

3rd Menai Crossing

Strategic Business Case

May, 2016

Quality information

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Contents

INTRODUCTION	2
1.1 THIS DOCUMENT.....	2
1.2 SCHEME CONTEXT	3
1.3 WELSH GOVERNMENT NUCLEAR POWER PROGRAMME	5
1.4 STRATEGIC OUTLINE CASE CHECKLIST	5
STRATEGIC CASE	10
2.1 INTRODUCTION	10
2.2 PROBLEM IDENTIFIED	10
2.3 SCOPE	27
2.4 OBJECTIVES.....	28
2.5 STRATEGIC FIT.....	30
2.6 INTERNAL AND EXTERNAL DRIVERS FOR CHANGE	35
2.7 MEASURES FOR SUCCESS.....	36
2.8 OPTIONS ASSESSED	38
2.9 CONSTRAINTS AND INTER-DEPENDENCIES	49
2.10 STAKEHOLDERS.....	49
2.11 IMPACT OF NOT CHANGING	51
TRANSPORT CASE.....	54
3.1 INTRODUCTION	54
3.2 OPTIONS APPRAISED	54
3.3 ASSUMPTIONS	55
3.4 ECONOMIC APPRAISAL	56
3.5 APPRAISAL SUMMARY TABLE	60
3.6 VALUE FOR MONEY STATEMENT.....	61
FINANCIAL CASE.....	63
4.1 INTRODUCTION.....	63
4.2 APPROACH TO ASSESSING AFFORDABILITY.....	63
4.3 COSTS.....	64
4.4 BUDGETS/FUNDING COVER.....	64
COMMERCIAL CASE	67
5.1 INTRODUCTION.....	67
5.2 OUTPUT BASED SPECIFICATION	67
5.3 PROCUREMENT STRATEGY	67
MANAGEMENT CASE	71
6.1 INTRODUCTION	71
6.2 EVIDENCE OF SIMILAR PROJECTS	71
6.3 DEPENDENCIES WITH OTHER PROJECTS AND PROGRAMMES	71
6.4 GOVERNANCE, ORGANIZATIONAL STRUCTURE AND ROLES	71
6.5 PROGRAMME/PROJECT PLAN AND REPORTING	72
6.6 ASSURANCE AND APPROVALS PLAN.....	73
6.7 COMMUNICATION AND STAKEHOLDER MANAGEMENT	73
6.8 RISK MANAGEMENT STRATEGY	74
6.9 MONITORING AND EVALUATION.....	74
6.10 PROJECT MANAGEMENT OPTIONS	75
FINAL REMARKS	78
7.1 SUMMARY.....	78
7.2 NEXT STEPS AND OTHER RECOMMENDED SHORT TERM TASKS.....	79



Introduction

01

Introduction

1.1 This Document

1.1.1 This report sets out the Strategic Outline Case (SOC) for the 3rd Menai Crossing and has been structured in broad alignment with the Department for Transport (DfT) guidance for a SOC.

1.1.2 The 3rd Menai Crossing would likely take the form of a new bridge constructed across the Menai Strait between the Isle of Anglesey and Gwynedd County, North West Wales. Although the exact location and design specification of the new crossing will be the subject of further study, it will likely be located in the close vicinity of the existing A55 Britannia Bridge. The new crossing, would effectively double the capacity of the A55 and would seek to address a number of specific transport objectives relating to:

- Improved journey times and journey time reliability on the A55;
- Improved network reliability during peak periods (including holiday periods);
- Enhanced levels of service crossing the Menai Strait for non-motorised users; and
- Reduction in the frequency and severity of personal injury accidents.

1.1.3 The remainder of this document is structured as follows:

- **Section 2: Strategic Case.** Setting out the robust case for change that fits with wider public policy objectives;
- **Section 3: Transport Case.** Demonstrating that the scheme offers the scope to deliver good value for money;
- **Section 4: Financial Case.** To demonstrate that the proposed case is affordable within the proposed funding arrangements;
- **Section 5: Commercial Case.** To evidence the commercial viability of the scheme and the proposed procurement strategy to facilitate delivery;
- **Section 6: Management Case.** To show that the scheme is deliverable within the context of project management; risk management; governance structures; communications and stakeholder management; and
- **Section 7: Final remarks.** Setting out brief recommendations and next steps.

1.1.4 The supporting appendices for this business case are as follows:

- **Appendix A:** Appraisal Summary Tables
- **Appendix B:** Model Forecasting and Economics Report (2008)
- **Appendix C:** Cost Estimates (2015)
- **Appendix D:** Ministerial task force on North Wales Transport – Report (December 2014) and Response (May 2015)

1.2 Scheme Context

1.2.1 The A55 forms part of the E22 Trans-European Transport Network (TEN-T), running from Holyhead port in the west on the Isle of Anglesey to Immingham port in the East, near Grimsby. The study area is contained wholly in Wales, and straddles the Isle of Anglesey County and Gwynedd County. There are currently two crossings, both dating to the 1800s; the A5 between Bangor and Menai Bridge, and the A55, between Capel-y-graig and Llanfairpwllgwyngyll. The A55 Britannia Bridge is a trunk road and is the main economic artery of North Wales, connecting the area with the Port of Holyhead in the East and Chester and the wider Strategic Road Network (SRN) in the West. *Figure 1.1* demonstrates the geographical context of the scheme, and proposed infrastructure as part of the Horizon Nuclear Programme.

