond to any emerging scientific needs. As a result, this Framework Plan is necessarily flexible and agile. RAL is a host of national research facilities, and needs to respond to the UK's scientific environment as a whole to ensure it remains on the leading edge. This context means the detail of built form and phasing required to support this work, particularly large-scale specialist national facilities, is uncertain.

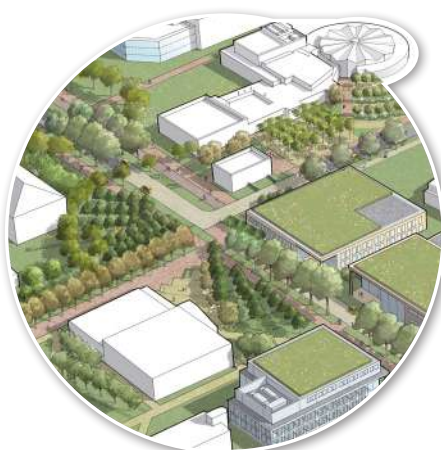
However, to ensure a comprehensive future approach, and to make sure the site can support a wide range of facilities into the future, this framework establishes clearly parameters in:

- » Landscape and views of the site, Green Infrastructure and Biodiversity provision;
- » Movement, including active and sustainable travel, vehicle access, servicing, car parking provision, and perimeter roads;
- » Key built form parameters of plots, heights and architectural design principles;
- » Placemaking and public realm, including streets, open spaces and frontages;
- » Infrastructure provision; and
- » General phasing principles for future development of the site.

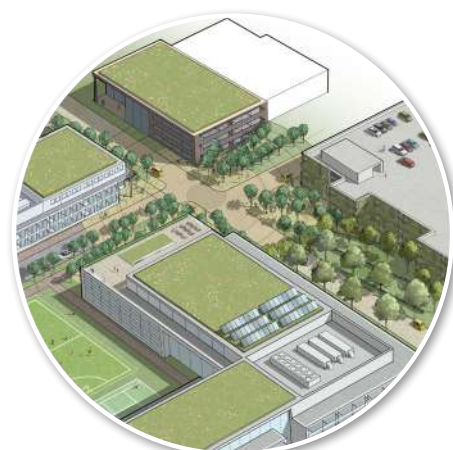
The fundamental purpose of the document is to give clarity on the future anticipated needs of the site, and the co-ordinated approach that will be taken. This will ensure that scientific needs will be balanced with placemaking and environmental sustainability, and to ensure that essential infrastructure can be identified and implemented to enable UK science. It will provide confidence that future detailed proposals fit in with the overall approach, and are maximising the potential of the RAL site.



Illustrative View of Fermi Avenue Gateway



Illustrative View of 'heart of ral'



Illustrative View of Southern Gateway

Development Principles

Underpinning the Framework Plan is a strong set of principles that reflect the ambitions and objectives of UKRI. These principles are grouped into three themes: Science, People and Environment.

The design principles were developed through a collaborative process within RAL, and tested with a number of internal and external stakeholders before being introduced to Vale of White Horse District Council as part of a pre-application process, for further discussion

Science: RAL is primarily a world-class science research facility, and the Framework Plan aims to set out the future principles and spatial development necessary to ensure it remains so. Principles that the Framework Plan sets out are:

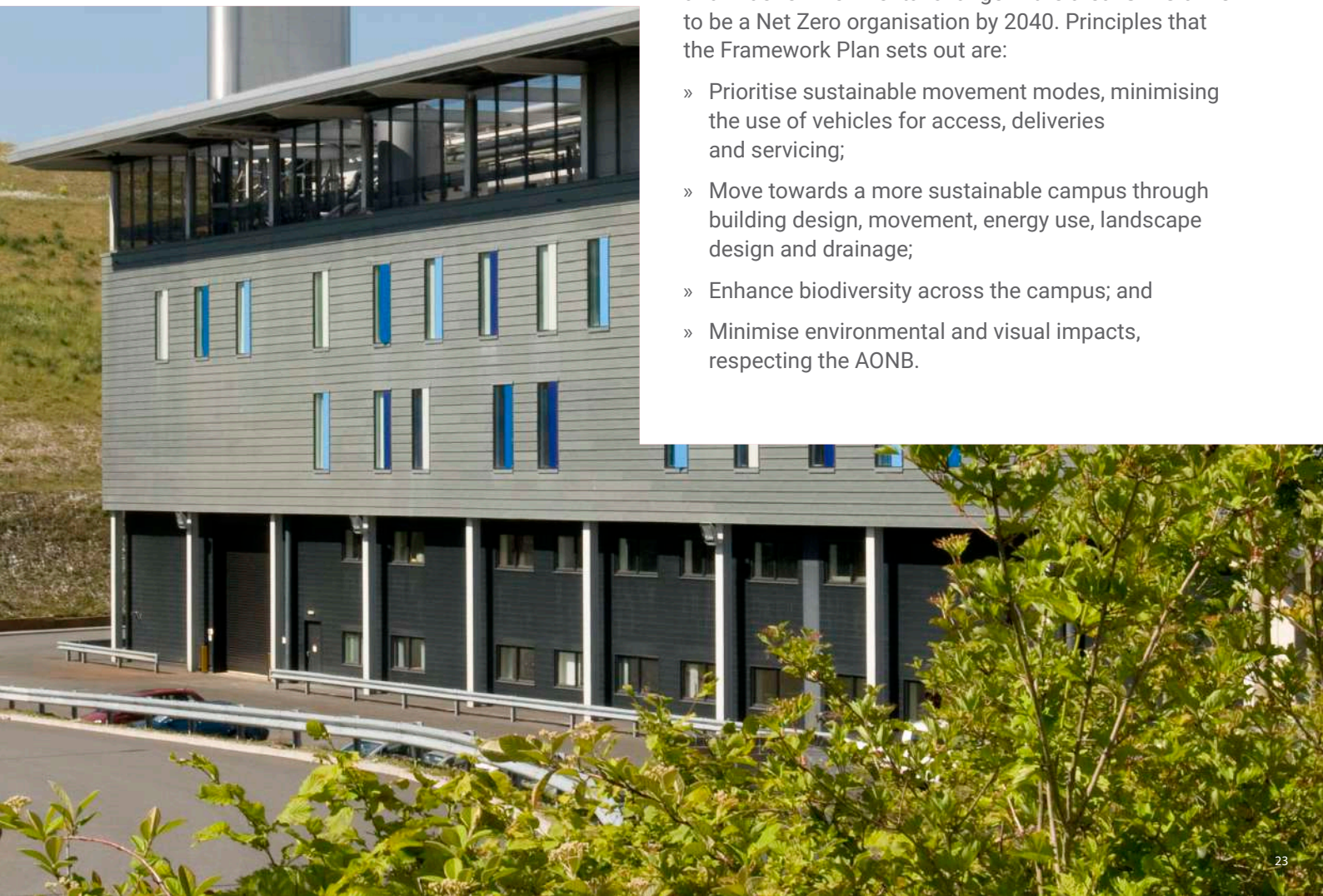
- » Create streets and places, that encourage interaction and communication; and
- » Future-proofing, ensuring the campus can grow incrementally in a structured fashion with flexible plots where servicing and utilities are anticipated and planned for.

People: None of the work at RAL is possible without a highly-skilled, motivated scientific and engineering community. Ensuring people are happy, healthy and enjoy the environment in which they work is a priority for future development. STFC has identified staff retention in STEM as a strategic risk to science and innovation in the UK. Placemaking at key sites, along with transformation of the working environment and experience, will be an important component in mitigating this risk. Principles that the Framework Plan sets out are:

- » Create a people-focused campus;
- » Create streets and places, that encourage interaction and communication;
- » Ensure buildings and spaces support mental wellbeing and support a social hub for the campus and its workforce; and
- » Encourage active life-styles throughout the day, such as walks, recreation and exercise on site.

Environment: Consideration of all aspects of environmental sustainability throughout the construction, operation and management of the site, as well as the external impacts of transport choices and wider environmental change in the area. STFC aims to be a Net Zero organisation by 2040. Principles that the Framework Plan sets out are:

- » Prioritise sustainable movement modes, minimising the use of vehicles for access, deliveries and servicing;
- » Move towards a more sustainable campus through building design, movement, energy use, landscape design and drainage;
- » Enhance biodiversity across the campus; and
- » Minimise environmental and visual impacts, respecting the AONB.



