Swansea Bay City Region – City Deal – Business Case

Project Title

SBCR Digital Infrastructure (Phase 1 – City Deal)

Project Sponsors (Lead Partner)

Partner Local Authorities and Private Sector

Summary

The SBCR Digital Infrastructure project has been developed to support economic and skills development throughout the Internet Coast. It aims to initiate a longer-term and far broader investment into regional digital infrastructure by building a unique innovation ecosystem and associated markets, and addressing market failures which currently prevent such development from occurring.

The proposed Digital Infrastructure will integrate the Internet Coast Themes into a seamless innovation ecosystem, using the region's assets and diversity to support indigenous and inward-investing opportunities. The relative rurality in parts of Pembrokeshire and Carmarthenshire contrast with the urban and industrial environments of Swansea and Neath Port Talbot. This provides innovators with a wide range of conditions to develop solutions for a variety of markets. Building upon foundations of existing regional digital infrastructure and leveraging the activities of the wider Internet Coast themes, the project will involve;

- **Creation of a SBCR Community** through an interconnected 'network' (akin to an extended EduRoam)—providing a regional platform for innovation, education and citizen access to services. This will use diverse underlying infrastructures to create seamless region.
- **Targeted fixed-line improvements** to break market failure, in sectors/sites aligned with Internet Coast Themes and wider economic benefit. Opening up the region to a plurality of suppliers, leading to effective sustainable market dynamics.
- **Tactical use of existing radio-based deployments** (including microwave and Wi-Fi) to connect key business sites where there might currently be significant barriers such as high costs of delivering fibre-based network connectivity **with focus on Internet Theme and wider economic benefit**. Doing so provides the ability for SMEs to establish premises in and create employment opportunities in business parks and enterprise zones sites where there is potential for business growth.
- **Connection with extra-regional digital assets** including bandwidth and datacentres. This will make use of existing and potential investments such as the Newport DataCentre and proposed Jupiter connection to maximise regional capabilities without duplicating efforts.
- **Establish Internet Theme Testbeds** to support innovation with 5G mobile connectivity and disruptive technologies such as Internet of Things (IoT) within Theme-related sectors.
- **Creation of market conditions via planning consent**, requiring new (including Internet Coast) proposals, and redevelopment of existing sites to incorporate infrastructure fit for future use and which extends connectivity beyond current reach.

The project provides strong synergies with the wider Internet Coast project portfolio, though weak dependencies, allowing alignment with developing clusters across Economic Acceleration, Health & Wellbeing, and Energy. Noting the almost infinite investment opportunity alongside chronic regional deficiencies within the scope of digital infrastructure, the project has been defined simply to catalyse further investment and provide uplift centred around the above targeted Themes.

Through building critical mass in markets and innovation activities, the project aims to attract a plurality of digital infrastructure firms, in an approach effectively exploited in other regions (for example, York, Newport and Glasgow). However, the unique combination of opportunities provided within the Internet Coast takes this further with a testbed environment supporting multi-sector interdisciplinary activity. For example, reaching more effectively into manufacturing hotspots will create conditions for *Internet of Health & Wellbeing* HTC medical device innovations to be taken to market through regional *Factory of the Future* virtual value and supply chains.

In parallel to physical infrastructure, the knowledge and innovation networks of each Internet Theme will be drawn together through a Community consisting of private and public sector organisations and Higher and Further Education institutions. This Community will draw upon existing skills and experience in the development and management of network overlay services on existing infrastructure. A key benefit will be to enable mobile working through partnerships with existing public Wi-Fi service providers and the creation of digital districts, all underpinned by seamless authentication to the network using tried and tested Wi-Fi roaming solutions like eduroam and emerging services like govroam. This will provide pervasive access to networks for public sector works, those in education as well as the citizen.

