

Harwell Campus “Exceptional Circumstances” report

Report to Vale of White Horse District
Council

6th October 2017

SQW

1. Introduction

'Britain's prosperity depends upon the pioneering work being done in science, technology and business. That's what makes Harwell, which for 60 years has been leading the way in research and innovation, such an engine for economic growth – and vital to the future of UK PLC.'

The then Prime Minister, David Cameron, Oct 2015

- 1.1 Harwell Campus is one of the largest and most important sites for scientific research, development and innovation in Europe. It is crucial for the UK that the economic potential of the investment made over the last 60 years is fully realised.
- 1.2 Harwell Campus currently accommodates 5,500 people working in over 225 organisations and businesses. Its focal point is the Rutherford Appleton Laboratory, with over £2bn investment in large scientific facilities. These facilities are germane to research in life sciences and big data, fundamental physics, advanced engineering, energy, satellite technologies, and materials science. Harwell is also designated as the UK's Space Gateway.
- 1.3 Harwell Campus has been at the forefront of British science and innovation for over 60 years: key milestones have included the foundation of the Atomic Energy Research Establishment in 1946 and the opening of the Diamond Synchrotron in 2007. It has seen sustained and substantial investment in its scientific assets – much of it funded through the UK public purse. The Campus as a whole now needs to look forward to the next phase of its development, adapting itself to the increasingly collaborative and inter-disciplinary nature of modern innovation.
- 1.4 An overview of the Campus and the principal assets within it is provided in Box 1.

Box 1: Overview of the Harwell Campus¹

Harwell Campus occupies a site which extends over 710 acres (287 ha) and is located to the south of Oxford. It accommodates over 225 organisations and currently accounts for over 5,500 jobs. In addition, over 30 universities have a presence on the site.

Part of the site – extending to about 93 ha – is included within the **Science Vale Enterprise Zone** (which also extends across part of Milton Park).

(i) Key constituencies within the Campus

The Campus has seen **over £2bn of world-leading research infrastructure**. It is home to large-scale scientific facilities which in combination represent a unique resource. At the core of these are the major facilities linked to the **Science and Technology Facilities Council's (STFC) Rutherford Appleton Laboratory**. These include:

- **Central Laser Facility (CLF)** – a leading laser facility
- **Diamond Light Source** – third generation synchrotron (funded by both STFC and Wellcome Trust, and constructed between 2003 and 2007), and including the **National Imaging Centre**
- **ISIS Neutron Source** – with a suite of neutron and muon instruments to investigate the properties of materials on the atomic scale
- **RAL Space** – space test facilities.

The **Research Complex at Harwell (RCaH)** is a multidisciplinary laboratory which was set up in 2006.

¹ This account is based mainly on information within "Harwell – Brilliance every day", produced by Harwell Campus and available at http://harwellcampus.com/uploads/news/05/02/harwell_brochure_2017-002.pdf

Alongside the core science facilities is a range of organisations whose remit is linked to the application of scientific excellence and know-how. These include:

- The **Satellite Applications Catapult** – which was set up in 2013 as an independent innovation and technology company, created to foster growth across the economy through the exploitation of space
- **European Space Agency (ESA)** – noting that its European Centre for Space Applications and Telecommunications (ECSAT) is located at Harwell
- **UK Space Gateway** – which includes a cluster of space organisations.

A third key constituency of the Harwell Campus is defined around a group of large businesses which have a presence. These include Airbus, Boeing, AstraZeneca, Thales and Johnson Matthey.

Finally, the Harwell Campus is also home to small and new businesses, some of which have spun-out from different elements of the research base. Situated within the Campus is the 25,000 sq ft **Harwell Innovation Centre**. This itself accommodates around 60 businesses.

(ii) Knowledge specialisms

Cutting across these different constituencies, the research and innovation specialisms linked to the Harwell Campus can be understood in terms of five broad themes:

- **Space & Satellite Applications:** UK's Space Gateway, ESA, RAL Space, Satellite Applications Catapult, Thales, Lockheed Martin, Airbus
- **Life Sciences & Healthcare:** Diamond Light Source, Wellcome Trust, Medical Research Council, Heptares, AstraZeneca
- **Big Data & Supercomputing:** STFC, CERN Tier 1, Emerald, Hartree Centre, NERC, JANET, IBM, Cisco
- **Energy & Environment:** STFC & EPSRC Energy Unit, EDF, UK AEA, UK Space Agency, STFC Met Office JV, Siemens
- **Advanced Engineering & Materials:** Rolls Royce, RAL Space, Honda, STFC Isis, Element Six (De Beers), Toyota.

(iii) Innovation ecosystem

Above and beyond these assets is a "soft" infrastructure that is developing quickly and is unlocking processes of innovation. For instance, Harwell Campus hosts a number of business angels and venture capitalists; and the Harwell address is itself considered to be helpful in terms of de-risking investment decisions and processes.

1.5 As it looks to the future, one key proposal is the development of an "Innovation Village", creating a mix of uses that will encourage collaboration while at the same time addressing some of the more pressing limitations of the current site, principally the shortage of suitable housing for the type of workers that organisations on the Harwell Campus need to attract. Specifically, it is proposed that the "Innovation Village" will be an "exemplar standard" development. It will include provision for 1,000 homes. The intention is that it should be fully integrated with the wider Campus, incorporating on-site services and facilities and a tailored or bespoke mix of dwellings consistent with the identified needs of tenant organisations.

1.6 Harwell is located in the North Wessex Downs Area of Outstanding Natural Beauty (AONB). New housing development in AONBs is subject to strict controls, and – under the National Planning Policy Framework (NPPF) – is only allowed under "exceptional circumstances".

1.7 NPPF (paragraphs 116 to 118) specifies those exceptional circumstances to justify development within an AONB. These are:

- the development is in the public interest
- there is a need for the development (including national considerations)

- the cost of developing elsewhere is greater and the scope for doing so is very limited
- there will be limited detrimental effects on the environment, the landscape and recreational opportunities.

Report structure

- 1.8 After briefly describing the planning context (Chapter 2), this report is divided into two main parts:
- **Part A** (Chapters 3-6) examines each of the exceptional circumstances in the NPPF in turn, and discusses the evidence from Harwell that relates to each circumstance.
 - **Part B** (Chapter 7) considers quantitative perspectives in relation to elements of the Innovation Village proposals.
- 1.9 The report then gathers these discussions together in a short concluding section (Chapter 8). It argues that Harwell's unique accumulation of scientific assets, its place within the wider UK science and innovation ecosystem and the economic growth potential linked to both do indeed constitute "exceptional circumstances" as described in the NPPF.

Background to this report

- 1.10 This piece of work was commissioned by Vale of White Horse District Council, working closely with Harwell Campus. It was also supported by Oxfordshire Local Enterprise Partnership. The Council's intention was that this report should inform the second part of the Vale of White Horse Local Plan (Local Plan 2031 Part 2), specifically the proposed housing allocation at Harwell Campus.
- 1.11 The study was undertaken by SQW with inputs from BBP Regeneration. SQW is a leading economic development consultancy with a long track record of working on the knowledge economy of Oxfordshire. Recent examples of project work include the preparation of the Oxfordshire Innovation Engine report (for a group of clients led by the University of Oxford and Science Oxford); support to Oxfordshire Local Enterprise Partnership in refreshing its Strategic Economic Plan; and support to the University of Oxford (and partners) in preparing the Science and Innovation Audit for the Oxfordshire Transformative Technologies Alliance. BBP Regeneration is a specialist land and property consultancy. The two companies have worked closely together over the last 20 years.

2. Current planning status

The Local Plan

- 2.1 The **Vale of White Horse District Council Local Plan 2031** recognises that Harwell Campus is a *"nationally and internationally significant centre for research and innovation"* and that its *"continued development is crucial to both the success of the Oxford Economy and the national prospects for job growth associated with 'Big Science'."*
- 2.2 The **Vale of White Horse District Council Local Plan 2031: Part 1 (LPP1)** was adopted in December 2016. LPP1 sets out the strategic policies and identifies strategic sites for housing, employment and supporting infrastructure required across the district up to 2031.
- 2.3 It states:
- that employment provision within the Science Vale area (i.e. Harwell Campus and Milton Park) accounts for around **15,850** projected jobs, which equates to around **70%** of the planned total (i.e. 23,000) for the district
 - within *"Core Policy 6 – Meeting Business and Employment Needs"* that:
 - **93ha** of Development Land is available at the Harwell Enterprise Zone
 - there is a further **35ha** of Development Land available at Harwell Campus, outwith the Enterprise Zone.
- 2.4 The Vale is now progressing the **Local Plan 2031: Part 2 (LPP2)** with submission to the Secretary of State timetabled for February 2018. The key purpose of LPP2 is to:
- allocate sites to address unmet housing need for Oxford to be addressed within the Vale of White Horse (VOWH)
 - update Development Management Policies (replacing any saved Local Plan 2011 Policies)
 - set out any policies required to support the Didcot Garden Town project, and
 - allocate additional sites, where this may be necessary.
- 2.5 The Council published a **'Preferred Options' (Regulation 18) LPP2 document** in March 2017 following Cabinet Member approval on 7 March 2017².