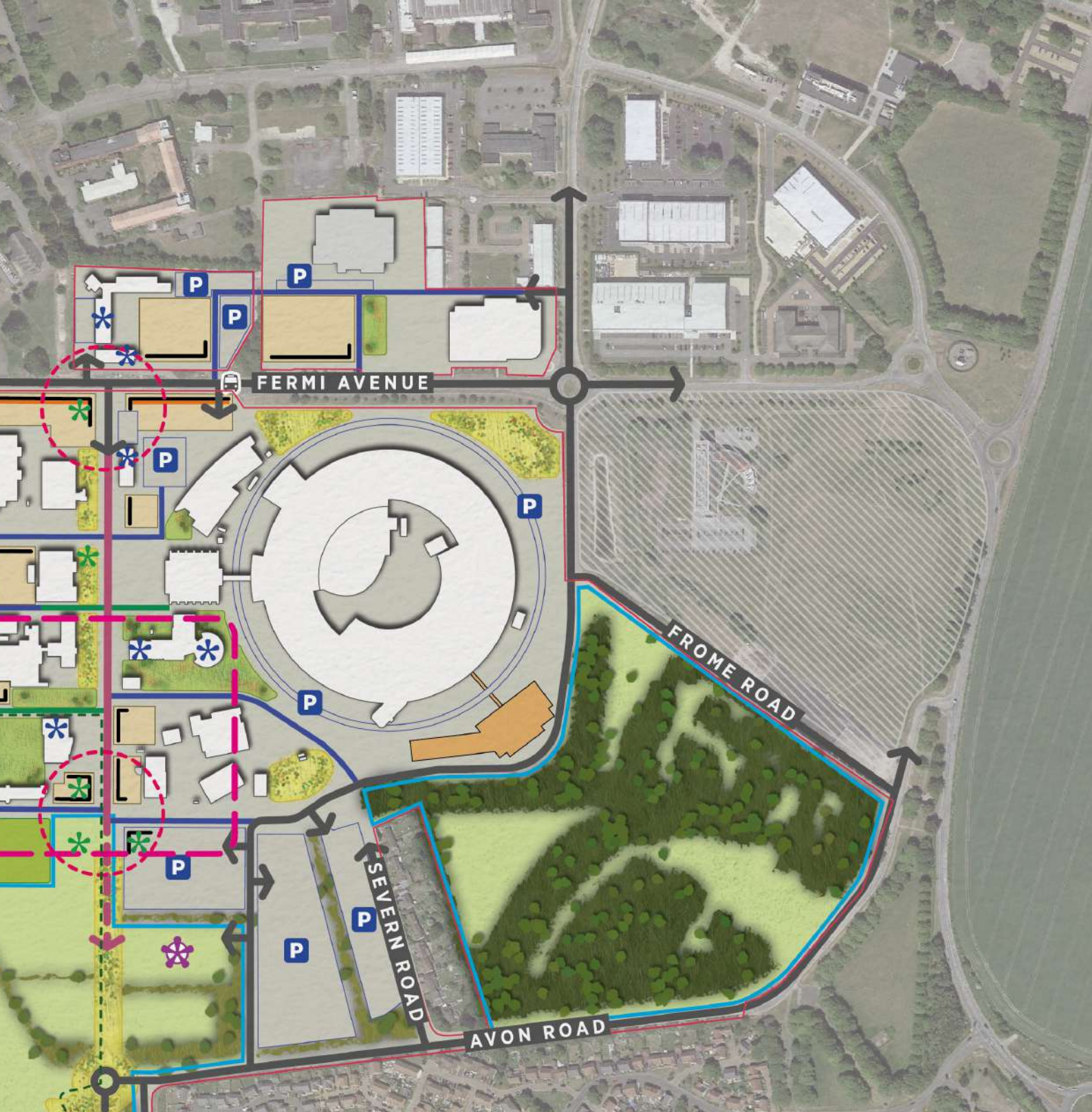
Overall Framework Plan

The overall Framework Plan is set out as a series of land uses, key connections and placemaking principles. These parameters fix the key spatial requirements of the site, and the masterplanning principles that are intended to create a more coherent, attractive and sustainable place.

Site analysis of the current situation, and principles and strategies for each of the main themes underlying this plan are detailed in this section, through a series of layer plans.



Fermi Gate
Development



Emergency Access

Boundaries

— Framework Plan boundary

Development and Built Form

- Existing building
- Committed pipeline building
- Development plot (main site)
- Primary development plot building frontage
- Key frontage to Fermi Avenue
- ✳ Existing amenity building
- ✳ Potential future amenity building
- Safeguarded land for UK large scale science facilities
- Sports facilities

Landscape Framework

- Existing woodland or structural planting
- Future woodland or structural planting
- Other biodiversity enhancement opportunities

Movement

- Public/external vehicle access
- 🚌 Bus stop
- Recreational pedestrian connections
- RAL Avenue
- Multi-modal street
- Pedestrian priority street

Vehicle Parking

🅑 Car park

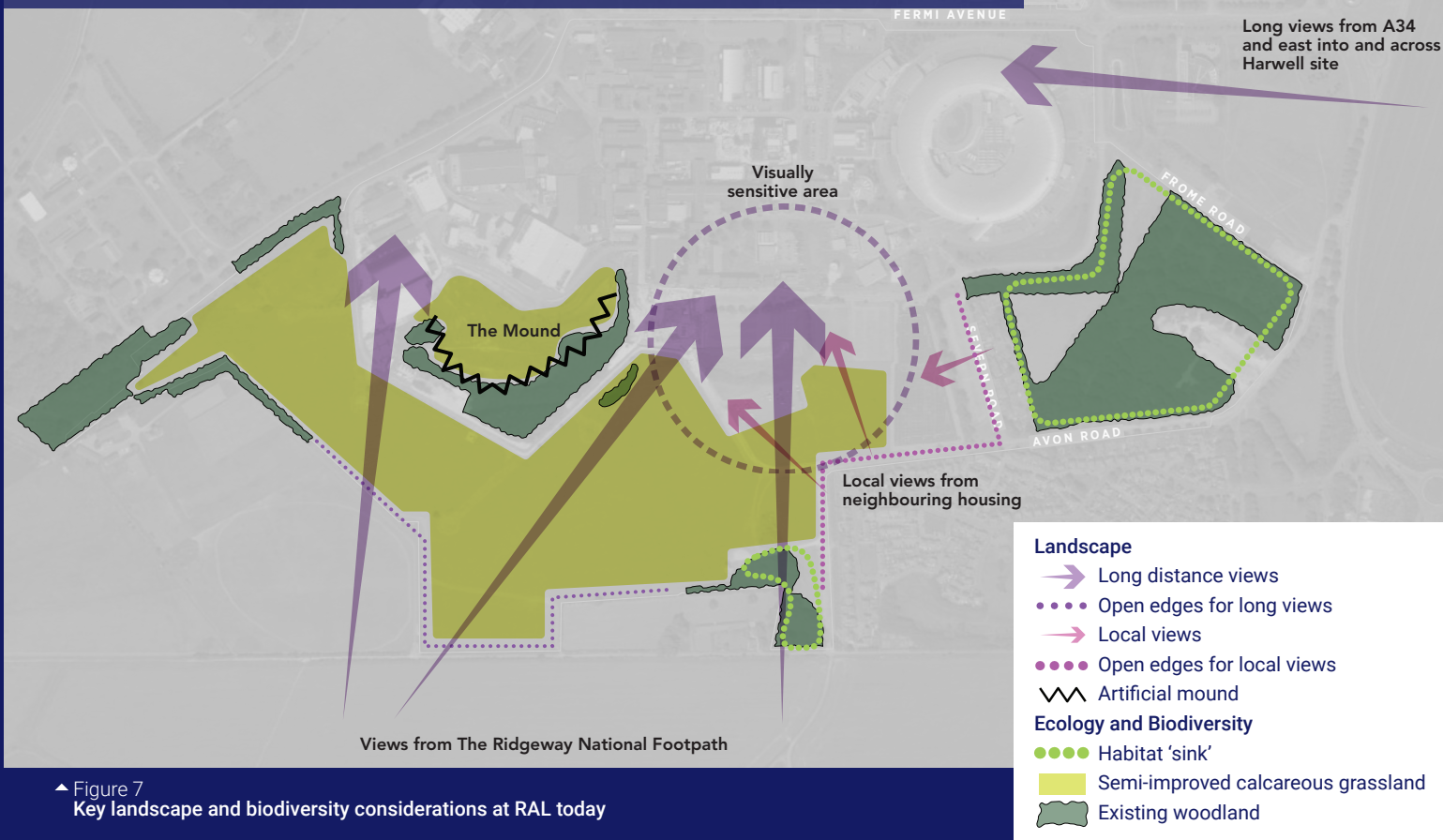
Service and Logistics

- Service and utilities loop safeguard
- ✳ Potential logistics/goods in site

Public Realm

- Open space
- 🌀 Key grouping: gateway space
- 🌀 Key grouping: 'Heart of RAL'

Landscape, Views and Biodiversity



Site Analysis

RAL forms the southern edge of the Harwell Campus, and is visually prominent within the North Wessex Downs Area of Outstanding Natural Beauty (AONB), “a unique and spectacular landscape that includes tranquil open downland, ancient woodland and chalk streams in the centre of southern England.” The grassland to the south is open and there is limited structural planting to screen long views into the site, particularly from the Ridgeway national footpath to the south and south-west, which is elevated on a ridge above the site.

Other important views into the site are from the eastern side, where the Diamond synchrotron and European Space Agency are highly visible. Views from the west are screened effectively by tree belts within the wider Harwell site.

It is important that:

- » Views of the Ridgeway escarpment to the south, including sections of the ancient monument of Grims Ditch on its slopes, are substantially conserved in views from the plain on which RAL sits.
- » Buildings do not appear above the existing boundary tree cover especially in views from the north, east and west and development should nestle within the existing surrounding tree structure from elevated views;

- » The visual green gap should be conserved between the Campus, the A34 and Didcot in views from the escarpment; and
- » Space is allowed for large scale tree planting to break up views of the proposed development and layer up tree blocks through development on site.

The southern edge of the site is partially screened by The Mound, an artificial hill constructed from the spoil of construction of the ISIS facility. Current built form does not complement the overall landscape character and is somewhat incongruous, with a mix of building styles, highly visible materials and visually prominent roofs.

Much of the main RAL site has low biodiversity and ecology value, with mown grass, some ornamental species and limited tree cover. Most of the site is buildings or hardstanding. There are few continuous green networks, particularly along the open southern edge of the site.

Big Science Land has ecological habitats or potential for enhancement. A large area of woodland to the east is an ecological sink (a refuge habitat for fauna moving along green networks), but is of relatively low ecological significance at present. To the south of the site, The Mound and a large area of semi-improved calcareous grassland provides biodiversity value.



▲ Figure 8
Proposed RAL Landscape Framework

Future Framework

The Landscape Framework sets out a number of strategies to ensure new development respects the surrounding landscape and maximises biodiversity opportunities.

Strategic land approach: Land to the south of the current RAL site, owned by UKAEA, is designated as reserved for UK large-scale scientific facilities, and is known as 'Big Science Land'. Like the rest of Harwell, it is within the North Wessex Downs AONB, and is highly visible from the Ridgeway footpath, around 2km to the south. Much of the land is also visible from residential properties at Chilton Field and Severn Road.

The Framework Plan identifies structural planting interventions within Big Science Land, surrounding potential flexible development plots and large-scale facilities. In parts of Big Science Land that are most sensitive to long views and local views, a layered approach to planting is set out to provide multiple layers of softening, particularly for long views from the Ridgeway over rooftops.

