

Executive summary

The interface between academic research and its application and exploitation takes many forms. For two decades, the University of Oxford's Begbroke Science Park (BSP) has been home to a wide range of activities in this sphere, playing a vital role in the University's 'impact' strategy and the wider economy. Central to its success is the *co-location* of multiple stakeholders and activities within an integrated innovation campus, which offers unique benefits not usually found in wholly commercial science or business parks. The launch of a new Government *Industrial Strategy*, which plays to regional strengths, a step change in the exploitation of academic research, supported by *Oxford Sciences Innovation*, and maturing links with key overseas partners, offers major new opportunities for the region and the wider UK that justifies the expansion of Begbroke Science Park and demonstrates 'very special circumstances' as required by the Government's *National Planning Policy Framework* for development in the Green Belt. At the local level this is supported by the Cherwell Local Plan Part 1 2011-2031 and the Employment Land Review (2012). At the regional and national level, the National Infrastructure Commission's (NIC) work on the Cambridge-Milton Keynes-Oxford Corridor has identified an opportunity to develop a series of successful but distinct places into a major economic corridor that delivers substantial benefits to the UK as a whole. To exploit these opportunities – and realise the potential for new jobs, inward investment and economic growth – expansion of Begbroke Science Park both within and (subject to a small-scale local review of the Green Belt) beyond its current boundary is essential. The current Cherwell Local plan has already recognised this growth requirement and was also supported through previous granting of outline planning approval for growth in the Park in 2015. At present, the site is sub-optimal in size, full to capacity and with an increasing waiting list of prospective tenant organisations. Growth will enable agile responses by the University and the region to new (often time-limited) opportunities; and, through a scale-up of activity and symbiotic links, will create a vibrant innovation community that will form a key part of the Cambridge – MK – Oxford corridor and support the Cherwell district's economy and wider employment context.

Introduction: background, policy and strategic significance

Begbroke Science Park (BSP) plays an important – and distinctive – role in the University of Oxford's strategy at all levels of the organisation: department, division and institution. It is central to efforts to enhance the impact of the University's research, which has become a priority for all universities over the last 10–15 years, in response to UK Government policy. If Oxford is to retain its world-leading position, it is essential that we can compete effectively in this arena. Together with Osney Mead, in West Oxford, BSP is also able to accommodate large, industrially-relevant experimental facilities that cannot easily be housed in the heart of the City.

This is also recognised by Cherwell District Council in the *Local Plan Partial Review: Oxford's Unmet Housing Need (2017)*, which identifies BSP as a **facility of international significance**. It is also recognised in the *Cherwell Local Plan Part 1 (2011-2031)* and *Employment Land Review (2012)*, which identified a need for additional land to be allocated for employment use at Kidlington. The *Local Plan* at Paragraph C.230 states that the University of Oxford plays a significant and leading role in research both in the UK and worldwide and in this context the Science Park is a vital site. It adds that the

University is moving towards delivery of the remaining phase of its core site (i.e. the previous 'lapsed planning permission that is proposed to be renewed by the current proposals) but once complete, further growth is constrained by the Oxford Green Belt. However, the amount of scientific research continues to expand and the Local Plan acknowledges that there are two 'exceptional circumstances' that justify a review of the Green Belt: the location of the Science Park, given the importance of being directly linked to University facilities and the research environment; and the potential for the Science Park to deliver wider benefits for the immediate locality through support for the development of a high-tech cluster and across the District with growth in scientific research, connecting with local businesses, nurturing enterprise and drawing investment into Cherwell District. These are unique and very special circumstances justifying inappropriate development in the Green Belt, in accordance with Paragraph 87 of the NPPF.

The University of Oxford continues to be a strong supporter of the local and regional economy, having signed up to the Oxfordshire Green Paper with other regional organisations to take shared responsibility for delivering the vision and accruing shared benefit across the region. The University also continues to be a supporter of the "Oxfordshire Place Based Sustainable Growth package deal" as evidenced by our continued commitment, and recent correspondence to the Chair of the Oxfordshire Growth Board, referenced in our support materials: *Letter from PVC (Research & Innovation) University of Oxford to Chair, Oxfordshire Growth Board, 15th November 2017.*

BSP is a place '**where industry and science meet**'. The interface between academic research and its (commercial) application and exploitation can take a variety of forms:

- applied research (with or without industry co-funding);
- collaborative research and development (R&D) involving co-location of academic and industry groups;
- commercialisation of university research outputs through spin-out companies or licensing; and
- co-location of third party companies (particularly Small/Medium Enterprises (SMEs)) who wish to access specialist academic facilities or benefit from the wider environment, culture and 'soft' infrastructure.

