Section A: Project description

Project Name: Centre for Electronics Frontiers - Turning Solent into UK's "Silicon Coast"

Lead Organisation: University of Southampton

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Summary description of the project

Silicon Coast is an opportunity for the Solent region to transform into a highly innovative and lucrative global centre for next generation hardware design and development. The sought investment in the **Centre for Electronics Frontiers (CEF)** will support:

i) the development of a solid scientific foundation for realising this transformation,
ii) the creation of local start-ups for the commercialisation of Artificial Intelligence (AI) hardware systems (with potential opportunities at all levels of the value-chain) and
iii) generate some of the leading figures of the field in the years to come.

The ambition of the CEF is to push the frontiers of electronics through emerging nanotechnologies, creating advanced nano-biosensors, efficient/recyclable storage solutions, and novel hardware for artificial intelligence. Over the past years, the work of the CEF has focused on developing and prototyping emerging nanotechnologies within Southampton's cleanrooms that address the challenge of unlocking AI.

Solent LEP investment in this project will unlock several expected benefits and outcomes for the local economy:

- Development of a state-of-the-art research facility of 755m2
- Create 20 new direct jobs and safeguard 20 existing jobs within the CEF
- In the medium to long term create over 265 jobs across SMEs and large companies involved in the project within the solent area;
- Support the creation of 10 new AI-related businesses;
- Deliver 180 new business relationships between Solent LEP based SMEs and companies;
- Attract £30m of additional research income into the area
- Deliver significant productivity gains in the development of new AI solutions
- Deliver productivity gains that will place the Solent area as a leader in innovation, leading to wider productivity benefits through improved environmental outcomes
- Fill identified AI skills gaps

The Benefits/Costs ratio for this project is estimated at 2.47 with benefits of £71.4m for costs of £28.8m over the period 2021-2031.

The CEF has experienced tremendous success in the past two years, which has led to doubling the research team. This growth has put a strain on the availability of space and in turn severely constrained CEF's research expansion, recruitment and innovation. The strain on space is threatening the University's ability to retain world-leading researchers and to drive forward research in this nationally important area without further investment.

In response, the University has strategically allocated space for CEF in the Gower Building near our Cleanroom Complex – part of the Highfield Campus. Refurbishing this space to a high standard will support the development of CEF activities towards a **truly user-centric/inspired innovation ecosystem, directly addressing the challenges**

related to technology adoption of AI. The project involves refurbishment and re-modelling of an existing commercial unit within the University's Gower Building (Building 60). The refurbished and re-modelled unit of 755 m2 will be transformed into high-tech demonstration space to the ground floor, innovation space, design space, meeting rooms / breakout space, offices, kitchen facility and toilets including accessible located on the first floor – Annex 2/3/4 for plans and artist impression.

Project Location: University of Southampton, Highfield Campus, SO17 1BJ (Grid reference SU424155)

Project Costs

Total Project Cost	**£1,734k**
Funding Requested from LEP	**£850k**
Local Contributions	**£884k**

Timelines

Earliest start date	April 2021
Desired start date	April 2021
Delivery Timescales	The project is programmed to commence April 2021 with completion by end of September 2021. The refurbishment will be completed and fully operational by March 2022.

Section B: The Strategic Case

Silicon Coast offers an ambitious and transformational programme where the full capability of Artificial Intelligence (AI) is unleashed to enhance the economic prosperity, health and well-being of the people living in the Solent area in line with the Solent 2050 Strategy. The applications of AI systems, including but not limited to machine learning, are diverse, ranging from understanding healthcare data to autonomous and adaptive robotic systems, to smart supply chains, intelligent personal assistive technologies or next-generation communications (beyond 5G capabilities) – totalling more than 1 trillion $ annual turn-over and strongly growing. AI opportunities are enormous across all areas of science, the economy and government. McKinsey & Company estimates that leading countries could gain an extra 20% to 25% of economic growth and productivity through AI over the next decade. Not only new industries will be created, but AI will also transform business models across many sectors as they deploy vast datasets to identify better ways of doing complex tasks. This offers the Solent area a new economic paradigm to drive economic growth and support green recovery.

The new space for the **Centre for Electronics Futures (CEF)** will bring together the University research in Artificial Intelligence (AI) and local business interests in the Solent area to enable the first steps towards **turning the Solent area into the UK's Silicon Coast.**

The vision for **Silicon Coast** is ambitious and transformational and wants to position the Solent region as a globally competitive and durable centre of innovation excellence for new AI technologies, systems and applications. Silicon Coast will:

1. Turn the Solent region into an internationally leading centre for research and development of advanced AI software and hardware.
2. Create an innovation test bed for the application of emerging technologies for sectors of strategic importance to the Solent region
3. Form an industrial network/forum facilitating the uptake of AI by local enterprises.
4. Create a cluster of cities and communities that become showcase adopters of AI technologies.

It offers a new paradigm to drive up economic growth and support green recovery post-Covid19 focused on unleashing the full potential of AI to enhance the economic prosperity, health and well-being of the people living

in the Solent area.

The first step for this ambitious vision is to create a national **centre of excellence** for design and manufacturing of advanced electronic technologies for AI that will offer:

1. A medium-scale **design and manufacturing centre for advanced electronics** where state-of-art capabilities are researched and perfected in preparation for industrial uptake.
2. A **chip design bureau for AI hardware and Internet of Things (IoT) systems**, working in tandem with the manufacturing centre for delivering world-beating hardware-software co-optimised AI business solutions.
3. A **business incubation centre** for quickly and aggressively transmitting generated research into new businesses and employment.
4. A **training facility** for training the innovators and scientists of tomorrow, thus creating a very substantial pull factor for investment in the UK.

The CEF will provide a physical space for business and enterprise to access and interact with world leading expertise, skills, and facilities available within one of the UK's most outstanding AI groups in an **environment that nurtures creativity and innovation**, to co-create new AI technologies and advance innovation. Importantly, the CEF will also become a centre for the innovative translation of research into commercial applications that will contribute to the economic growth of the region – capitalising on the established innovation, technology transfer and business growth capability of the University. The Centre will be co-located with the University of Southampton's Zepler Insititute £120m Cleanroom Complex which houses the best set of nanoelectronics and photonics fabrication capabilities in the UK.

The CEF will 1) enable interactions between business and researchers to overcome the barriers to adoption of AI, which will be addressed through the co-creation of solutions; and 2) accommodate large-scale test facilities that enable co-designed technological solutions to be advanced to high levels of readiness for commercialisation.

The objectives of the CEF are to:

- Provide access to state-of-the-art facilities and expertise within one of the UK's most outstanding and diverse engineering faculties, to increase the capacity of local business for internal innovation;
- Create an entrepreneurial environment in which commercial sector employees and academic staff can collaborate on innovative business ventures, new business models, products and services;
- Support existing businesses (especially SMEs) in developing their capacity for innovation and growth and develop and upskill local business current and future staff in the latest AI innovations;
- Act as a gateway through which companies (especially SMEs) in the Solent area can access, and partner with, large market players and stakeholders with whom the University of Southampton has strong strategic relationships.