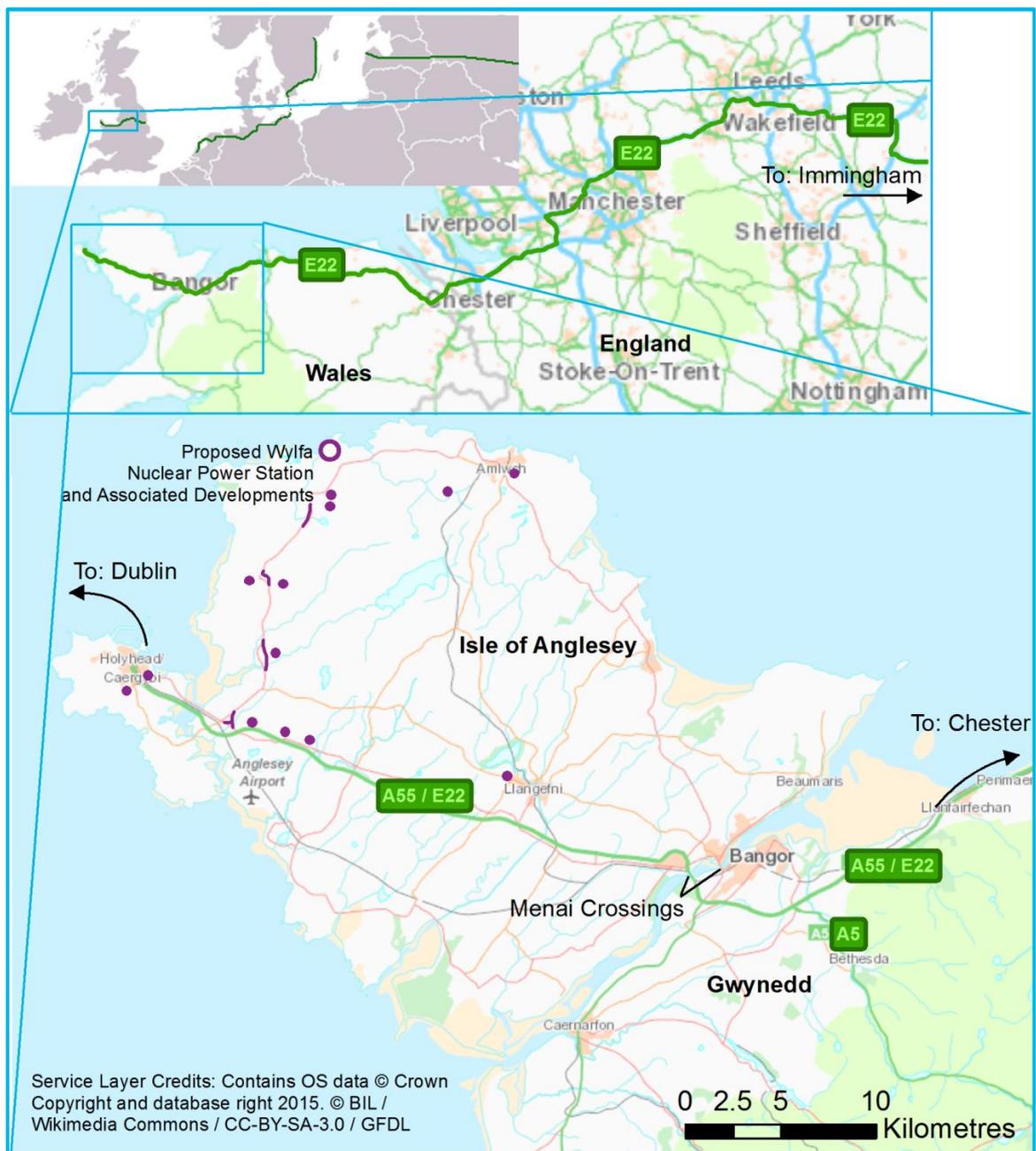


Figure 1.1 – Overview Map

1.2.2 Numerous studies have been undertaken in the past to progress the development of the project (*Figure 1.2*).

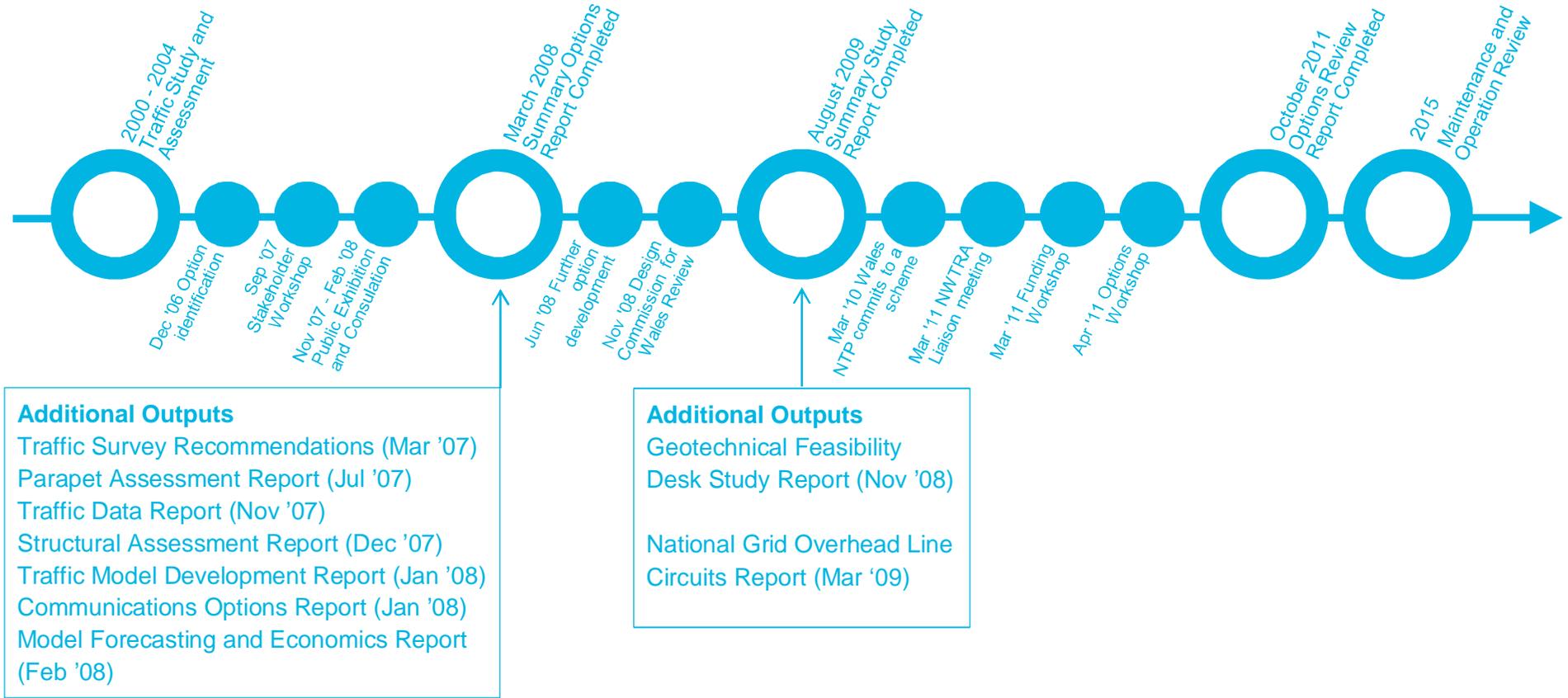


Figure 1.2 Scheme Development Timeline

1.2.3 This SOC has been prepared on the basis of key findings from the studies undertaken to date. This document will support Welsh Government in determining the case for progressing the scheme to Key Stage 2 in the Highways project development process.

1.3 Welsh Government Nuclear Power Programme

1.3.1 A cross sector and departmental Nuclear Programme is being developed to reflect the importance of the nuclear sector in Wales. A co-ordinated and strategic approach to the Nuclear Programme is being adopted, structured around seven 'workstreams', each of which comprises a series of projects and therefore act as a mini programme, in its own right. The seven workstreams are:

- **Education, skills and labour supply** – through extension of the labour supply catchment;
- **Infrastructure** – by providing a step change in strategic infrastructure linking Anglesey with the mainland and national road networks;
- **Sites and premises** – through increased accessibility;
- **Business development and supply chains** – through increasing connectivity to key growth areas on Anglesey and enhancing the scope for regional agglomeration;
- **Marketing and communications;**
- **Inward Investment** – by creating more attractive conditions for business; and
- **Housing**

1.3.2 The nuclear programme is focussed upon maximising the social and economic benefits that the nuclear sector can generate for Wales and has the following objectives.

- To deliver Welsh Government's commitments outlined in 'Energy Wales' by securing transformational nuclear sector investment over the next 30 years;
- To maximise the benefits of nuclear sector investment in the UK by securing supply chain opportunities for Welsh companies, employment for Welsh residents, and encouraging inward investment; and
- To help deliver jobs and generate prosperity for peripheral and under-performing regions of Wales. Through this it will help develop, maintain and support vibrant and sustainable communities in Wales, including the continued promotion of the Welsh language.

1.3.3 The Outline Business Case (OBC) for the overall Nuclear Power Programme, identifies a third road crossing of the Menai as part of the Infrastructure workstream. The overall Infrastructure workstream is expected to facilitate the objectives described above by enhancing strategic infrastructure which will aid inward investment and improve opportunities for Welsh Companies to export to the global market.

1.3.4 This SOC, therefore also provides further evidence to support recommendations for a third Menai crossing to be included in the Nuclear Power Programmes investment plans.