Harwell Campus

- 2.6 Following the site selection process and discussions between Harwell Campus and the Council, one of the sites proposed for allocation within LPP2 is Harwell Campus. The Campus is just under 300 hectares in size in total (including the 93 hectares which were designated as an Enterprise Zone in 2012). The housing allocation extends to about 37 hectares in size. The

² See <http://democratic.whitehorsedc.gov.uk/ieDecisionDetails.aspx?ID=1393>

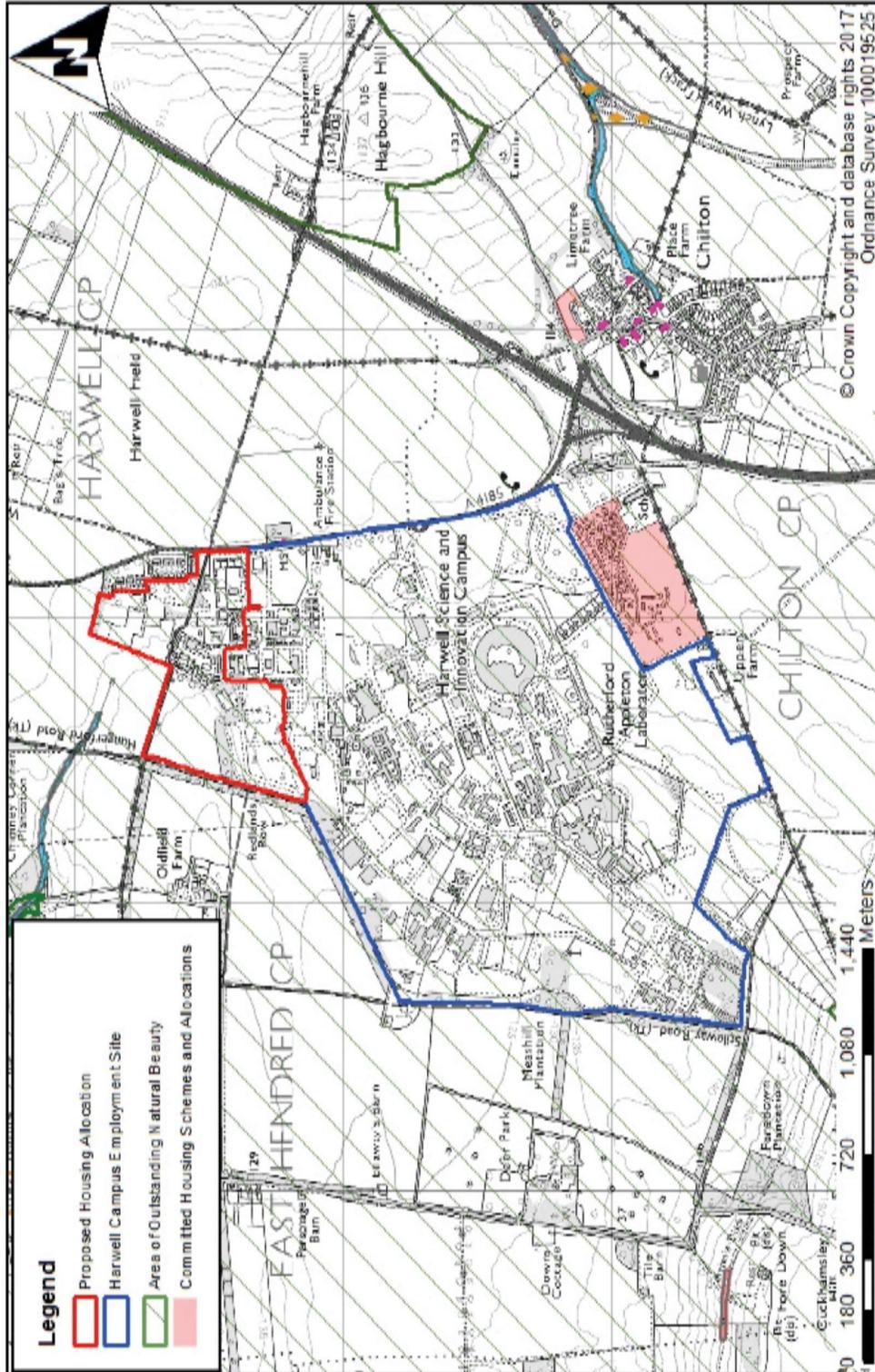
site is allocated for development by **Core Policy 15 (Local Plan 2031: Part 1)**, which is complemented by **Core Policies 15a and 15b (Local Plan 2031: Part 2)**.

- 2.7 Within land already allocated for employment, the intention is to deliver an "Innovation Village" as an "exemplar standard" development. It will include provision for 1,000 homes. The intention is that it should be fully integrated with the wider Campus, incorporating on-site services and facilities and a tailored or bespoke mix of dwellings consistent with the identified needs of tenant organisations (Refer to Core Policy 15b: Harwell Campus Comprehensive Development Framework, and see map overleaf).
- 2.8 The proposal is supported by Oxfordshire County Council, Oxfordshire Local Enterprise Partnership (OXLEP) and the Department for Business, Energy and Industrial Strategy (BEIS). Although not confirmed yet, there is the potential for the site to be developed in partnership with the Homes and Communities Agency – this is being discussed separately.
- 2.9 The proposal forms part of the Didcot Garden Town Delivery Plan (published for consultation in June 2017) and will contribute to the 15,000 houses to be delivered across South Oxfordshire and Vale that make up the Garden Town initiative³.

Links to previous proposals

- 2.10 The Council previously proposed to allocate two sites at Harwell Campus through LPP1. However the Inspector removed these sites from the plan prior to adoption. The site identified at Harwell Campus in LPP2 is different from the sites removed from the LPP1:
 - the site itself is different: it is on land that is designated for employment use through Local Plan 2011 Saved Policy E7 and Core Policy 6 and therefore the principle of development is accepted at this location;
 - the site is being promoted by Harwell Campus Partnership and has support from the Oxfordshire Local Enterprise Partnership; and
 - the Council in conjunction with the Campus Partnership has produced more up to date evidence relating to the need for housing at the Campus since the Examination of LPP1; some of this new evidence is discussed in this report.

³ See: <http://www.whitehorsedc.gov.uk/business/didcot-garden-town-0>



Part A: Exceptional Circumstances

3. “The development is in the public interest”

- 3.1 The first of the exceptional circumstances in the NPPF that needs to be demonstrated is that **the development is in the public interest.**

The nature and scale of investment in Harwell’s science base...

- 3.2 Harwell Campus is one of the largest and most important sites for scientific research, development and innovation in Europe. **It is crucial for the UK that the economic potential of the investment made over the last 60 years is fully realised.**
- 3.3 Harwell Campus currently accommodates 5,500 people working in over 225 organisations and businesses. Its focal point is the Rutherford Appleton Laboratory, with over £2bn investment in large scientific facilities. These facilities are germane to research in life sciences and big data, fundamental physics, advanced engineering, energy, satellite technologies, and materials science. Harwell is also designated as the UK’s Space Gateway. The table below describes some of the key facilities at Harwell.

Table 3-1: Harwell Campus scientific research and innovation centres⁴

Centre	Summary description
Diamond Light Source	The UK national synchrotron science facility, producing intense beams of light for a series of ‘super microscopes’ for research on the structure and properties of a wide range of materials, from proteins for designing new and better drugs to engineering components such as a fan blade from an aero-engine. It serves >5,000 scientists a year and supports over 100 companies in proprietorial research.
ISIS Neutron & Muon Spallation Source	Using beams of neutrons (and muons) to investigate structures of matter at atomic scale. Serves an international community of >3000 scientists to research clean energy & the environment, pharmaceuticals & health care, nanotechnology, materials engineering, catalysis and polymers, and fundamental studies of materials.
PHE Harwell	Public Health England (PHE) is an executive agency, sponsored by the Department of Health. Its Centre for Radiation, Chemical and Environmental Hazards is at Harwell, focusing on public health with regards to the environment.
Central Laser Facility	The Central Laser Facility (CLF) provides scientists across Europe with specialised laser equipment to experiment in physics, chemistry and biology. Applications include accelerating subatomic particles to high energies, probing chemical reactions and studying biochemical and biophysical processes.
RAL Space	Research & technology development, space test facilities, instrumentation, and studies of science and technology requirements for space mission design. A Concurrent Design Facility and a robotics test laboratory are operated by RAL Space.
Satellite Applications Catapult	The Satellite Applications Catapult (SAC) fosters innovation and accelerates the take-up of emerging technologies. Its objective is to promote, develop and facilitate the commercialisation and advancement of the UK’s satellite applications industry.
STFC	STFC activities include the ESA Business Incubation Centre, designed to bridge the gap between a technology transfer idea and getting the project off the ground, assisting its development into a viable business.
ECSAT	ECSAT (European Centre for Space Applications & Telecommunications) has activities

⁴ Based on information set out in *Oxfordshire Transformative Technologies Alliance – Science and Innovation Audit, 2017*

Centre	Summary description
	related to telecommunications, integrated applications, climate change, technology and science.