Investment from City Deal: £25m
Investment from other Sources: £30m

Programme Strand

Internet of Economic Acceleration

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Total Costs	15,000	20,000	20,000					55,000
City Deal	10,000	10,000	5,000					25,000
Private	5,000	10,000	15,000					30,000
Other Public								

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1) Project Title

2) Executive Summary

The SBCR Digital Infrastructure project has been developed to support economic and skills development throughout the Internet Coast. It aims to initiate a longer-term and far broader investment into regional digital infrastructure by building a unique innovation ecosystem and associated markets, and addressing market failures which currently prevent such development from occurring. Building upon foundations of existing regional digital infrastructure and leveraging the activities of the wider Internet Coast themes, the project will involve;

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Through building critical mass in markets and innovation activities, the project aims to attract a plurality of digital infrastructure firms, in an approach effectively exploited in other regions (for example, York, Newport and Glasgow). However, the unique combination of opportunities provided within the Internet Coast takes this further with a testbed environment supporting multi-sector interdisciplinary activity. For example, reaching more effectively into manufacturing hotspots will create conditions for *Internet of Health & Wellbeing* HTC medical device innovations to be taken to market through regional *Factory of the Future* virtual value and supply chains.

The long-term impact of the Digital Infrastructure project will be to build a market that levers significant private sector investment into region-wide infrastructure. This will support economic development, skills development and improved social inclusion. Closing this gap will result in additional employment of 780 jobs and GVA productivity improvements worth £270m.

3) Project Description

The Digital Infrastructure (Phase 1) Project has been developed to initiate a longer-term and far broader investment into regional digital infrastructure by building a unique innovation ecosystem and associated markets, and addressing market failures which currently prevent such development from occurring. The project involves two core principles which underpin its impact and sustainability.

- *Open Access Open Innovation*: Infrastructure created within the project will be application/user agnostic and made available to the broadest possible userbase. This is intended to promote collaboration and innovation across each of the Internet Themes and wider economy.
- *Co-investment*: Phase 1 projects will co-invest with the private sector (users and operators) to create demand and correct market failure. Co-invested infrastructure will be used as a platform for further development, reaching further into connected sites/communities.

The project will attract co-investment from private sector by de-risking an initial portfolio of activities aligned with the Internet Coast Themes, as outlined in the figure below;
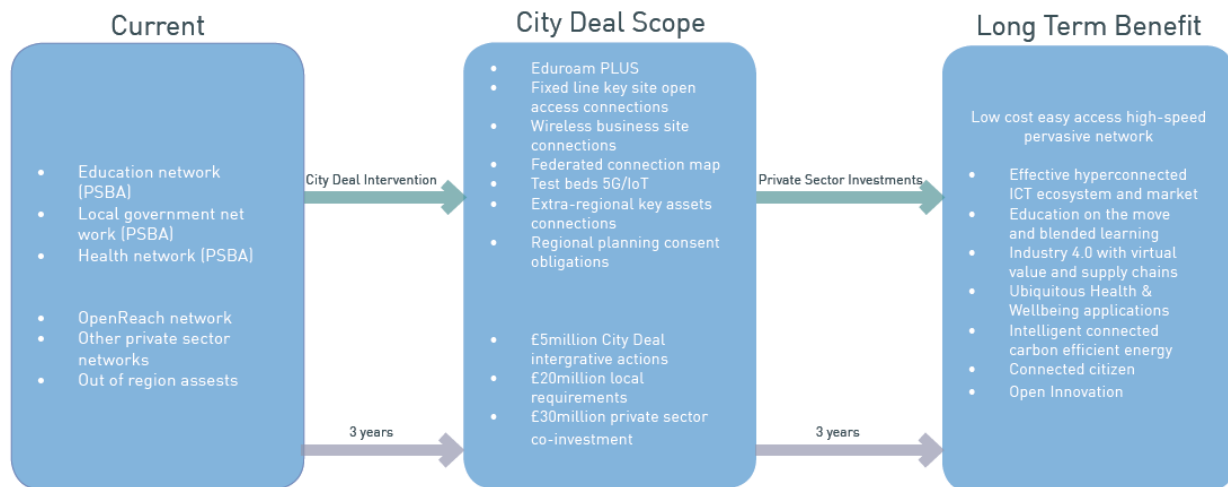
The above presents how the City Deal Digital Infrastructure will lead through to longer-term private sector-led investment and benefits, through individual project strands as follows;

- **Creation of a SBCR Innovation Community** *through a 'network of networks' providing a regional platform for innovation, education and citizen access to services.* Centred upon the Internet Theme, targeted intervention will build upon existing commercial provision and through smart investment develop the region into a market of sufficient breadth and scale to attract inward-investment from commercial providers to enhance existing infrastructure. The currently fragmented nature of economic activity across sectors/sites contributes to market failure as activities lack the scale and density to make private sector-led interventions commercially viable.