Further to the west, the land is less visible from the Ridgeway, and less immediately visible from local residential properties. This land is most suitable for large-scale scientific facilities, and the framework safeguards this land for currently anticipated facilities.

Structural screen planting is located around the potential boundaries of large-scale facilities, and integrated with strategic SuDS, recreational access and considering the visibility of a new perimeter road to provide access to Big Science Land. Further LVIA testing will be undertaken for specific proposals.

Advance planting: Where possible, the landscape framework should be established prior to development occurring. Given the anticipated timescales of funding decisions on major facilities, advance planting of landscape layers could provide effective mitigation once construction begins as the planting would have had time to mature.

Planting within the landscape framework should:

- » be of native species, with a variety of species included;
- » incorporate planting that will grow to different heights, including ground and lower-level coverage;
- » maximise opportunities to create ecological corridors; and
- » be generally natural in style, becoming more formal in planting style for 'layers' that are closer to Heart of RAL.

Building impact mitigation options: Within Big Science Land, new buildings and facilities may need to explore additional landscape impact mitigation options over and above the landscape framework. Potential options include:

- » **Use of appropriate colours and materials:** most buildings within Big Science Land will be viewed against a backdrop of trees or the landscape beyond when viewed from height. Darker, naturalistic colours on all elevations (including the roof) will reduce the apparent visual impact of a building when viewed from a distance. Guidance is available from the North Wessex Downs AONB on appropriate materials.
- » **Localised screen planting:** Buffers of trees located close to larger/taller buildings such as target stations, potentially combined with spoil heaps from excavation to provide additional height and landscape screening. Has potential to screen views from greater distance and height (Ridgeway) more successfully.
- » **Bunding / The Mound:** Localised shielding of facilities with banked earth. This is a similar approach used for ISIS currently with the Mound. Displaced earth could be used to provide bunding between new buildings and Ridgeway views. Any artificial mounding of earth should consider the impact upon the landscape character.
- » **Partial burial:** Banked earth with facilities located within, with natural habitat on top facing towards Ridgeway.
- » **Full burial:** Tunnelling potential for some facilities, with occasional or limited above ground facilities that can be locally screened.
- » **Green roofs:** Biodiverse roofs, employed in a number of physics facilities in Europe, allow buildings to reduce '5th elevation' impact and improve environmental performance with minimal maintenance.
- » **Green walls:** use of low-maintenance solutions for planting on building elevations can reduce visibility of larger buildings.

Further LVIA testing will be undertaken for specific proposals.

Local boundaries: The southern boundary of the site adjacent to Avon Road is currently open with views up the hill to RAL, with some new planting visible. Houses back onto the road, with private gardens of approximately 20m depth between homes and fenced boundaries.

This boundary needs to provide additional visual screening for residential homes, as well as improve the quality of Avon Road to ensure it can be used by service vehicles to access Big Science Land and the southern part of the site. Design principles include:

- » localised screen planting between existing properties and Avon Road;
- » a mown edge to Avon Road, with opportunities for wildflower planting further away from the carriageway and footways;
- » structural planting on the north side of Avon Road, to potentially accommodate a footway or cycleway within;
- » a setback of buildings from the northern edge of Avon Road,
- » minimal lighting on carriageway as necessary to maintain vehicle safety; and
- » lower-height lighting along footway/cycleway to maintain pedestrian safety.

Lighting: As the southern edge of Harwell Campus, RAL has an outsize impact on the AONB through lighting. The impact of lighting design on the character of the surrounding AONB is a key part of the landscape framework. A holistic approach, balancing lit impression and light pollution, will be a central theme in any design approach.

Lighting design will be sensitive to the surrounding area and its users. It will seek to:

- » enable users to move about the site safely, helping to alleviate the fear of crime, and to easily identify main entrances to each building;
- » minimise light spill and glare, to minimise impact on local sensitive areas (including residents, ecological receptors, and the surrounding natural landscape);
- » meet the high aspiration of the North Wessex Downs AONB document 'Dark Skies of the North Wessex Downs, A Guide to Good External Lighting' of making 'a very positive contribution to the conservation and enhancement of an AONB';
- » consider all potential light sources, including exterior lighting, public realm and light spill from building windows.

Biodiversity Net Gain Approach: STFC will enhance and improve biodiversity where projects have unavoidable impact upon the natural environment.

Where Biodiversity Net Gain is required, this shall be achieved in the following hierarchy of priority:

1. On site
2. Locally (i.e. adjoining to site or nearby corridor creation)
3. Within Planning Authority area
4. Within STFC's land portfolio
5. Via government BNG credit scheme

When considering local enhancement, two approaches are identified:

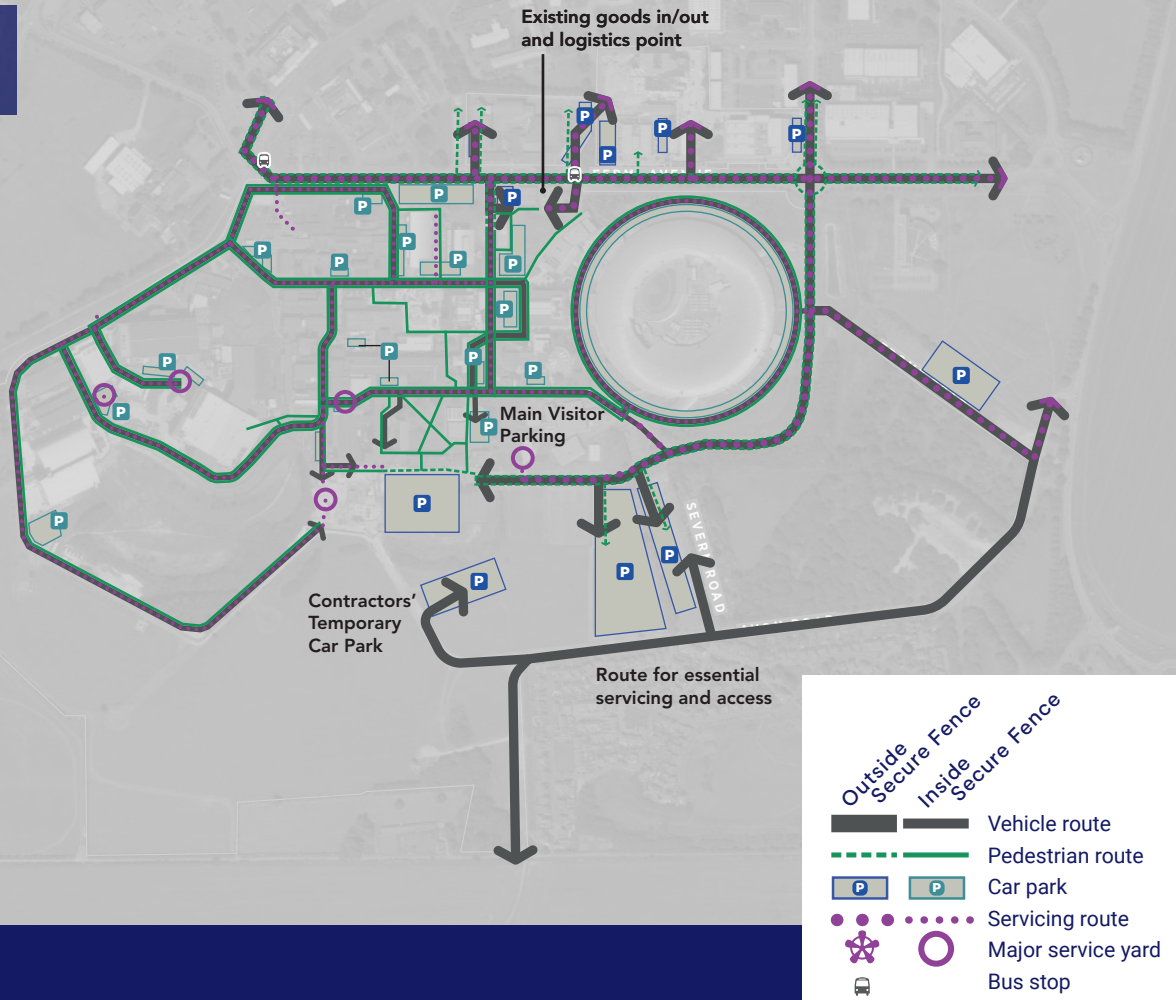
- » **Large-scale:** large currently un-used areas of the campus where small interventions and management could enhance native habitats and biodiversity potential. As well as those identified by STFC's ecology consultants as part of their baseline survey, the Framework Plan identifies areas across the site where this could occur without conflicting with future development requirements.
- » **Small-scale:** there are opportunities within streets, open spaces and key locations for habitat creation as part of the public realm of the campus. These vary from native planting and street tree opportunities through to management for wildflowers in street verges.

General principles for increasing biodiversity across the site are:

- » A patchwork of different habitats across the site, working together to be replicated in a way that they would be seen in the natural world, can be more valuable than repeating the same habitat creation strategies everywhere in RAL.
- » All planting species used should be resilient to the effects of climate change. Native species should be prioritised at natural edges to the site, whereas a mix of more ornamental species may be used in more formally landscaped areas.
- » Networks of connected habitats are more valuable than isolated habitats.
- » Accessibility of habitats, and lighting levels, should vary across the site, to provide refuge for nature away from people, as well as providing spaces where users can come into contact with nature.
- » Seasonality of planting to be considered, to provide additional interest.

Some land set aside for potential use by UK large-scale scientific facilities is currently grassland with a higher ecological value than the rest of the site. The uncertainty and long-term nature of such facilities means that this land should be set aside from the land available for RAL's general strategic habitat creation needs. Should new facilities come forward on this land, a bespoke biodiversity net gain strategy would be created for it alone.

Movement



▲ Figure 9
Movement at RAL today

Site Analysis

Vehicle access to the site is split, with visitors and contractors arriving at the main reception on Fermi Avenue, staff mostly using Road 7 (along the eastern and southern edge of Diamond Light Source) to access the main staff surface car parks (accessed either by Fermi Avenue or Frome Road), and goods deliveries using the logistics entrance on Fermi Avenue.

