

SBCD Campuses Economic Analysis

4.5 Cost Benefit Analysis

The following section presents updated Economic Case material for the project Business Case, developed in response to new Green Book guidance (Treasury, 2018), with appraisal focused on targeted productivity effects (wage premium). The analysis sits alongside that already undertaken and presented in the 2017 *Internet Coast Proposal Impact Appraisal*, based on job creation both within the development itself and as a wider result of the initiative.

Supported by the City Deal, the first phase of the project aims to contribute to the regional and wider UK economy by enabling and supporting growth of high GVA activity in Life Sciences, Sport and Well-being. Focus upon ICT-enabled health and fitness applications, advanced practice in health and care, and medical devices innovation also relates to associated sectors including ICT and Advanced Manufacturing. This is reflected in the broader cluster¹ context noted in analysis of the region by SQW (2016), and specifically as driven by the Life Sciences, Health & Wellbeing sectors (RLP, 2013, Davies et al., 2018). These strengths, and the interplay of high productivity sectors within the cluster also underpins the current *South Wales Crucible Science and Innovation Audit* (SIA).

4.5.1 Summary Appraisal

The following table presents a summary of the short-listed Options appraised against the Business as Usual/Do Minimum baseline, and applying the parameters presented in later sections of this document. Note that the anticipated UK impact is higher as there will be industries from outside the Swansea Bay City Deal region that will engage with the initiative. All benefits captured at the UK level therefore include and reflect the benefits captured at regional level.

UK

Option	10 Year BCR	15 Year BCR	15 Year NPV
Do Minimum	1.01	1.70	£3.3m
Preferred Approach	2.22	2.33	£18.8m
Alternative Approach (1)	0.85	1.87	£12.3m
Alternative Approach (2)	0.33	0.76	- £3.4m

Table 4.11: Short-listed options appraised against business as usual baseline - UK

Regional

Option	10 Year BCR	15 Year BCR	15 Year NPV
Do Minimum	1.07	1.80	£3.8m
Preferred Approach	2.03	2.16	£17.6m
Alternative Approach (1)	0.91	1.99	£14.0m
Alternative Approach (2)	0.43	0.92	-£1.2m

Table 4.12: Short-listed options appraised against business as usual baseline - Regional

¹ The role of economic activity in the sector beyond that captured by core SIC codes has been recently echoed in the UK Life Sciences Sector Report for the House of Commons Committee on Exiting the European Union.

	Do Minimum	Option 1 (Preferred)	Option 2 (Alternate)
Net Present Social Value	£3.3m	£18.8m	£12.3m
Public Sector Cost*	£4.181m	£14.15m	£14.15m
BCR	1.70	2.33	1.87
Significant non-monetisable** benefits	N/A	5-10,000 QALYs (range of values including in assessment)	5-7,500 QALYs (noting delivery timescales for option against core assessment)
Significant unquantifiable benefits	N/A	Indirect regeneration and transport benefits	Indirect regeneration and transport benefits
Risk costs by type[^] and residual optimism bias	Delivery risk - £1.06m 20% OB	Delivery Risk - £2.97m 20% OB	Delivery Risk - £4.47m 20% OB
Switching values		8yr Delay ~37% benefit reduction	
Time horizon and reason	15yr – to align with infrastructure nature of development, and SBCR Economic Strategy. This reflects the nature of the benefits sought and activity for each of the appraised options. Guidance on relevant benefits from DCLG, HMT and other sources (both academic and governmental).		

Table 4.13: Appraisal summary table

*discounted

** captured as part of aligned health economics assessment

[^]see also sensitivity analysis section

4.5.2 Options and Counterfactual

This appraisal is undertaken against the baseline ‘Do-Nothing’ case, alongside ‘Do Minimum’, and ‘Alternative’ Options as summarised in 4.4.2. The Do-Nothing baseline is developed from analysis of the SBCR economy presented in the SQW analysis, along with sector-specific insight from RLSP and other publications, along with further data drawn from ONS. Projected performance of each option is based upon regional and sector insight for need and demand drawn from industry, government, and academic sources, as noted throughout this document and referenced throughout the Business Case.

Do-Nothing involves the relative plateauing of related ‘Priority’ sectors within the region, as projected by Cambridge Econometrics for the RLP (2013) report (notably Chemicals, Pharmaceuticals, Electronics and Professional Services sectors). This implies continued regional reliance on the challenged industrial sectors, identified by SQW and therefore potential continued divergence from UK and Wales levels of productivity. It is recognised that this sector perspective, derived from SIC coding of activities, is limited in respect to the broader cluster noted in Davies et al. (2018). However, it does provide a baseline for regional knowledge-based economic activity to support consideration of Options.

Continuing divergence from Wales and UK average GVA per capita performance implies the Do-Nothing baseline may be a negative trend. However, for the purpose of this appraisal the current

regional average is utilised and therefore the current GVA per capita of targeted sectors is also used for future years (i.e. without inflation/growth, though with STPR² discounting).