EduRoam is an existing example of this approach, and has demonstrated how diverse networks can be integrated to serve users from separate organisations working across each other's infrastructure, This in itself reflects the SBCR *Open Access Open Innovation* philosophy. Adopting these principles, the SBCR Network will harness public and private infrastructure (existing and new) to support collaboration in innovation and education. Drawing together the significant communities in each of the Internet Themes, together with further users from private/public sectors and academia, this will create a market relevant to private sector led infrastructure investment.

Targeted Fixed Line Improvements: The Internet Coast involves a range of key sites including business parks with a mass of Factory of the Future-related operators, Health & Wellbeing Village developments, and major urban regeneration in the Swansea Digital District. Connecting these activities with other thematic Internet Coast sites, and outwards to the wider Internet via high-speed resilient connectivity will simplify collaboration and facilitate innovation. Market failure and the lack of competition in delivering affordable high-speed connectivity has introduced significant obstacles for many SMEs and start-ups located in business parks across the region. The SBCR Digital Infrastructure programme will remove these barriers by utilising a blended or hybrid approach that mixes traditional services from established carriers and innovative solutions from smaller telecoms providers. The proposal here is not to re-invent, or to duplicate existing infrastructure but to maximise opportunities through the use of traditional fibre leased-line services, limited deployments of private fibre, and radio-based network technologies to meet requirements. By opening up the *region to a plurality of suppliers, and linking service suppliers to potential customers can stimulate competition, and even lead to established carriers improving their access to products by lowering costs thus kick-starting effective and sustainable market dynamics*. Co-investment from City Deal into a viable and effective connectivity programme, targeted appropriately across local authority areas will de-risk private sector investment and create momentum for further roll-out. Based upon the Open Access Open Innovation approach, these deployments will involve opening (shared bandwidth) of infrastructure to the *SBCR Innovation Community*. This will maximise benefit of investments by making them available to the largest possible userbase. Individual connections will therefore be implemented where they plug gaps in existing infrastructure, and where co-investment is necessary to achieve the access for the *SBCR Innovation Community.*

Innovative use of Radio and WiFi based Connectivity Solutions *to connect key business sites, with focus on Internet Theme and wider economic benefit. Reaching underserved employment sites with growth potential*. Adopting a similar approach to the **Targeted Fibre Infrastructure Improvements** above, this project strand will deploy radio-based and WiFi solutions that have already been proven to deliver benefit in other parts of the UK to reach key sites/employers where topography and/or costs of laying fibre have conspired to introduce market failure for SMEs and new businesses. These connections will target Internet Theme gaps, such as reaching manufacturing sites un/under-served by existing services required for Factory of the Future (Industry 4.0) collaborations or where services (e.g.CENGS) may use high-bandwidth video/data connections.

- **Connection with extra-regional digital assets** *including bandwidth and datacentres. This will leverage access to existing services such as as the Newport Next Generation DataCentre without duplicating infrastructure. This could involve solutions for aggregated access to Cloud Services being delivered from the datacentre by suppliers like Microsoft (the Azure platform), Amazon Web Services and Google. The PSBA network will shortly be enabling access to NGD Cloud Services for the public-sector organisations within the City Deal region, and a similar slightly-revised aggregated model could be used for other private sector organisations within the region.*