Bus services to Oxford and Didcot serve RAL along Fermi Avenue, with a bus stop near the Electron building. Services run frequently, and there are few bus priority measures on the wider network.

STFC and the wider Harwell JV continue to work closely together on transport matters. Both use the same access infrastructure and have similar issues in providing feasible sustainable travel alternatives for staff on site.

Vehicles are able to move freely throughout the site, and highway infrastructure is dominant in the public realm.

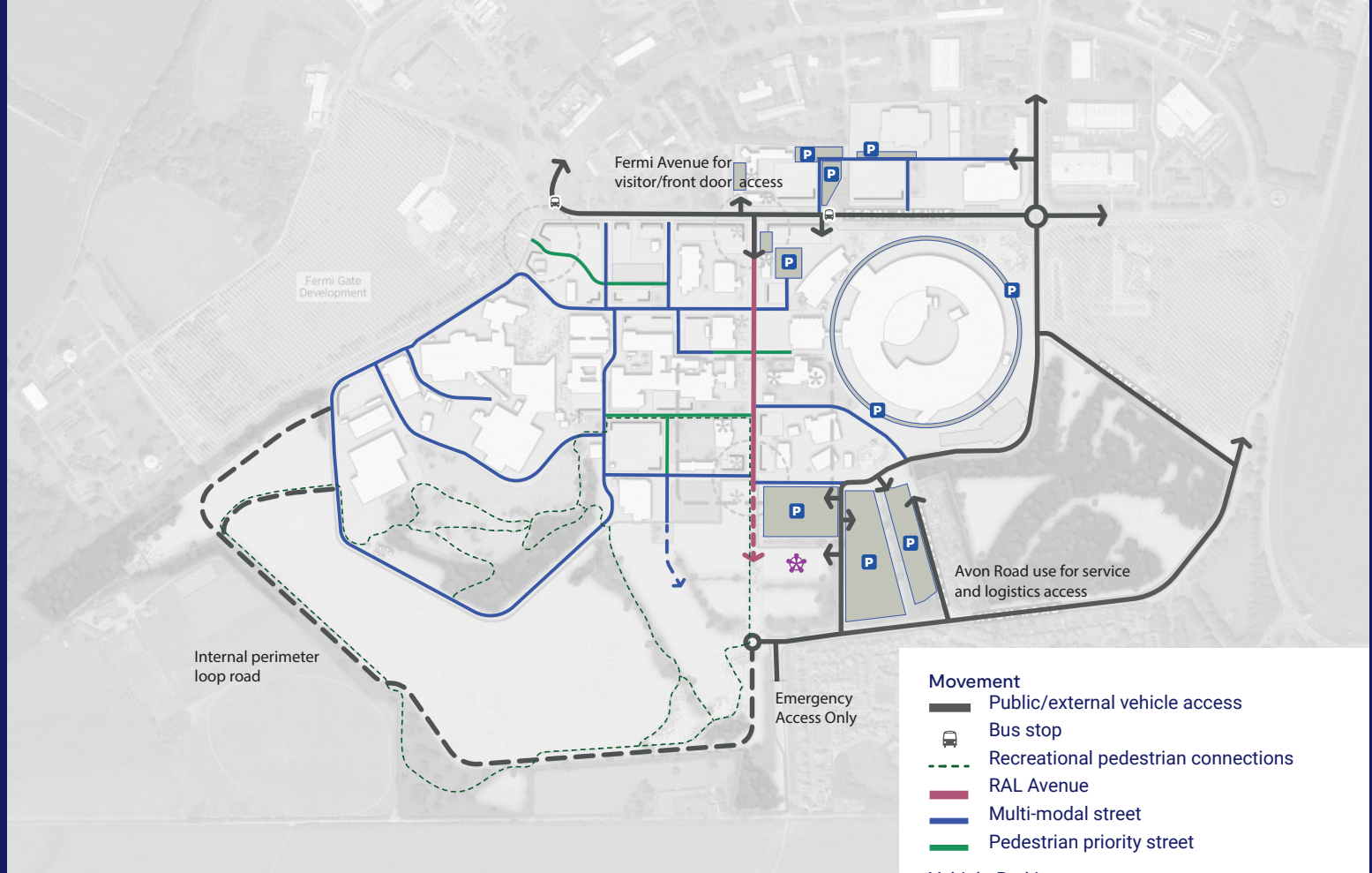
Roads are similar in appearance and scale.

Pedestrian movement covers the whole site, but often on the edges of carriageways. Pedestrian entrances from car parks are functional. Car parking uses a significant amount of land and defines the character of much of the public realm.

Cyclists have to arrive via vehicle entrances, as turnstiles for pedestrian access cannot accommodate bicycles.

Servicing of buildings can dominate the public realm, with major pedestrian desire lines through service yards or operational streets, and service entrances facing onto primary areas of public realm.

Adjacent to the site are a small network of roads such as Avon Road and Severn Road which provide emergency access, construction access or access to homes near the site. They are not extensively used and have a mix of surfacing materials, and are mostly without kerbs.



▲ Figure 10
Proposed RAL movement framework

- Movement**
- Public/external vehicle access
 - Bus stop
 - - - Recreational pedestrian connections
 - RAL Avenue
 - Multi-modal street
 - Pedestrian priority street
- Vehicle Parking**
- P Car park
 - service and logistics
 - - - Service and utilities loop safeguard
 - ★ Potential logistics/goods in site

Future Framework

Beyond the boundary of the site, RAL fits in and co-ordinates with the Harwell FMP’s movement strategies. The principles set out below add further detail to how movement within the site will be handled in the future, and what new development will comply with.

Sustainable travel priority in site: STFC’s wider transport and sustainability strategies encourage sustainable modal shift for those arriving at the site. Within the site, active and sustainable modes of mobility will be the norm and encouraged through the improvement of streets, and provision of cycling, walking and micro-mobility infrastructure. This strategy is integrated with the public realm and placemaking strategies outlined later in this section

Cycle and micro-mobility parking will be integrated conveniently throughout RAL as part of streets, buildings and open spaces. A small number of cycling hubs near entrance gateways will contain all facilities to support cyclists, including covered, secure parking, lockers, shower facilities either as part of the building or nearby, and space and facilities for maintenance.

Secure storage for bicycles will be considered within new buildings. Cycle charging points for e-bikes may be provided, along with space for bicycle maintenance.

Car parking: Car parking will be considered as a ‘pathway’ towards the goal of a mostly internally car-free site, except for disabled and other essential operational parking and vehicle movements. By setting out a footprint for parking, replacement of existing internal car parks can be undertaken as the opportunity arises. In places, away from sensitive edges of the site, this parking footprint could support 2 additional decks of parking.

New decked parking should be light, clean and secure. Use of natural materials or screening on exterior walls reduces visual impact, and clear entrance points into car parks from RAL Avenue should be provided. Provision for EV charging will be included in all new and upgraded car parks.

The STFC Travel Plan has actions to shift to sustainable travel modes for staff and visitors. The success of this will be monitored on an ongoing basis to understand the potential for reducing car parking requirements.

New developments will not provide general staff parking within the plot. On-plot parking should be provided for essential operational requirements and disabled/accessible parking. Service parking should be integrated within a service yard, away from main pedestrian routes and streets within the site.

Disentangling servicing from visitors and staff vehicle movements: at present staff, servicing and visitor vehicle movements overlap and conflict. By implementing the Framework Plan, visitors would arrive at RAL's current reception on Fermi Avenue, staff parking would be accessed along Road 7 leading to the southern side of the site, and delivery vehicles would be able to access the logistics/goods in building via either Frome Road/Avon Road, or Road 7. Each would be separately signposted.

Internal movements within the site will be greatly simplified and rationalised. As staff parking is moved outside the security fence, internal vehicle movements will be operational and logistics. These will be concentrated on multi-modal and service streets concentrated to the periphery of the site. Vehicle movements will be discouraged from accessing the core 'Heart of RAL' area (see placemaking strategies later in this section). This ensures a significant proportion of the site can be given over to people first, with public realm and materials designed for human needs rather than those of traffic.