Opportunity

The Solent region is ideally placed to become a global AI leader and to maximise the growth opportunity offered by AI. It hosts: (1) a business ecosystem spanning SMEs to large-scale corporations with a strong appetite to innovate; (2) academic institutions with world-leading experts across all required knowledge fields and unique design/manufacturing infrastructure (e.g. Zepler Cleanroom Complex); (3) dual city region with above average level of connectivity with the wider UK and internationally (Southampton is one of UK's largest passenger and cargo ports and Portsmouth has a large Royal Navy base); (4) significant public-funded infrastructure and know-how (dstl, University Hospital Southampton); (5) ambition for clean, green growth (Southampton's commitment to become carbon-free by 2030).

Despite its impressive size and growth, the AI market has the potential to grow far more if its key bottlenecks are addressed a) lack of truly 'cognitive' functionality (i.e. beyond statistical learning), b) lack of efficient hardware and c) lack of public trust. Addressing the 'big 3' bottlenecks will create huge market opportunities in multiple, multi-bn£ market segments including in autonomous navigation, military support and decision-making, banking and insurance, smart healthcare, transportation, logistics and more, where currently the combination of state-of-

art AI's energy-inefficiency and lack of transparency in decision-making still preclude deployment.

The CEF will provide the enabling innovation platform to let Solent area lead the way in accelerating the adoption of new and ground-breaking technologies. A key bottleneck towards the proliferation of the technology is the lack of efficient hardware to embed AI everywhere – well beyond the reach of the cloud. The need for the next generation of hardware for AI technology is unanimously recognised by global industrial stakeholders and by the scientific community racing to develop the upcoming generation of hardware for AI.

Leading-edge Research at the Centre for Electronics Frontiers

A revolution in computing technologies is in the making, which has a huge potential impact on our daily lives. Current computing technologies will soon not be able to sustain the requirements of our societies: only in 2017 more than 10 zettabytes of data were produced, and IT infrastructures and consumer electronics absorbed over 10% of the global electricity supply. It is expected that by 2025, 50+ billion electronic devices will be interconnected, and over 180 zettabytes of data will be generated annually. However, conventional technologies will not be able to support the processing of the predicted data deluge. Only a disruptive change in the development of alternative hardware solutions based on new devices, architectures and algorithms will improve performance while dramatically minimizing energy consumption.

In a recent article on New Scientist (August 2nd, 2017) it was stated "a bottleneck has been baked into computer architectures". This same article highlighted Southampton's world-leading work by CEF researchers as a viable solution to this outstanding challenge. Novel hardware technologies established within our state-of-art cleanrooms have brought a new era in electronics as they offer simpler, smaller and more energy-efficient alternatives to transistors. CEF advances this technology into novel hardware modules/systems endowed with: (1) real-time and on-node sensing/processing capabilities; (2) pattern recognition; (3) reasoning; (4) memory consolidation and/or on-line learning capabilities; overall rendering (5) autonomous/"thinking" hardware.

This project is planned specifically to generate impact in a critically important application domains in the IoT market, as well as in applications related to health monitoring, surveillance, industrial inspection, environmental monitoring, and smart buildings/cities. Specifically, our novel sensory modules will allow processing data at the edge (device-level) in a highly compressed manner while maintaining the granularity of extracted information. Our classifier chipsets will empower mobile surveillance cameras, phones and robotic systems with pattern extraction capabilities without requiring any connectivity to the cloud. This will impact key applications such as image/video and natural-language processing. Besides the obvious benefits in power savings and capability, this approach will also aid democratizing AI and even allow users to maintain the privacy of their data, as the need to process this information in a remote location is mitigated. The next level of intervention lies with developing hardware/software modules for reasoning. This consolidates sensory knowledge for enhancing the resilience of any decision making; important for autonomous vehicles and agents. Perhaps, one of the biggest challenges of continuously-on ("lifelong learning systems") relates to learning capacity and adaptation. Current hardware paradigms (particularly embedded solutions) are severely constrained via the availability of finite memory resources.

Strategically, our vision can be understood as aiming to: i) prepare the ground for generating most of its impact in the medium term (~5-year horizon), ii) generate some of the earliest impacts and iii) achieve this by investing in 'ahead of the curve' technology with an intent to facilitate the arrival at marketable results before other actors, many of which currently focussing on incremental innovations in the field (be they competitors or not). In TRL terms (EU Commission standard) this may be expressed as mainly spanning the interval between level 2 (concept formulation) and 4 (validation in lab) to 5 (validation in relevant environment – i.e. with realistic constraints on most notably power efficiency, size and independence from bulky supporting equipment/circuitry). We consider that this project aligns very well with current national priorities, the needs and opportunity exploitation readiness of UK industry and existing strengths within the national academic system, including the availability of infrastructure capacity e.g. in the Zepler Cleanroom Complex at the University of Southampton. In conclusion,

this programme takes a holistic view in developing novel hardware solutions for AI, ranging from the physical implementation at the sensory front-end all the way to high-level cognitive functionality. In our view, this is set to be the key for enabling the next wave of AI.

Alignment to Industrial Strategy and national Programme

This investment will thus contribute across a number of UK capabilities through: (1) processing big-data in real-time, (2) enabling affordable and power-efficient solutions for robotics and autonomous systems and (3) translating advanced materials capabilities into novel AI solutions. It also addresses specific challenges identified in the UK Government's Industrial Strategy, namely: (1) enabling efficient hardware solutions for Robotics and AI, (2) mitigating energy constraints of modern electronic solutions that are demand response, (3) providing alternative approaches for delivering leading-edge heathcare and medicine, (4) leveraging advanced manufacturing processes and/or functional materials and (5) contributing in a more connected-world vision through freeing up bandwidth of interconnected devices.

AI and Data Economy are one of the four Grand Challenges of Industrial Strategy (2017). Building on the recommendations of the independent AI review, 'Growing the AI industry in the UK', the AI Sector Deal saw the announcement of a £1Bn investment to promote the adoption and use of AI in the UK. The Sector Deal aims to attract and retain both domestic and global AI talent; deliver major upgrades to our digital and data infrastructure; ensure that the UK is the best place to start and grow an AI business; and contribute to communities' prosperity by spreading the benefits of AI across the country. The AI Roadmap (2021) published by the AI Council (which includes Southampton academic Prof Dame Wendy Hall), sets out the government's strategic direction on AI and identifies 1. research, development and innovation; 2. skills and diversity and 3. data, infrastructure and public trust as the underpinning requirements to enable a cross-sector adoption of AI. The University is at the forefront of AI developments in the UK and was invited to become a member of the Alan Turing Institute . The CEF contributes to these national priorities and will work with local businesses to accelerate the uptake of AI.