Source: Consortium members

...including very recent and planned future investment

- 3.4 Although Harwell Campus has seen substantial public investment over a sixty year period, it is important to recognise that this process is not simply historic – the investment process is live and on-going. Very recent and big investments include the Synchrotron (completed in 2007) and the Satellite Applications Catapult (2013, profiled below). Although located in Oxfordshire, these are not simply “local resources”; they are of national and international significance.

Box 2: Satellite Applications Catapult: A national facility located at Harwell

The Satellite Application Catapult was established at Harwell in May 2013 to foster innovation and accelerate the take-up of emerging technologies, focusing on ‘downstream’ space applications and operations. The Catapult receives Innovate UK core grant funding and generates external income through collaborative R&D and commercial work. It employs nearly 130 staff.

The Catapult works with other space-related organisations (e.g. UK Space Agency, European Space Agency, UKSpace, RAL Space, Satellite Finance Network) to encourage the adoption of satellite applications through a range of activities designed for start-ups, SMEs, multinationals, academics and other public and private sector organisations.

These activities are organised under three strategic themes: ‘Enabling Business’ to support businesses (of all sizes) to access and develop opportunities in the space sector; ‘Energising the Market’ to stimulate demand for satellite technology; and ‘Empowering the Technology’ to assist in the commercialisation of satellite technology and develop market expertise to allow both space and non-space sector organisations to utilise satellite assets, services or data.

- 3.5 In July 2017, the Government confirmed funding of £99m from the Industrial Strategy Challenge Fund to create a National Satellite Testing Facility (NSTF) on the Harwell Campus. The NSTF is due to open in early 2020, to support the assembly, integration and testing of space instruments and satellites, positioning the UK to capitalise on the need to test the estimated 3,500 -10,000 satellites that are due to be launched by 2025. The NSTF will also facilitate the construction of bigger and more technologically advanced satellites and remove the need for UK companies to use test facilities abroad.
- 3.6 Harwell is also home to the European Centre for Space Applications and Telecommunications (ECSAT). It is worth noting this is not an EU institution – its member countries include some from outside Europe altogether, such as Canada.
- 3.7 Space was identified by the government as one of the eight ‘great technologies’ that would drive UK economic growth in future years. Harwell’s space industries cluster is the country’s most important, and is therefore central to achieving the government’s ambitions for the sector. In all, there are around 70 organisations, both public and private, at Harwell working on space-related activities. In addition to ECSAT, the UK Space Agency and the Satellite Applications Catapult, they include Airbus, Thales, Boeing and Lockheed Martin.

- 3.8 **The key point therefore is that Harwell is recognised as a national and international asset which has benefited from substantial investment and in which further investment in leading-edge scientific facilities is proceeding apace. The UK taxpayer has invested substantially, over decades, and is continuing to do so. Taking steps to ensure a significant return on investment is certainly therefore in the public interest.**

Harwell's wider significance

- 3.9 The **Vale of White Horse Local Plan 2031** has the ambition of promoting 'Science Vale' as a world-class location for science and technology-based enterprise and innovation. Harwell Campus (and its Enterprise Zone) lies at the heart of the Science Vale area, and is home to the largest collection of science-based enterprises within it. It is thus central to the Council's plans for the economic development of the district. It has also been prioritised for economic growth by Oxfordshire LEP.
- 3.10 Science Vale also needs to be recognised as a core part of broader spatial constructs that are widely seen as critical for the UK's knowledge economy. These are reflected in national policy initiatives. For example:
- Science Vale is a key component of the Cambridge-Milton Keynes-Oxford corridor. In 2016, the National Infrastructure Commission was tasked with providing proposals and options to maximise the potential of the corridor "*as a single, knowledge-intensive cluster that competes on a global stage.*" Its interim report – published in autumn 2016 – confirmed the area's potential to be "*the UK's Silicon Valley*" but noted that a chronic undersupply of homes was putting the prospects of sustained growth at risk.
 - The "Golden Triangle" – defined between Oxford, Cambridge and London – is recognised as the greatest concentration of science-based assets nationally, and Science Vale is a major contributor.
- 3.11 More generally, national policy recognises and supports the value of science-based activity to the national economy. To this end, the Government has protected the public science budget since 2010, despite the pressures on public spending. The Industrial Strategy Green Paper (2017) aims "*to improve living standards and economic growth by increasing productivity and driving growth across the whole country*". It identifies ten pillars to support this ambition, the first of which is "*Investing in science, research and innovation*". The strategy states that "*we must become a more innovative economy and do more to commercialise our world leading science base to drive growth across the UK.*" Harwell is a key asset in relation to this process.

Wider impacts

- 3.12 Harwell's facilities account for an important share of the UK's science-based assets; they are a national resource and amenity. For example, it is estimated that over 30 university teams from across the world are on-site at Harwell at any time. These span many of Britain's most highly-ranked universities, including Oxford, Cambridge, UCL, King's College London, Edinburgh, Manchester, Birmingham, Sheffield, Leeds, Liverpool, Cardiff and Queen's University, Belfast. There are also teams from universities in the United States, Spain, Portugal and Norway. Although very difficult to quantify, the wider economic impacts of these different research teams will have a spatial footprint that extends across the UK and internationally.

3.13 It is also important to have regard to the wider impacts of "Harwell science". Science developed at Harwell is having a very significant effect on many different spheres. It is, for example, central to satellite technologies⁵; to regenerative medicine⁶; to materials science⁷; and to sensor technologies⁸. Through these and other technologies, it is transforming approaches to medicine, space science and many other domains. It is generating economic impact through the firms which are commercialising the science (both those on Harwell Campus, and many others elsewhere) and it is also achieving wider societal outcomes (e.g. related to health).

3.14 The facilities at Harwell attract many of the world's best-known companies. Recent industrial users of Harwell's major facilities come from some of Britain's most important industrial sectors including pharmaceuticals, advanced manufacturing, steel production, chemical engineering, energy (including nuclear), consumer goods and defence and aerospace. Looking just at the major STFC-funded facilities – the Diamond Light Source, the CLF and ISIS – demonstrates the range of companies that draw on Harwell's resources.⁹ These have included:

- Airbus
- AkzoNobel
- Alstom Power
- AMEC Nuclear UK Ltd
- Areva
- Astra Zeneca
- BAE Systems
- Baosteel Co. Ltd
- BMW-Mini
- Boeing
- BP
- British Energy
- Case New Holland
- Cisco Systems
- Corus
- DuPont
- E.On
- EADS
- EDF Energy
- European Space Agency
- Fujifilm
- General Motors
- GlaxoSmithKline
- Magnox
- Mars UK
- Merck
- Mitsui-Babcock
- Nestle
- Nippon Steel
- Oxford Instruments
- Proctor and Gamble
- QinetiQ
- Rolls Royce
- RWE NPower
- Siemens
- Tata Steel
- TDK
- Thales
- Toshiba
- Total
- Toyota
- Unilever
- Williams F1

⁵ Noting, for example, the work of companies like Oxford Space Systems

⁶ The Electrospinning Company, based at Harwell, is active in this field

⁷ See, for example, the work of Cobalt Life Systems

⁸ Oxsensis is active in this field

⁹ List drawn from STFC (2016) *STFC Impact Report*

3.15 Among the specific projects carried out at the Diamond Light Source are the following:¹⁰

- **BASF** used it to carry out chemical tomography, leading to a world first in catalysis research. Catalysis plays a vital role in the chemical industry and industrial research, and catalysts are constantly being developed and refined. BASF's project (in conjunction with UCL as well as Diamond) explored the relationship at a subatomic level between platinum and molybdenum.
- **Johnson Matthey** used the DLS to look at platinum speciation in three-way catalysts. This work was designed to help better understand how platinum group metals used in car exhaust catalysts behave in 'real world' situations.
- **Rolls-Royce** used it to develop a 'non-destructive' way of measuring the stresses on a Trent aircraft engine fan blade generated by a surface treatment on the blade. Previously, such testing involved machining some of the metal away. The new method avoids that, while also being faster and more accurate.