4.5.3 Productivity Uplift (Wage Premium/GVA per worker)

SBCR is part of the West Wales & Valleys region, which has suffered a long-standing productivity gap with the rest of Wales, UK and EU, in turn resulting in its qualification for three rounds of EU Structural Funds support. This hides a sectoral disparity though, which underpins a renewed strategy to pursue more productive activities in 'Priority' sectors, including those involved in the Internet Coast programme.

GVA per hour worked within Life Sciences in Wales during the period 2006-2014 showed strong upward trajectory, surpassing by 2014 the UK average, while manufacturing outperformed at ~110%³. This was set within the wider economy which performed at ~75% of UK average. This must be viewed within the regional sector context, with the Medical Devices noted as being broadly in line with the UK average⁴. SQW (2016) presented a £11,900 deficit between mean regional and UK GVA per capita (£34,300 compared to £46,200), i.e. a difference of 34.7%. Other recent data⁵ aligns with these values. In this respect, the regional relationship between Life Sciences & Well-being with other Priority sectors (Davies et al., 2018), namely ICT (eHealth) and Advanced Manufacturing is of note, with these sectors performing in line with broader UK. The added potential of Sports & Exercise Science, including development of digital technologies presents, further intersectoral potential aligned with the identified SIA strengths. The SQW report also notes that Health, and the associated sectors present some of the strongest potential for employment growth and overall GVA impact.

However, it should be noted that that wider benefit is provided through health and wellbeing improvements. While these do not relate directly to the Spending Objectives they are captured in this appraisal as a separate section to ensure consistency with Green Book guidance.

It is recognised that the options appraised may result in a range of skills and economic activity, though all with a focus on Priority Sectors. Therefore, each option involves comparison between contribution to such sectors compared to the regional average.

The current, and anticipated impact of Covid both in the near and longer-term serve to reinforce the importance and growth of sectors supported by the Spending Objectives. This is noted in the updated Risk Assessment.

4.5.4 Additionality and National / Regional Contexts

As the development and application of skills in Life Sciences & Well-being could be at the expense of potential for another sector this appraisal focuses on the potential improved GVA provided compared to alternative use. This relates solely to the above noted differential between targeted sectors and the wider regional economy. The options development, and analysis thereof supports the 'levelling-up' agenda to achieve more balanced growth, though with focus on additionality rather than displacement. On this basis the analysis delivers against the principles of 'Place-based Analysis'

² For the Time Horizons applied, this utilises the 3.5% Green Book STPR figure

³ Priority sector statistics 2016 – New GVA Data, Statistics & Research, Welsh Government, <http://gov.wales/statistics-and-research/priority-sector-statistics/?tab=previous&lang=en>

⁴ Taken from their inclusion in Sector: Computer, electrical and optical, cited from Life Sciences Industrial Strategy, Report to Government, Sir John Bell, 2017

⁵ Regional GVA NUTS2, Office for National Statistics, <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/regionalgvanuts2>

presented in the Green Book (2020). It retains however the original model used in the 2017 version rather than the CIA Model of the business case to allow continued tracking against this baseline.

Clearly, some benefit realised by the initiative would be otherwise achieved, while the proposed activity will also to an extent substitute or displace other activity(ies). Indeed, some skills would have been otherwise developed (i.e. elsewhere) or for application in other sectors. The intervention tackles growing and unsatisfied demand for STEM skills within the life science sector noted by Prof Sir John Bell (2017), which will be further pressured by Brexit uncertainty. This in itself supports additionality of the initiative, together with evidence of such demand at the regional level (RLP, 2013). To address consideration of additionality, the appraisal draws upon guidance including that of UK Government (BIS, 2009, Treasury, 2018) and other sources (Partnerships, 2008, EU, 2013) to consider additionality with regard to both spatial and activity contexts. From a south west Wales regional perspective, evaluations of prior ERDF activities give some context to potential levels of additionality (Oldbell3, 2012).

The main analysis presents the case for UK-level benefit of the Campuses initiative, however there is strong regeneration theme and ambition to restructure the SBCR economy within the Internet Coast City Deal giving emphasis to benefit to the region. As presented in Annex 3 of the Green Book, distributional analysis allows for appraisal at both levels and is here treated as follows with key parameters;

	UK	SBCR
Additionality	30%	15%
Multiplier	Excluded ⁶	1.4

Table 4.14: Distributional analysis – key parameters

Mean/Median additionality of benefits derived from development educational infrastructure has been shown to be of the order of 46% and 53% respectively (BIS, 2009)⁷. Noting the potential for leakage, as some skills will leak beyond the UK this is factored as 30%⁸ remaining additionality at the UK level.

From Destinations of Leavers from Higher Education (DELHE) data, it can be projected that leakage beyond the region will be ~50% of this group, and therefore SBCR additionality is factored as 15%. However, as multiplier effects can be factored at the regional level these are included as ~1.4, which is relatively conservative for knowledge-based activity. Recruitment data for Swansea University presents ~50% local input and targets the majority Home/EU. On the output side, data drawn from DELHE show strong existing retention within the region and UK. The nature of the proposed activity also overlaps into the broader health economy with skills supply and innovation activity relating to health and social care. Major regional (and national) challenges in recruitment and retention of health service staff suggest that additional supply would be. This is supported by data presenting that health professionals trained at Swansea University (through SUMS and CHHS) exhibit greater preponderance to continue training and practice within the region⁹.