Alignment to Solent 2050 Strategy

The emerging **Solent 2050 Strategy** sets out four core elements for growth: Marine and maritime cluster; Clean Growth; Visitor economy and Coastal communities together with a number of key enablers (embracing and enabling new technologies; Skills and Talent; Improved Connectivity). One of the key challenges for the Solent area is a relatively low productivity rate. Businesses can use AI to improve efficiency and productivity. Using big data and data analytics will enable smarter, faster and better decision-making and process optimisation in business. The CEF is set to significantly contribute to the development of a pipeline of highly skilled AI experts able to deliver new AI technologies solutions to businesses. The CEF will play a key role in accompanying businesses and local government in the Solent region, in their data journey. A number of the priorities identified in Solent 2050 strategies have the potential to be enabled through AI. Examples of such opportunities include:

- **Business Productivity -** AI for **increasing business productivity**, resilience and increased competition
- **Clean Growth - Environment and energy** where better use of data could help manage smart energy networks, tackle climate change and deliver net zero CO2 targets
- **Ageing Population and Health** where new capabilities for the management, use and interpretation of health data could help to predict and better manage diseases, and deliver new treatments
- **Creative industries** from virtual production to improve data infrastructure
- **Defence and security** where demonstrating AI technologies at scale is challenging
- Application of AI to **government policy and public services** to improve the effectiveness and efficiency of services to the public, and how policy is informed by data

Silicon Coast – Centre for Electronics Frontiers

The people pipeline of world-class talent who can deliver AI solutions is the cornerstone of this initiative with the Centre for Electronics Frontiers (CEF) playing a key role in training this talent pool of the future. The CEF was

born out of the Zepler Institute at the University of Southampton that is the largest photonics and electronics institute in the UK. The 350 research staff and PhD students use their expertise in electronics, photonics, physics and nanoscience to tackle key societal challenges and develop technologies that make a real difference to our daily lives. The erbium-doped fibre amplifier, invented and developed in the late 1980s at the University, is now a crucial component of the internet. Fibres developed here are found in the Moon Rover and Mars Explorer and are used in the manufacturing of life-saving medical devices. The Institute has led on a range of 'world firsts' that have been enabled through the state-of-the-art cleanroom facility that is at the core of the Zepler Institute representing the UK's best set of nanofabrication capabilities.

Options considered for the Scheme

The Centre for Electronics Futures (CEF) is part of the world-renowned Zepler Institute (ZI) - home to the £120m cleanroom complex that houses the most advanced set of photonic and nanoelectronic fabrication capabilities in the UK. Over 350 researchers work in ZI, offering a unique mix of expertise in established and cutting-edge technologies, combined with a wide range of equipment for micro and nanofabrication and electronic and optical characterisation across a range of facilities. To ensure the sustainability of the cleanroom facilities and the strength of the research base, the ZI has seen a significant increase in number of research staff and post-graduate research students (PGRs). This growth is placing considerable strain on existing office space with staff and PGRs having to work in densely packed spaces far from the Cleanroom complex. The strain on space is also threatening our ability to retain world-leading researchers. The potential for future growth in the CEF research programmes is constrained by lack of space in B53, with no room for expansion. The provision of additional space for 80-90 researchers is needed to address this.

Criteria for Options Assessment

In considering the best option for the expansion for the Centre for Electronics Futures, the University has taken into consideration the following requirements:

- Flexible working space to expand and consolidate scientific research.
- Future-proofing growth of group
- Co-location of research group (both staff and PGR students)
- Proximity to the Clean Room Complex (Building 53)
- Minimum impact on existing University operations
- Accessibility for external partners (business/general public/schools)
- Value for money
- Speed of delivery

The functional content required for the Centre for Electronics Futures is as follows:

- Core: office and writing-up space, AI hardware demo area and innovation space
- Shared facilities: entrance & meeting rooms
- General; senior academic cellular offices
- Circulation and support areas
- Inclusive access
- Plant

Option Development - Long List

The University has identified key objectives and benefits for the Scheme. Consequently, a number of options were considered, that included:

Option 1 – Do Nothing

No reconfiguration, refurbishment or development works to any existing buildings or departments.

Benefits

- No disruption to existing services as no construction or refurbishment required.
- No capital investment required

Issues

- Disruption to delivery of research programmes in short/medium term due to lack of capacity;
- Risk of losing research group to competing universities in other regions
- No opportunity to re-profile workforce as critical mass of services through co-location would not be achieved;
- Physical and environmental issues facing the current research programmes unresolved;
- Significant limitations in providing the necessary capacity, improved significant adjacencies and workflow within the department to cope with current and future demand;
- No or little opportunity to improve the staff experience;
- No opportunity to expand recruitment within the programme;

Option 2 – Limited Capital Development

Renovation and/or refurbishment of existing estate portfolio. A number of options were considered and assessed for suitability against the identified requirements. These included:

Building	**Preliminary Assessment**
B39 – Southampton Statistics Sciences Research Institute	Although close to B53, B39 is too small and not fit-for-purpose to accommodate current research group. This option would not address the need to future-proof the growth of the CEF. **Discounted**
B45 – Health Professions and Rehabilitation Sciences	B45 offers sufficient space for the CEF and is currently vacant. But it is too far from B53 to provide a conducive and innovative working environment. This option does not fit with the wider University estates strategy that has earmarked this space for alternative education and research activities. **Discounted**
B25 – eSciences Building	B25 does not provide sufficient space for the current research group and is too far from clean room. Access to the building is restricted due to the type of research undertaken by other research groups in the building. This option would not address the need to future-proof the growth of the CEF and broad engagement with businesses and public. **Discounted**
B60 – Gower Building	B60 - The former bookstore in B60 is next to B53 and has been vacant since 2019. The unit has sufficient space to accommodate the additional space needs for CEF. It is accessible by a wide range of stakeholders with parking facilities close by and foothold generated by the commercial units. **Shortlisted**

The Vice-Chancellor, the Dean of the Faculty of Engineering and Physical Sciences and the Head of the Centre for Electronics Futures considered the various sub-options under Option 2 and decided that the only option worth pursuing with limited capital development was the refurbishment of Building 60.