The proposed development

3.16 Within this overall context, the proposed development at Harwell Innovation Village is important because it will help realise – on an on-going basis – the full potential of the scientific asset basis that exists within the Campus. The link between the two is defined principally in terms of securing an appropriate supply of skilled labour (the evidence and challenges that the Innovation Village will help to address are explored in detail in the pages that follow). For this reason, the proposed development is in the public interest.

¹⁰ Examples drawn from the Diamond Light Source's website's Case studies section.

4. “There is a need for the development (including national considerations)”

- 4.1 The second exceptional circumstance that has to be demonstrated is that **there is a need for the development (including national considerations)**.
- 4.2 Harwell Campus was first established after World War II, originally for civil nuclear research. As described in Chapter 3, it has become a major facility of national importance, but to function well, the organisations on it need to recruit and retain staff against the backdrop of a highly buoyant local labour and housing market. Survey evidence suggests that the recruitment and retention of staff is becoming more difficult, both because Harwell employees’ housing needs differ from those of the local population more generally, and because of wider cultural shifts in the choices highly-educated workers make about their working environment. Despite its global reputation, the future success and impact of the Harwell Campus is not therefore assured.

Capturing global talent and unleashing innovation: *from Science Parks to Innovation Districts*

- 4.3 In the last half-decade or so there has been a shift in thinking about the most effective ways to attract highly educated workers to a locality. This is the result both of the changing tastes of younger adults, who increasingly prefer to work in mixed-use developments rather than commuting long distances to their place of work, and to changes in beliefs about how innovation can best be encouraged – there is an increased understanding of the role of collaboration and the value of ‘accidental’ meetings and ideas exchange. The concept of the **innovation district** has emerged, in which academic, commercial, retail and residential developments are co-located to facilitate such learning and exchange. Although the model varies across countries and depends on the industries that are being targeted, the majority of such districts are being developed in city-centre neighbourhoods, reflecting the perception that cities already provide some of these functions.
- 4.4 Many city planners and developers around the world have concluded that mixed-use innovation districts are the best way to help knowledge-intensive science and technology firms to flourish. From Barcelona to Hamburg to Cambridge, such schemes are seen as the most economically efficient urban form for such enterprises. This approach has begun to displace the traditional science park model in which employment space is separated from other uses (such as retail and residential) and often based in sub-urban or semi-rural locations.
- 4.5 Research by SQW in 2015¹¹ examined international best practice in the development and operation of innovation districts, and concluded that while there is not a single model of development or operation, it is essential to take a long-term view of returns on investment.

¹¹ Some of the headlines from this are reported at <http://www.knowledgequarter.london/the-innovation-district-lessons-from-europe-by-chris-green-director-sqw/>

All sites vary in their characteristics, so bespoke solutions that work with the grain of the site are necessary.

- 4.6 In the UK, organisations such as St John's College (Oxford), the University of Cambridge, Cambridge University Hospitals NHS Foundation Trust and Grosvenor Estates – all of which take a long-term view of the sustainability and value of land – are now promoting mixed-use developments or innovation districts on sites they own. The four projects described in Box 3 below show these organisations preparing and delivering plans for innovation districts on sites which in the past would have been expected to be developed as science parks.

Box 3: Developing local Innovation Districts within Oxford and Cambridge

Oxford Northern Gateway

- A high density mixed-use innovation district is proposed for the 44ha Northern Gateway site, which was previously designated for development primarily as a science park. The original Area Action Plan proposed the development of around 90,000 sqm of R&D space, 500 homes and a hotel, as well as small-scale retail accommodation. However, the current proposals for phase 1 aim for a more mixed-use development, including more residential accommodation and studio space on site, along with more small-scale retail and leisure.

West Cambridge

- The University of Cambridge is currently developing the West Cambridge site to accommodate the expansion of the University Science Departments. The original masterplan is being re-worked to take account of the new circumstances for development of peripheral employment sites, particularly the argument for higher density and a better mix of uses.

Cambridge Biomedical Campus

- Cambridge University Hospitals NHS Foundation Trust is currently developing the Cambridge Biomedical Campus on the southern edge of Cambridge. The development has already attracted investment in global head office and R&D functions from the UK-based pharmaceutical firm Astra Zeneca, and Papworth Hospital will move to the site in 2017/18. The original campus of 90 acres has more recently been expanded to take more Green Belt land. There is also a great deal of accommodation for nurses on the Addenbrooke's site, and around 4,000 new homes are being developed on an adjacent site.

North East Cambridge

- Grosvenor Estates has established a partnership with Cambridge City Council for the development of an innovation district on the 40ha site at North East Cambridge, adjacent to the new station and including land currently owned and operated by Anglian Water. Much of the site is currently unused or under-utilised. Both Trinity College and St John's College have welcomed the involvement of Grosvenor in the planning for NE Cambridge, as their thinking was proceeding along more traditional lines until the ideas proposed by Grosvenor became well known.

- 4.7 Clearly, such a shift poses challenges for the more traditional science park model, especially at locations outside major urban areas. Harwell, for all its existing strengths, is not immune from such pressures. Harwell's response to these changes has been to develop its version of an innovation district: the "Innovation Village". This will offer a 'work-live-play' community, with a new residential neighbourhood being created as an attractive living environment, designed to provide new homes for both permanent and transient employees working both at the campus and within Science Vale.

The need for development within a Harwell Innovation District (including an Innovation Village)

4.8 At Harwell, the need for the transition described above is urgent: **the underlying scientific asset base is world class, but without sufficient numbers of suitably qualified people who are willing and able to commit to working at Harwell, its impacts will be stymied.**

4.9 Over recent years, a number of surveys and studies among Harwell employers, employees, and potential employees (e.g. Oxford University STEM students) have been carried out to ascertain people's views on the strengths and weaknesses of the site as it is currently configured. Some of these surveys, notably those of employers, are relatively small-scale, but they are consistent in relation to their principal findings. In combination, they need to be seen as a key evidence base. Some insights from them are summarised below.

Harwell already has many of the ingredients of an Innovation District...

4.10 The evidence suggests that some elements of a successful innovation district are already in place. For example, the Harwell Business Survey¹² of employers found that the key benefits of being located at Harwell were the *"reputational strength of the area, the availability of skilled labour and the clustering/ interconnectivity between businesses and organisations."* The links with Oxford's academic institutions were seen as particularly important, and the firms also felt they benefited from the presence of complementary companies.

...but recruitment is difficult...

4.11 However, the same survey also found that Harwell has some weaknesses as a location, which employers felt were hampering their ability to attract the highly (sometimes uniquely) skilled labour they needed. Their comments highlighted concerns relating to transport infrastructure and public transport services, and the lack of affordable housing in the vicinity more generally, and the loss of other supporting infrastructure such as shops. Most of the Business Survey's respondents felt that encouraging social or community clustering on the site would have a considerable beneficial impact on its businesses, and that housing development would be needed to facilitate such clustering. Such developments were seen by the majority as likely to help maintain Harwell's competitive advantage as a place to work. The employers in the Survey described themselves as being involved in *"very high-level technical/scientific applications"*, so these issues have implications not just for Harwell but are critical for the UK in maintaining its lead and competitiveness across these globally important sectors.

...and links to housing provision are recognised...

4.12 A survey of 165 Harwell workers undertaken in 2017 by a trade union sought to examine these issues.¹³ More than half of respondents had worked in the Harwell area for 11 years or more, and more than half were over 40 years old. Just over three-quarters were home-owners

¹² The Harwell Business Survey was undertaken by CBRE in 2016. It explored the current thinking of some of the key businesses at Harwell. CBRE received detailed responses from eight organisations, representing 15% of the Campus's workforce. The majority of them had been on the Campus for at least 15 years, with two of them having been there for all 70 years

¹³ Information supplied by the Harwell Campus Partnership, with reference to a survey undertaken in 2017.

(50% with a mortgage, 26% without). Some 16% lived within five miles of their place or work. In addition:

- 90% of respondents thought that there were jobs on the Harwell Campus with particular skill requirements that made them unique for their type of work/business.
- 78% thought this unique skill need made it more difficult to attract people to the Campus with the right level of skills and/or expertise
- 94% felt it was crucial that the Harwell Campus continues to develop its unique place as a science and technical hub
- 68% felt it was relevant for their employer to have a role in housing provision for Harwell Campus staff.

4.13 A housing needs survey¹⁴, carried out in 2015 and involving 933 respondents, examined related issues in some depth. It noted that Harwell is host to world-leading facilities, and therefore its 'offer' has to compete with international locations, not simply other places in the UK.