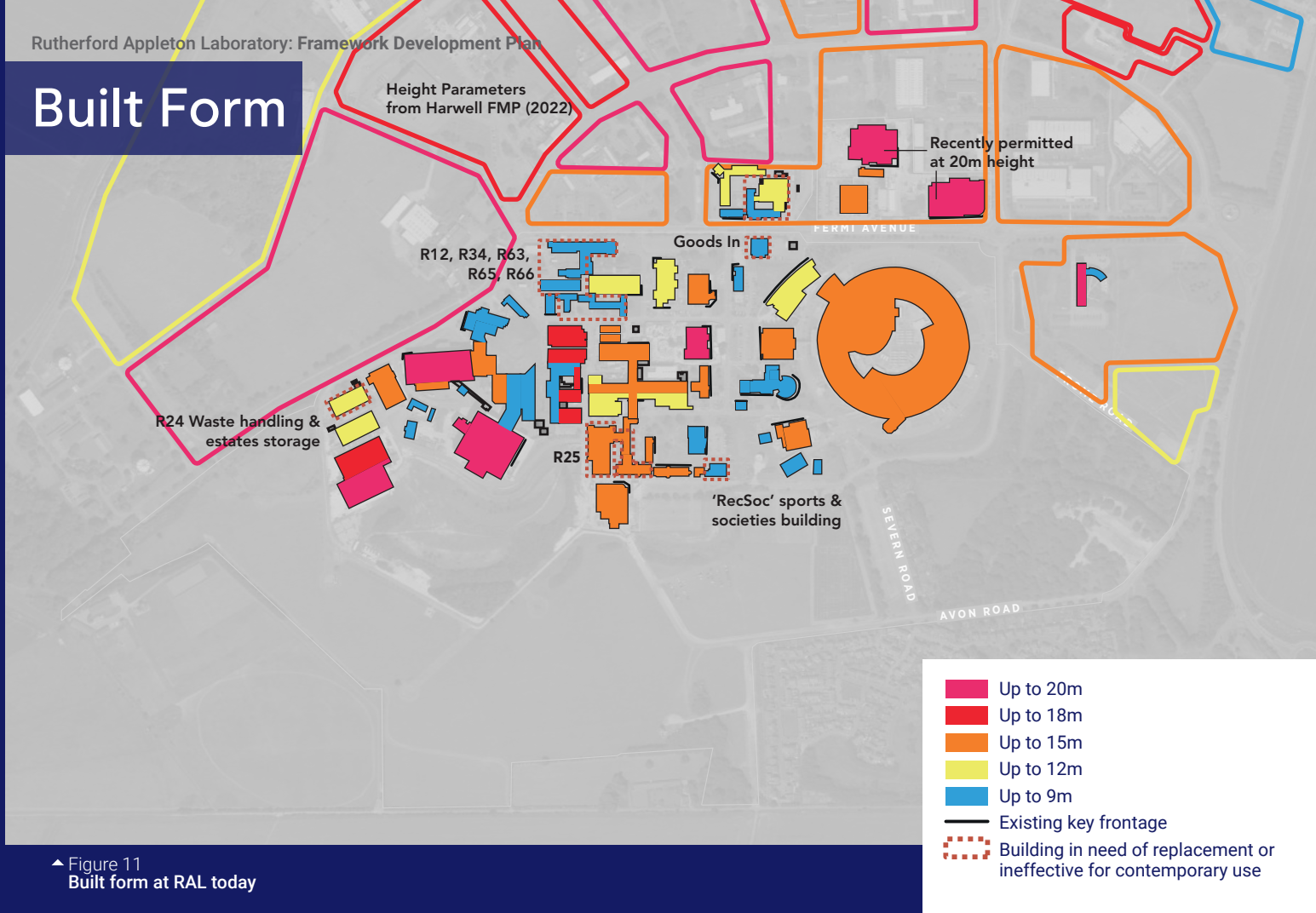
Security and movement: RAL is a secure site and will remain so. At present there is a security fence and limited controlled entrance points.

Recreation: Healthy lifestyles are an important part of STFC's strategy for improving the quality of RAL for staff and visitors. Recreational routes are identified as part of the landscape framework to provide a variety of environments for staff and visitors to use. The 10 principles of Sport England's 'Active Design' guidance set out how the built environment can support active and healthy lifestyles, and should be reflected in any new development.





Built Form



▲ Figure 11
Built form at RAL today

Site Analysis

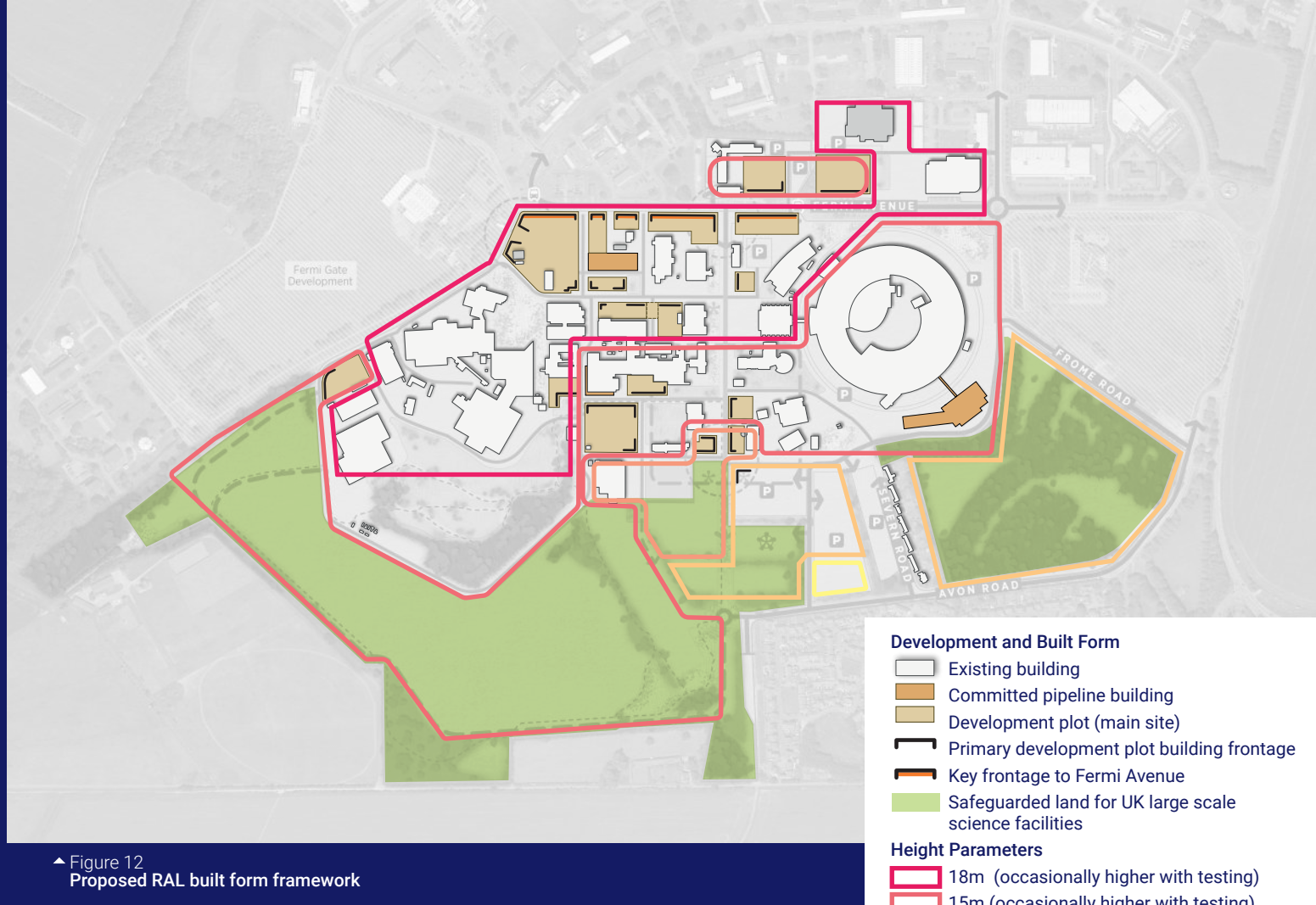
The site has a mix of building forms, ages and conditions, reflecting its heritage as a research facility since the 1950s. The estate has a significant number of buildings in comparatively poor condition, and a considerable number that are no longer effective for their current use. Some 45% of building stock is either condition C (deficient) or D (poor) and should be replaced or refurbished soon to allow successful research to continue.

Much of the site feels like a series of individual buildings rather than having a cohesive campus approach to materials, scale, detailing or even clustering of typologies and uses. There is often no clear distinction between building types, and no clear visual indication of entrances.

Older buildings are typically low-rise, with low plot ratios, and make inefficient use of land. They are typically surrounded by parking and servicing yards.

Newer buildings are typically 3-4 storeys, some with basements, and are of functional modern construction. There is no consistent design language in many recent buildings.

Building fronts and backs are not arranged consistently, with service yards facing towards main entrances of neighbouring buildings. Buildings front onto the main street from reception towards the restaurant and visitor centre, although there is not a consistent building line.



▲ Figure 12
Proposed RAL built form framework

Development and Built Form

- Existing building
- Committed pipeline building
- Development plot (main site)
- Primary development plot building frontage
- Key frontage to Fermi Avenue
- Safeguarded land for UK large scale science facilities

Height Parameters

- 18m (occasionally higher with testing)
- 15m (occasionally higher with testing)
- 12m (occasionally higher with testing)
- 12m
- 9m

Future Framework

The principles set out below add further detail to how built form within the site will be considered and developed in the future, and what new development proposals will comply with.

Building Heights: Building height ranges are set out, responding to a number of influences:

- » Tested parameters set out in the Harwell Framework Masterplan (2022).
- » Submitted Outline Planning Application parameter plans for Fermi Gate.
- » Precedent buildings along Fermi Avenue and EPAC.
- » Sensitivity to the southern edge at Avon Road.
- » Potential flexible operational requirements of new facilities.

Heights set out are an accepted and tested height through the Harwell FMP and other work. To ensure flexibility, where it is required by operational or scientific requirements taller heights would require additional visual impact testing before approval. Any such work should be undertaken at an early stage, as part of a pre-application discussion with VoWH DC, before committing to building massing and concept.

It is not intended that the whole zone is built above the specified height, instead this approach is set out to ensure flexibility for operational requirements for occasional taller buildings.

The maximum building heights are above ordnance data and pertain to the maximum height of the building roof level, including plant. Occasional non-intrusive plant, flues or antennae may exceed the stated maximum building heights provided that they are located to reduce visual clutter and appropriate design, screening or visual mitigation (if necessary) is provided so that they do not form a continuous visual block.

Occasional reviews of the cumulative impact of development, particularly on Big Science Land to the south-west, should be carried out.

Frontages: Buildings will be arranged so that 'key frontages' face towards streets with pedestrian-priority or pedestrian facilities. Ideally this will front onto a primary or secondary open space.

The design of key frontages should be considered with special care, due to their importance to the overall campus aesthetic. Where absolutely necessary for operational or scientific reasons, key frontages may contain service doors or entrances, but their design must be considered carefully to minimise any impact these have on these frontages. Use of landscape features, materials or architectural design can lessen their impact.

Security: All new buildings should be designed so that they can be secured with building-level security, and should not rely long-term on the security fence being in place. The number of external entrances should be kept to a minimum, ideally with a primary front door and a single service bay.

Internal space provision needs to allow for a staffed reception and potential security gates. Equipment should be secured within buildings, and not located outside in cages or similar where practical.

Architectural design language

A series of principles are set out below to ensure a more consistent and legible environment through building design.