- **Establish Internet Theme Testbeds** *to support innovation with 5G mobile connectivity and disruptive technologies such as Internet of Things (IoT) within Theme-related sectors.* The testbeds will utilise the diversity of the region and its sectors – ranging from urban (dense) to rural (sparse), community wellbeing (IoHW Village) to clinical (IoHW Campus) and across sectors CENGS (ICT Service) to Advanced Manufacturing (Factory of the Future/Steel Science). The Digital Infrastructure project will support deployment of infrastructure at key sites (e.g. 5G mast at IoHWB Village) to facilitate innovation of mobile applications in respective sectors. This will serve to develop demand within the region, promoting further operator investment for wider rollout as the userbase grows. These initial connections created with co-investment will also involve opening (shared bandwidth) of the infrastructure to the *SBCR Innovation Community.* The following map shows how a number of sites will be used together providing a Testbed for the IoHW as developed with one of the SBCR private sector partners.
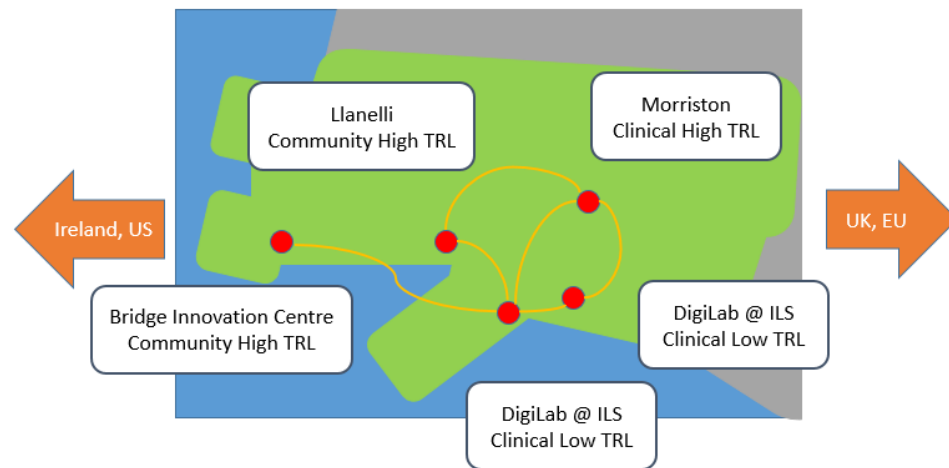
- **Creation of market conditions via planning consent**, *requiring new (including Internet Coast) proposals, and redevelopment of existing sites to incorporate infrastructure fit for future use and which extends connectivity beyond current reach.* Recognising the importance of Digital Infrastructure, the partner authorities will embed a common approach to future development (and redevelopment) that requires infrastructure to be established/upgraded in line with the approach outlined above. Future phases of activity will not require co-investment from public funds, but facilitate private sector investment, including through partnership between developers and a more diverse market of operators.

The following example describes how the Infrastructure will be utilised to support innovation across the Internet Themes, in addition to the connectivity benefits provided to wider sectors and citizens.

Example – Testbed: Health and Wellbeing

The network of Life Science Campuses and Villages being created by the Internet of Health and Wellbeing provides an environment for medical device and assisted living technology innovation. Fujitsu, working with Carmarthenshire Council and the Llanelli Village developer are integrating an ICT layer to develop Internet of Things (IoT) solutions. The company has already established a team of 15 developers in the region which it plans to grow as opportunities progress. It is planned that the Village platform will be rolled out creating opportunities for managed services with significant export potential.

An example of one innovation already take through Proof of Concept is 'Offload', a mobile platform for pressure ulcer management. This telehealth application has been developed with local clinicians to support remote management of conditions. The Testbed environment will allow this to be trialled and validated in a community setting, supporting initial market entry and 'proof of business'. 5G connectivity will allow further functionality to be developed including high definition video consultation/review where both clinician and patient time can be used efficiently.

Alongside the activity of multinational enterprises is a vibrant community of startups and SMEs working in the digital space. For example, Trakcel, a University spin-out is using web-based applications to manage delivery of stem cell therapies. Working with major partners such as GSK, the company demonstrates the potential to reach markets at pace and scale. The Testbed environment will allow development across a seamless wireless environment as therapies are delivered and managed across a range of environments including clinic, laboratory and home.

Core to the concept are openness of infrastructure, allowing collaborations to form and flourish, along with development of the community. Expansion of the user base provides users with whom applications can be tested, and also builds the market to attract further infrastructure investment.