Since its launch in 2000, BSP has hosted activities right across this spectrum. Crucially, it has done so in the context of an *integrated* campus, designed to promote interaction, synergies, translation of knowledge and technology and, ultimately, innovation. Impact and innovation are not linear processes, and often entail a degree of serendipity: **sustained co-location of relevant academic researchers and industry** (users) with opportunities for informal interaction is therefore key, and is central to the success of major clusters in the US, such as **Silicon Valley, California**. Growing this model at BSP will therefore form an important step in delivering the NIC's vision for a knowledge-intensive cluster along the Cambridge – Milton Keynes – Oxford corridor that will serve as a UK equivalent to Silicon Valley.

The important contribution BSP makes to the regional innovation ecosystem was recognised in the 2013 report *The Oxfordshire Innovation Engine: realising the growth potential*, by consultants SQW (which identified its 'tremendous potential' and recommended its 'major long-term expansion' as part of the region's Knowledge Spine); through Government investment of £4.2m in new buildings at BSP (matched with £7m of University funding) via the Oxfordshire City Deal; and its selection as the venue for the announcement of the City Deal by Chancellor George Osborne, in 2014. The Chancellor's Autumn Statement (2017) also acknowledged the importance of research, the vision of the NIC for the

Cambridge-Milton Keynes- Oxford Corridor and the need to capitalise on the global reputations of the UK's two most famous universities.

More recently, Oxford's research and innovation capabilities have attracted growing interest from business and public-sector organisations in China and the Far East. Ten delegations have visited BSP in 2017, alone; and since September 2017, Oxford's Mathematical, Physical and Life Sciences (MPLS) Division has signed two Memoranda of Understanding with Jiangsu Industrial Technology Research Institute (JITRI) and one with Guangzhou Economic & Technological Development District (GETDD). Both partnerships aim to address developments and innovations in several fields, including life sciences, environmental protection, and manufacturing technologies (all sectors that have, or have had, a presence at BSP), and complements the creation of Oxford's first overseas centre for physical sciences and engineering research and technology, at Suzhou in China (OSCAR Institute). JITRI and GETDD both wish to establish innovation space at Oxford encouraging collaboration and inward investment; BSP is the ideal location for this.

But to date BSP has been operating on a small, **sub-optimal scale**.¹ To realise its full potential, we need the ability to **grow the campus** and **respond swiftly to external drivers**. Challenges and opportunities – arising from developments in Government policy and in the Oxfordshire innovation landscape – have reinforced the need to further develop the site. This will further cultivate the **vibrant innovation community** at BSP that will deliver new jobs and inward investment for the region, drive economic growth and protect Oxford's position amongst the world's leading universities.

This submission – from the University's MPLS Division – outlines the very special circumstances and justification for renewing and granting outline planning permission for the proposed development. This is aimed at: supporting the case for reinstating the lapsed outline planning approval, setting out how additional capacity at the BSP site will benefit the (local, regional, and national) economy and the University of Oxford; and presenting some illustrations of the types of activity that will be located at the Science Park in the near future, if a further renewed planning permission is granted by Cherwell District Council, as local planning authority.

Utilisation of existing planning envelope

BSP is currently focused on a red-lined core site of 4.8 hectares (5.54ha including the access from the A44), within which a much smaller approved area of development exists. Following completion, in 2016, of the new Accelerator Building (an extension to the existing Centre for Innovation & Enterprise, funded via the Oxford City Deal and University match funding) the built-out area is approx. 14,200 sqm. The University has previously held outline planning consent (most recently App. No. 15/00309/OUT) for an additional 21,236sqm, *which lapsed in May 2017**, and wishes to reinstate this consent as soon as possible to provide capacity for two more building developments, with an estimated total area of 12,500 sqm.