⁶ As required by Green Book guidance, though retained for SBCR where below full employment and wider regeneration opportunity support inclusion of multiplier effects

⁷ Though as this is based on a relatively low number of observations a conservative approach has been adopted.

⁸ For the 'Base' Case, with a range of parameters used in Optimistic and Pessimistic Cases

⁹ ## SUMS/CHHS data

4.5.5 Time horizon

The Swansea Bay City Region has developed Internet Coast within its 15-year economic strategy through to 2031. The long-term capital investment infrastructure nature of the proposed initiative lends itself to appraisal over a longer-period, of 20-30 years, in line with guidance of organisations such as that proposed specifically for science parks (EU, 2002, EU, 2014). Indeed, the City Deal-funded phase of the project is presented as part of a longer-term ambition to transform Life Sciences, Sport & Well-being Research & Innovation capabilities; Clinical Services; and Education/Skills capacity, in partnership between Health Service, academia and private sector (ARCH, 2017). For example, certain options relate to early phase activities opening up further development sites (e.g. road infrastructure planning), which would involve activity towards the end of the 15-year period, with significant impact sometime thereafter. Benefits arising from development's subsequent phase are factored separately with associated risks (including for benefits realisation and timescales) considered within the sensitivity analysis.

To align with the Internet Coast programme and generic Green Book time horizon, both 10 and 15-year horizons are used to support the appraisal. It should be noted though, that the project plans that describe intention for both the activity and a significant portion of its benefits to be realised beyond this period.

4.5.6 Residual values

The project's infrastructure will clearly be of value beyond the 10 and 15-yr time horizons. Therefore, to incorporate residual value and opportunity cost an anticipated market value of the ILS/Education facilities at these points has been incorporated. While depreciation along with facility maintenance is incorporated separately¹⁰ in the Financial Case, it has in the absence of market projections been used with a standard linear 30-year depreciation cycle¹¹ to present a relatively conservative market value.

4.5.7 Wider benefits

The targeted benefits (as presented previously) relate predominantly to employment and productivity, though also to broader regeneration and health outcomes. This includes enhancement of the built environment, which along with enhance employment prospects would result in improved land values. This is of particular note for some options which target longer-term impact potential by opening up major development sites (e.g. Morrison ARCH development land). In parallel, improved health outcomes would result in cash-releasing benefits to Health service and other organisations as well as benefits to individuals. Such benefits include the long-term health benefits described below.

4.5.8 Long-term health and wellbeing benefits

The project will create expanded infrastructure with wider capabilities allowing a greater focus on academic and clinical quality and value improvement initiatives to deliver safer and better healthcare, physical fitness and rehabilitation, and well-being. The proposal relates exclusively to the innovation and economic development ambitions of the City Deal. By the nature of the sector, its innovation inherently aims to improve health outcomes, while clinical collaboration results in improved services. This potential is strengthened by the breadth of innovation ranging from medical devices benefitting

¹⁰ As noted in 6.13 of the Green Book

¹¹ Of note, this aligns with the Project Sponsor accounting practice, RICS Red Book and EU CBA Guidance for developments of this nature EU 2002. Guide to cost-benefit analysis of investment projects. *In: EVALUATION UNIT, D. R. P., EUROPEAN COMMISSION (ed.). Web, EU 2014. Guide to Cost-Benefit Analysis of Investment Projects, Economic appraisal tool for Cohesion Policy 2014-2020. In: POLICY, D.-G. F. R. A. U. (ed.). Web.*

patients with specific conditions through to sports and exercise technologies supporting both broader population and elite athletes. Therefore, the project will provide a pipeline of healthcare innovations, which will provide both local economic uplift through improved health and wellbeing and subsequent productivity along with wider societal benefit.

The metric that is widely used to demonstrate improvements in improved health and wellbeing is that of the quality adjusted life year (QALY). One QALY equates to one year of perfect health and is a fundamental requirement of health technology assessments in UK settings, with widespread application across other healthcare systems.

The table below presents a series of scenarios that highlight the potential value added as a result of QALY gains arising from the Swansea City Deal campus developments. The current value attached to one QALY equates to £20,000, although this key variable is a matter of debate. For the purpose of this appraisal, the NICE figure of 20,000 is used as an upper bound, with lower values providing alternative scenarios.

The scenarios have been developed to take account of potential QALY gains, the time taken to generate such gains and the value placed on a QALY. The first row therefore depicts the position whereby 2%, 3% and 4% of the Swansea population (roughly 250,000) – although the City Deal catchment area would be more extensive – and each ‘receive’ an additional one year of perfect health, which is valued at £15,000 and £20,000, over 5, 10 and 15 year time periods.

No. of residents who will benefit from one additional year of perfect health	Value (£)	Potential health value added (£)		
		5 years	10 years	15 years
5,000	15,000	338,629	623,746	863,805
5,000	20,000	451,505	831,661	1,151,740
7,500	15,000	507,943	935,619	1,295,708
7,500	20,000	677,258	1,247,492	1,727,610
10,000	15,000	677,258	1,247,492	1,727,610
10,000	20,000	903,010	1,663,322	2,303,480

Table 4.15: Potential value of benefits from Quality Adjusted Life Years

Initial analysis indicated that on the basis of a greater proportion of residents were to benefit to the extent of one additional year of perfect health – say 10%, the value attached to that was £20,000 (as per NICE threshold) and these were generated within a 15-year timescale the potential health value added would equate to £5.8 million.