1.4 Strategic Outline Case Checklist

1.4.1 Following discussions with Welsh Government officials it was agreed that this task be undertaken in line with the principles of the new WelTAG. The guidance is currently being revised to adopt the Five Cases approach for the appraisal of public sector business cases. It also compliments the Green Book published by HM Treasury and reflects the Rationale Objectives Appraisal Monitoring Evaluation Feedback (ROAMEF) cycle used widely throughout Europe.

1.4.2 The following checklist provides a page indexed list of the key components of this business case document.

Strategic Case

Criteria	Description	Section/Page Reference
Business Strategy	Provide the context for the business case by describing the strategic aims and responsibilities of the organization responsible for the proposal	S2.5, p30
Problem Identified	Describe the problem identified. What is the evidence base underpinning this? Is there justification for government intervention?	S2.2, p10
Impact of not changing	What is the impact of not changing?	S2.11, p51
Internal and external drivers for change	What is driving the need to change?	S2.6, p35
Objectives	Establish specific, measurable, achievable, realistic and time bound objectives that will solve the problem identified.	S2.4, p28
Measures for success	Set out what constitutes successful delivery of the objectives.	S2.7, p36
Scope	Explain what the project will deliver and also what is out of scope.	S2.3, p27
Constraints and inter-dependencies	High level internal/external constraints and Internal/External factors upon which the successful delivery of the project are dependent	S2.9, p49
Stakeholders	Outline the main stakeholder groups and their contribution to the project. Note any potential conflicts between the different stakeholder groups and their demands.	S2.10, p49
Options	Set out all the options identified and evaluate their impacts on the proposals objectives and wider public policy objectives. Risks associated with each option should be identified as should any risks common to all options.	S2.8, p38

Transport Case

Criteria	Description	Section/Page Reference
Introduction	Outline approach to assessing value for money	S3.1, p54
Options appraised	A list of options (set out in the strategic case) that have been appraised.	S3.2, p54
Assumptions	WebTAG sets out the assumptions that should be used in the conduct of transport studies. List any further assumptions supporting the analysis.	S3.3, p55
Sensitivity and Risk Profile	Set out how changes in different variables affect the NPV. The risk profile should show how likely it is that these changes will happen.	S3.4.23, p59

Criteria	Description	Section/Page Reference
Appraisal Summary Table	See WebTAG for detailed guidance on producing an AST.	S3.5, p60; Appendix A
Value for Money Statement	See value for money guidance on producing the value for money statement	S3.6, p61

Financial Case

Criteria	Description	Section/Page Reference
Introduction	Outline the approach taken to assess affordability	S4.1, p63
Costs	Provide details of: <ul style="list-style-type: none"> · The expected whole life costs · When they will occur · Breakdown and profile of costs by those parties on whom they fall · Any risk allowance that may be needed 	S4.3, p64
Budgets/Funding Cover	Outline details regarding the funding sources	S4.4, p64

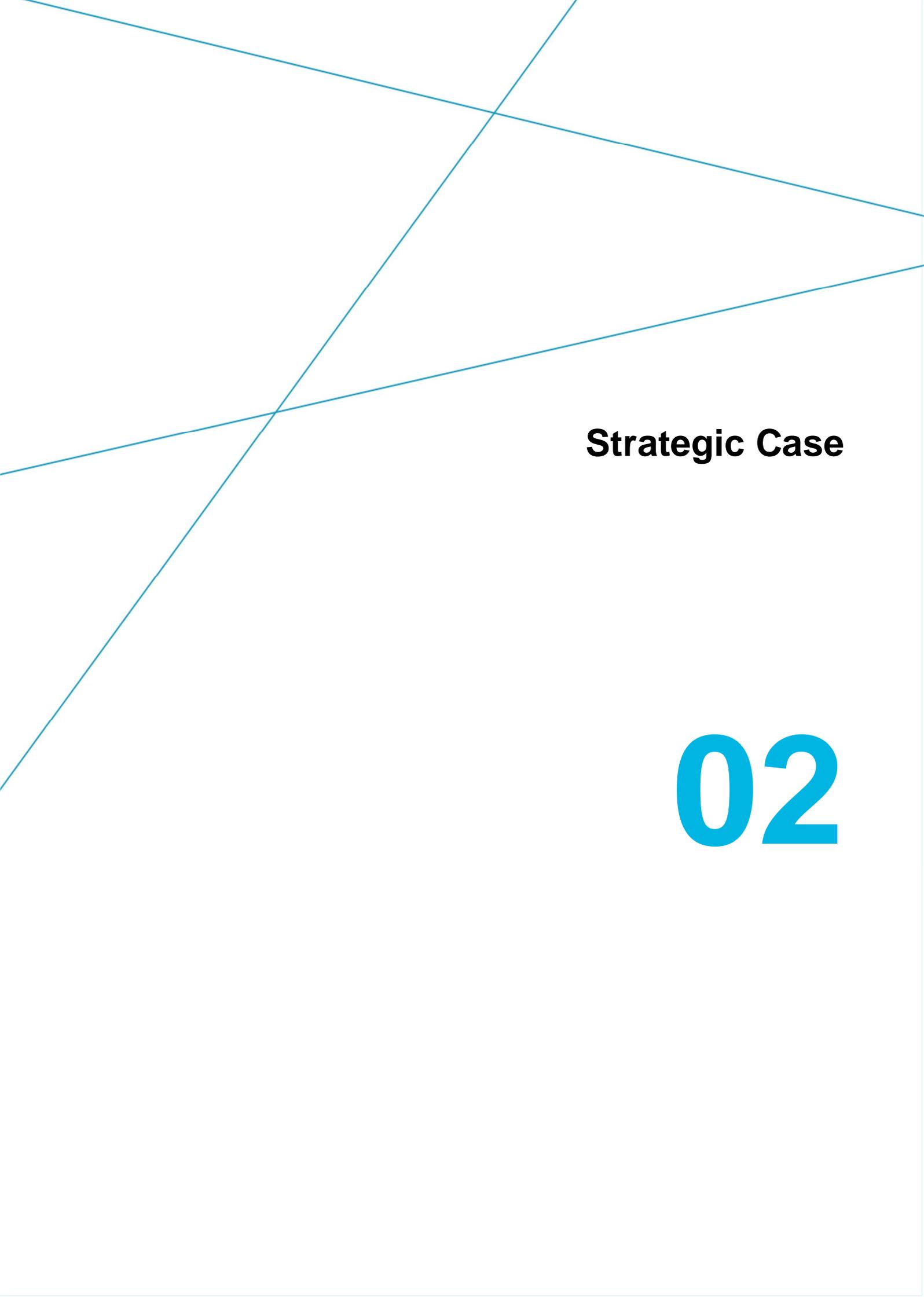
Commercial Case

Criteria	Description	Section/Page Reference
Introduction	Outline the approach to assess commercial viability	S5.1, p67
Output based specification	Summarize the requirement in terms of outcomes and outputs	S5.2, p67
Procurement Strategy	Detail procurement/purchasing options including how they will secure the economic, social and environmental factors outlined in the economic case.	S5.3, p67
Sourcing Options	Explain the options for source of provision of services to meet the business need e.g. partnerships, framework, existing supplier arrangements, with rationale for selecting preferred sourcing option	S5.3, p67

Management Case

Criteria	Description	Section/Page Reference
Introduction	Outline approach taken to assess if proposal is deliverable	S6.1, p71
Evidence of Similar Projects	If possible, provide evidence of similar projects that have been successful, to support the recommended project approach.	S2.2.39, p23; S6.2, p71

Criteria	Description	Section/Page Reference
Programme /project dependencies	Set out the deliverables and decisions that are provided/received from other projects	S6.3, p71
Governance, organizational structure and roles	Describe key roles, lines of accountability and how they are resourced	S6.4, p71
Programme /Project Plan and Reporting	Plan with key milestones and progress including critical path	S6.5, p72
Assurance and approvals plan	Plan with key assurance and approval milestones	S6.6, p73
Communication and stakeholder management	Develop communications strategy for the project	S6.7, p73
Risk Management Strategy	Arrangements for risk management and its effectiveness so far	S6.8, p74
Monitoring and Evaluation	Develop a monitoring and evaluation plan for the scheme post-opening	S6.9, p74
Project Management Options	Summarize overall approach for project management at this stage of the project.	S6.10, p75

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Strategic Case

02

Strategic Case

2.1 Introduction

2.1.1 The role of the strategic case is to outline the rationale and justification for construction of the 3rd Menai crossing. More specifically this section details:

- The key problems the scheme is intended to resolve;
- The proposed scheme scope and objectives;
- Internal and external drivers for change;
- The optioneering and sifting process adopted to date;
- High level constraints and dependencies;
- Stakeholder perspectives and issues; and
- The implications of not implementing change.