4)   Project Aims and SMART objectives

The Digital Infrastructure project has defined a series of Aims of Objectives which integrate with the wider regional planning as listed below;

Aims

- Development of a SBCR Innovation Community
- Support innovation and high-value job creation in targeted SBCR Internet Coast themes
- Support wider uplift in regional productivity through wider use of ICT across all sectors
- Address market failure to realise private sector-led further phases

Objectives

- Engage and cohere existing (e.g. EduRoam) and new (e.g. Factory of the Future) regional networks to establish SBCR Innovation Comm
- Connect key sites through Fixed Lines to support Internet Coast Themes
- Connect key industry/employment sites through Wireless to support Internet Coast Themes
- Established connected Testbeds to support Internet Coast Themes, with 5G/IoT core infrastructure
- Embed Open Access Open Innovation approach as part of co-investment approach
- Embed Open Access Open Innovation and Co-investment principles in planning approach for future development/redevelopment across SBCR local authorities

To enable the above, the Digital Infrastructure Phase 1 project has been developed with key SMART objectives as presented in the table below;

Objective	Timescale	Measure
SBCR Community Scoping and Development	Q2 – 2017 Ongoing	50,000+ Active users by 2020 500,000+ Engaged Citizens by 2022
Connectivity – Identify/Plan Fixed Lines	Q4 – 2017	Regional Mapping of Phase 1 Rollout
Connectivity – Identify/Plan Wireless	Q1 – 2018	Regional Mapping of Phase 1 Rollout
Connectivity – Identify/Plan Extra-Region	Q1 – 2017	Mapping of Phase 1 Rollout
Deploy – Fixed Lines / Extra-Regional	Q2 – 2019	Rollout across ~20 key sites across SBCR
Deploy – Wireless	Q4 – 2018	Rollout across ~30 key sites across SBCR
Deployment (Private Sector-led)	Q2 – 2018 onwards	Private sector investment surpassing CD investment
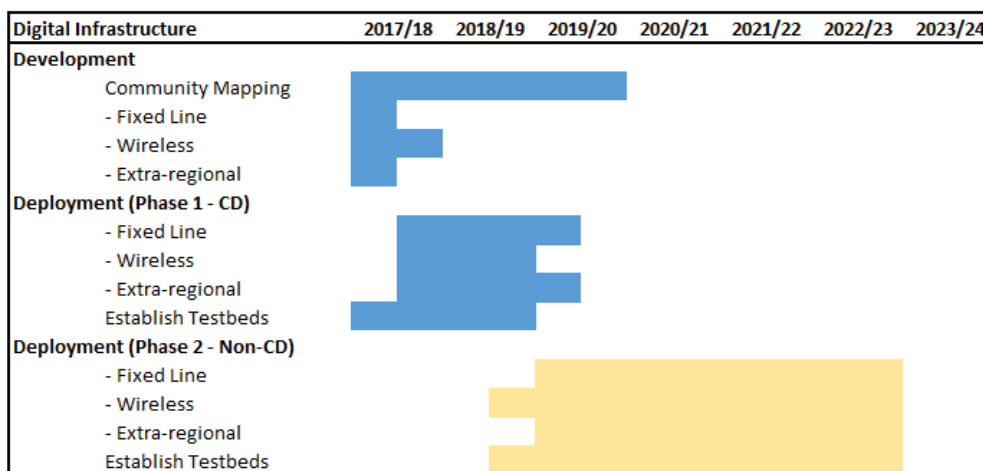
| Local Authorities Private Sector Swansea University	Office of the Leader and Chief Executive Civic Centre Oystermouth Road Swansea SA1 3SN 01792 636000

The Internet Coast vision describes the opportunity presented by the region to harness ICT for innovation across Themes of Energy, Life Science, Economic Acceleration and Smart Manufacturing. Each component of the Digital Infrastructure project responds to need/demand summarised as;

Testbed
The Testbed concept is core to each of the Internet themes relying on data and communication. At present the market for communications infrastructure is weak, particularly in rural areas with sparse population. Development of 'testbed' activities is therefore an important part of working to build the market by increasing users of technologies such as 5G mobile.