**A brief note on the reasons for the previous Outline Planning Approval lapse. By the time the BSP boundary issues were resolved by the s73 permission (15/00309/OUT) there was just two years for the preparation, submission and approval of all the reserved matters before the time-period expired.*

¹ An independent land allocation report, commissioned by the University, concludes that 'at present [2017], however, the Park is too small...without a sense of place [or] sufficient amenity offering'.

However, there was no agreed and defined scheme to progress, submit, receive approval, discharge conditions, commission and then implement at that point to enable the outline permission to be kept “alive”.

The expiry of the original deadline for submission of reserved matters has allowed the University a timely opportunity to review its approach to the funding of capital projects (illustrated by the recent issue of a £750m Bond), and its strategy for the Begbroke Science Park development. These have also coincided with – and offer the opportunity to capitalise on – the interest from Project Spyder (an R&D company wishing to expand at the Science Park), which was not in the offing at the time the previous permission was about to expire.

Context and opportunities

Begbroke Science Park has a distinctive, well-recognised unique selling point within the region; and **demand** for space – from University spin-outs, research partners, and other third-party companies interested in becoming part of the innovation ecosystem at BSP – **outstrips supply**. For example, space in the new 2,200 sqm Accelerator Building extension (CIE Phase I) was fully committed within 9 months of completion, and there is now a waiting list for tenancies. Several rapidly growing spin-outs that are < 18 months old are already reaching the point where no further expansion floorspace is available at BSP.

Inability to grow both now and in the future (subject to the small-scale Green Belt Review referred to earlier in this document) beyond the current red-lined site (established by the previous outline planning permission 15/00309/OUT) will lead to significant **opportunity costs and lost potential** for spin-out companies (unable to stay close to the research base during early R&D phases); for third-party companies (more limited access to specialist facilities and equipment); for the University (constraining academic-industry engagement and impact); for the Oxfordshire Knowledge Spine (loss of employers and skilled staff to developments such as Imperial White City and NW Cambridge); and the wider Cambridge-Milton Keynes- Oxford Corridor.

In earlier (2015) submissions to the Council to support the University’s case for expansion of BSP and a partial review of the Green Belt to accommodate employment needs (Local Plan Part 2 process), we anticipated that the strategic expansion of (academic) Engineering Science research would directly drive a substantial proportion of the future growth at BSP. Following several key changes in the external environment over the last three years – the most significant of which are described in more detail, below – we now expect the majority of the short- and medium-term growth to come from commercial R&D borne out of research developed within or in association with the University (as well as continued Departmental research project growth). Once again, this reflects one of the key strengths of BSP: it is well placed to respond, in a flexible way, to a range of different opportunities across multiple sectors but needs the benefit of an outline planning permission for the development of the existing site to be able to accommodate such opportunities, as soon as practically possible.

Co-location of a critical mass of academic and commercial activity spanning multiple business sectors also opens up **alternative career paths** for PhD graduates and postdoctoral researchers at the University who do not wish to pursue an academic career but do want to remain in R&D. It will increase the potential **that highly-skilled scientists trained in Oxford will remain in the area**, rather than move to Cambridge or London to find employment, and thereby **further boost the Oxfordshire and Cherwell economies**.

A recent study by BIGGAR Economics estimated that in 2014/15 the economic contribution to the UK by University of Oxford spin-out companies was £285m Gross Value Added and almost 4,600 jobs (of which £132m GVA and nearly 1,900 jobs was in Oxfordshire).² An expansion of BSP – enabling more Oxford spin-outs to remain nearby for longer – will increase both the aggregate contribution to the UK economy, and the proportion which is realised within Oxfordshire.

The University, through a variety of facility investment and funding vehicles expects to invest several tens of millions in new space for R&D businesses and projects at BSP. The current campus accommodates several hundred jobs and research project staff, (circa 400 in total across the site), and the proposed new facilities related to the renewed outline planning application of 12,500 sqm would attract a similar amount of jobs and employment, encouraging multi-million pound investment by business collaborations, UK government research grants and spin out investment funds. We expect that the new developments would create an additional 200 – 300 job opportunities for the local economy. The new built facilities would attract investment of between £30m - £40m, and significant additional investment in world class equipment.