Benefits

- Relative low level of capital investment required
- Sufficient space to accommodate CEF with a cohort of the ZI PGRs
- Proximity to Clean Room Complex (B53)
- Varied and flexible option for refurbishment
- Deliver fit for purpose facilities for the long term
- Key co-location of research team achieved
- Accessibility
- Speed of delivery
- No displacement of jobs
- Limited impact on other University operations

Issues

- Estates issues with building condition with Covid19 pandemic

Option 3 **– Significant Capital Development – Construction of new building**

Construction of a purpose-built facility in the vicinity of B53 or building an additional level in B53

Benefits

- Future proof the expansion of research team;
- Capacity and environmental issues resolved;
- Close access to Clean Room Complex
- Construction of new Centre would add a stimulus to recruitment;

Issues

- No site available close to B53
- Significant capital investment
- Longer-term delivery
- Significant disruption to activities with potential loss of income
- Loss of position as regional, national and global research centre

Option Development – Shortlist

A working group made up of representatives from the Faculty of Engineering and Physical Sciences (where the CEF and ZI sit) and from the Estates and Facilities Department of the University was established to review the various options and make recommendation to the Vice-Chancellor and the Dean of the Faculty. It was agreed that Options 1 and 3 will be discounted as they do not provide the necessary facility to enable the expansion in research activity and would require substantial capital investment that would not deliver value for money in the long term for the University, or the region.

Option 1: Do nothing

The space in the existing facility is insufficient to support the current and future needs of new and expanded specialist research demands. Key spatial requirements to support the success of research are adjacencies to spaces, collaborative working areas, opportunity to expand and access to state-of-the-art specialist research equipment. There is no scope for expansion in the current space occupied by the CEF.

Option 2: Refurbishment

The footprint and layout of the existing space occupied by CEF does not permit the right configuration nor does it have sufficient space to provide expansion opportunities to support the research and collaborative activities of the CEF. The B60 space will allow for the development of an AI hardware Demo area on the ground floor for showcasing developments in this emerging and high-growth area to colleagues beyond CEF/ZI, industrial partners and supporting outreach activities to schools. The working group has planned for an innovation space for enhancing the experience of our students through hosting brain-storming activities and research related

meetings/events; overall providing flexibility to all occupants.

Option3: Construction of new building
The lack of available land for redevelopment in the vicinity of the Clean Room Complex (B53) led to this option being discounted. An economic appraisal of the option of building an additional level to the Mezzanine in B53 is presented in this case (for comparison purposes only since the significant costs, longer-term delivery and significant disruption to operations resulted in this option being ruled out.

The outcome of both the non-financial and economic appraisals is that the preferred option for the delivery of the project objectives is **Option 2 – Refurbishment of Gower Building (B60)**

Section C: The Financial Case

1. **Set out the total funding profile for the project in the table below**

£000	2020-21	2021-22	2022-23	2023-24	Total
Solent Capital funding		**£850K**			
Capital funding from other sources		**£884K**			
Revenue funding from other sources					
Total		**£1,734K**			

2. **How have the costs been calculated?**

The full project cost is estimated at £1,734,000 including all third-party consultant costs. The project budget is based on the initial feasibility study prepared by BGS architects with professional consultant support provided by sub consultants Qoda relative to the proposed mechanical and electrical services installations. Gleeds Cost Management Ltd have prepared the cost estimate in collaboration with BGS architects and Qoda.

Costs have been based on benchmark information extracted from similar projects with an appropriate inflationary uplift applied. Quotations have been obtained from specialist furniture suppliers for inclusion within the overall project costs. The scope of works for audio visual and IT / data Installations have been provided by the University's in-house specialist ISolutions. The cost estimate has been reviewed and validated collaboratively by the consultant professional team with specialist staff in the Universities Estates and Facilities Department to verify appropriate allowances have been included in the estimated overall project cost.

Building costs are based on a building with 755 sq m gross internal floor area that will result in an internal net area of 446 sq m due to specific requirements of the facility.

3. **Is the capital funding request from Solent LEP the minimum sum required to enable the project to proceed?**

The University has allocated a fixed sum towards the project, balancing the requirements of its entire portfolio of activities, and is not in a position to make loan repayments as an alternative to grant funding. The University of Southampton generates a modest surplus as a proportion of its income (2019/20 £38.3m (6.6%); 2018/19 £22.2m (3.8%); 2017/18 £30.8m (5.3%)) which is reinvested to support the University's strategy and deliver the capital programme to maintain and improve the University's infrastructure. The University's capital programme supports the delivery of the strategy across the range of our operations encompassing teaching and learning, residences, and research and enterprise. Typically, the capital programme requires around £50M cash spend per annum which is funded through a mixture of surplus, external funding, philanthropy and borrowing.

In order to ensure value for money in the distribution of University funds to capital projects, those areas which positively impact on research and enterprise activities are required to seek external 'matched' funding. Approval and release of matching contribution by the Estates Project Board is dependent on contribution towards the overall costs being secured from external sources.

The University has a finite amount of funding available for capital projects which has to be balanced between the requirements of teaching, research and infrastructure. The Covid19 pandemic has had a significant impact of the University's financial position with a high level of uncertainty over the forthcoming years. The estates strategy has earmarked £1.7m towards the capital costs of the project. The University is looking for contributions from external sources to offset these costs – seeking £850K from the LEP and £250K from the Wolfson Foundation to enable this project.

4. **Explain how Solent LEP funding will unlock or bring forward your project**

The investment from the LEP will contribute to the overall funding envelop for this project and will enable the unlocking of the necessary internal capital funds to proceed with the project. The proposed refurbishment requires redevelopment from a commercial unit to research facility and offices presenting an ideal opportunity to provide a state-of-the-art and innovative facility that will enhance the innovative capacity of high-technology and knowledge-based businesses in the Solent LEP area. The University is seeking to maximise the impact of the refurbishment and seize the opportunity to develop an innovative solution with a co-investment by the Solent LEP, for the wider economic benefit of the Solent area.

5. **How will the remainder of the project be funded? Provide source of the match funding, amount and status in the table below.**

Source of matched funding	**Amount (capital)**	**Amount (revenue)**	**Status (degree of commitment - e.g. secured, awaiting decision etc.)**
University	£634K		Overall envelop of £1.7m approved with the expectations that at least 50% external contributions will be secured.
Wolfson Foundation	£250K		Invited to submit stage 2 full proposal for funding (March 2021)

6. **Set out a breakdown of the estimated costs of the project in the table below**

Project component – cost heading	**Cost (£000s)**	**Date of spend**
Preliminaries	£190K	By end of September 2021
Consultancy Fees	£170K	By end of October 2021
Contingencies	£100K	By end of September 2021
Alterations, Demolitions, Substructure	£150K	By end of May 2021
Building (Frame, External/Internal Walls)	£195K	May – end of June 2021
Finishes and Fittings	£380K	Mid-June – end of September 2021
Mechanical/Gas/Electrical/Gas/Communications Installations	£548K	Mid-May – end of September 2021

7. **What specific works will Solent LEP funding contribute towards?**

The Solent LEP grant will contribute to the overall costs of the project. By March 2022, the project will be complete and in operation.

8. **Provide evidence on what risk allowance (optimism bias) has been applied to the project cost.**

The high-level estimates are projections and costings using industry standards and represent estimates against current anticipated specification and quantities prepared by an experienced and suitably qualified consultant team. A process of Risk Management has been implemented to monitor, manage and mitigate risks. This is ongoing to establish the affect and potential level of cost associated with the risks. The project contingency is allocated based on level of risks and currently stands at £100K.