As the business case development has progressed, and consideration is given to longer-term impact of these health benefits it can be determined that this benefit could be in the range £16m - £32m, depending upon the QALY value applied during a generational perspective. This time-horizon would be appropriate in the context of the Wellbeing of Future Generations (Wales) Act 2015 which gives statutory requirement to such appraisal.

No. of residents who will benefit from one additional year of perfect health	Value attached to one year of perfect health (£)	Potential value added (£)		
		5 years	10 years	15 years
100	10,000	4,515,052	8,316,605	16,481,515
100	15,000	6,772,579	12,474,908	24,722,272
100	20,000	9,030,105	16,633,211	32,963,029

Table 4.16: Potential longer-term value of health benefits

Further, there are likely to be additional gains arising from improvements in life expectancy and years of healthy life expectancy, given the number of areas classed as being in the most deprived communities in the Swansea City Bay areas, and the differential between rich and poor communities in terms of health life expectancy approaching 20 years for males and 18 years for females within SBUHB region. It has been estimated that reducing overall mortality from circulatory disease to levels seen in the least deprived areas of Wales would increase life expectancy in the most deprived areas by 1.5 years in males and 1.3 years in females, while similar gains would be made if cancer mortality rates were reduced (1.3 years in males, 1.2 in females). Further, reducing excess deaths from external causes (e.g. accidents, suicide) would have a particularly large effect on males living in the most deprived areas, potentially adding nearly a year to their life expectancy.

These results would be predicated on the assumption that the preferred approach (or alternatives) would be adopted, as the 'do minimum' option would not generate the additional improvement in health and wellbeing. This baseline scenario has become further challenged since the initial appraisal due to the Covid crisis, suggesting greater potential additionality from the proposed intervention.

4.5.9 Longer-term benefits (beyond City Deal-funded phase)

The project will provide further health benefits as part of its phase 2 with the development of 55 acres of land at Morriston Hospital, in addition to the broader development of Sketty Lane identified from the Strategic Case. Through this development, a new Institute of Life Science will be established on the site alongside the development of an elective treatment centre (orthopaedics), a new thoracic surgery service, and the development of a cardiac centre. This will allow the project to evolve to become the regional centre for specialist treatments for South West Wales, working across the regional Life Sciences, Sport & Health network.

4.6 Optimism bias

This section of the appraisal also notes the relatively conventional nature of the construction, though with a potentially diverse range of occupants, and therefore the higher end of the range¹², 20%, is used to factor for Optimism bias. The proposed activity, across Preferred Approach and Alternative 1 also draw upon organisations with experience in delivery of similar infrastructure projects to time and budget, which suggests this value is relatively conservative (TECC, 2015).

Potential impact upon benefits realisation has been comprehensively considered through the risk analysis, presented in section 4.7 below. This assessment has been undertaken through review of relevant literature and prior projects, and workshop activity with Project Managers/Directors engaged in recent similar initiatives, both within the region/sector and further afield. These risks have been synthesised into parameters used in the sensitivity analysis presented in Section 4.8.

¹² As noted in Annexe 5 of the Green Book, 2018

4.7 Risk analysis

Through the series of meetings/workshops undertaken to support scoping and development of the long and short-lists, a comprehensive risk register has been developed. This draws upon experience of prior initiatives, both revenue and capital, together with understanding of sector and wider challenges. These have been categorised as follows, using the organisation-specific risk types used by the Project Sponsor. The initial risk assessment has been workshopped to identify appropriate mitigations which relate to all options. This has resulted in the following key residual risks and mitigations. Note that a risk register setting out the risk by type (Business/Service/External) is included as Appendix A5.