4.14 Concerns were widespread, with affordability being a major worry. Salaries can be modest for some Harwell staff, such as post-docs at the start of their careers. Houses for sale locally are often of the larger 'executive home' type, not necessarily suited to the typical Harwell employee. The lack of rental and short-term accommodation for students and international visitors was also noted. The current rental offer is of mixed quality, dominated by small 'buy-to-let' investors.

...particularly in relation to younger workers at Harwell

4.15 Evidence from some employers, such as the STFC, suggests their workforce is older than the national average (STFC's has a median average age of 46).¹⁵ Many such workers were able to get on the local housing ladder two decades ago.

4.16 Younger employees, by contrast, find it much harder. One survey interviewee¹⁶ noted, for instance, that three young people he knew who were working at the Rutherford National Laboratory were living with their parents, while others were commuting from Oxford. Given that Harwell's older workers will gradually need to be replaced as they retire, and that the overall number of jobs at Harwell is rising significantly, the ability of employers to attract younger workers will play an increasingly important role in determining the success (or otherwise) of Harwell Campus.

4.17 New development is not necessarily targeted at this demographic: local housebuilding is dominated by volume house building in Didcot.¹⁷ The supply of private market rented properties – a key housing type for younger workers – in Didcot, Wantage and Harwell grew by 2.5% between 2001 and 2011, well below the South East's average of 7%. More generally, the median house price in South Oxfordshire in 2013 was 10.5 times local earnings, a higher

¹⁴ Corke Wallis (2015) *April Campus survey*

¹⁵ Figure quoted in Harwell Campus (2015) *Needs & Delivery Report*

¹⁶ Quoted in Corke Wallis (2015) *April Campus survey*

¹⁷ Data quoted in this paragraph all drawn from Hawkins Brown survey research in 2015 quoted in Harwell Campus (2015) *Needs & Delivery Report*

ratio than the national average. Average house values were 33% higher than the average for England and Wales.

- 4.18 These observations are important because Harwell employers are seeking to recruit and retain a workforce that is internationally mobile. A survey of Oxford University science, technology, engineering and maths students¹⁸ suggested such people are willing to look both nationally and internationally for potential jobs. More than half (54%) were willing to move anywhere in the UK for the right job; 34% would consider a location in Europe, while 44% would consider a position anywhere in the world.
- 4.19 Harwell's employers are already operating in this global market for talent. The Diamond Light Source employs staff from 44 countries while Element Six, a private company, has staff from 29¹⁹.

Case studies

- 4.20 Further evidence relating to some of the constraints facing major employers on Harwell Campus was gathered during the summer of 2017, through case study interviews. Two different accounts are summarised below.

Box 4: Interview with Karen Stevens, Deputy Head of HR, Science and Technology Facilities Council, Harwell

The STFC employs around 1,300 people at the Rutherford Appleton Laboratory, the vast majority of whom are scientists, engineers, researchers and technicians. It also hosts visiting students and academics. The STFC is also the principal funder of the Diamond Light Source, a separate organisation that employs approximately 600 people on Harwell Campus. These two organisations are the largest employers on the site.

Recruitment is difficult for STFC Harwell. Nationally, the skills it is seeking are in short supply, and the cost of living locally is a big issue. As a public sector organisation, it is affected by the public sector pay cap, and for historic reasons, it pays a little less than other public-sector bodies locally. It is not able to compete on pay with private-sector companies in Oxfordshire. (The STFC employs scientists at its headquarters in Swindon too – there, recruitment challenges are less acute.)

STFC has a particular problem retaining engineers and computing experts, particularly mid-career professionals. It takes time to build up experience in designing high-tech instrumentation and in running major facilities, and by the time such people have been at STFC Harwell for 5 to 10 years, the pay gap with the private sector can be substantial – for engineers it can be £10-15,000 a year. Staff within this group often have young families and large mortgages; and in this context, it is hard to resist private-sector offers, many of which come from firms either on Harwell Campus or close by (such as Milton Park, Didcot or Witney). Having a family means the quality of local schools is also important: Wantage and Newbury have good schools but are very expensive, while much of the house-building locally is happening in Didcot.

Younger workers such as post-docs may be less affected by pay differentials as they are at a relatively early stage in their careers, but they are still affected by high housing costs: a one-bed flat in Wantage can cost in excess of £750 per month.

The STFC has tried to recruit internationally – science is a global community – but the high cost of living is an issue here too. Karen was aware of at least a couple of examples of offers being declined by international candidates on grounds of the costs of housing and living more generally.

The STFC does what it can to alleviate recruitment problems. It has limited capacity to change its pay structure, so it emphasises the other attractive elements of Harwell – the expertise and collaboration on the Campus, the pleasant environment – and offers flexible working and part-time working arrangements to broaden the potential talent pool. The STFC is trying 'over-recruiting' people at early career stage to help build a pipeline in the hope that some of them will stay on, but many of the younger people struggle to get on the housing ladder. This is compounding the problems

¹⁸ Research undertaken for Ptarmigan Land by BMG Research. For this survey, 101 such students were interviewed face-to-face in street interviews.

¹⁹ Data taken from Jardine (2015) *Harwell Residential Quarter Employer Interviews*

the STFC has with mid-career staff, who are the ones who would normally train up and develop the less experienced ones. The shortage of mid-career staff is thus becoming a major problem for the STFC.

Karen believes that other public-sector organisations in Harwell and the surrounding area are experiencing similar difficulties. As a result, private-sector firms and start-up companies may start to suffer at some point – they recruit from STFC and similar organisations, so their success is to some extent predicated on the larger public-sector bodies and their role within the local labour market.

Karen thinks any form of affordable housing in the Innovation Village could reduce some of the pressures on Campus staff. The Village would help in other ways, too. The Campus suffers from a lack of facilities such as shops and cafés – "you can't just nip out and buy something at lunchtime". The Campus was livelier 20 years ago, and it lost its only bank branch last year. She thus thinks that the plans for an Innovation Village will help Harwell's efforts to succeed.

Box 5: Interview with Dr Nanda Rodrigues, Chief Operating Officer, MRC Harwell

The MRC has a major research centre based on the Harwell Campus, consisting of two main facilities: the Mary Lyon Centre and the Mammalian Genetics Unit. It carries out research into the links between genes and disease in humans: among the conditions being studied are hearing loss, type 2 diabetes and dementia. The MRC currently has about 250 staff based at the facility. Scientific staff typically work in research teams, led by one or more senior academics and with more junior scientists and/or technicians working in support.

The MRC's reputation and the quality of its work means that it draws interest from talented scientists from across the world, even though salaries are modest. Although there is a core of staff who have been at the MRC in Harwell for a long time – up to 40 years in some cases – and have deep roots in the local community, the structure of scientific careers is such that many posts/placements are relatively short term. There is a need for local affordable housing for these workers. A PhD student will typically be there for three or four years and a post-doc for four years, while Erasmus students, for example, may work at Harwell for a few months. These scientists are usually at the start of their careers and many have fixed term contracts. For these reasons, they may not want to buy a house and may not be able to afford to own and run a car. Technicians may be recruited from more local communities, but more often now the MRC is recruiting graduate technicians who move into the area as a first job. Salaries are modest for them too, and many struggle to find suitable property to rent during their time at Harwell.

Such people are very important to the purpose and success of MRC Harwell but are not well-served by the local infrastructure. Public transport links to Oxford, where many of the students live, are not especially good. The recent introduction of a privately-run shuttle bus to Oxford University has proved a great success, but so much so that it is now often oversubscribed.

Housing, too, is an issue. Many MRC staff (and indeed many of those on the Campus more widely) tend to want smaller flats or houses for rent. Rental properties in the local area are often poor-quality. Organisations at Harwell do not pay London weighting, but house prices and rents in the locality are at London levels, meaning that staff often have to 'trade down' on the quality of their housing. Nor can this entirely be sidestepped by living further away. While there is some scope for home- and flexible working at the MRC, many staff have to come in each day to work with the equipment, limiting the scope for long-distance commuting.

The wider Campus currently also lacks places for socialising, such as cafés and restaurants. The result is that it tends to be a "nine-to-five kind of place" – people do not stay on in the evening, as there is little to do. This in turn limits the chance meetings and cross-fertilisation of ideas that Dr Rodrigues has seen at other campuses abroad. Efforts are made to run networking events on the Harwell Campus, but they can feel quite contrived or forced in comparison.

The Innovation Village offers a chance to address some of these concerns. It is designed to reflect the specific needs of Harwell staff rather than the needs of the wider local population. Although the staff at the MRC (and Harwell more generally) tend not to be driven by money, they should still enjoy a reasonable standard of living: affordable housing, improved public transport and a livelier environment could all contribute significantly to that.