Fixed Line
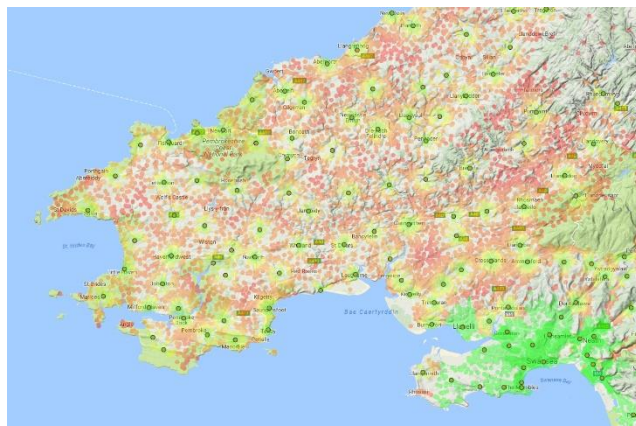
Wales has seen improvement in fixed line connectivity with broadband reaching the vast majority of premises and major conurbations are well served. Relatively good access is seen in the vicinity of BT exchanges, though gaps exist, particularly in rural areas. Only in Swansea is there a plurality of operators (i.e. Virgin Media and BT). This continued monopoly (apart from LLU) with weak market drivers therefore requires intervention to ensure sufficient infrastructure for testbed activities.

Source: Thinkbroadband.com
Mobile and Wireless
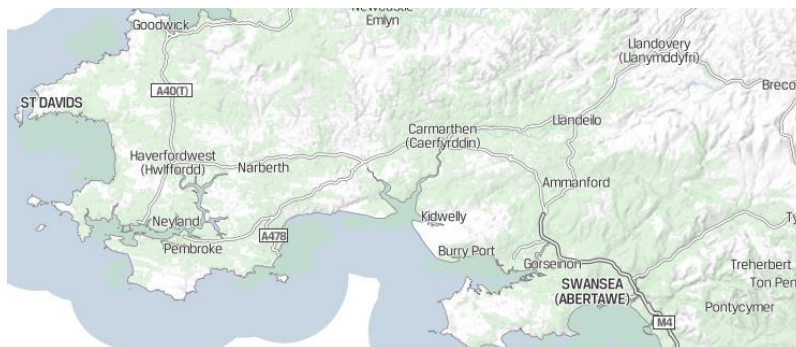
Wales currently has lowest proportion of premises with 4G coverage from one or more operators, though this is developing rapidly (Ofcom 2016). EE provides the most extensive coverage, however the regional topography limits its availability, particularly within buildings, as shown in the map below. Limited availability of high bandwidth mobile connectivity creates a challenge for testbed activity. Coupled with operator-specific infrastructure (masts) this limits further the mobility of development activity across the region. However, as the topography and challenges are themselves useful test and development conditions this lends itself to the opportunity to co-invest in infrastructure for Open Access Open Innovation.

7) Added Value

The Digital Infrastructure project has been developed to optimise its additionality at regional, Wales and UK levels, with focus upon the Internet Coast themes. The variable quality of existing infrastructure across the region underlines the market failure and need for intervention. Regional strengths and opportunities, including the recently announced BT rollout of new fixed line technologies and the Public Sector Broadband Aggregation (PSBA) network provide a foundation for intervention.

Deadweight: Market failure within the region has created significant inertia in digital infrastructure investments. Therefore, the Digital Infrastructure project would be realising scope and impact which would not otherwise occur. This implies that limited, if any, deadweight exists.

Displacement and Substitution: The Co-Investment approach has been developed to minimise displacement and substitution by enhancing the role for private sector in what is an otherwise relatively sparse marketplace. Further phases, which will be private sector-led completely negate this issue.

Leakage: The inherent nature of the Digital Infrastructure project is to connect both within and beyond the Swansea Bay City Region. Supporting the Internet Coast Themes it will enable collaboration and innovation in value and supply chains across the UK and therefore result in a level of (beneficial) leakage. However, the net beneficiary of knowledge and opportunity spill-overs will be the region itself, as the infrastructure is applied to further opportunities focused in each of the Themes.

8) Financials

The Digital Infrastructure (Phase 1) project has been developed recognising the enormity of the opportunity and challenge presented. Rather than simply proposing to initiate the scale of scope presented by the region, it instead aims to catalyse longer-term and far greater investment while also accelerating development of the Internet Coast themes. Therefore, the project scope and its financial profile focus upon early integrative interventions delivered in partnership with existing and future private sector partners.