- » **Building layout:** Innovation hubs/science campuses tend to be organised in one of two ways, the head and tail approach (multiple uses in one building) or the farmhouse and shed approach (separate uses). Due to the nature of RAL, both of these approaches are already existing and should be utilised further, allowing each plot to reflect its use.
- » **Façades:** Creating different character groups helps add a structure and framework for each building's aesthetic to follow. This can be applied to either whole façades or parts of, and will enable a clearer understanding of the function of the spaces within. The character of each building can, in turn, help to improve the legibility around the site. Character types of Frontages, Backs/Servicing and Feature Buildings are set out on following pages.
- » **Sensitive façades:** Careful consideration is to be given to the design of façades facing sensitive uses such as the Ridgeway and residential areas to limit overlooking and light spillage. Careful internal planning to locate highly-populated functions away from these façades is to be considered. Reduced window sizes, incorporation of louvres and planting buffers could all be utilised to mitigate any impact these might present.



Precedent example of design for sensitive facade

- » **Entrances:** Main entrances to each building need to be clearly legible and easily identified within the streetscape through the use of recesses, canopies, lighting, materials and colour. The main entrances should be located along a key active frontage, as described for each plot within the development plan. Where appropriate, a higher level of visibility should be allowed for in these areas with inclusion of further glazing. The use of clear signage should aid legibility.
- » **Plant:** Plant should be designed into the overall composition and design of buildings wherever practical. It should be integral to the design such that it is perceived as part of the intended form and shape of a proposed building. If located at roof level, it should be set back from the building edge where possible. Where plant is located at ground level, it is to be shielded from view with screening, and located away from the main building frontages. All plant must be accessible for servicing and maintenance.
- » **Roofscapes:** Roofscapes act as a fifth elevation and appropriate consideration should be given to these. The use of green and brown roofs may be considered.



Precedent examples of screening of roof plant



Precedent examples of entrance design

Building Character Types

Creating three different character groups helps add a structure and framework for each building's aesthetic to follow. This can be applied to either whole façades or parts of, and will enable a clearer understanding of the function of the spaces within. The character of each building can, in turn, help to improve the legibility around the site.



Character 1 – Frontages

Active frontages can create a visual link to the activity within the buildings and offer opportunities to interact with the landscaping and surrounding context. The fronts of each building should be easily identified, with a human scale to them. Glazing should be considered to connect the internal and external environments, improving legibility to the spaces beyond. These characters should provide elements of active frontage, highlighting entrances and shared amenity spaces.



Character 2 – Servicing

These façades incorporate both functional uses and service areas. The design of these should respond to the use within and can be of a calm, utilitarian aesthetic. They should be industrial and robust in design. From simple metal clad sheds to more articulated façades in front of labs and office spaces, these façades should respond directly to the internal use within. Consideration should be given to flexibility and how these spaces might adapt and change over time, incorporating cladding systems that can easily be reconfigured or reused where possible.

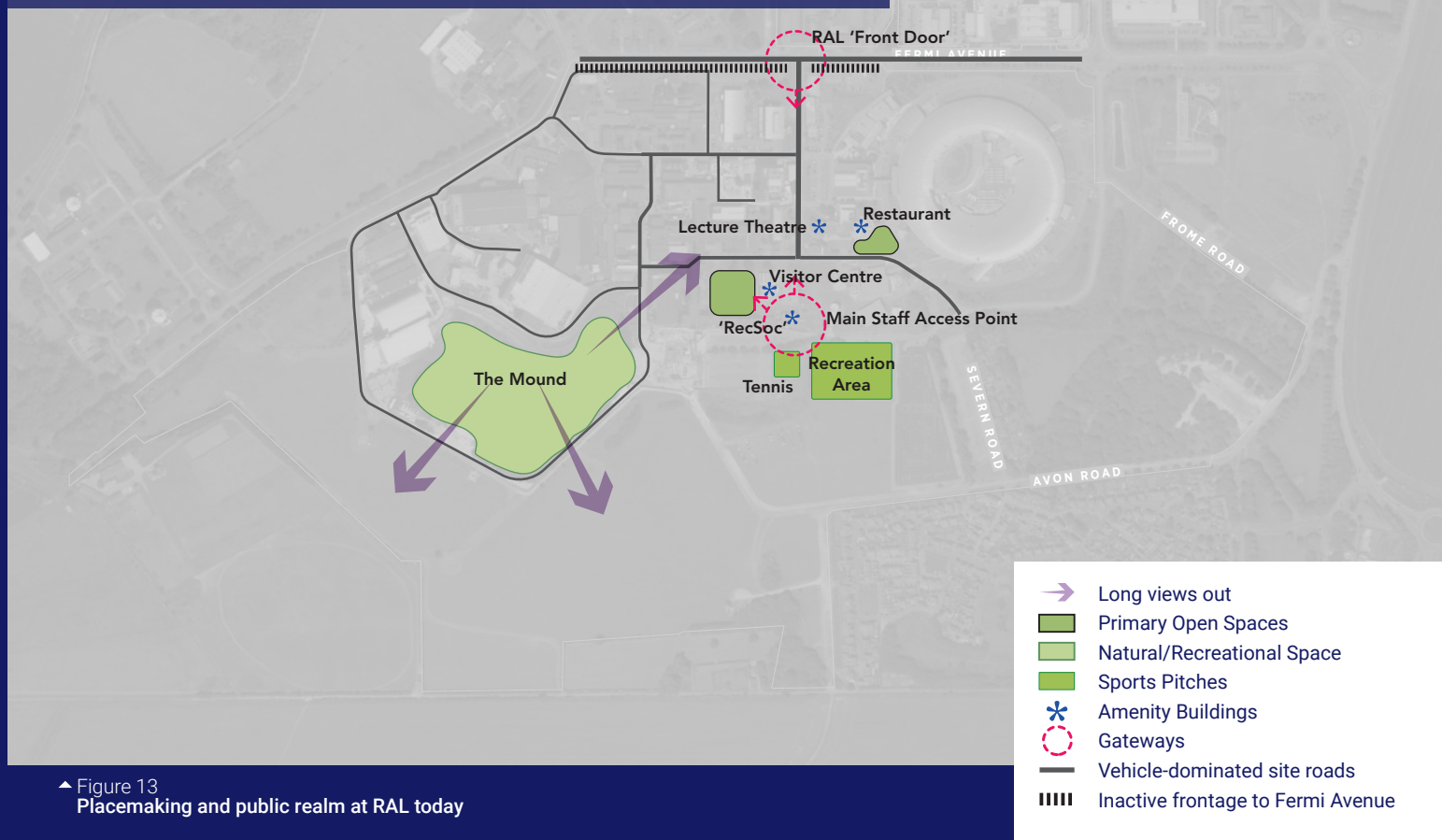
Character 3 – Feature Buildings

These buildings should be the focus of the campus and highlight the communal amenity uses that happen within. They should have a human scale to the façade, and appear more playful in character with distinct designs to help identify these within the campus and improve legibility around the site.

These buildings should have a clear connection to the surrounding landscape and feel welcoming and inviting for all.

The majority of the existing amenity buildings could be improved visually to help distinguish them from the other campus buildings. This could be achieved through vinyl infographics, additional landscaping around these plots or through future extensions and redesign.

Placemaking and Public Realm



▲ Figure 13
Placemaking and public realm at RAL today

Site Analysis

RAL is a historic site with a long history of science, however the spaces between the buildings have not benefited from the same innovative energy that happens within. The majority of the RAL site is functional, with basic planting and most space given over to hardstanding, carriageways, service yards or parking. Some landscaping exists, primarily near newer buildings. As a result there is no obvious street hierarchy, which gives the site poor legibility and means there are few memorable places that have defined characters and uses.

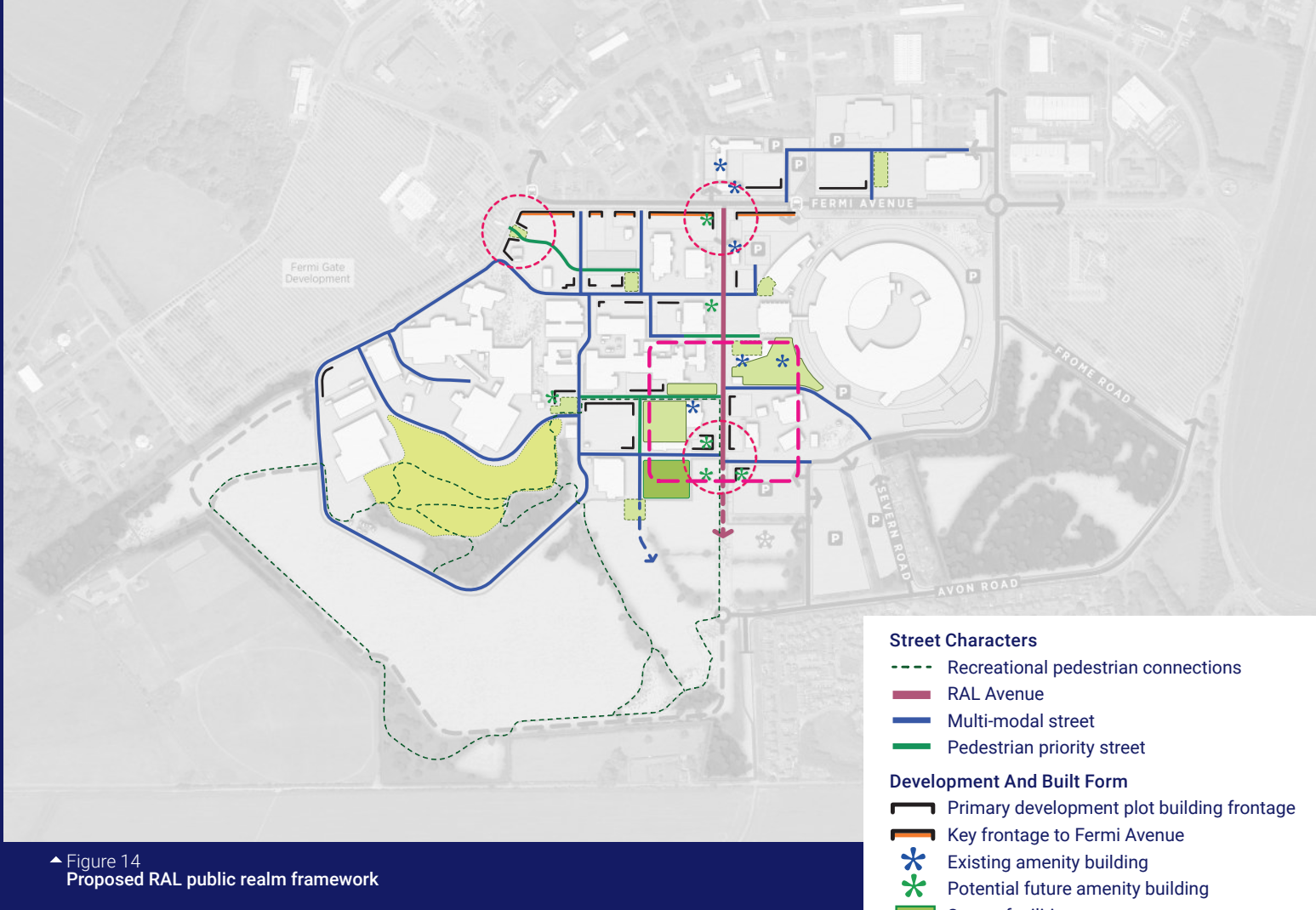
RAL has two key areas where there is a higher standard of public realm and placemaking:

- » the green to the north of R68 and south of R1, with grass, planting and some seating areas and pods; and
- » The area to the south of the restaurant, with outdoor seating, planting and hard landscaping.