Table 4.17: Initial risk analysis

Number	Title	Risk Type	Description	Benefit(s) Affected	Likelihood	Impact	Combined Factor	Mitigation/Transfer	Anticipated Effectiveness	Residual Risk Factor	Owner
Design/Development Phase											
D0003	Project Initiation / Approvals	Business	Difficulty in agreeing scope/delivery arrangements with local and/or government sponsors	Skills; Innovation; Economy; Sustainability	30	70	21	Strong engagement with SBCR, WG, UK Gov and wider stakeholders; Research-informed approach	65%	7.35	SBCR
D0004	Delay/Limits of Initial Funding	Funding	Delayed/frustrated/reduced approval(s) leading to dis-alignment with wider cluster and stakeholders	Skills; Innovation; Economy; Sustainability	20	50	10	Strong engagement with SBCR, WG, UK Gov and wider stakeholders; Research-informed approach	70%	3	SBCR
D000x					0	0	0		100%	0	
Implementation Phase											
I0001	SBCR/IoHWP Partnerships	Operational	Difficulties in timely SBCR/IoHWP agreement of effective Implementation arrangements	Skills; Innovation; Economy; Sustainability	25	80	20	Strong engagement with SBCR Partners and Internet Coast Projects; research-informed approach	70%	6	SBCR
I0003	Procurement Failure (market)	Procurement	Lack of attractiveness to market - due to competition with other opportunities, level of co-investment etc.	Skills; Innovation; Economy; Sustainability	10	70	7	Research-informed approach; Effective market engagement	30%	4.9	SRO
I0004	Lack of co-investment	Funding	Campuses opportunity fails to attract targeted level(s) of private sector co-investment	Skills; Innovation; Economy	30	30	9	Research-informed approach; Effective market engagement	60%	3.6	SBCR
I0009	Economic downturn (local/national)	Economic	Downturn in economic opportunities such as inward-investment/growth due to factors such as Brexit disruption	Innovation; Economy	40	40	16	Diversified and longer-term targeted economic and skills benefits, beyond economic cycles/shocks; research-informed approach	40%	9.6	SBCR
I000x					0	0	0		100%	0	
Termination (Mainstreaming) Phase											
T0004	Infrastructure Renewal	Sustainability	Failure to plan/deliver renewal of infrastructure leading to lack of financial sustainability	Sustainability	30	40	12	Transfer - Partner	60%	4.8	Operator
T0005	Lack of long-term co-investment	Funding	Failure to attract further stages of co-investment to expand/enhance activity beyond Internet Coast phase	Innovation; Economy	30	30	9	Strong engagement with Partners, SBCR, WG, UK Gov and wider stakeholders; Research-informed approach	50%	4.5	SBCR
T000x							0			0	
							0			0	

4.8 Sensitivity analysis

The risk assessment presented in the previous section presents key residual risks, which could potentially result in delayed or reduced benefits realisation, cost increase or combination thereof. Sensitivity analysis, for both Regional and UK level appraisal has therefore reviewed short-listed options with parameters ranging up to 1-year delay, 40% reduction in benefits and 20% cost increase (in addition to factored Optimism Bias).

Sensitivity analysis of the Preferred and Alternative Options shows switching values of 66% reduction in benefits or 305% increase in cost for Preferred Option before Do Minimum becomes next Option. Alternative 3, involving a distributed fund could also potentially switch if Benefits of the Preferred Option were delayed, though this would be beyond the initial project phase and subject to other risks. The following tables present a further perspective of the Options appraised at UK and Regional Level.

4.8.1 UK perspective

SBCR Cost-Benefit Analysis: April 2021 UK Perspective

Project Name **Campuses**
Version **3.0**
Date **05/04/2021**

Scenario (Base)	10Yr NPV	15Yr NPV
A - Preferred Implementation	11,202,821	18,782,103
B - Alternative 1	- 1,436,857	12,310,026
C - Alternative 2	- 6,318,993	- 3,364,775
D - Alternative 3	5,271,441	9,525,264
E - Do Minimum	32,869	3,328,349

Sensitivity Analysis

	10Yr NPV	15Yr NPV
20% reduction in Wider Benefit		
A - Preferred Implementation	-	-
B - Alternative 1		
C - Alternative 2		
D - Alternative 3		
E - Do Minimum		

	10Yr NPV	15Yr NPV
1Yr Delay in Benefits		
A - Preferred Implementation	9,576,021	4,630,178
B - Alternative 1	- 3,810,440	- 1,841,899
C - Alternative 2	- 7,251,638	- 3,364,775
D - Alternative 3	3,885,820	7,402,036
D - Do Minimum	- 718,429	- 1,480,581

	10Yr NPV	15Yr NPV
20% increase in costs		
A - Preferred Implementation	9,309,309	15,951,718
B - Alternative 1	- 3,330,369	9,479,641
C - Alternative 2	- 8,212,505	- 6,195,160
D - Alternative 3	3,377,929	6,694,879
E - Do Minimum	- 638,932	- 6,195,160

Sensitivity Analysis

	10Yr NPV	15Yr NPV
40% reduction in Benefits		
A - Preferred Implementation	2,934,669	5,608,492
B - Alternative 1	- 4,649,139	1,725,245
C - Alternative 2	- 7,578,420	- 7,679,635
D - Alternative 3	- 624,160	54,388
E - Do Minimum	- 1,323,881	73,437

	10Yr NPV	15Yr NPV
Slow Mobilisation (6month delay)		
A - Preferred Implementation	10,389,421	17,298,599
B - Alternative 1	- 2,623,649	10,074,971
C - Alternative 2	- 6,785,315	- 4,318,676
D - Alternative 3	5,081,025	8,463,650
D - Do Minimum	- 342,780	2,797,199

	10Yr NPV	15Yr NPV
1Yr Delay and -20% Wider Benefit		
A - Preferred Implementation	-	-
B - Alternative 1		
C - Alternative 2		
D - Alternative 3		
E - Do Minimum		

4.8.1 Regional perspective

SBCR Cost-Benefit Analysis: April 2021
Regional Perspective

Project Name Campuses
Version 3.0
Date 03/04/2021

Scenario (Base)	10Yr NPV	15Yr NPV
A - Preferred Implementation	9,772,373	16,420,107
B - Alternative 1	- 893,395	13,998,178
C - Alternative 2	- 5,368,934	- 1,158,657
D - Alternative 3	6,560,343	17,029,211
E - Do Minimum	240,942	3,827,526