Meeting the specific housing needs of the Harwell campus

- 4.21 How then might some of these concerns be ‘translated’ into a housing mix that would serve the needs of the Harwell campus community better? A document – “*Meeting the specific housing needs of the Harwell campus*” – sets out the proposed approach from the Partnership.²⁰
- 4.22 It is clear from this assessment that Harwell’s employees have a distinct profile, and as result have different housing needs from the wider regional housing market. While a number of Harwell’s organisations have been established a long time and have relatively stable workforces, there is also a large, more transient population. This includes PhD students, international researchers coming to work for relatively short time periods at, say, the Diamond Light Source, and overseas staff seconded to Harwell by their organisations. Harwell’s employee base also has higher proportions of younger single people and couples without children than the surrounding area.
- 4.23 The document argues that it is clear from its assessment of housing needs that the current housing supply does not (and will not) meet the needs of a substantial proportion of Harwell employees, particularly those living in smaller households, international visitors, or those on low to medium incomes. Nor will commuting necessarily solve the problem: there is limited affordable housing within easy commuting range. The Partnership therefore aims to address these housing issues in its proposal. It presents a bespoke approach to meet identified housing needs based on an understanding of likely employee requirements drawing on the surveys of employees and occupiers. In some respects, the Innovation Village thus represents a return to Harwell’s mixed-use past. When the site was primarily focused on civil nuclear research the site offered hundreds of new homes to its staff (at discounted rents), as well as other amenities.
- 4.24 The Partnership has put forward the following indicative mix of the housing that might be provided. It includes a substantial proportion of build to rent homes, which would be managed professionally on behalf of the Campus and held for the long term as an income-generating asset. It believes this mix is better aligned to the incomes and needs of Harwell staff. The Partnership sees the categories of ‘intermediate sale’, ‘intermediate rent’ and ‘starter homes’ all being forms of affordable housing.

Table 4-1: Indicative housing mix

Category	Percentage		Type
Market sale	25-35%	65%	Private
Build to rent	30-40%		
Intermediate sale	5-10%	35%	Affordable
Intermediate rent	15-20%		
Starter homes	5-10%		
Total	100%		

Source: Adapted from table 4.6 in Appendix 3 Harwell Survey report: the specific housing needs of the Harwell campus

- 4.25 This bespoke approach cannot, however, be delivered simply through the market. It needs to form part of a Comprehensive Masterplan framework for the Campus, offering a blend of

²⁰ Harwell Framework Masterplan, Appendix 3 Harwell Survey report: the specific housing needs of the Harwell campus

different housing types and with long term management arrangements that secure its delivery and long-term sustainability.

- 4.26 This proposal is not the profit-maximising option. The Partnership's view of the site is designed to maintain its long-term viability, and is aligned with the Vale of White Horse's economic ambitions for the area.

5. “The cost of developing elsewhere is greater and the scope for doing so is very limited”

- 5.1 The third exceptional circumstance is that **the cost of developing elsewhere is greater and the scope for doing so is very limited.**

The strengths of Harwell

- 5.2 The key strengths of Harwell – its collection of world-class organisations; the skills of its staff; its links with academic institutions – mean that many of the building blocks for a successful innovation district are already in place. These attributes have been discussed in detail in previous sections of this report.

- 5.3 However there are two other aspects of Harwell that merit consideration in relation to the third “exceptional circumstance”:

- first, its location – some twenty minutes from Oxford and less than an hour from London and Heathrow – affords unique locational advantages in terms of local, national and international science and enterprise.
- second, the sheer scale of the Harwell site sets it apart. The Campus, at almost 300 hectares, is substantially larger than many of its key global competitors: Cambridge Science Park is 60 hectares in size; Singapore Science Parks are 70 hectares; Massachusetts Institute of Technology is 108 hectares; Mission Bay San Francisco is 124 hectares.²¹

The scope to develop elsewhere

- 5.4 Large parts of the District are constrained in development terms – not least because of Green Belt and the North Wessex Downs AONB. There are relatively few suitable sites for housing (and indeed employment) growth, and the scope for delivery elsewhere is therefore limited.

- 5.5 The Council has however worked through a structured approach to site selection, which is summarised below.

Box 6: The approach adopted by Vale of White Horse District Council in relation to site selection

A site selection process was undertaken in accordance with national policy and guidance, ensuring a robust and proportionate assessment²².

Specifically, a five-stage process was undertaken to assess sites in terms of their sustainability.

All potential sites were identified from a range of sources and were first considered through the Housing and Economic Land Availability Assessment (HELAA)²³ to determine whether they were suitable for further consideration. These sites were then subject to site filters, detailed desktop assessment and then detailed evidence testing, engagement with key stakeholders and formal public consultation.

²¹ Sizes of sites and footprints in Harwell Campus (2015) *Harwell Now, Harwell Future*

²² Site Selection Topic paper, October 2017

²³ Housing and Economic Land Availability Assessment, October 2017

Those sites that reached Stage 4, the detailed evidence testing stage, were considered to be reasonable site options. There were 34 sites in total. Of these, 7 were judged to be "preferred sites" and 27 sites were identified as "other reasonable options". All of these sites were subject to detailed evidence testing including assessment through the sustainability appraisal (SA) process.

The testing was informed by technical evidence base studies. These included a **Landscape Capacity Study and Addendum Study** undertaken by Hankinson Duckett Associates. This considered the landscape sensitivity, value and capacity of individual potential housing sites. The Addendum reconsidered evidence for sites where updated information and/or revised site boundaries were received during and following Preferred Options consultation. The Addendum also considered the landscape capacity of any new sites submitted.

The evidence base studies and SA included an assessment of the individual impact of the sites and relevant studies and the SA have assessed the cumulative impact of sites. This included not only assessing the preferred site options in their entirety as a site package but also other differing site packages. The differing site packages ranged from a small number of larger sites to a larger number of smaller sites.

In relation to developing elsewhere, the other "reasonable site options", tested through Stage 4 and assessed through the SA process, were all outside of the North Wessex Downs AONB and located at least 2 miles from the Campus. These were:

- The site at **South of Milton Heights**: This has landscape sensitivities which would restrict the level of development for the majority of the eastern parcel of the land. The impact on the highways network (on both the local and strategic network) would present a significant adverse impact. Both Highways England and the Highways Authority object to any increase in development at this site, unless significant additional mitigation could be provided.
- The site at **North of East Hendred**: This was assessed following the Preferred Options consultation as it was promoted through the consultation. Development at this location would have a significant adverse impact on the immediate and wider landscape and would result in a fundamental change to the landscape character in the area. In addition, it is unlikely the local road network would be able to cope with the scale of growth proposed, particularly on the A417 and at the A34 Milton Interchange.
- The site at **Rowstock**: This would need to be of a sufficient scale to deliver appropriate services and facilities to support the development due to the location of the site at a smaller village. The vast majority of the site is sensitive to development which would have an adverse impact on the setting of the AONB. This significantly restricts the level of development which would not be able to deliver the services and facilities required.
- The site at **West of Harwell Village**: The potential accesses to the site present adverse safety impacts. The Highways Authority objects to any development in this location unless it can be demonstrated that there would be satisfactory access which at present has not been demonstrated.

There are other alternative parcels of land at the Campus which were tested through the site selection process. However, all of these parcels were discounted before Stage 4 and are not therefore considered to be reasonable site options.

(Source: Summary provided by Vale of White Horse District Council)

Conclusion

- 5.6 Harwell's unique combination of resources and relationships, at scale, and in an outstanding location needs to be understood within the context that is Oxfordshire (and, arguably, the Golden Triangle more generally). The whole area is constrained in development terms – not least because of Green Belt. Suitable sites for housing (and indeed employment) growth are in short supply, and the scope for delivery elsewhere is therefore very limited. Moreover none of the alternatives would bring anything like the wider attributes and assets of Harwell. Hence if the aim is to develop an Innovation Village in order to effect a fully functioning Innovation District, there appears to be no plausible alternative to development on the Harwell site itself.

6. “There will be limited detrimental effects on the environment, the landscape and recreational opportunities”

- 6.1 The final exceptional circumstance that needs to be demonstrated is that **there will be limited detrimental effects on the environment, the landscape and recreational opportunities.**
- 6.2 Much of the land identified for housing in the map in Chapter 2 of this report had previously been developed for housing and other uses when the site was an RAF base, and has had a mix of such uses ever since. Even though Harwell Campus sits within the North Wessex Downs Area of Outstanding Natural Beauty (AONB), it contains significant brownfield land designated for employment use, part of which is now proposed to be developed for housing. This will help to create an innovation village, providing more facilities on site and reducing the need for commuting from elsewhere (and so reducing the environmental impact associated with such commuting).
- 6.3 A report by Hankinson Duckett Associates has examined in detail the landscape and visual criteria that support the exceptional circumstances of development within the Harwell Campus site as a housing allocation. A summary of HDA’s findings is provided in Box 7 below; the full report is available separately²⁴. This demonstrates that the proposed residential development at Harwell Campus would have limited impact on the landscape setting of the AONB, which would in any case be capable of being successfully mitigated. It concludes that *“there would be no long-term adverse effects of the proposed allocation on the wider AONB and the proposals put forward would deliver a number of benefits to the AONB landscape”*.