9. **Provide an explanation of the process that will be followed in dealing with cost over- runs**

Project will be managed and delivered within the budget and timeline in line with University gateway procedures for capital projects. Costs are monitored with regular reviews against budget throughout the project. Cost updates are communicated to the Universities Estates Projects Board via submission of monthly dashboard reports. This gives early warning of potential cost over-runs and opportunities to implement mitigation actions at an early stage. Cost over-runs are then considered by the EPB with additional funding sought and approved as appropriate.

10. **What are the main risks to project delivery timescales and what impact will this have on cost?**

Risks	Impact on cost
Delays in delivery of the new space - Construction programme delays.	Increased time resulting in additional costs.
Possible effects of COVID-19 in short term project delivery.	Increased time resulting in additional costs.
Long lead in materials and plant	Increased time resulting in additional costs.

11. **Will the project require on-going revenue support? If so, how will this be funded?**

The project will result in the refurbishment of a state-of-the-art facility. After completion, the on-going costs will be the standard maintenance costs for office accommodation. Based on experience of similar building, it has been estimated that the operating cost will be in the order of £35K per annum.

The University supports numerous major capital projects and has developed robust access and technical support arrangements to ensure successful collaboration and financial sustainability derived from the Transparent Approach to Costing methodologies. These will be applied in this case ensuring that the projects supporting in the building generate sufficient income to support running and depreciation costs.

Section D: The Economic Case

1. **Provide a description of your assessment of the impact of the project to include:**

The costs and benefits of the Scheme have been quantified over a10-year appraisal period (2021-2031).

- The capital costs of the Scheme presented in the economic appraisal include both the construction costs of £1,734,000 as well as anoptimism bias of 5.76% which is based on the University'sexperience and track record in delivering capital projects.
- Staff revenue costs are also included in the total costs. These costestimates are based on 20 new FTE direct jobs and 20 safeguardedjobs. The total cost of staff over the appraisal period is estimated tobe £16,000,000.
- The benefits of the Scheme monetised in the economic appraisal include: the value of direct FTE jobs (including safeguarded jobs),indirect jobs in the supply-chain, construction jobs, and jobs createdin innovative SMEs and start-ups as a result of the project.

- A number of benefits have not been quantified e.g. IPcommercialisation; inward investment; productivity gains.

Impacts:

Jobs: Create 20 FTE new direct jobs in the CEF; Sustain work for 30 tradespersons at the peak of construction; In the medium to long term create over 265 jobs across SMEs and large companies involved in the project within the Solent area; Retention of graduates and highly-skilled jobs in the Solent area.
Business Support: Deliver significant productivity gains in the development of new AI solutions; Deliver 180 new business relationships; Fill identified AI skills gaps; Support enterprise skills development for Solent LEP based SMEs so that they are able take advantage of commercialisation opportunities made possible by the CEF.
Business Creation: Support the creation of at least 10 new AI-related businesses; draw in over £20m of venture capital investment directly to the work of the CEF and the Solent area by 2031;
Environmental and Social Impacts: Deliver productivity gains in engineering that will place the Solent area as a leader in innovation, leading to wider productivity benefits through improved environmental outcomes
Innovation Facility: Enable a sustainable Capital Project for an innovation centre to benefit local businesses and enterprise in the Solent area.

Key risks:

There are several risks associated with this project that require consideration, ranging from local scale barriers to national and global scale shifts in economic climate. Through awareness of risk it is possible to enact mitigation from those that are most predictable and easy to modify. Potential risks to achieving the target impacts include the following 1. Persisting pandemic or 2. Shift in economic climates resulting in short- to medium-term uncertainty and reduced confidence to invest in research and development. This may make businesses in the Solent area less likely to interact with the CEF.
Risk Reduction:
Showcase the AI capabilities to help business decide on adopting new technologies;
Industry engagement events, working in collaboration with delivery partners – including the Solent LEP will focus on enhancing confidence through innovation and creativity developed with researchers and academics.
Evidence that industry closely linked to Universities are more resilient than those that are more isolated.
To further mitigate against Benefits realised being lower than those predicted, built into the plan is engagement with senior industrialists and policy makers to amplify, grow and provide as focus for economic and societal impact.

Description of modelling approach used and checks made to ensure robustness of model:

The economic impacts of the project has been determined using a benefit-costs analysis over a 10-year period from 2021-2031. The baseline costs include: capital and revenue costs for the building; staff revenue costs and business. The benefits include new research and commercialisation income; value of direct jobs in the CEF and associated value chain, value of the construction jobs, impact of open innovation for SMEs in the Solent area and an estimate of the indirect jobs resulting from the activities of the CEF. Details of the assumptions and calculations can be found in Annex 1.

The table below summarises the key outputs from a preliminary economic appraisal for the scheme and shows excellent value for money and a significant return on investment for the project between 2021 – 2031:

Present Value of Benefits	£28.8m
Present Value of Costs	£71.4m
Net Present Value	£42.6m
Benefit: Cost Ratio	2.47

It is estimated, using SETsquared methodology based over 15 years of experience running existing incubators, that the CEF will have a significant impact on the formation of SMEs, growth and job creation within the Solent economy. SETsquared is in a strong position to provide high impact business acceleration services to the CEF, particularly helping Solent based SMEs gain access to the commercial benefits. It is part of SETsquared's mission to help more knowledge-based companies to be founded and grow and help develop better, stronger and deeper relationships between the research assets of universities, SMEs and major businesses.

The scale of this opportunity would suggest that open innovation activities valued across the companies involved in the programme in terms of new sales or improvements to their competitive position will be significant. Based on the typical job creation rates for the SETsquared centres we estimate that the early stage work will help create 10 new jobs, which is a modest number of direct new jobs in the Solent area, but as the project gathers momentum by 2031 this number will rise to 130 jobs. SETsquared experience suggests given the nature of this project these early numbers are achievable. By 2031, this work is projected to have created around 265 highly-skilled jobs in the local economy.

The University will also work with the regional and national organisations, such as InnovateUK to ensure that local SMEs and technology-based companies are aware of, and take advantage of, Government programmes designed to support innovation and business growth. The University of Southampton also has a first-class track-record in helping SMEs access private sector investment from angel, venture capital and institutional investors and will continue to use its experience to help Solent SMEs raise commercial funding to help them grow.

2. **For all projects, complete the table below showing the expected employment (direct or indirect) outputs arising from the scheme?**

	Direct Jobs	Indirect Jobs
Total jobs created (FTE)	20	265
Total jobs safeguarded (FTE)	20	
Total construction jobs created (FTE)		
Total new jobs	40	265

Section E: The Commercial Case

1. **Give details of the preferred procurement route for the project and why this option was chosen**

A 2-stage tender process has been selected for the project. The stage 1 tender will be based on a fully designed strip out package and provisional sums for the remaining elements of work. Contractors will provide a firm fixed price for the strip out works package. The contractor will price the remaining elements of works based on the provisional sums with overheads and profit and prelims applied. The preferred contractor will be engaged via the stage 1 tender process. Detailed design will progress in parallel with the stage 1 tender process. The fully designed remaining elements of work will be priced at stage 2 of the tender process.