The OSI effect

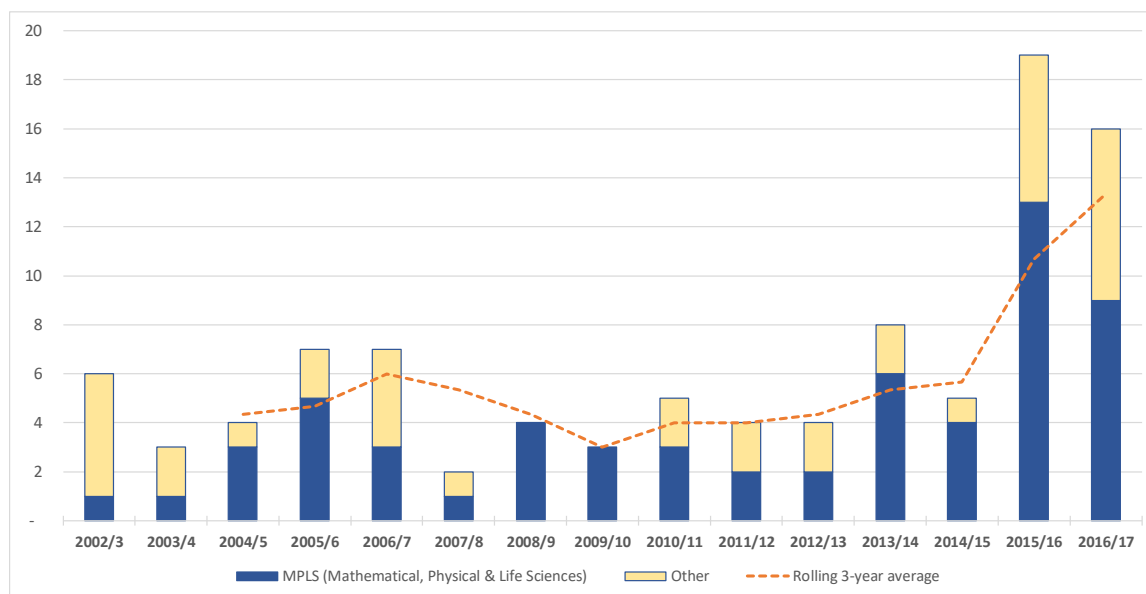
Growth will occur in response to both emerging needs and opportunities. Arguably, the primary driver for expansion is **Oxford Sciences Innovation plc (OSI)**. Launched in May 2015, OSI is a venture fund specifically focused on the commercialisation of research from the MPLS and Medical Sciences divisions at the University of Oxford. It has raised over £600m in capital; and since November 2015 has invested around £82m, supporting the creation of 40 new companies, and secured over £25m in follow-on investment. It is reported that the current portfolio of companies is valued at over £400m, with the identification and formation of successful spin out growing exponentially. Oxford already had a strong track record in commercialising its research outputs, but as figure 1 shows, OSI's formation has led to a step change in commercialisation activity.

From 2002/3 to 2014/15, the University of Oxford created on average between 2 to 8 spin-out companies per academic year; this rose to 19 companies in 2015/16, and 16 companies in 2016/17. In addition to growth in the *number* of spin-outs, OSI has also raised the bar in terms of *aspiration* and *long-term outcomes*: its goal is to nurture and grow 'the next generation of world-leading companies'. We are already seeing examples where access to OSI funds – beyond the initial Round 1 investment – is supporting accelerated growth. Although the University's accelerated creation of successful spin outs is growing exponentially it still lags far behind the USA (East and West coast University establishments), and provision of space, facilities and equipment at BSP and other sites in Oxford is crucial to the current and future success of Oxford and the region.