Sensitivity Analysis

	10Yr NPV	15Yr NPV
20% reduction in Wider Benefit		
A - Preferred Implementation	8,568,427	12,457,153
B - Alternative 1	- 1,805,158	11,014,353
C - Alternative 2	- 5,819,897	- 2,624,690
D - Alternative 3	6,092,844	14,174,884
E - Do Minimum	- 139,860	2,913,963

Sensitivity Analysis

	10Yr NPV	15Yr NPV
40% reduction in Benefits		
A - Preferred Implementation	2,076,400	4,191,294
B - Alternative 1	- 4,323,061	2,738,137
C - Alternative 2	- 7,008,384	- 6,355,964
D - Alternative 3	1,084,179	10,265,410
E - Do Minimum	- 1,199,037	372,944

	10Yr NPV	15Yr NPV
1Yr Delay in Benefits		
A - Preferred Implementation	8,290,604	2,268,182
B - Alternative 1	- 3,427,126	- 153,747
C - Alternative 2	- 6,466,032	- 15,310,582
D - Alternative 3	4,282,433	2,877,286
E - Do Minimum	- 556,444	- 981,403

	10Yr NPV	15Yr NPV
Slow Mobilisation (6month delay)		
A - Preferred Implementation	9,031,489	15,043,371
B - Alternative 1	- 2,160,261	11,626,015
C - Alternative 2	- 5,917,483	- 2,263,322
D - Alternative 3	4,252,641	2,351,771
E - Do Minimum	- 157,751	3,263,794

	10Yr NPV	15Yr NPV
20% increase in costs		
A - Preferred Implementation	7,878,861	13,589,722
B - Alternative 1	- 2,786,907	11,167,793
C - Alternative 2	- 7,262,446	- 3,989,042
D - Alternative 3	2,329,337	14,198,826
E - Do Minimum	- 430,859	2,865,740

	10Yr NPV	15Yr NPV
1Yr Delay and -20% Wider Benefit		
A - Preferred Implementation	7,441,964	10,372,821
B - Alternative 1	- 4,069,501	6,771,880
C - Alternative 2	- 6,790,840	- 4,582,934
D - Alternative 3	5,475,847	11,089,206
E - Do Minimum	- 852,898	1,905,761

The sensitivity analysis has shown the preferred implementation as being most resilient in face of key risks occurring, from both UK and regional perspectives. Risks occurring that result in delayed and/or reduced benefits have the most significant impact on most implementations, while cost overruns would have greatest negative affect on Alternative 2 (already most expensive option). Switching value analysis suggests that as the same risks affect Alternatives, then Do Minimum would become the next Option in the event of 66% reduction in benefits realised or 305% increase in costs.

Regional NPV is generally higher than the UK perspective for all options/scenarios reflecting the localised wider benefits to the regional economy through multiplier effects, offsetting the reduced additionality due to leakage.

Potential Affordability	Challenge to sustainably develop revenue, though relatively limited requirement	Relatively unknown/untested, though commitment only with market response	Public partnership potential to realise development	Requires market testing to provide confidence for co-investment opportunity	Dispersed investment(s) nature may lack mass to develop private sector interest	Level of co-investment may be challenging spread across three locations
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Preferred Approach

A - Do Minimum	B – Dispersed Growth	C - Intermediate I	D - Intermediate II	E - Intermediate III	F - Do Maximum
Rely on existing activity/sites	Investment fund for disparate activities	Incremental increase(s) of existing Ecosystem (ILS1/2) across two sites	Mixed – Dual Site combination: Incremental Development and Focused major development	Mixed – Dual Site Development and fund for disparate activities	Full ARCH Prospectus Expand existing and establish new Campuses