The procurement process has been selected so that a contractor is engaged at the early stage of the programme and commences strip out works, hence relieving pressure on the programme.

In addition, although the works are of a simple nature, the logistical arrangements for execution of the works are

likely to be of a complex nature due to the location of the site. By having a contractor on board at an early stage there will be the benefit of having the expertise of the contractor to assist in logistical planning.

2. **A full procurement strategy will not need to form part of the bid documentation submitted to Solent LEP. However, an outline of the Procurement Strategy should be included as an Annex.**

The form of contract will be the JCT Intermediate form of contract. The procurement process is outlined below and will be managed by the Project Manager:

- Intrusive surveys / investigations. Small value works package to be prepared, priced and executed on site.
- Early preparation of the Stage 1 tender documentation.
- Early Stage 1 tender invites to a minimum of 4 suitably experienced contractors selected in collaboration with the University Estates and Facilities representatives and the Consultant design team.
- Progression of Stage 2 detailed design in parallel with the Stage 1 Tender Pricing.
- Receipt of Stage 1 tenders.
- Stage 1 tender evaluation process based on price and a quality submission. Includes a process of interviews.
- Stage 1 tender report with a preferred contractor recommended.
- Seek EPB approval to proceed and appoint the Contractor.
- Placement of contract / Pre-construction agreement with the preferred contractor.
- Commencement of stripping out works on site.
- Confirm Stage 2 tender price with the appointed contractor.
- Commence the main works package on site.

Section F: The Management Case

1. **Provide details of who will be responsible for delivering the scheme, the roles and responsibilities of those involved, and how key decisions are/will be made. Include summary details of their relevant experience.**

The University is a corporation formed by Royal Charter and holds charitable status. Our aims, powers and the governance framework within which we operate are set out in our Charter, Statutes and Ordinances. At the highest University level, Capital Projects are presented to the University Executive Board and University Council for ratification and investment decision (See Annexes 5 and 6- Project Structure & Governance chart and terms of reference). The Council guides the University's overall strategic direction and is ultimately responsible for its finances, buildings and staff. It approves all major developments and receives regular reports from the Vice-Chancellor and Executive Management Team. It also presents audited financial statements each year. The Vice-Chancellor and the University Executive have overall responsibility for the day-to-day management of the University.

On formalisation, the business case is subsequently scrutinised by the Estates Programme Board, who allocate the necessary resources to elicit the brief, scope the end user interfaces (technical and research), budget allocations and oversees the delivery of capital programmes and manages any risk.

The Project will be led by a dedicated Project Manager (PM) who will be supported by a consultant team including Architect, Principal Designer, Interior Designer, Mechanical and Electrical Engineer and Structural Engineer.

2. **Summarise briefly the name, cost and scope of any major schemes costing over £2m in the last 5 years which the applicant has delivered**

Similar projects that the University has successfully delivered over the last few years include:

- Monte Boiler House – £2m: Refurbish student social space

- Highfield District Heating - £1m: Improve resilience of heating infrastructure
- Refurbish B.67 - £3m: Refurbish and reconfigure to enable relocation of B.45 occupants
- Jubilee Sports changing rooms - £1m: Reconfigure to Sports England standards

3. **Provide details of the latest project position on the 'readiness' of the project for investment and demonstrate that it can be delivered within the specified time frame.**

The project is currently running to programme, with commencement of works on site scheduled for April 2021 with completion by end of September 2021.

The latest project position is as follows:

2. Design team appointed.
3. Minor amendments to the approved layout identified and being undertaken.
4. Intrusive site investigation / survey package being put together for pricing by contractors (Small value works packages).
5. Stage 1 tender documentation being prepared.

The section of the Gower Building for this refurbishment currently holds planning consent for a Class A1 use on the ground floor. The current A1 use is a bookshop, and this will be refurbished into the Centre for Electronic Frontiers showroom, which is permitted under A1 planning rules. The first floor, which will house the smart working environment and innovation space, does not require planning permission as it is already used for similar purposes.

5. **Set out in the table below the high-level project stages or milestones. Append a high-level Gantt chart showing your key milestones, a critical path and any interdependencies.**

Project Stage/ Key Milestone	Description	Indicative Date
Feasibility	Review of the completed and approved feasibility report. Minor amendments to the approved layouts to be undertaken.	February 2020
Strategy	Project planning, cost planning and control, site investigations and surveys, demolitions, planning engagement and submission. Outline building control and third party approvals. Utility engagement	February 2021
Design Development	Evolution of design through RIBA stages 2-4 (feasibility, outline design, detailed design) including architectural, structural engineering, and services engineering.	February 2021 – March 2021
Pre-Construction	Preparation of procurement/tender documentation, selection of potential contractors, tender process, selection of contractor	March 2021 – April 2021
Construction	Management and coordination of all construction-related processes and delivery function	April – early September 2021.
Commissioning	Satisfaction of specification performance requirements and adequacy testing of building prior to handover.	Mid to end of September 2021
Handover and occupation	Formal handover and operational briefing, Facilities Management briefings	End of September 2021
Post completion management	Instigating pre-defined process of dealing with problems and defects	October 2021

6. **Provide a brief description how this project fulfils its obligations under the Equality Act 2010, including the potential impact on groups with protected characteristics, in consideration of Section 149(1) of the Act**

The project brief is for the facility to be all inclusive. The Entrance to the facility is to be altered to provide all-inclusive access. An evacuation lift is proposed to provide all-inclusive access to the first-floor facility. An accessible toilet is to be provided on the first floor.

State Aid and Confidentiality

State aid is any advantage granted by public authorities through state resources on a selective basis to any organisation that could potentially distort competition and trade in the European Union (EU). Full details can be found here www.gov.uk/guidance/state-aid

7. **Please answer the following questions yes or no:**

a	**Is the assistance granted by the state or through state resources?** - "Granted by the State" means by any public or private body controlled by the state (which, in the UK, means national or local Government).	Yes	√	No	
	- "State resources" is broad: any measure with an impact on the state budget or where the state has significant control are included, for example, tax exemptions, Lottery funding and the EU structural Funds.				
b	**Does the assistance give an advantage to one or more undertakings over others?** - An "undertaking" is any organisation engaged in economic activity. - This is about activity rather than legal form, so non-profit organisations, charities and public bodies can all be undertakings, depending on the activities they are involved in. - An undertaking can also include operators and 'middlemen' if they benefit from the funding - "Economic activity" means putting goods or services on a market. It is not necessary to make a profit to be engaged in economic activity: if others in the market offer the same good or service, it is an economic activity. - Support to an organisation engaged in a non-economic activity isn't State aid, e.g. support to individuals through the social security system is not state aid. - An "advantage" can take many forms: not just a grant, loan or tax break, but also use of a state asset for free or at less than market price. Essentially, it is something an undertaking could not get in the normal course of business.	Yes		No	√

c	**Does the assistance distort or have the potential to distort competition?** - If the assistance strengthens the recipient relative to its competitors then the answer is likely to be "yes". - The "potential to distort competition" does not have to be substantial or significant: may include relatively small amounts of financial support to firms with modest market share.	Yes		No	√
d	**Does the assistance affect trade between Member States?** - The interpretation of this is broad: it is enough that a product or service is tradable between Member States, even if the recipient does not itself export to other EU Markets.	Yes		No	√
If your answer to all four of the following questions is "yes", your assistance is almost certainly State Aid. If some of your answers are "no" or if you are unsure, seek specialist advice.					