² *Economic Impact of the University of Oxford* (BiGGAR Economics, April 2017)

Fig. 1 Number of companies spun out by Oxford University Innovation, by academic year (2002/3 to date)

Source: analysis of spin-out companies listing on OUI website



Examples of BSP success stories

Oxford Nanopore Technologies (ONT) grew from 6 staff to 70 whilst at BSP (2006-9), before moving to the Oxford (Magdalen) Science Park. It now has almost 300 employees and continues to grow fast – with satellite offices in Cambridge, Boston, New York, France and Japan – and has recently acquired a 5,175 sqm site on the Oxford (Magdalen) Science Park. ONT has raised £351m of funding to date. Its MinION device, the world’s first nanopore DNA sequencer, is now used by scientists in over 70 countries and in 2016 was used on the International Space Station. Following a further successful funding round, Oxford Nanopore Technologies was recently valued at over £1.5bn.

Oxford Photovoltaics is commercialising solid-state, thin-film perovskite solar cell technology designed to boost solar cell efficiency and performance, and to transform the way glass is used in the construction industry. Founded in 2010 by Prof Henry Snaith FRS, Oxford PV now has nearly 40 staff, and raised close to £30m in equity in a two-year period (2015–16); both Prof Snaith and the company have been recognised through a string of awards. Oxford PV has recently moved its corporate HQ from BSP to Oxford Industrial Park. Its scale-up and manufacturing development activities will be undertaken at a site in Germany.

Undisclosed R&D Companies at BSP. Due to commercial sensitivities relating to funding and IP protection we cannot disclose particular named companies, but several current occupiers at BSP are planning for significant businesses growth in the coming months and years (2018 – 2025), including significant recruitment of staff and investment in new equipment and increased space at the Park. These companies are all potential tenants of both the **CIE Phase 2** (circa 4,500 – 6,000 sqm), and pre-let facilities; as well as customers of the **Fabrication Facility** (circa 2,500 sqm).

Maturing company links

The last 5 years have seen the establishment and growth of a range of new academic-industry links, involving commercial partners from the UK, Europe, and beyond. Often, such relationships begin through a collaboration with a single researcher, and grow through the sponsorship of a succession of projects within that research group: several relationships are now reaching a stage of maturity where the industry partner is looking to establish an R&D presence of its own in Oxford; and in some cases,

the company is willing (and able) to contribute to the capital cost of a new or refurbished building. Other strategic relationships span multiple research groups and departments from the outset, and have the potential to develop into Centres of Excellence in specific fields of research or industry sectors.

Space and transport constraints make it impracticable to establish large-scale facilities of this nature in the heart of Oxford city centre. But BSP offers a viable solution. Indeed, an independent study commissioned by the University in 2017 observed that **'Begbroke provides one of the most obvious sustainable opportunities outside the city' to cater for the likely long-term need for science R&D and office and technology space** (which is unlikely to be met in full by proposed developments in, or south of, Oxford).

Government policy

Realising economic and societal **impact** from publicly-funded research and innovation has been a key part of Government policy over the last decade. More recently, a focus on fostering regional economic growth has been transformed into an emphasis on **'place'** in science and innovation, as part of a *One Nation Science* agenda which aims to 'map local research and innovation strengths and infrastructure ... to identify and build on areas of greatest potential in every region'.³

The Autumn Statement 2016 included an additional £4.7 billion of Government investment in R&D over 4 years, with a £2 billion *per annum* (or 20%) increase by 2020 relative to 2016 levels. In January 2017, the Government published an *Industrial Strategy* Green Paper; and in April 2017 announced the launch of the *Industrial Strategy Challenge Fund* (ISCF), the flagship vehicle through which much of the additional £4.7 billion will be channelled.

The Autumn Statement 2017 also included reference to the NIC's report on the Cambridge-Milton Keynes-Oxford Corridor being 'one of the most significant growth corridors in the country' and a raft of measures to improve infrastructure including funding to improve rail services in Oxfordshire and £215m to support housing and infrastructure through the Oxfordshire Housing and Growth Deal. This has been supported by the University of Oxford as it is an opportunity to further the collective agenda for knowledge-led, sustainable, economic growth accruing shared benefit across the region. The University sees the Deal as creating an environment in which the University can fulfil its mission of providing high-quality education, world-class research and impactful innovation while helping to enhance the quality of life in the region.

As Table 1 shows, there is a strong correlation between the areas identified, or under consideration, for investment and existing research and innovation strengths or industry clusters in the region. This presents significant opportunities to attract large-scale public investments and to raise awareness of Oxfordshire's science and innovation capabilities amongst policy makers and the general public.