Description	This option describes no expansion of the existing ecosystem small investment into the reconfiguration of existing infrastructure to maximise efficiency of existing facilities.	This option describes the creation of an investment fund to invest in individual opportunities across the region on a competitive basis as they emerge in a portfolio of disparate activities/facilities.	This option describes limited investment across 2 sites (Singleton and Morriston) to begin an incremental increase in capacity and capabilities at both development sites in line with the expectations of the SBCR.	This option describes a larger investment across 2 sites (Singleton and Morriston) to establish increased capacity in response to need demand and establish at Singleton and Morriston to support regionalisation and further incremental development.	This option describes the creation of a fund with the same intention Option B to invest in small regional opportunities across the region in addition to the expansion of ILS at Singleton and the development of an ILS at Morriston as described in Option D .	This option describes major investment across 3 sites (Singleton, Morriston and Hywel Dda) to realise the ARCH vision to create Campuses at all sites through new build developments.
Scope	Utilise current ILS facilities to support growth of existing, and capture of new, opportunities. Capital investment limited to enhancing efficiency of existing facilities. ~500s.m. of mixed facilities^	Develop specialist capabilities / capacities in locations across SBCR with public and private sector in response to emerging opportunities. This would be market-led opportunities developing a portfolio of projects giving Open Access capabilities	Increase capacity/capability of existing ILS1/2 through development of new facilities across 2 sites (i.e. ILS3 at Singleton and ILS at Morriston) in response to need demand. ~4,500s.m. of mixed facilities (3,000m² at Singleton and 1500m² at Morriston)	Establish significant capacity/capability of existing ILS through development of new facilities in response to need demand, along with initial development at a further site to support regionalisation. ~10,000sqm of mixed facilities over the period to 2032 (2,000sqm at Singleton, 7,700sqm (2 phases) at Morrison)	Providing a combination of B&D approaches with realisation of ARCH Campuses scope; i.e. ILS-scale facilities at two locations and further smaller developments across the region. ~12,000 + 1,000s.m. of mixed facilities^ over the period to 2032	Expand existing ILS site and establish full ARCH Morriston and Hywel Dda Campus infrastructures. This would realise the original 2014 ARCH ambition across both UHB regions. ~24,000-30,000.m. of mixed facilities^
Service Solution	Promotion and reconfiguration of existing SU capabilities to maximise capacity of current operations.	Development of facilities across the region through open competition amongst existing ecosystem	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Combination of Implementation Approaches B&D	New-build of major facilities at Singleton, Morriston and Hywel Dda sites.
Service Delivery	Swansea University and partners (inc. Life Sciences Hub Wales)	Diverse (Procured) Ecosystem – portfolio procured/ partnered on individual opportunity basis	Utilisation of existing organisation Frameworks	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership
Implementation	Immediate start as 3/5-year project	3-year project – Competition / procurement of portfolio of investments	5-year project	Phased 3, 5-year project	Phased 5, 8-year project	Immediate start ~7yr project
Funding	~£5m City Deal funding Total : ~£5m	~£15m City Deal Funding with potential to leverage an additional £15m of public/private investment. Total : ~£30m	~£15m City Deal Funding with the potential to leverage an additional £15m of public/private investment Total : ~£30m	£15m City Deal funding with the potential to leverage an additional £115m public/private capital investment Total : ~£130m	£15m City Deal funding with the potential to leverage an additional £60m public/private investment Total : ~£75m	£15m City Deal funding with the potential to leverage an additional £80m public/private investment Total : ~£95m

Alternative Approach 1

A - Do Minimum	B – Dispersed Growth	C - Intermediate I	D - Intermediate II	E - Intermediate III	F - Do Maximum
Rely on existing activity/sites	Investment fund for disparate activities	Incremental increase(s) of existing Ecosystem (ILS1/2) across two sites	Mixed – Dual Site combination: Incremental	Mixed – Dual Site Development and fund for disparate activities	Expand existing and establish new Campuses

				Development and Focused major development		
Description	This option describes no expansion of the existing ecosystem small investment into the reconfiguration of existing infrastructure to maximise efficiency of existing facilities.	This option describes the creation of an investment fund to invest in individual opportunities across the region on a competitive basis as they emerge in a portfolio of disparate activities/facilities.	This option describes limited investment across 2 sites (Singleton and Morriston) to begin an incremental increase in capacity and capabilities at both development sites in line with the expectations of the SBCR.	This option describes a larger investment across 2 sites (Singleton and Morriston) to establish increased capacity in response to need demand and establish a footprint at Morriston to support regionalisation and further incremental development.	This option describes the creation of a fund with the same intention Option B to invest in small regional opportunities across the region in addition to the expansion of ILS at Singleton and the development of an ILS at Morriston as described in Option D .	This option describes major investment across 3 sites (Singleton, Morriston and Hywel Dda) to realise the ARCH vision to create Campuses at all sites through new build developments.
Scope	Utilise current ILS facilities to support growth of existing, and capture of new, opportunities. Capital investment limited to enhancing efficiency of existing facilities. ~500s.m. of mixed facilities^	Develop specialist capabilities / capacities in locations across SBCR with public and private sector in response to emerging opportunities. This would be market-led opportunities developing a portfolio of projects giving Open Access capabilities	Increase capacity/capability of existing ILS1/2 through development of new facilities across 2 sites (i.e. ILS3 at Singleton and ILS at Morriston in response to need demand. ~4,5,00s.m. of mixed facilities^ (3,000m² at Singleton and 1500m² at Morriston)	Establish significant capacity/capability of existing ILS through development of new facilities in response to need demand, along with initial development at a further site to support regionalisation. ~10,000sqm of mixed facilities over the period to 2032 (2,000sqm at Singleton, 7,700sqm (2 phases) at Morrison)	Providing a combination of B&D approaches with realisation of ARCH Campuses scope; i.e. ILS-scale facilities at two locations and further smaller developments across the region. ~12,000 + 1,000s.m. of mixed facilities^ over the period to 2032	Expand existing ILS site and establish full ARCH Morriston and Hywel Dda Campus infrastructures. This would realise the original 2014 ARCH ambition across both UHB regions. ~24,000-30,000s.m. of mixed facilities^
Service Solution	Promotion and reconfiguration of existing SU capabilities to maximise capacity of current operations.	Development of facilities across the region through open competition amongst existing ecosystem	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Combination of Implementation Approaches B&D	New-build of major facilities at Singleton, Morriston and Hywel Dda sites.
Service Delivery	Swansea University and partners (inc. Life Sciences Hub Wales)	Diverse (Procured) Ecosystem – portfolio procured/ partnered on individual opportunity basis	Utilisation of existing organisation Frameworks	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership
Implementation	Immediate start as 3/5-year project	3-year project – Competition / procurement of portfolio of investments	5-year project	Phased 3, 5-year project	Phased 5, 8-year project	Immediate start ~7yr project
Funding	~£5m City Deal funding Total : ~£5m	~£15m City Deal Funding with potential to leverage an additional £15m of public/private investment. Total : ~£30m	~£15m City Deal Funding with the potential to leverage an additional £15m of public/private investment Total : ~£30m	£15m City Deal funding with the potential to leverage an additional £45m public/private investment Total : ~£60m	£15m City Deal funding with the potential to leverage an additional £60m public/private investment Total : ~£75m	£15m City Deal funding with the potential to leverage an additional £80m public/private investment Total : ~£95m