8. **Provide details of any aspect of the project which you believe to be commercially confidential and explain why.**

This project is not commercially confidential.

Stakeholder Management

9. **Provide a summary of your strategy for managing stakeholders**

A strategy has been agreed for stakeholder management based on a Project Governance and Structure. Project Leads and personnel who have specific roles and responsibilities in relation to the proposed building will be consulted to define the detailed requirements for the building. This will include staff from the Faculty of Engineering and Physical Sciences and Estates and Facilities.

An overview of the Project Governance Structure is as follows:

- Estates Programme Board (EPB) – Project funder. Reported to via Estates Project Advisory Group (Michael Butler / Darren Rattew).
- FEPS Faculty Estates Board – Liaison / Management / Feedback to be undertaken by Michael Butler.
- ZI Management Board – Liaison / Management / Feedback to be undertaken by Themis Prodromakis, Anna Peacock and James Wilkinson.
- Estates Project Advisory Group (EPAG) – Set up to drive the Project and report back to EPB. The Lead Project Manager to be the Project Design team interface and report directly to EPAG.

Technical Advisory Groups as follows:

- ***Communication and Marketing*** - To establish specific requirements for the appearance, branding, signage, and graphics for the visual aspect of the scheme including elevational treatments. To establish any specific operational requirements of the University and related constraints during execution of the works. (Exams, Graduation and Open days etc.). To establish requirements for provision of communications / marketing media.

- ***Building User Groups*** – To liaise with and manage the requirements and expectations of Building users. Liaison to be undertaken by EPAG delegates.

- ***Communication Group for B60*** occupants including Residences, Commercial units and UOS Accounts – To facilitate agreement and implementation of logistical arrangements for the safe execution of the works and to minimise disruption to operational requirements. Liaison / Management to be undertaken by the Lead Project Manager.

- ***IT Data and AV*** - To develop, agree and implement proposals to meet the Faculties specific operational requirements including future proofing / flexibility of use.

- ***Additional TAG Groups*** - To be formed as required during the evolution of the project.

10. Has any consultation with stakeholders taken place or is any planned?

Regular dialogue has been undertaken and will be ongoing with Stakeholders throughout the project via an estates project advisory group. A project structure and governance for the project has been set up for the project including a communication protocol and terms of reference, which has been agreed and documented.

11. Can the project be considered as controversial in any way?

The project is not considered as controversial.

Risk Management

12. Set out the key risks associated with the project

Provide a summary of the main risks attached to the project, specifyingtheir likelihood, impact and how they will be managed and mitigated.

Risk	Likelihood (L/ M/ H)	Impact (L/ M/ H)	How risk will be managed/ mitigated
Delays in delivery of the new space - Construction programme delays (Programme ambitious. COVID-19 related matters.)	Medium	High	Robust planning with suitable and sufficient contingency. Faculty to formulate contingency plan to mitigate space not being available for start of the new semester.
Scope of work results in significant disruption to building users resulting in financial claims, costs for decanting of residents, loss of trade, restrictive logistical arrangements resulting in extended programme and related additional costs.	Medium	High	Undertake early engagement with stakeholders. Discuss and agree specific requirements for logistical arrangements. Explore the option to decant residences and UOS Finance Office for the duration of the works.
Financial climate changes significantly - Possible post Brexit issues enhanced by COVID related matters.	Medium	Medium	Tender list only includes proven companies. Due diligence on preferred contractor
Possible effects of COVID-19 in short term project delivery.	Low	Medium	Follow Government direction and University directives.
Project costs exceed approved budget.	Medium	Medium	Undertake regular review to validate budget. Include for factoring in costs for potential decants of building residents and finance office.
Insufficient services provision within building. Shared Services.	Low	Medium	Qoda to review existing services capacities.
Long lead in materials and plant	Medium	Medium	Early identification required. Consider early purchases.

Building fabric / structural issues identified. For example formation of openings for new windows, ventilation louvers and support for brise soleil.	High	High	Early surveys and intrusive investigations.

Section G: Monitoring & Evaluation

1. Can the scheme be measured against these KPIs?

Net additional jobs created (directly or indirectly) or safeguarded in the Solent LEP area that can reasonably be linked to the intervention.	Yes	√	No	
Number of businesses or institutions assisted	Yes	√	No	
Number of new learners	Yes	√	No	
Private sector investment leveraged as a result of the delivery of the intervention (either directly or as part of a wider package of enabling measures).	Yes	√	No	
Local Gross Value Added (GVA) created or safeguarded.	Yes		No	
Commercial Floor space Constructed	Yes		No	√
Housing Units Created	Yes		No	√
Growth in Apprenticeship numbers	Yes		No	√

2. Provide details of how and when you will monitor and evaluate this project

We have described the delivery of outputs over 3 timescales:

1. Short-term: the delivery of the building within 12-month budgetary window.
2. Medium-term: Translation of co-created of projects with Solent businesses (including SMEs) and wider industry to commence within a 5-year period.
3. Long-term: Job and skills and business creation within a 7-year period.

From a university governance position, the capital project will be overseen by the University's Estates Programmes Board (EPB). It will be carried out in accordance with the processes outlined in prescribed University Project Routemaps and which typically follow the RIBA planned stages of work. The EPB is appointed by, and takes direction from, the University Executive Board. All decision making and financial commitments are made by EPB in line with strict project gateways from the Routemap. Monthly reporting to EPB is undertaken and periodic reviews during the construction phase are presented during the course of the works on site to the University. Reports against expenditure, matched funding and outputs will be made to the LEP on a regular basis. This will be in line with costs, timescales and deliverables. Section 13 will form the basis of a Risk Register that will be updated and reported regularly.