With a tried-and-tested model of academic-industry co-location, BSP is ideally placed to compete for these investment opportunities in areas of regional strength.

³ July 2015 speech by Minister for Universities & Science: <https://www.gov.uk/government/speeches/one-nation-science>

Table 1 Mapping of Industrial Strategy Challenge Fund areas onto Oxfordshire research and sector strengths

ISCF area	Research strengths	Oxfordshire sector strengths
Battery technologies	✓ OU	<i>Automotive and motorsport^c</i>
Robotics & AI in extreme conditions	✓ OU, Brookes	<i>Electronics and sensors^c</i>
Driverless vehicles	✓ OU, Culham	<i>Autonomous vehicles^a • Automotive & motorsport^c</i>
Manufacturing & materials of the future	✓ OU	<i>Advanced materials^b</i>
National satellite test facility (Harwell)	✓ OU, Harwell	<i>Space technologies^c • Electronics and sensors^c</i>
Quantum technologies	✓ OU	<i>Quantum computing^a</i>
Next generation (digital) services		<i>Space-led data applications^a • Digital health^a</i>
Data to early diagnosis & precision medicine	✓ OU	<i>Digital health^a • Healthcare^b</i>
Transforming construction	✓ OU, Brookes	<i>Built environment^b • Sustainability^b</i>
Prospering from the energy revolution	✓ OU	<i>Sustainability^b</i>
Space	✓ OU, Brookes, Harwell	<i>Space-led data applications^a • Space technologies^c</i>
Healthy ageing	✓ OU	<i>Healthcare^b</i>
Audience of the future	✓ OU	<i>Creative and digital^c</i>
Transforming food production	✓ OU	<i>Biosciences^b • Life Sciences^c</i>

Key: OU = University of Oxford • ^a = one of four sectors identified in the Oxfordshire Science & Innovation Audit⁴ •

^b = ‘evidenced capability’ for OxLEP in Smart Specialisation Hub report, *Mapping England’s Innovation Activity*⁵ •

^c = covered by an OxLEP sector profile report.

Future vision

Renewal and reinstatement of the previously-granted planning permission (App. No. 15/00309/OUT) will allow the construction of two new buildings, with a total area of 12,500sqm, to provide for the following activities:

Large-scale R&D facilities for commercial tenants:

Major innovation in knowledge-intensive fields such as advanced materials, autonomous vehicles and energy storage has become an extremely complex endeavour, requiring collaboration between academia and companies of disparate sizes to advance developments towards new products and services, and ultimately economic and social impact.

In this setting, to grow as a possible future innovation district, BSP needs to expand its capacity to host diverse ‘clusters’ of start-ups, large companies and academic groups in an environment where connections can easily be made and collaborative efforts supported. Key to establishing these clusters are large ‘anchor’ institutions that draw others in; major commercial tenants will attract academic groups working on relevant science and technology. Over time, new research Centres of Excellence will

⁴ *Oxfordshire Transformative Technologies Alliance* (Aug 2017). Science & Innovation Audits form part of the *One Nation Science* initiative. <http://www.oxfordshirelep.com/sites/default/files/OxTTA%20SIA%20report%20%281%29.pdf>

⁵ <http://smartspecialisationhub.org/wp-content/uploads/2017/06/Mapping-Englands-Innovation-Activity-June-2017-FINAL.pdf>

generate further spin-outs, which will add to the pipeline of companies seeking innovation space at BSP and in Oxfordshire, creating a set of interdependencies that results in self-reinforcing growth.

Currently there is no outline planning permission and, hence, no ability to accommodate larger tenants at BSP. Permission and additional building space will enable BSP to attract existing and external companies to host significant R&D activity on site. One model through which to achieve this is the use of 'pre-let developments,' building tailored space for companies to lease over the long-term.

A current BSP tenant, a global technology company with over 4,000 employees and existing research links to the University, wishes to consolidate all of their UK-based R&D activity within a single 6,000 - 8,000sqm performance centre building at BSP through a pre-let arrangement.