There are some open spaces designed for outdoor seating, meeting or other use by people. The Mound is accessible and there are paths and benches. Green infrastructure is mostly amenity grass, with some trees, but there is no consistent landscape design language.

Entrances, edges and gateways do not create a strong impression or connection to their surroundings. Wayfinding is complex for the unfamiliar. Buildings are numbered and there is a consistency in signage of numbers on buildings, but finding locations within the site can be difficult due to incomplete or inaccurate directional signage. Landmarks or distinctive buildings for directions can be unclear.

There are sports pitches to the south of the site, near the car parks, and though the amenity/recreation building ('RecSoc'), remains a popular centre of social life on the site, it is undersized for the population it serves.



▲ Figure 14
Proposed RAL public realm framework

Future Framework

Public realm at RAL will be progressively transformed to prioritise people first, and with a series of distinctive, high-quality spaces for meeting, relaxing and events. It will form the connective 'glue' between departments and individuals working across the site.

Hierarchy of streets: Street types in the Framework Plan are set out as a hierarchy, based on their importance for pedestrian movement and placemaking. Pedestrian movement is prioritised at the top of the hierarchy, and vehicle and service movements are more prominent lower down. At the top of the hierarchy, RAL Avenue brings the site together and hosts key amenity buildings. Pedestrian-priority streets connect RAL Avenue to key destination locations within the site. Multi-modal streets are important movement corridors shared by most modes on site. At the bottom of the hierarchy are service roads, providing essential access to facilities but not considered core placemaking or pedestrian movement opportunities. All streets, except service roads, provide the space and opportunity to include street trees or green infrastructure, although this will be subject to no conflicts with existing utilities.

Hierarchy of spaces: Open space types in the Framework Plan are arranged as a hierarchy, based on their importance as a destination and use for the overall site. At the top are primary spaces, intended to be used regularly by all at RAL. Further down are destination spaces, used by those departments and buildings in the immediate vicinity, followed by incidental spaces that are mainly used by the adjacent building.

Design principles for all space are:

- » safe, accessible and legible (easy to understand);
- » overlooked and with passive surveillance, ideally with main entrances facing onto them;
- » maximising opportunities for new habitats and biodiversity and the public realm which contribute to the overall site aspirations in line with the design guide;
- » robust, resilient, sustainable and fit for purpose; and
- » designed with a clear purpose or activities in mind.

It may be necessary to consider additional security precautions in the public realm. Guidance on locating Hostile Vehicle Mitigation (HVM) protective features sensitively into the public realm has been prepared by the Centre for the Protection of National Infrastructure (CPNI).

In addition, natural spaces for wider recreational use have been identified. These provide a different environment for users, and integrate with the wider biodiversity and landscape network.

Several key locations for public realm transformation are identified, which would have an outsized effect on the overall quality of placemaking on the site due to their prominence. These are:

- » 'Heart of RAL', a central location for amenity uses linking primary spaces and straddling RAL Avenue;
- » Gateways at Fermi Avenue, Fermi Gate and the southern staff entrance, where RAL connects to the outside world; and
- » Fermi Avenue frontage, turning a poor quality edge into an outward-facing location that connects with the rest of the campus through building design language, landscaping and public realm.

These locations will be prioritised for implementation under the Framework Plan's principles.

Sports Facilities: the recreation facilities at RAL are popular and well-used, and it is STFC's intention to retain and enhance this. The Framework Plan envisages the potential reconfiguration of outdoor sports pitches to connect to a new indoor sports hall to enhance provision. Any reconfiguration would ensure that provision is retained or enhanced, and land is safeguarded for this purpose.

Wayfinding: The overall wayfinding strategy centres around passive legibility. Creating streets with different characters will improve the currently legibility of the site. In addition to this, the design of the key target points and associated building frontages around these will also help with legibility. Additional signage (in a coherent design language to be developed) at key intersections should add to this.

Any new signage should be concentrated along RAL Avenue. Directional posts pointing east and west could be located on the Avenue as you move up a "ladder" from the south to the north.

Public art: The use of public art within the public realm can form an important part of placemaking, helping to express the work and character of RAL to staff and visitors, and aid legibility if positioned in key locations.

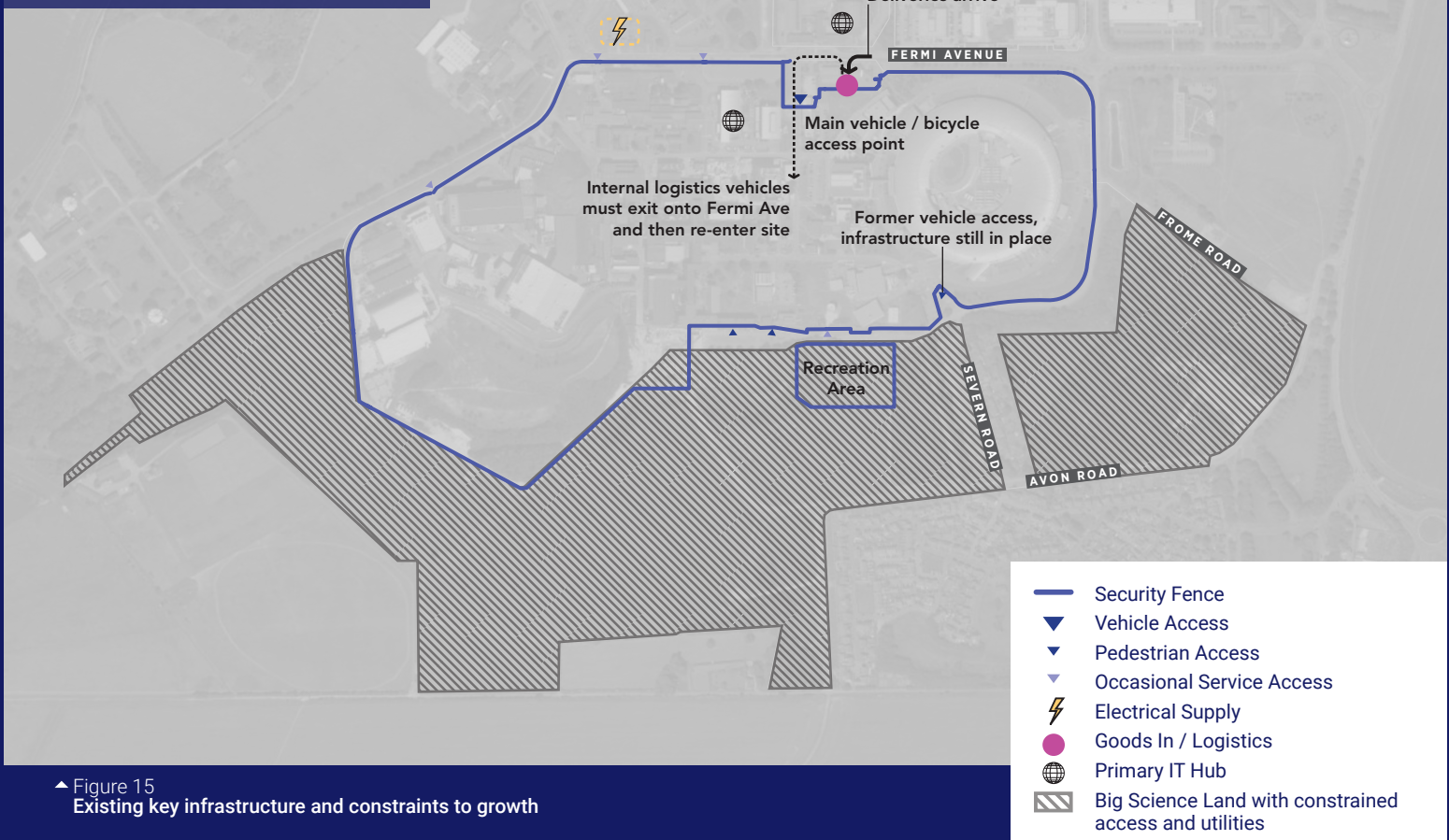
As well as general opportunities within key open spaces, there are particular locations within the campus which would benefit from locating public art to reflect nearby buildings and the work that happens in the immediate area. These form part of defining distinctive characters around RAL. Celebration of historic moments at RAL, or the heritage of the site as an RAF airbase, is another good placemaking opportunity. There is an opportunity to use heritage equipment from iconic past science undertaken at RAL as part of a public art strategy and as wayfinding cues.

As part of the implementation of the Framework Plan, STFC is developing a RAL public art strategy to cover the whole site.