2.2 Problem Identified

Congestion

2.2.1 The A55 is the strategic route through North Wales running from Holyhead in the west to Chester to the east. The A55, and vast majority of the remainder of the E22 TEN-T route in the UK, is dual carriageway, either of a motorway or high standard. The service level across of the A55 across the Britannia Bridge is single carriageway and coincides with one of the busiest sections on the A55 (c32,000 vehicles per day). Approximately 46,000 vehicles per day cross the Menai Strait using either the A5 Menai Bridge (local route) or the A55 Britannia Bridge. High traffic flows on the bridge occur due to the lack of alternative routes to and from the Isle of Anglesey and the high volume of local traffic which commutes across the bridge on a daily basis. The latter is coupled with longer distance tourist traffic visiting Anglesey or using the Holyhead ferry terminal to access destinations in Ireland.

2.2.2 Annual average daily traffic flow data (2000 to 2014) for A5 Menai Bridge and A55 Britannia Bridge is presented in *Figure 2.3* and *Figure 2.4* respectively. There has been an observed upward trend in all vehicle and HGV use of both routes from 2000 up until 2008. This may be as a result of economic difficulties experienced during and after the 2008 recession, and also the closure of Anglesey Aluminium in 2009. A significant drop in HGV vehicle numbers on the A5 Menai Bridge is primarily linked to a 60% reduction in 2-axle HGVs.

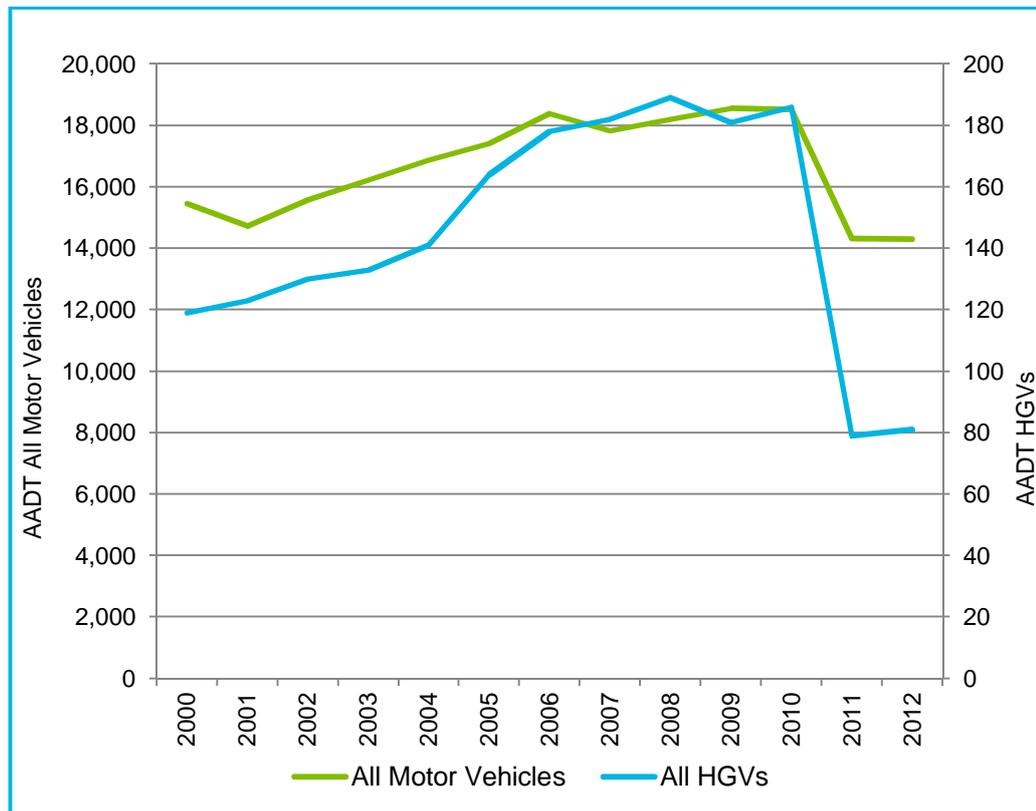


Figure 2.3 – A5 Menai Bridge AADT

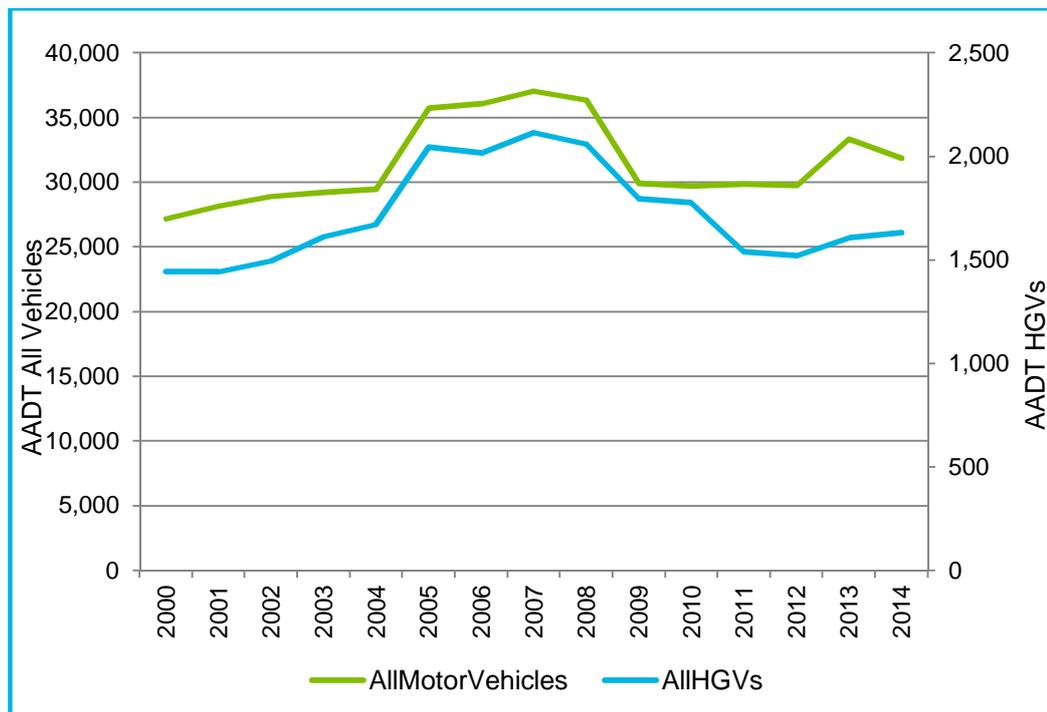


Figure 2.4 – A55 Britannia Bridge AADT

2.2.3 Congestion in the area is a recognised problem, negatively impacting on tourism and business development in Anglesey. Issues of poor journey time and journey time reliability occur regularly during commuter peak periods, as well as summer and bank holiday periods. Periods of congestion also result from the peaks of flow associated with vehicles travelling onto and exiting the Irish ferries.