Innovation space for University spin-outs and other high-tech SMEs:

As stated above, demand for space on the BSP site from University spin-outs, research partners, and other third-party companies outstrips supply. This demand is only likely to accelerate - the 'OSI effect' has seen a significant increase in the number of spin-outs from MPLS.

At the same time many spin-outs situated on the site are growing rapidly and reaching the point where there is no suitable expansion space available to them, accelerating the point at which BSP is unable to meet companies' needs within the current red-lined or core site – in the same way that previous successful tenants have had to move elsewhere to support expansion (see 'examples of BSP success stories' above).

The ability to retain spin-outs and non-University SMEs at BSP for longer will benefit the site, the academic research base and the companies not to mention the local economy; being able to remain close to the site's facilities (e.g., the *Oxford Materials Characterisation Service*) and to the research that underpins the company's technology – rather than move to commercial sites elsewhere – will allow nascent companies to exploit this competitive advantage for longer, and de-risk their technology through more stages of the business cycle.

Providing additional 'innovation space,' ranging in scale from agile 'hot-desk' space, through incubation space to larger 'grow-on' accommodation to support companies across more stages of the business life cycle, will benefit BSP through an increase in the number and diversity of its commercial tenants. This can be facilitated by approval for and investment in CIE Phase 2 development which is proposed to be circa 4,500 sqm.

Device fabrication and prototyping facility:

Manufacturability is a key step in the innovation pathway; without consideration of design and fabrication processes in the development of a technology then it is not possible to develop new products and services from the research advances made by MPLS departments and spin-outs. If research outputs are to be beneficially exploited then it is necessary for repeatable and cost-effective 'scale-up' to be developed and demonstrated.

High-value manufacturing has become extremely important to the UK's economy, adding £275bn of Gross Added Value per annum to the UK economy⁶. With the strength of Oxford's research base in nanotechnologies, functional materials and quantum devices, and BSP's diversity of high-tech companies placed to gain a competitive advantage, the site is well positioned to translate the

⁶ *High Value Manufacturing Landscape Report.*

https://www.ifm.eng.cam.ac.uk/uploads/Resources/IFM_HVM_REPORT_WEB.pdf

University's low TRL developments into industrial processes that benefit the region and the wider UK economy.

To develop manufacturability requires access to specialist fabrication and prototyping facilities and knowledge. By constructing a purpose-built facility to host a managed suite of cutting-edge equipment, BSP can provide for the fabrication needs of academic research groups, spin-outs and companies from across the wider region. Siting such facilities on-campus will offer close proximity and enable faster advancement of device development and optimisation by reducing the cycle time between fabrication and testing.

Many of these facilities are too specialist and expensive for most companies (particularly start-ups) to have in-house and are therefore rarely found on commercial science parks. Hosting a device fabrication and prototyping facility at BSP will add to the appeal of the site for companies.

The facility is likely to operate on a similar model to the highly successful *Oxford Materials Characterisation Service*, which is already housed at BSP. Such a facility would also operate within the ambit of the previous planning permission (condition nos. 7 and 8 of 15/00309/OUT) relating to light manufacture and manufacturing of prototypes. We are planning to develop a new model phased Fabrication Facility which can accommodate growth over time and will require a facility of between 1,500 – 2,500 sqm.

Engineering and physical sciences research buildings:

The existing research activity from several of the University's academic departments (largely the departments of Engineering Science and Materials) at BSP is one of the main drivers for companies to base themselves at the site.

Additional departmental space at BSP will help the University achieve its strategic objective to generate economic and societal benefit from its research. Key to achieving impact in the physical and engineering sciences is the commercialisation of research outcomes and closer engagement with the end users of research. BSP has a significant role to play by offering flexible space for academic departments to be co-located with industry, driving innovation. This co-location is a unique characteristic of BSP not offered by purely commercial business parks in the region (e.g. Milton Park or Oxford Science Park). In addition, by siting the more applied research areas near the fabrication facility, there will be a direct benefit to the research through integration of manufacturability at an early stage.

The availability of flexible R&D space will enable the University's departments to respond quickly to unexpected, short-notice opportunities. These could include major investment from corporate partners (whose R&D investment decisions are made more rapidly than universities typically operate), Government capital funding (there has been a growing trend for large, irregular and short-notice calls, with a requirement to spend significant sums within 1-2 years), or capital and project funding from the University's nascent partnerships with Chinese businesses and Government.