Beyond the delivery of the building we have already outlined a number of quantified outcomes and benefits from the project. We will follow the **Core Evaluation Questions** as set out in the Green Book (HMT 2018) relating to what extent were the SMART objectives achieved and by when. As described in the Green Book (HMT 2018) we will effectively follow the **R**ationale, **O**bjectives, **A**ppraisal, **M**onitoring, **E**valuation and **F**eedback (ROAMEF) suggested by defining a set of what is described as 'Critical Success Factors' or could also be described as Key

Performance Indicators. The Table below shows the Outcomes we have described in this document set out as **S** – specific, **M** – measurable, **A** – attainable, **R** – relevant, **T** - time-based and will be used as the capture tool (living document) for Monitoring and Evaluation.

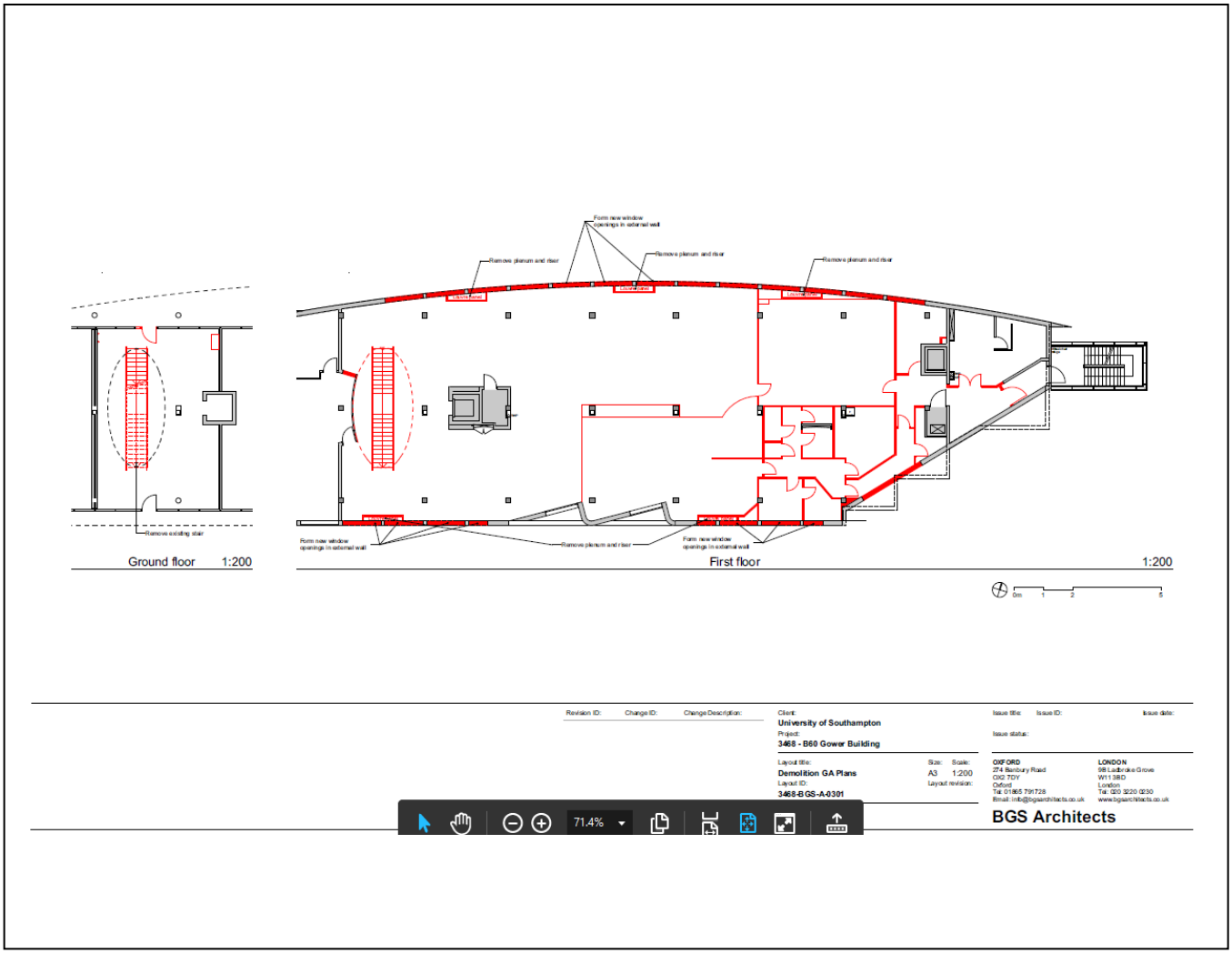
Outcome	**Predicted**	**Actual**	**Time Period**	**Progress**	**Feedback**
Refurbishment					
Direct jobs created					
Indirect jobs created					
New businesses created					
New business relationships					
Private sector investment					
Benefit Cost Ratio					
Collaborative research funding					
Industry funded PhDs					
Training (CPD) for partners					
Student employability within Solent area					
Industry engagement and outreach in Solent area					

Annexes

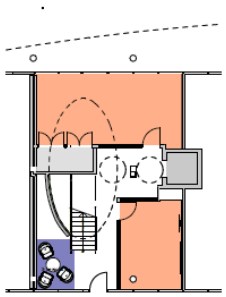
1) Costs/Benefits Analysis – Centre for Electronics Frontiers
2) **B60 – Gower Building Option**
3) **B60 – Demolition GA Plans**
4) **B60 – Proposed GA Plans**
5) B60 ZI Expansion Project Structure & Governance
6) B60 Refurbishment Estates Project Advisory Group Terms of Reference
7) University of Southampton Economic impact study

Annex 2 **- B60 – Gower Building Option**

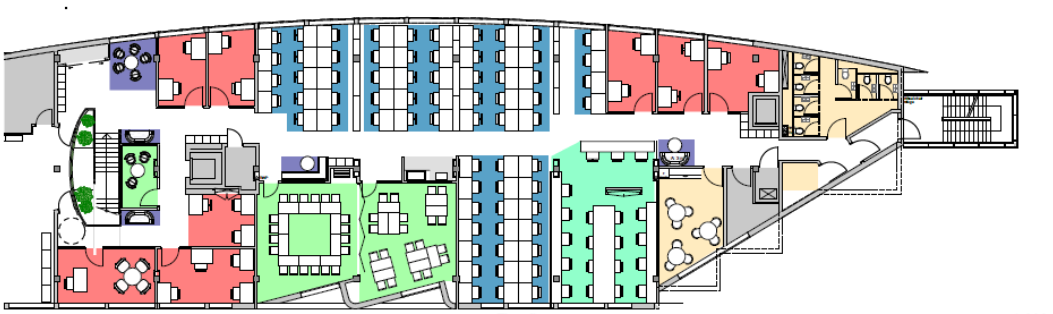
Annex 3 - B60 – Demolition GA Plans



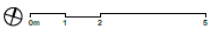
Annex 4 - B60 – Proposed GA Plans



Ground floor 1:200



First floor 1:200



Revision ID: Change ID: Change Description:

Client:
University of Southampton
Project:
3468 - B60 Gower Building

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Layout revision:

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