2.2.4 TrafficMaster data derived from GPS satellite navigation systems installed in vehicles

has been analysed for the period from October 2014 to July 2015 for the A55 between J7 and J10 and alternative local routes. *Figure 2.5* and *Figure 2.6* below show the delays experienced on the Britannia and Menai bridges in the AM and PM peaks, with reduced speeds experienced on the A55 in the eastbound direction in the AM peak and in the westbound direction in the PM peak. On an average weekday within this period delays of 1 minute (when compared to the off-peak average) were experienced in the westbound direction between 17:00 and 18:00. In the eastbound direction average weekday delays of 3 minutes were experienced between 08:00 and 09:00.

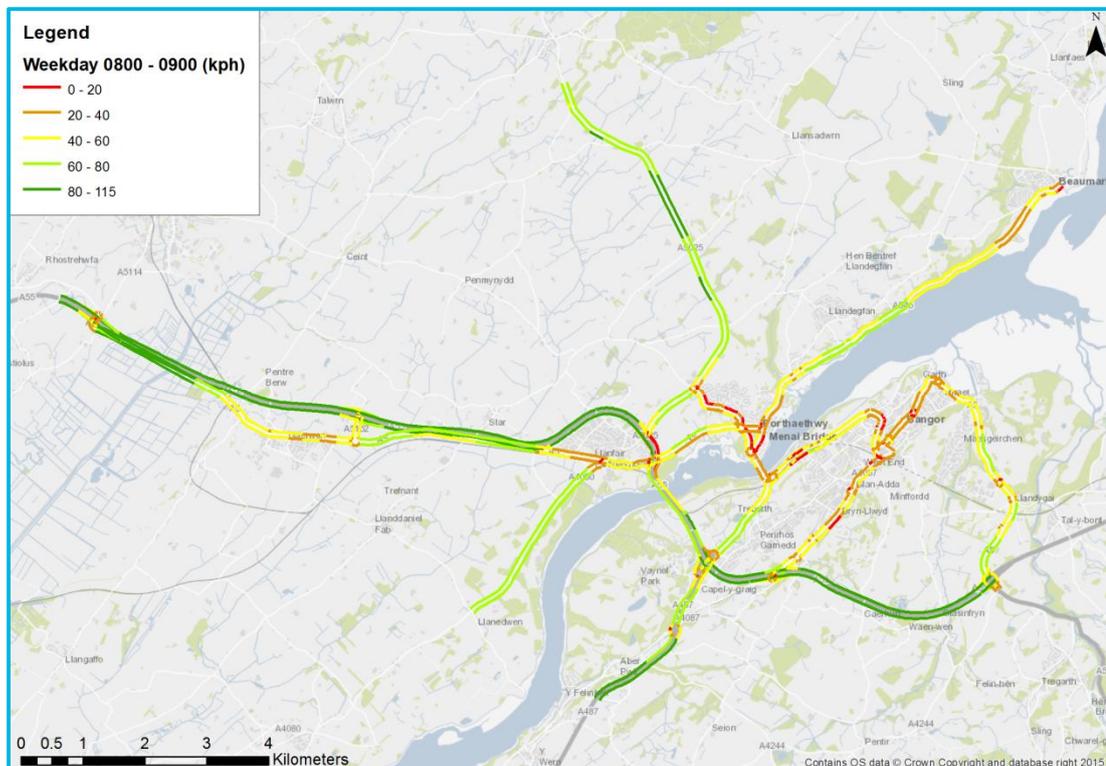


Figure 2.5 – Average weekday traffic speeds – 08:00 to 09:00

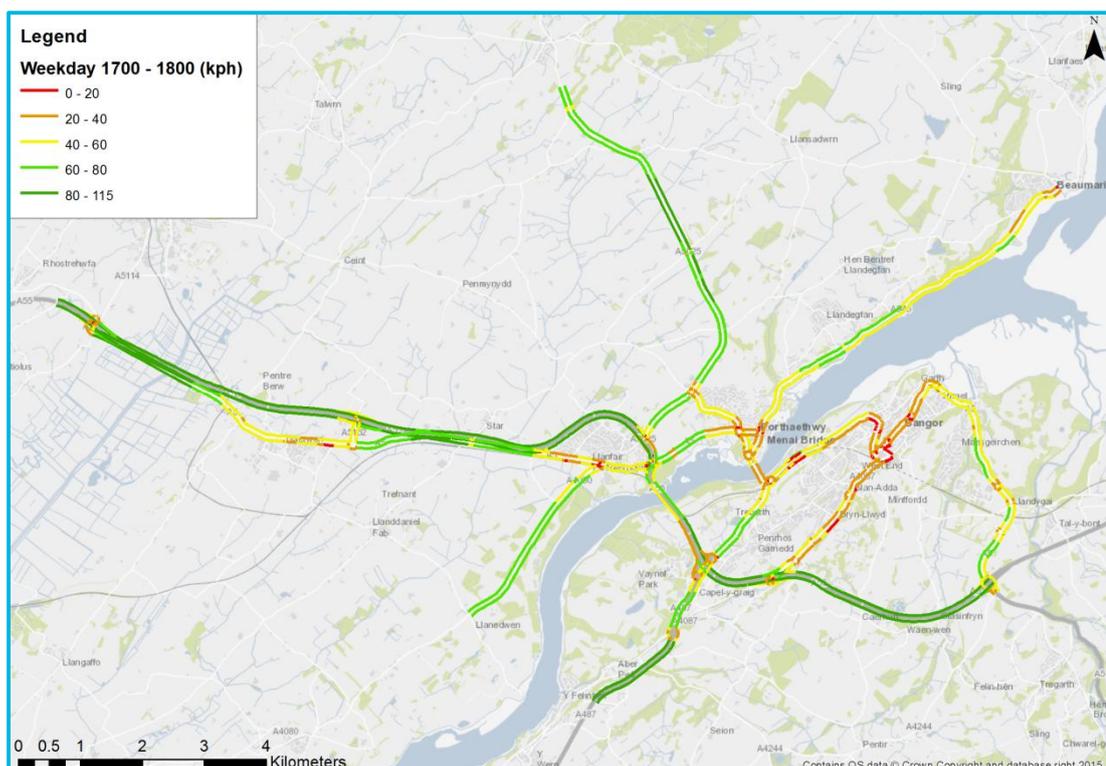


Figure 2.6 – Average weekday traffic speeds – 17:00 to 18:00

- 2.2.5** Larger delays are regularly experienced during incidents and holiday periods, when higher volumes of traffic are experienced. The largest delays observed were experienced in the eastbound direction during the holiday periods, with delays of 8 minutes observed on average during holiday Mondays between 12:00 and 13:00 and delays of over 2 minutes for westbound journeys undertaken on a holiday Friday between 16:00 and 17:00.
- 2.2.6** The Model Forecasting and Economics Report (Atkins, 2008) further identified that by 2027, journey times will increase by between 14 and 17 minutes between Junctions 7 and 10 (compared to 2012 equivalents).
- 2.2.7** Rat running has also been identified in previous studies as a consequence of congestion on the A55. In particular, Lon Refail in Llanfairpwllgwyngyll, which runs alongside the A55 between J8 and J8a sees significant levels of rat running in peak periods, which result in increased air pollution, noise and vibration levels for local residents. While local journey patterns, and the impact of congestion on the A55 on these is not fully understood, it is likely improvements to the Britannia Bridge will attract trips from the area surrounding the Menai Bridge, and would therefore reduce traffic on local roads in the vicinity of Bangor and the settlement of Menai Bridge.