Alternative Approach 2

	A - Do Minimum Rely on existing activity/sites	B – Dispersed Growth Investment fund for disparate activities	C - Intermediate I Incremental increase(s) of existing Ecosystem (ILS1/2) across two sites	D - Intermediate II Mixed – Dual Site combination: Incremental Development and Focused major development	E - Intermediate III Mixed – Dual Site Development and fund for disparate activities	F - Do Maximum Expand existing and establish new Campuses
Description	This option describes no expansion of the existing ecosystem small investment into the reconfiguration of existing infrastructure to maximise efficiency of existing facilities.	This option describes the creation of an investment fund to invest in individual opportunities across the region on a competitive basis as they emerge in a portfolio of disparate activities/facilities.	This option describes limited investment across 2 sites (Singleton and Morriston) to begin an incremental increase in capacity and capabilities at both development sites in line with the expectations of the SBCR.	This option describes a larger investment across 2 sites (Singleton and Morriston) to establish increased capacity in response to need demand and establish at Singleton and establish a footprint at Morriston to support regionalisation and further incremental development.	This option describes the creation of a fund with the same intention Option B to invest in small regional opportunities across the region in addition to the expansion of ILS at Singleton and the development of an ILS at Morriston as described in Option D .	This option describes major investment across 3 sites (Singleton, Morriston and Hywel Dda) to realise the ARCH vision to create Campuses at all sites through new build developments.
Scope	Utilise current ILS facilities to support growth of existing, and capture of new, opportunities. Capital investment limited to enhancing efficiency of existing facilities. ~500s.m. of mixed facilities^	Develop specialist capabilities / capacities in locations across SBCR with public and private sector in response to emerging opportunities. This would be market-led opportunities developing a portfolio of projects giving Open Access capabilities	Increase capacity/capability of existing ILS1/2 through development of new facilities across 2 sites (i.e. ILS3 at Singleton and ILS at Morriston in response to need demand. ~4,500s.m. of mixed facilities^ (3,000m² at Singleton and 1500m² at Morriston)	Establish significant capacity/capability of existing ILS through development of new facilities in response to need demand, along with initial development at a further site to support regionalisation. ~10,000sqm of mixed facilities over the period to 2032 (2,000sqm at Singleton, 7,700sqm (2 phases) at Morrison)	Providing a combination of B&D approaches with realisation of ARCH Campuses scope; I.e. ILS-scale facilities at two locations and further smaller developments across the region. ~12,000 + 1,000s.m. of mixed facilities^ over the period to 2032	Expand existing ILS site and establish full ARCH Morriston and Hywel Dda Campus infrastructures. This would realise the original 2014 ARCH ambition across both UHB regions. ~24,000s.m. of mixed facilities^
Service Solution	Promotion and reconfiguration of existing SU capabilities to maximise capacity of current operations.	Development of facilities across the region through open competition amongst existing ecosystem	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Mixed Refurbishment / New-build of facilities, with delivery through existing ILS initiative	Combination of Implementation Approaches B&D	New-build of major facilities at Singleton, Morriston and Hywel Dda sites.
Service Delivery	Swansea University and partners (inc. Life Sciences Hub Wales)	Diverse (Procured) Ecosystem – portfolio procured/ partnered on individual opportunity basis	Utilisation of existing organisation Frameworks	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership	Mixed: Public/Private Partnership: Procured development co-investment partnership
Implementation	Immediate start as 3/5-year project	3-year project – Competition / procurement of portfolio of investments	5-year project	Phased 3, 5-year project	Phased 5, 8-year project	Immediate start ~7yr project
Funding	~£5m City Deal funding Total : ~£5m	~£15m City Deal Funding with potential to leverage an additional £15m public/ private investment. Total: ~£30m	~£15m City Deal Funding with the potential to leverage an additional £15m of public/private investment. Total : ~£30m	£15m City Deal funding with the potential to leverage an additional £45m public/private investment. Total : ~£60m	£15m City Deal funding with the potential to leverage an additional £60m public/private investment. Total : ~£75m	£15m City Deal funding with the potential to leverage an additional £80m public/private investment. Total : ~£95m