Finances £k	2017/18	2018/19	2019/20	2020/21	2021/2022	2022/23	2023/24	Total
Total Costs	15,000	20,000	20,000					55,000
City Deal	10,000	10,000	5,000					25,000
Private	5,000	10,000	15,000					30,000
Other Public								

Match Funding

Private: A central aim of the Digital Infrastructure project is to lever significant private sector co-investment where market failure has prevented such activity. De-risking of initial activities through City Deal partnerships at key sites will mobilise a plurality of suppliers into the region making wider opportunities viable. As Phase 1 will represent a relatively limited number of sites/projects, it is planned that co-investment will at least equal that of City Deal though at far greater level in the

longer-term.

<u>Impact of Reduced Funding</u>
While the portfolio of Internet Coast projects can deliver significant impact with existing infrastructure (i.e. weak dependencies), stronger regional connectivity will maximise their integration and impact (i.e. strong synergies). Reduced funding therefore misses the opportunity to fully exploit wider opportunities from City Deal and other investments.

However, the greatest potential impact would arise from the lost opportunity to address market failure in the region. The intervention has been developed to provide ongoing dealflow for private sector investment, and therefore requires initial scope/scale of opportunity. Therefore, it is likely that with reduced scope that the initial mass of activities/projects needed to develop commercially-viable propositions for sustainable investment.

<u>Options Appraisal: Long-list</u>

Criterion/Option Conclusions D – Discounted, B – Baseline P – Preferred, A – Alternative	Do Nothing	Integrated Plan (Phased)	Integrated Plan (Full/Immediate)	Reduced Scope (Limited Funding)	Private Sector Standalone	Do Later
Critical Success Factors						
Strategic Fit	✗	✓	✓	✓	✗	✓
Business Needs	✗	✓	✓	✓	✗	✗
ARCH Integration	✗	✓	✓	✓	✗	✗
Internet Coast Integration	✗	✓	✓	✓	✓	✗
Potential Value for Money	✗	✓	✓	?	?	✗
Potential Achievability	✓	✓	✓	✓	✗	✗
Supply-side Capacity	✓	✓	✓	✓	✓	✓
Potential Affordability	✓	✓	?	?	?	✗
Conclusion	**B**	**P**	**A**	**A**	**D**	**D**

The following section provides a summary of key options as presented above;

Do Nothing - Baseline

Not developing the Digital Infrastructure will fail to maximise the impact of wider City Deal project portfolio and other activities. It could preserve resources for other interventions, though potentially at the expense of longer-term benefits for the Internet Coast. It would also stymie wider growth as continued market failure will not improve existing poor infrastructure.

Integrated Plan – Phased – PREFERRED

The Phased approach to developing Digital Infrastructure provides an opportunity to align effectively with wider City Deal developments in order to pump-prime greater and longer-term private sector investment. It also avoids embarking on potentially incomplete works by defining clear scope by phase. This supports the transition to greater private sector investment and a change in public-sector role of facilitative-planning for later phases following correction of market failure.

Integrated Plan – Full/Immediate – ALTERNATIVE

Commencing a fuller roll-out of connections and broader scope of digital infrastructure can clearly be considered. However, the immense resource requirements in planning alone would consume enormous investment and time. Prioritising early-benefit actions (i.e. Initial Phase) could protect the targeted benefits, though still involve significant investment. Such an approach may draw greater interest from private sector partners though weaken the co-investment proposition. UK Government may consider to make SBCR the focus of the recently-announced £1bn digital infrastructure investment and this is therefore considered as an alternative approach.

Reduced Scope

Omitting a project strand would reduce costs though result in a less-developed overall infrastructure. Reduced connectivity and engagement would in turn fail to maximise the potential of the Internet Coast Themes by potentially missing key sites within their associated sectors. This approach would also weaken the proposal to the private sector for co-investment and in turn the development of critical mass for sustainable private-sector led further phases.

Do Later

While the Digital Infrastructure does not create dependencies with other Internet Coast projects which could be successfully delivered independently, the broader programme creates the opportunity to build a strong case for private-sector co-investment to target growing sectors. Failing to align, particularly as City Deal projects are establishing their own infrastructure would therefore be a missed opportunity and present poor value for money.