Poor Network Resilience

- 2.2.8** Incidents such as bad weather and traffic accidents can also cause major disruption due to the lack of alternative routes. High winds can result in bans for high sided vehicles and the need to operate the bridge with reduced speed limits or close the bridge entirely, if wind speeds exceed 70mph. On average (for the period from April 2009 to December 2010) 93 weather related incidents occurred per year, with 1 total closure, 18 20mph hour restrictions and 74 30mph restrictions. Such events again contribute towards issues of congestion and poor journey time reliability, particularly on local networks.
- 2.2.9** A particular lack of resilience can also be seen during periods of maintenance. For example, painting of the A5 Menai Bridge structure between March and December 2005 added up to 6,000 vehicles a day onto the A55 Britannia Bridge, resulting in additional congestion.
- 2.2.10** The lack of enhanced safety facilities, such as hard shoulders, coupled with capacity and congestion at peak times, results in poor resilience with regards to emergency vehicles. Reliable and quick access to incidents either side of the Menai Strait can be deterred due to insufficient provision for emergency services.
- 2.2.11** Two current design issues have caused concerns with regards to road safety; the lack of a central reservation on the Britannia Bridge, and the close proximity of junctions either side of the Britannia Bridge to the merging sections from two to one lane. Both features increase the risk of a serious collision. Any such incident will also likely require the closure of the crossing while recovery and collision investigation is undertaken, resulting in widespread disruption.

Economic Growth Constraints

- 2.2.12** The closure of Anglesey Aluminium in 2009 and Wylfa Nuclear Power station in 2015 saw the loss of over 600 jobs, as well as a severe impact on associated service industries which supported these businesses. These closures highlight the importance of attracting new businesses to Anglesey.
- 2.2.13** Congestion, poor connectivity and lack of resilience all combine to make the Isle of Anglesey a less attractive destination for investment. Cumulatively these are limiting factors in the future growth potential of the area and are a potential threat to locking in the benefits of future proposals associated with the isle's enterprise zone and Nuclear

Power Station. Access, also limits the scope for the growth of Holyhead Port – a conduit of imports and exports to Ireland.

2.2.14

Anglesey hosts an Enterprise Zone (EZ), covering the entire island intended to support economic growth in the area. Within the zone, there is a desire to focus investment on eight key sites, deemed most suitable to meet the needs of business. A number of developments are planned for the Isle of Anglesey within the vicinity of the A55 (*Figure 2.7*) including the following:

Short Term (1 to 5 years)

- Land & Lakes leisure park and holiday resort, with 465 permanent jobs;
- Redevelopment of Penrhos heliport and former Mon training premises, providing up to 103 permanent jobs (Anglesey EZ Key Site 3);
- Holyhead Biomass Powerstation (299 MW) and Orthios Eco Park, creating 500 jobs on the former Anglesey Aluminium site; (now on site) (Anglesey EZ Key Site 1);
- Numerous plans for low carbon energy generation as part of the Anglesey Enterprise Zone with associated jobs (short, medium and long term);
- Parc Cybi, a 120 acre employment development near Holyhead (Anglesey EZ Key Site 2);

Medium Term (6 to 10 years)

- A new nuclear power station (Wylfa Newydd) and associated developments at the site of the closed Wylfa power station, encompassing Rhosgoch brownfield site, suitable for supporting development and supply chain firms (Anglesey EZ Key Site 8);
- Land & Lakes, 320 residential units;
- Proposed redevelopment and expansion of the Port of Holyhead (Anglesey EZ Key Site 4);
- Newry beach waterfront development including residential units, a hotel, marina and mixed use commercial space;
- Gaerwen Industrial Estate expansion, covering almost 16 hectares and providing an estimated 870 permanent jobs (Anglesey EZ Key Site 7);
- 200 new residential units at Gaerwen;
- Redevelopment of Welsh Country Foods site, covering 6.5 hectares and providing an estimated 360 permanent jobs; and

Long Term (11 to 15 years)

- Menai Science Park, providing 250 to 1,200 permanent jobs, in association with Bangor University.

Uncertain (no specific plans at present)

- Creamery Land / Land North of Lledwigan Farm, which has the potential to support 700 permanent jobs in B1, B2, or B8 uses, such as direct energy uses and development to support energy projects (Anglesey EZ Key Site 6); and
- Bryn Cefni Industrial Estate, which has the potential to support 533 permanent jobs in B1, B2, or B8 uses, such as direct energy uses and development to support energy projects (Anglesey EZ Key Site 5).

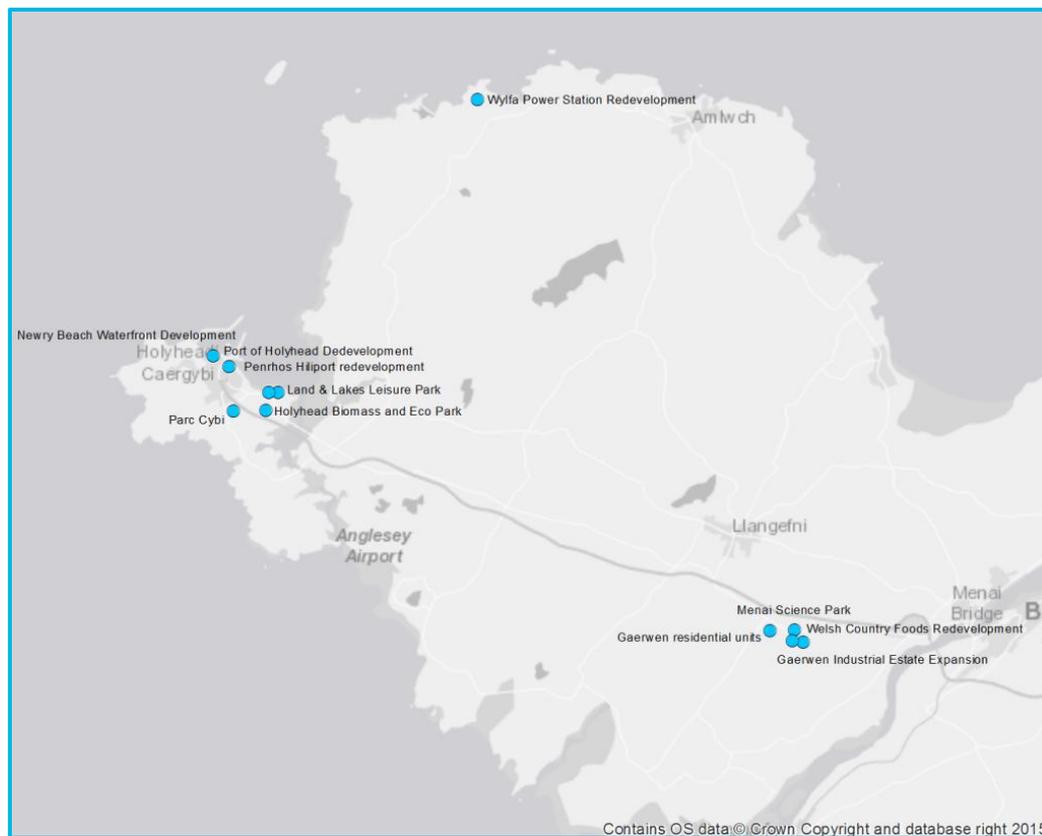


Figure 2.7 – Locations of Planned Developments

2.2.15 The unlocking of these proposals will be in part dependent upon securing good connections to the mainland. Without the creation of additional infrastructure capacity existing congestion and delays are likely to worsen. The strong recovery of the Irish economy since the last economic downturn has led to an increase in freight volumes travelling through the Port of Holyhead with the level of freight units now exceeding levels seen before the financial crisis level, with 361,000 trailers recorded in 2014 compared to 337,000 in 2007.