Box 7: HDA’s Landscape and visual appraisal – Main conclusions

“Development of the proposed housing allocation would have some initial adverse effects, notably on the character of the land within the site to the north, land located to the immediate north of the site and from four public footpaths which have existing views of the site. The changes brought about by the development would be consistent with the overall baseline condition and would be restricted to the site and its immediate surroundings. There would be no significant adverse effects on the character and appearance of the wider AONB landscape. There would be initial adverse effects on the recreational experiences of people using the Icknield Way, Hungerford Road and Winaway. However, there would be no significant adverse effects on the enjoyment of the Ridgeway National Trail.

In the longer term, 10-15 years, the proposed mitigation strategy would mature and the character of the landscape, to the north of the site, would revert to its baseline character, with some improvement to local landscape character as the whole campus would be screened from rural viewpoints to the north. The proposed landscape scheme along the Icknield Way would also mature so that the character and appearance of the route would improve. Existing negative views of the campus would be screened by new planting; attractive views to the north-west would be maintained and new and attractive features would be introduced along the route. There would be an improvement in connectivity across the footpath network surrounding the site, allowing more people to experience and enjoy the beauty of the AONB landscape.

The new location for the proposed housing allocation seeks to minimise the potential adverse effects on the AONB. The landscape strategy would mitigate the identified detrimental effects on the environment, landscape and recreational opportunities within the AONB in accordance with bullet point three of paragraph 116 of the NPPF. There would be no long-term adverse effects of the proposed allocation on the wider AONB and the proposals put forward would deliver a number of benefits to the AONB landscape”.

²⁴ Harwell Campus Landscape and Visual Appraisal Report by Hankinson Duckett Associates for Vale of White Horse District Council, September 2017

Part B: Quantitative perspectives

7. Comments on jobs and other impacts

Insights from previous studies

- 7.1 A study from 2014 provided an estimate of potential employment at Harwell Campus, based on a policy-led scenario²⁵. These calculations were not driven by the availability of land but by the scale of demand envisaged for the kind of uses likely to be attracted to Harwell over the forecasting period **to 2031**. On this basis, the study estimated that **9,000 jobs** might be attracted to the Campus overall, of which **5,800 jobs** might be within the Enterprise Zone²⁶.
- 7.2 This second figure is important because it underpins the one that appears in the original Science Vale UK EZ bid²⁷. Within that submission, it was estimated that the number of *net* jobs on the Enterprise Zone would be in the order of **3,500**.

Proposals for Harwell Innovation Village – and implications for employment growth at Harwell

- 7.3 Through “Harwell Innovation Village”, the intention is to make provision for **1,000 houses**²⁸ **at Harwell Campus**. However, importantly:
- Harwell Innovation Village is to be developed on “*land already allocated for development*”^{29,30}; and
 - the commitment remains that “*the Campus also accommodates at least 5,400 ‘net’ additional jobs*³¹ in the plan period up to 2031”³².
- 7.4 In principle, diverting “*land already allocated for development*” from conventional employment B Use Classes to those associated with an Innovation Village (some combination of A and C Use Classes) may have implications for future employment growth, as compared to the assumptions made previously.

²⁵ *Economic Forecasting to Inform the Oxfordshire Strategic Economic Plan and the Strategic Housing Market Assessment*, Final report to Vale of White Horse Council and Partners by Cambridge Econometrics and SQW, February 2014

²⁶ *Economic Forecasting to Inform the Oxfordshire Strategic Economic Plan and the Strategic Housing Market Assessment*, Table 4-1. Final report to Vale of White Horse Council and Partners by Cambridge Econometrics and SQW, February 2014

²⁷ The bid itself quotes a net figure of 3,500 jobs (allowing for local displacement), but this is derived from the gross figure of 5,800 jobs

²⁸ Core Policy 15a from *Local Plan 2031 – Part 2: Detailed Policies and Additional Sites – Preferred Options* Vale of White Horse District Council, Consultation Draft, March 2017. See page 49

²⁹ *Local Plan 2031 – Part 2: Detailed Policies and Additional Sites – Preferred Options* Vale of White Horse District Council, Consultation Draft, March 2017. Para 2.78, page 45

³⁰ Note that some, but not all, of this will be within the EZ. Based on information from Vale of White Horse District Council, we have assumed that 15.46 ha of developable land within the EZ will be diverted to housing uses

³¹ This is the “total Harwell Campus” figure for net jobs from *Economic Forecasting to Inform the Oxfordshire Strategic Economic Plan and the Strategic Housing Market Assessment*, Table 4-1. Final report to Vale of White Horse Council and Partners by Cambridge Econometrics and SQW, February 2014. The corresponding figure for gross jobs is 9,000 (for the whole Campus)

³² *Local Plan 2031 – Part 2: Detailed Policies and Additional Sites – Preferred Options* Vale of White Horse District Council, Consultation Draft, March 2017. Para 2.96, page 51

The implications of the policy change for existing commitments to jobs growth

- 7.5 In order to test whether the Campus can accommodate 9,000 jobs (of which 5,400 are net additional) and, as part of this, whether the Enterprise Zone can accommodate 5,800 jobs (3,500 net additional), analytical work was completed in summer 2017, based on the best available evidence and assumptions. This is summarised in Figure 7-1 below.

Figure 7-1: Calculating the jobs capacity of the Enterprise Zone

1: Overall employment provision on Harwell Campus – from the latest available Campus Masterplan

The latest available Campus Masterplan makes provision for 93,000 sq m of new employment space within the Enterprise Zone and 47,000 sq m of new employment space outside the Enterprise Zone. Over the longer term, additional new employment space is likely to be available within the "Nuclear Area" (130,000 sq m) and "Big Science Area" (90,000 sq m).

2: Developable land within the Enterprise Zone

Of the 93ha, it is estimated that 21.04 ha is "non-developable" for a range of reasons (e.g. contamination, structural landscaping, open space).

If we assume that 15.46 ha of the EZ developable land is diverted to housing, the total developable land remaining for employment uses within the EZ may be estimated at 56.50 ha.

3: Development density

Based on comparable schemes (and also consistent with the original EZ bid), a reasonable assumption in relation to development densities would be in the order of 3,750 sqm per hectare. Across 56.50 ha of employment land, this would generate a total of 207,580 sqm of overall employment provision (including in relation to one building where we understand the floor area is fixed – the National Science Centre).

4: Mix of site uses

From the latest available Campus Masterplan, it is possible to estimate a mix of uses. Multiplying this by the assumed development density generates a possible mix of accommodation (shown in the Table 7-1 below).

5: From floorspace to jobs

Finally – and on the assumption that the Enterprise Zone is fully developed by 2037 (the end of the EZ period) – density assumptions (from HCA) can be applied to calculate the jobs capacity of the mix of floorspace described below.

Table 7-1: Calculating the jobs capacity of floorspace at the Enterprise Zone (by 2037)

Accommodation type	Proportion of total	Floorspace (sqm)	Jobs capacity of floorspace
• Prime offices	34.88	72,477	4,848
• Light industrial	16.74	34,789	644
• R&D	29.77	61,847	2,945
• Innovation space	3.26	6,765	294
• Retail	5.12	10,630	514
• Leisure	7.91	16,428	714
• National science centre	2.33	4,645	135
Overall Total		207,580	10,093

- 7.6 The key finding from Figure 7-1 is that even if 15.46 ha of developable land on the Enterprise Zone is diverted to housing, the remaining land has the capacity to accommodate 10,093 jobs by 2037.
- 7.7 Although the Local Plan timescale is shorter (to 2031), the inference is that the capacity of the EZ land is in excess of the gross target for the Campus as a whole (9,000 jobs). While this would need to be adjusted downwards to align timescales, the calculations above do not consider employment provision outside the EZ – and this too would contribute to the Campus total.

Other sources of jobs growth

- 7.8 The analysis above is a supply side argument, focusing on site capacity. To form a more rounded view of the consequences of the decision to divert land to housing, three other factors ought to be flagged.