The flexible building space needed to compete for such windfall investments in engineering and physical sciences is difficult to find in the city; without it, there is a risk that funding, and the resultant jobs, will go elsewhere – even in instances where Oxford may be pre-eminent in research terms. Expansion of University Departmental space at BSP is closely related to the strategy for space provision in the city centre and elsewhere across the University.

However, we are planning for expansion of MPLS Division departmental growth and could over the coming years accommodate growth of between 3,000 – 4,500 sqm of interdisciplinary departmental

research space including the potential for inward investment through a China research links programme.

Other considerations

With the exception of pre-let buildings, whose specification will vary according to the client tenant, new buildings will be designed for **flexible and adaptable R&D use** – suitable for academic or commercial R&D activity, and **easily reconfigurable** between office, light labs or wet labs, as necessary. The device fabrication and prototyping facility will require specialist clean room space.

Expansion will also include consideration of:

- **Parking** and transport support services to consolidate links with other county and University sites
- **Conference and events facilities** (ancillary D1 use) to support site tenants, and available for use by external organisations
- **Amenities and other support services** to underpin site operation, and promote interaction

Examples of potential technology focus areas

Centre for Research in Advanced Materials Manufacture

Oxford hosts a critical mass of world-class research in the development of novel nanomaterials; and a critical mass of device designers creating prototype devices structures based on novel materials. For new materials and devices to reach application, there are key issues to address: how to produce nanomaterials on a larger scale ('scale up'); and how to make devices in a repeatable and cost-effective manner. Leveraging existing research expertise in Oxford and new fabrication and prototyping facilities, the Centre will focus on these key high-value manufacturing challenges. Applications areas span a range of sectors, from transport safety and motorsport to renewable energy to wearable devices and display technologies.

Centre for Smart Sensors and Devices

A translational facility conducting R&D, design, fabrication and process development for next-generation sensors and instrumentation. Potential application areas are wide-ranging and include: the 'Internet of Things'; satellite and drone sensors and communications instrumentation; or instrumentation used in autonomous vehicles to monitor their environment or perform actions involving movement and control. Aligned with Government approaches to space/satellites, robotics, healthcare, and driverless cars, the Centre would sit between Oxford research capabilities and regional or national industry groupings (e.g. space cluster at Harwell; regional automotive cluster; or healthcare across Oxfordshire). Developments could also be applicable to the (design of) novel instrumentation required for quantum computers, allowing the development of a supply chain cluster at BSP.

Conclusion

Oxford University Begbroke Science Park (BSP) continues to be a facility of international significance and of great importance to the local, regional and national economies. BSP is at the core of the county's innovation ecosystem, which falls within Oxfordshire's 'Knowledge Spine' and the nationally-important Cambridge–Milton Keynes–Oxford Corridor.

It has already been previously established (through the adopted Cherwell Local Plan 2011-2031 Part 1) **that 'exceptional circumstances' exist to justify a small-scale local review of the Green Belt to meet future employment and expansion needs at Begbroke Science Park.**

Previous planning permissions, most recently in 2015 with the granting of permission (App. No. 15/00309/OUT) for up to 21,236 sqm of additional floorspace for primarily new research facilities at BSP accepted that there were 'very special circumstances' that justified the development of the site.

These very special circumstances have only been enhanced or reinforced since this time for the reasons set out in this document, and the continued success of the park to generate innovation and impact for the benefit of the local, regional and national economy.

The granting of a further planning permission for 12,500 sqm of additional floorspace within the established red-lined or core site at BSP will enable R&D, innovative research and prototype manufacture along with related market opportunities to be accommodated at BSP in the short-term so that these are not lost from the site, the University, District, region and wider Cambridge-MK-Oxford Corridor.

Only the Oxford University BSP has the ability to locally accommodate such unique and valuable opportunities where "research and industry meet" – as previously acknowledged – and therefore it is imperative that permission is granted as soon as possible to facilitate such valuable development, investment, employment, knowledge-sharing and contribution to the local, regional, national and international economies.