2.2.16 Future projections for the Port of Dublin indicate a doubling of volume between 2015 and 2032 to 62 million tonnes. The long run growth forecasts for the Irish economy (GNP) has been estimated to be in the region of 2.3% (real); using this as a proxy would imply a freight level (all other things being equal) of around 569,000 trailers by 2033, a 58% increase on current levels. The lack of any rail freight terminal facilities in Holyhead mean that this additional demand will all be focused on the road network, putting additional pressure on the A55 and the Britannia Bridge in particular.

Safety

2.2.17 The existing Britannia Bridge has no central reservation, which creates an increased risk of head on collisions. This is a particular concern due to the high volume of HGVs using this route. The close proximity of east bound on slip lane to the merging point on the main A55 carriageway merges (reduction from two lanes down to one), also creates a safety risk. In previous studies, accident data was obtained from 'Stats 19' road safety data, published by the Department for Transport¹. This data has since been updated to 2014; the latest available in this data set. A summary of collisions over the period 2005-2014 is illustrated in *Figure 2.8*.

¹ Available from <https://data.gov.uk/dataset/road-accidents-safety-data>, accessed 13th April.

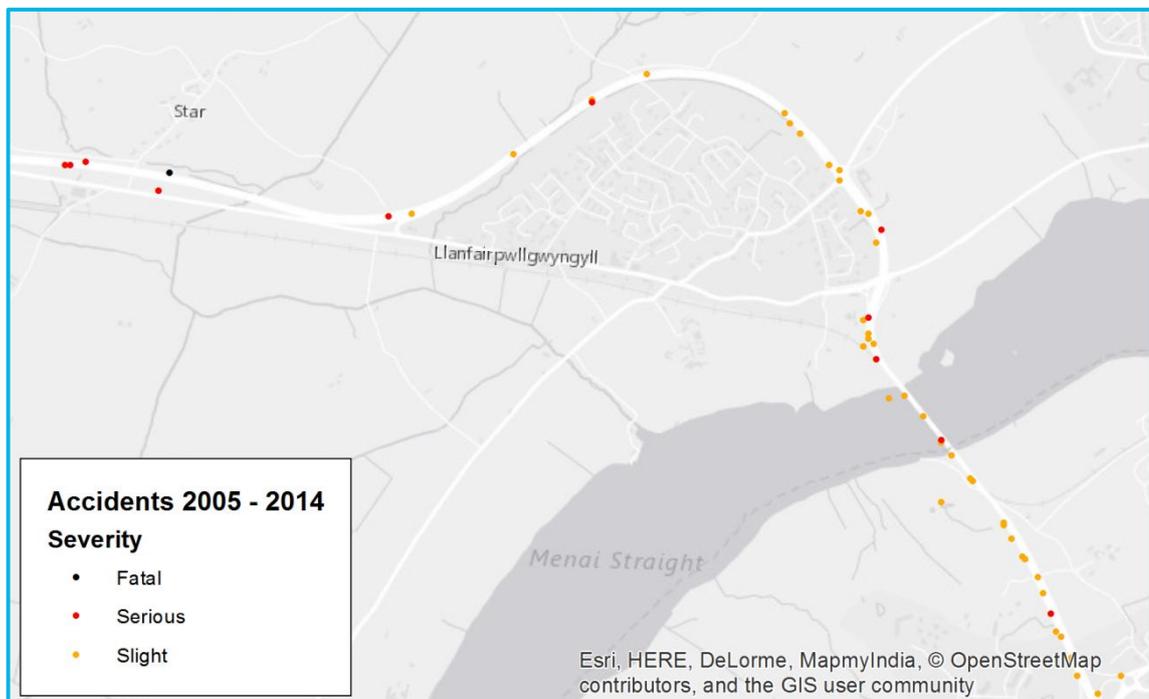


Figure 2.8 – Accident Location and Severity

2.2.18 This data was compiled in a similar way to previous analysis, to review any changes in accident rates or patterns. A summary of all accidents between J7a to J10 on the A55, which includes the Britannia Bridge, can be seen in *Table 2.1*.

Year	Total Injury Accidents	Severity			Weather					
		Fatal	Serious	Slight	Fine	Rain	Snow	Fine & High Wind	Rain & High Wind	Other
2005	7	-	-	7	5	0	-	1	1	-
2006	4	-	-	4	2	1	-	-	-	1
2007	7	-	-	7	6	1	-	-	-	-
2008	1	-	-	1	1	0	-	-	-	-
2009	7	-	2	5	7	0	-	-	-	-
2010	8	-	1	7	3	2	1	-	1	1
2011	6	-	2	4	5	1	-	-	-	-
2012	9	-	1	8	8	1	-	-	-	-
2013	3	-	1	2	3	-	-	-	-	-
2014	-	-	-	-	-	-	-	-	-	-
Total	52	-	7	45	40	6	1	1	2	2

Table 2.1 – Accident Data Summary

2.2.19 Over a 10 year period there have been 52 accidents on the A55 between J7a and J10, 13% of which were serious and 45 of which were slight. Almost a quarter of accidents (23%) occurred in abnormal weather conditions, although only one serious accident took place in 'Other' weather conditions, with the remaining 7 being under 'fine' conditions. Of the serious accidents, one took place on a slip road, and one took place during road works.

Public Transport, Cycling and Walking Demand

2.2.20 There are currently 7 regular bus services that cross the Menai Strait using the Menai

Bridge²:

- 4A, X4, 44 Bangor to Holyhead – approximately 2 per hour;
- 42 Bangor to Llangefni via Newborough – approximately 1 per hour;
- 43, 47 Bangor - Llanfair Pwllgwyngyll – approximately 2 per hour;
- 53, 56 Bangor to Llanddona – approximately 1 per hour;
- 57, 58 Bangor to Glanrafon – approximately 1 to 2 per hour; and
- 62 Bangor to Cemaes – approximately 2 per hour.
- 63 Bangor to Llannerch-y-medd – 5 per day.

2.2.21 In addition, there are two daily services that use the Britannia Bridge, X43 and 46, from Bangor to Talwrn and Caernarfon to Llangefni.

2.2.22 While there are limited buses using the Britannia Bridge that will benefit directly from a new bridge, there are a significant number of bus services that utilise the Menai Bridge. Any improvements to the A55 Britannia Bridge crossing will offer the potential for decongestion and reliability benefits for services running across the Menai Bridge.

2.2.23 The National Cycle Network (NCN) routes 5 and 8 currently cross the Menai Strait, as an on-road route, via the A5 Menai Bridge³. Cyclists are currently banned from the pavements of the A5 Menai Bridge, while there is no segregated facility on the A55 Britannia Bridge. Two signposted circular, mostly traffic free routes on Anglesey itself are widely promoted to tourists. A traffic free route across the Menai Strait would improve access to and from mainland Wales onto Anglesey. In particular, NCN8, which approaches Menai Bridge from the south west, would provide a 'mostly traffic free' route from Bryncir, east of Snowdonia National Park, via Caernarfon and Park Menai to Llanfairpwllgwyngyll.