1: The relationship between housing provision and (endogenous) jobs growth

- 7.9 Increasing housing provision will in itself generate jobs as new households consume local services, etc. There is a body of work on the relationship between the two: one estimate suggests around **150 jobs per 1,000 population**³³. Across 1,000 dwellings, this could translate into, perhaps, 400 jobs.
- 7.10 In addition, it is probable that the incidence of homeworking will be high. Whilst the residents employed by organisations on Harwell Campus are very likely to be office/lab-based, their spouses/partners could well have a high propensity to work from home. Typically, they will be young, well-educated and digitally literate; and they might well have young families to care for. All of these circumstances would tend to favour home-based working. **This in itself could result in, perhaps, 200-300 jobs in the context of 1,000 new dwellings.**

2: Jobs relating to construction

- 7.11 The scale of development at Harwell Campus will in itself mean that significant numbers of jobs will be created as part of the construction. The construction process will take at least a decade, and because of this, jobs linked to construction can be counted as an impact relating to the site's development.
- 7.12 Based on some very broad assumptions about the nature of development – and drawing in benchmarks from other work³⁴ – the table below provides an estimate of construction jobs. These would be generated on a year by year basis throughout the duration of the EZ (until 2037).

³³ See *Employment Densities Guide – 2nd Edition (2010)* Drivers Jonas Deloitte for OffPAT and HCA, para 4.33

³⁴ *Calculating Cost Per Job – HCA Best Practice Note, 2015* – based specifically on "Table 3: Labour coefficients (workers per £1m output per year at 2011 prices)"

Table 7-2: Construction jobs linked to the development of the Enterprise Zone (housing and employment) on a year-by-year basis through to 2037

Construction Type	Jobs / £1m spend	Total Jobs
New Housing	19.9	1,642
Private Industrial	10	305
Private Commercial	16.6	2,781
Total		4,727

3: The relationship between housing provision and (exogenous) jobs realisation

- 7.13 Our final point is rather different. It derives from evidence provided by the occupants of Harwell Campus in relation to the challenges of recruitment. In short – because of the price (and mix) of housing within a reasonable distance of Harwell – recruitment and retention is challenging, especially in respect of younger scientists at the early stage of their careers (when levels of pay are relatively low). If employers cannot recruit, jobs will not be filled, irrespective of the physical provision that is made for them.

Implications for wider site-related economic impacts³⁵

- 7.14 Informed by the site capacity-based modelling work summarised in Figure 7-1, two further dimensions of site-related economic impact should be noted.

Business rates

- 7.15 If the assumptions set out in Figure 7-1 are correct – and the EZ area is fully developed over the 25 year period – Vale of White Horse District Council expects to see no significant reduction in forecast business rates in Harwell. This analysis will be reviewed in more detail in future months.

Community Infrastructure Levy (CIL)

- 7.16 Earlier in 2017, the Planning Inspectorate published a report on the Community Infrastructure Levy Draft Charging Schedule for Vale of White Horse District Council. Approval was given for a “zoned” approach to charging CIL on residential property.
- some specific locations were listed as Zone 3 within which CIL was £0; none of these were within Harwell Campus
 - Zone 2 (Faringdon, Grove and Wantage) was established at a rate of £85 per sqm; again this not include the Campus
 - Zone 1 was defined with a CIL rate of £120 per sqm of built floorspace; we are assuming that this will apply in relation to development on Harwell Campus

³⁵ Note that these are all site-related and they exclude the wider national/international impacts deriving as a result of the scientific work completed within Campus facilities and discussed earlier in this document

- 7.17 Assuming Harwell Innovation Village is defined around 1,000 dwellings which span a mix of 1, 2 and 3 bedroom properties, we can take an "average" figure to represent a midway point between the likely floor areas of this mix of units. Applying the Zone 1 multiplier, we can reach an estimate of the likely CIL payments that will be made as the housing is built. In total, this amounts to **£9,197,324**.

Conclusion

- 7.18 The overall conclusion is that under a "*with Harwell Innovation Village*" scenario – in which provision is made for 1,000 houses – there still appears to be sufficient employment provision to accommodate the commitment to jobs set out in the Local Plan.

8. Conclusions

- 8.1 Overall, this review has found that there are “exceptional circumstances” relating to the development of an “Innovation Village” on Harwell Campus. These relate to all four of the “exceptional circumstances” identified in NPPF. The evidence/argument in support of each is summarised in the table below.

Table 8-1: Exceptional Circumstances in relation to Harwell Campus

From the National Planning Policy Framework	Summary of evidence/argument
<i>“the development is in the public interest”</i>	<ul style="list-style-type: none"> • Harwell Campus is a major hub of UK science and it has seen substantial and sustained investment – much of it funded from the public purse – over 60 years • Science developed at Harwell is having a very significant effect on many different spheres. It is, for example, central to satellite technologies³⁶; to regenerative medicine³⁷; to materials science³⁸; and to sensor technologies³⁹. Through these and other technologies, it is transforming approaches to medicine, space science and many other domains. It is generating economic impact through the firms which are commercialising the science (both those on Harwell Campus, and many others elsewhere) and it is also achieving wider societal outcomes (e.g. related to health) • It is clearly in the public interest that the full potential of the scientific investment already made at Harwell is fully captured. The development of the Innovation Village will contribute significantly to this
<i>“there is a need for the development (including national considerations)”</i>	<ul style="list-style-type: none"> • Harwell Campus is a major employment location already, accommodating some 5,500 jobs in 225 organisations. These organisations include public sector bodies (e.g. STFC and MRC) and private sector firms. Most of them are on Harwell Campus because they are either generating or using the associated scientific asset base • There is evidence to suggest that key organisations on Harwell Campus are struggling to recruit and retain staff. There are clearly evidenced skills shortages across the STEM domain, both nationally and in Oxfordshire. House prices are very high in the county and affordability ratios are challenging • These general observations are compounded by the particular character of the Harwell workforce. In general, scientists are not well-paid – particularly those in the public sector organisations. These bodies have long played a role in terms of training future generations of scientists who will often move into the private sector. This “pipeline” however is under threat • There is also a high incidence of “early career” scientists who tend to be on short/fixed term contracts. These people’s housing requirements are not well matched with current provision in and around Harwell • More generally, there is a well-evidenced move from employment-focused science parks to “Innovation Districts” which are characterised more clearly in live-work terms, enabling more informal working patterns and the exchange of tacit knowledge • The points above all lead to the conclusion that there is a need for housing development at Harwell which can contribute to the creation of an Innovation District. Housing-related issues are key to the recruitment and (especially) retention challenges. Addressing these is crucial to the

³⁶ Noting, for example, the work of companies like Oxford Space Systems

³⁷ The Electrospinning Company, based at Harwell, is active in this field

³⁸ See, for example, the work of Cobalt Life Systems

³⁹ Oxsensis is active in this field

From the National Planning Policy Framework	Summary of evidence/argument
<i>“the cost of developing elsewhere is greater and the scope for doing so is very limited”</i>	<p>long term success of Campus occupants – and the full exploitation of the investment already made in the science base</p> <ul style="list-style-type: none"> • Nowhere else in Oxfordshire – or across the UK – has the same density of science-based assets as Harwell. Moreover the scale of the Campus (in terms of Ha) genuinely sets it apart. In combination, density/scale confer important competitive advantages and potentials and these could not easily be replicated elsewhere • Moreover, given Green Belt and other constraints, it is not obvious that anywhere else in Oxfordshire could provide a development site on anything like the same scale • Vale of White Horse District Council has considered a number of different site options. It has found none of the proposed alternatives to be suitable
<i>“there will be limited detrimental effects on the environment, the landscape and recreational opportunities”</i>	<ul style="list-style-type: none"> • Hankinson Duckett Associates was commissioned by Vale of White Horse District council to examine in detail the landscape and visual criteria that support the exceptional circumstances of development within the Harwell Campus site as a housing allocation. In relation to the proposed development, HDA’s conclusion is that <i>“there would be no long-term adverse effects of the proposed allocation on the wider AONB and the proposals put forward would deliver a number of benefits to the AONB landscape”</i>

Source: SQW

8.2 In relation to the quantitative effects of making provision for 1,000 houses at Harwell Campus on “land already allocated for development”⁴⁰, analysis has suggested that:

- the number of jobs would not be less than previously assumed, and could be more; in part, this is because previous calculations (informing the masterplan, the EZ application and the Local Plan) have all been based on demand-side considerations, not issues relating to site capacity
- based on a large number of assumptions, CIL payments linked to 1,000 dwellings on the Campus (some in the EZ, some outside) will sum to £9.1m (in aggregate); and – although to be tested further in due course – Vale of White Horse District Council expects forecast business rates receipts to be unchanged.

⁴⁰ Local Plan 2031 – Part 2: Detailed Policies and Additional Sites – Preferred Options Vale of White Horse District Council, Consultation Draft, March 2017. Para 2.78, page 45