Infrastructure



Site Analysis

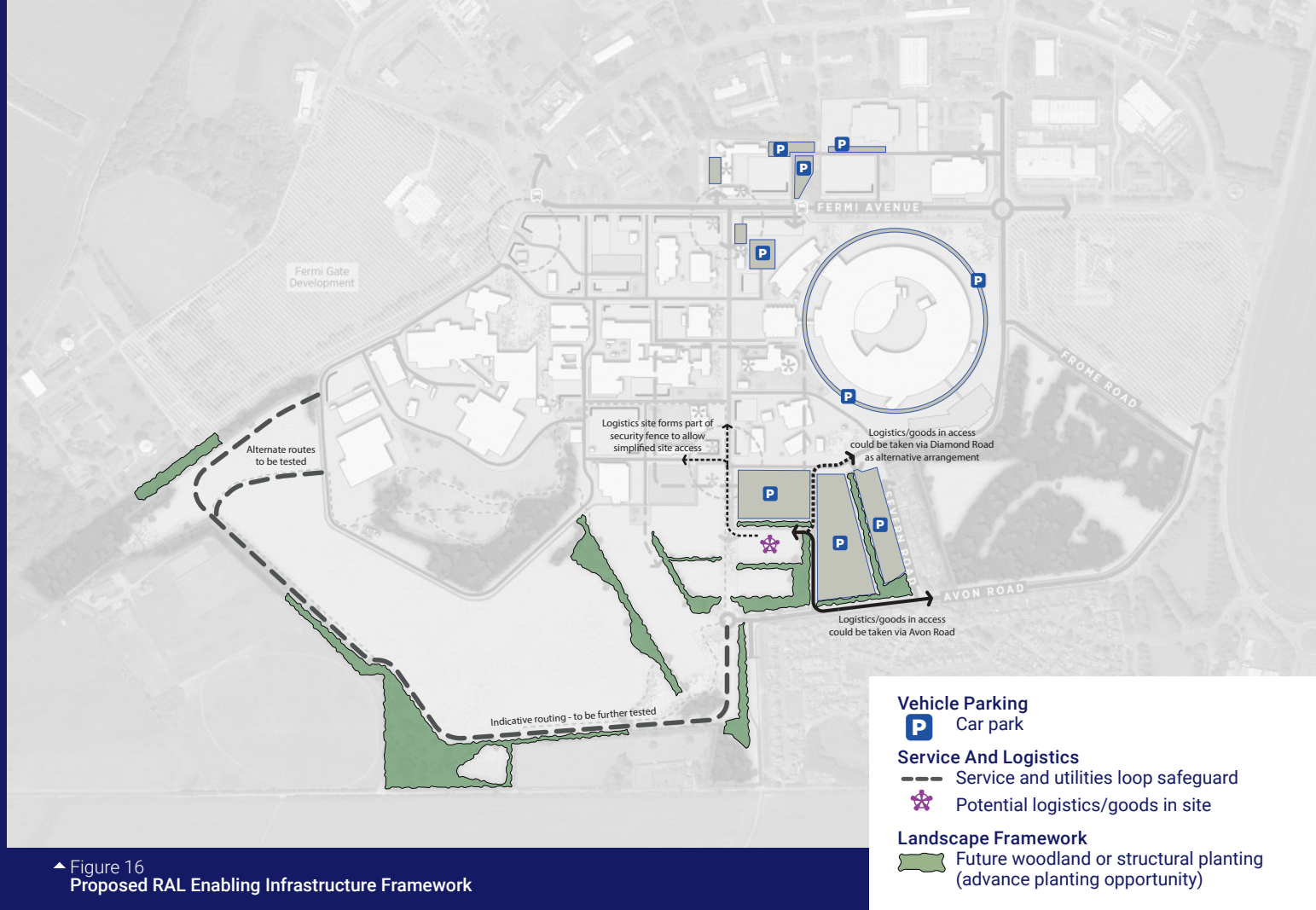
Electrical power is provided by a single substation to the north of Fermi Avenue, at the western end.

Electrical and digital infrastructure has been built incrementally. There is currently no utility provision to Big Science Land.

Access to Big Science Land is constrained, with various internal service routes running nearby, requiring sharp turns which are likely to be unsuitable for larger vehicles. External routes such as Avon Road are in poor condition and border existing properties.

Surface water on the main site, which broadly drains towards the north, is handled today by a network of surface water sewers that feed two large culverts, draining to an attenuation pond adjacent to the Chilton A34 interchange. Drainage in Big Science Land is towards the south and will likely require a more natural attenuation solution for large-scale facilities.

The current Goods In building is located at a prominent location on Fermi Avenue and is in poor condition. It is a 'back of house' activity and does not need to be in such a prominent location. The current waste management located in R24 is also in poor condition and needs replacement.



▲ Figure 16
Proposed RAL Enabling Infrastructure Framework

Future Framework

To realise the overall ambitions for RAL, a number of key infrastructure projects with spatial implications have been identified. These are safeguarded within the Framework Plan to ensure they can be delivered as and when needed.

Servicing and utilities ring: to ensure appropriate servicing access to large-scale facilities hosted within Big Science Land, a servicing and utilities ring is proposed, incorporating a carriageway, footway, surface water management, appropriate landscaping and accessibility multi-service utilities trenching. This approach has a number of benefits:

- » providing an access loop, within the secure perimeter, simplifying vehicle movements and enabling a rationalisation of streets within the site;
- » additional resilience for key utilities such as high and low voltage electrical power, data connections and other services by removing single points of failure within utility infrastructure;
- » an opportunity to introduce new advance structural planting along the southern perimeter of Big Science Land; and

- » Future-proofing of the land to ensure new facilities do not cut off or impair access to the rest of the land available, and to ensure they have service provision ready.

Advance planting: to enable expansion and intensification of the site, early implementation of the landscape framework set out in this plan will be essential. This will ensure that by the time development is in place, it is surrounded by more mature planting that will reduce its visual and landscape impact. Advance planting of the green infrastructure areas identified within the landscape framework. This can be integrated with early identification of areas suitable for habitat enhancement.

Car park consolidation: STFC’s aim is to remove as much staff car parking from inside the site perimeter as possible, to ensure the site can be more intensively developed, and to enable and encourage sustainable modal shift in travel choices. The Framework Plan sets out safeguarded areas that could, through the use of decking, accommodate car parking needs on the site into the future, within the landscape framework to minimise visual impact. This approach allows provision of car parking in the future to respond to modal shift measures taken by STFC.

Logistics and goods in relocation: at present goods in for the site is located on Fermi Avenue, in a highly prominent location that can cause confusion for visitors and compromises the frontage along Fermi Avenue. At present internal delivery vehicles have to leave the site and then re-enter at the main reception gate, but a future goods in location to the south of the site could straddle the security line, with incoming deliveries outside the fence, transferring through the fence within the logistics building, and then being moved into the site on internal electric vehicles.

A potential new location for Goods In has been identified as shown on the plan. This location:

- » moves what is a 'back of house' function away from the 'front door' on Fermi Avenue;
- » frees up space for development on Fermi Avenue;
- » allows the demolition of buildings currently in a poor condition; and
- » simplifies goods in vehicle circulation, potentially using Avon Road instead of Road 7.

Design principles for the new logistics location are:

- » Use of advance planting and landscaping to reduce visual impact from the south and east.
- » Frontage of Goods In onto RAL Avenue to allow pickup of some items by those walking from elsewhere in the site.
- » Use of noise abatement fencing and arrangement of buildings to reduce noise impacts.
- » Careful lighting design to limit light spill from the servicing yard.

Further feasibility testing on the site will be undertaken.

Phasing

Future scientific facilities are uncertain by their nature, and they may vary in floorspace, height requirements, servicing requirements and other operational needs governing where they can be located within the RAL site. Funding streams are also unpredictable, and new areas of research may open up rapidly. As such it is not possible to set out detailed phasing of plots and projects within RAL, as it would be on a commercial employment site. However, the Framework Plan sets out a series of principles by which new developments will be located and phased on the site.

Locating buildings: Higher levels of daily activity and use by people should be concentrated closer to the central parts of the site to create vibrancy at key locations, and to promote a campus feel. Such an approach can also support strategies for moving car parking away from buildings and to consolidated car parks. Concentrating most people near the centre of the site reduces distances to walk.

Infill first: where possible, new buildings will be located on development plots located within the existing STFC boundary. This will allow building stock identified as deficient or unsuitable to be replaced with modern, more efficient and intensive buildings in line with the parameters set out above. This will ensure the site's buildings can be upgraded, land used efficiently, and site infrastructure improved progressively. It will also offer an opportunity to fund improvements to the public realm within the site.

The ability to do this will depend on availability of identified plots, whether those plots have sufficient capacity, and compliance of the proposed use with the Framework Plan parameters. For example, it would not be suitable to locate a large, low-density 'warehouse' style facility building along the main RAL Avenue, which is primarily focused on people, amenity and placemaking.



Site intensification and co-location of uses: closely related to infill first, site intensification aims to push up the overall floor area ratio across the site to make better use of land. Approaches to take could include combining facilities or departments into single buildings and reusing surface car parks.

Decanting needs: due to the intensive use of existing buildings, new construction will have to consider decanting of existing inhabitants before a site can be redeveloped. Where possible, this will be done in a strategic manner with a wide range of potential moves considered to new buildings, which could result in a number of departments or projects being moved into a single flexible building to enable redevelopment of an existing building to occur.

Large-scale scientific facilities on 'Big Science Land': the land to the south of RAL is owned and held by UKAEA in reserve for UK large-scale scientific facilities, a position reflected in the Framework Plan, which sets out a safeguard. Use of 'Big Science Land' will be reserved for such facilities, and there will be continuing discussion with UKAEA as such possibilities come up. Subject to agreement with UKAEA, it may be suitable to locate key supporting infrastructure that enables growth at RAL such as consolidated car parking provision and recreational facilities. A range of building scales and typologies are anticipated within this land, which has informed the landscape framework.

As a result this land will be held in reserve for these facilities and will only be developed when other options within the main site have been exhausted. Forward planning for infrastructure to enable the use of this land, including advance planting, will continue in collaboration with UKAEA.





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