2.2.24 Pedestrian and cyclist movements to and from the Isle of Anglesey are also currently restricted. The only means of crossing from the mainland onto Anglesey by foot is currently via the A5 Menai Bridge. Pedestrians are banned from Britannia Bridge because the footway terminates at each of the towers, which makes the route unsafe. Cyclists are not banned from using the main carriageway on both bridges, but signage prohibits the use of bicycles on the segregated footways of the Menai Bridge. Generally only experienced riders would consider using the live carriageway of either bridge, which are unappealing for cyclists due to narrow lanes or have high speeds and large proportions of large vehicles.

² Bus services and timetables derived from Bus Network Map and timetables, <http://www.anglesey.gov.uk/transport-and-roads/public-transport/bus-or-coach/local-bus-timetables>. Accessed 12th April 2016.

³ Available from <http://www.sustrans.org.uk/ncn/map>, accessed 12th April 2016.

Summary of Identified Problems

The identified problems can therefore be summarised as follows:

- Congestion at commuter peak periods over Britannia Bridge;
- Congestion during peak summer holiday periods over Britannia Bridge;
- Congestion affecting tourism and business development on Anglesey;
- Congestion due to regular waves of ferry traffic (particularly off the Island) from Holyhead with increasing impact on the freight and passengers at the Ferry Terminal as delays increase;
- Congestion and rat running through local communities as a result of congestion on the A55;
- Congestion anticipated to worsen on the A55 over the period up to 2027, acting as a future growth constraint (connectivity barrier to inward investment);
- Unreliable network performance of the E22 route connecting Ireland (via ferry services) to Wales, England and mainland Europe;
- Limited segregated provision for pedestrians and cyclists across the Menai;
- Poor resilience for all vehicles, especially emergency services – particularly during holiday and peak periods;
- Reliance on both the Britannia Bridge and Menai Bridge being fully operational;
- No alternative to Britannia Bridge for wide and high loads; and (abnormal loads);
- Regular need to close the bridge to high sided vehicles during high winds; and
- Safety concerns due to a lack of central reserve over the bridge and lane merges close to junctions.

Affected Populations

2.2.25 The target market for the proposed improvement includes the following key groups:

- Residents of the Isle of Anglesey County and Gwynedd County, including Bangor;
- Commuters travelling between Anglesey and the mainland for work;
- Existing and future businesses, including those related to the significant proposals at Wylfa Newydd nuclear power station and Anglesey EZ;
- Education, healthcare, shopping and leisure travellers;
- Tourists visiting North Wales, or travelling by ferry to Ireland;
- Haulage firms travelling between Ireland, Wales, the rest of Great Britain and mainland Europe; and
- The users and operators of ferry services between Holyhead and Dublin.

2.2.26 Anglesey has a resident population of 69,700 people (2011 census). Many of these people rely on the use of the existing bridges across the Menai Strait to access work, education, healthcare, retail and leisure facilities.

Tackling Social Exclusion

2.2.27 *Figure 2.9* shows the Welsh Index of Multiple Deprivation overall scores for super output areas in North Wales (2011 census). *Figure 2.10* highlights the levels of deprivation associated with access to services in North Wales. This demonstrates that a number of

areas of rural Anglesey suffer from a lack of access to essential services.

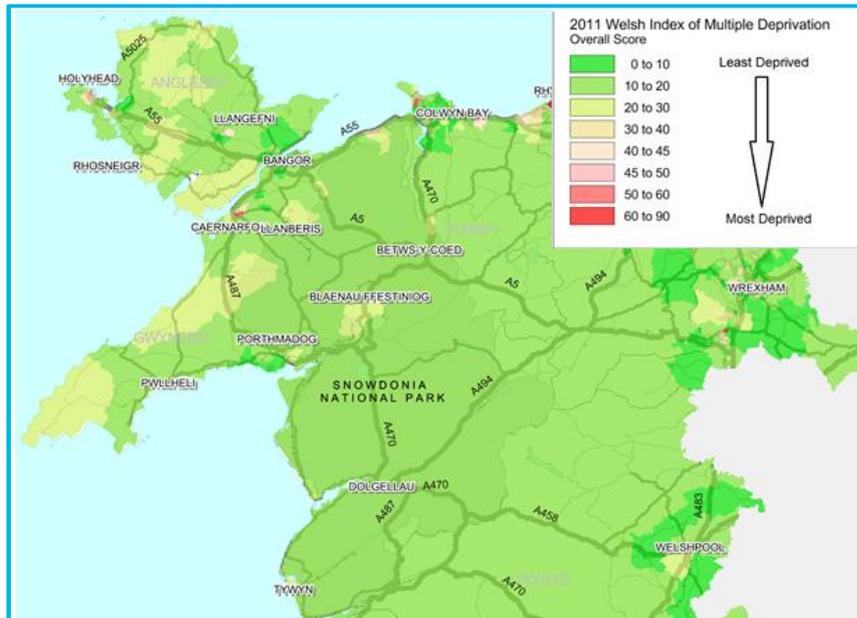


Figure 2.9 – Welsh Index of Multiple Deprivation 2011 – Overall Score

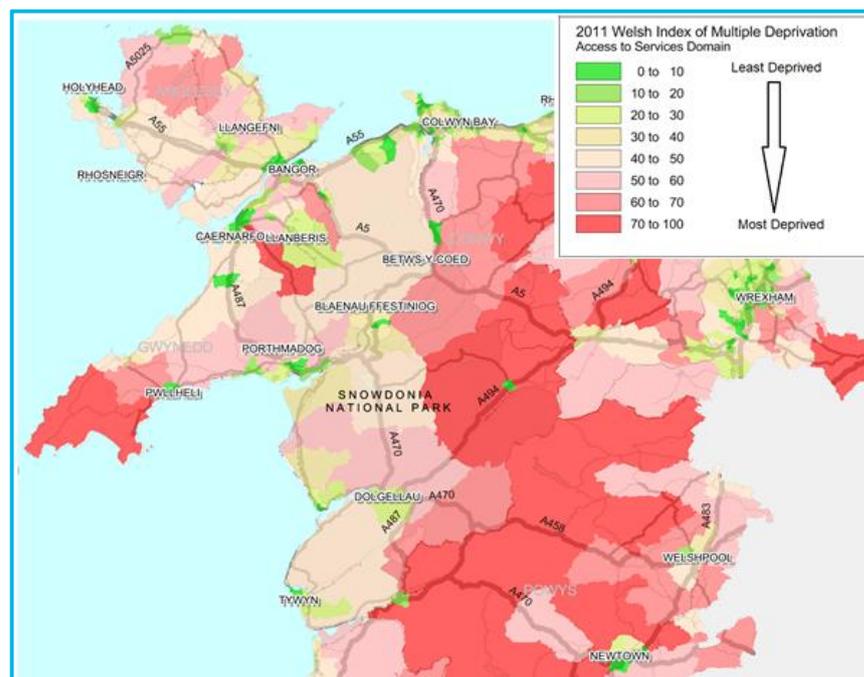


Figure 2.10 – Welsh Index of Multiple Deprivation 2011 – Access to Services

Travel to Work Characteristics

2.2.28

Figure 2.11, below, shows the breakdown of employee jobs for people living in Anglesey and Gwynedd. This shows that retail, health and accommodation and food services are key sectors of work for Anglesey residents, with the same sectors also important areas of employment for those living in Gwynedd. The education sector is a key employer in Gwynedd.

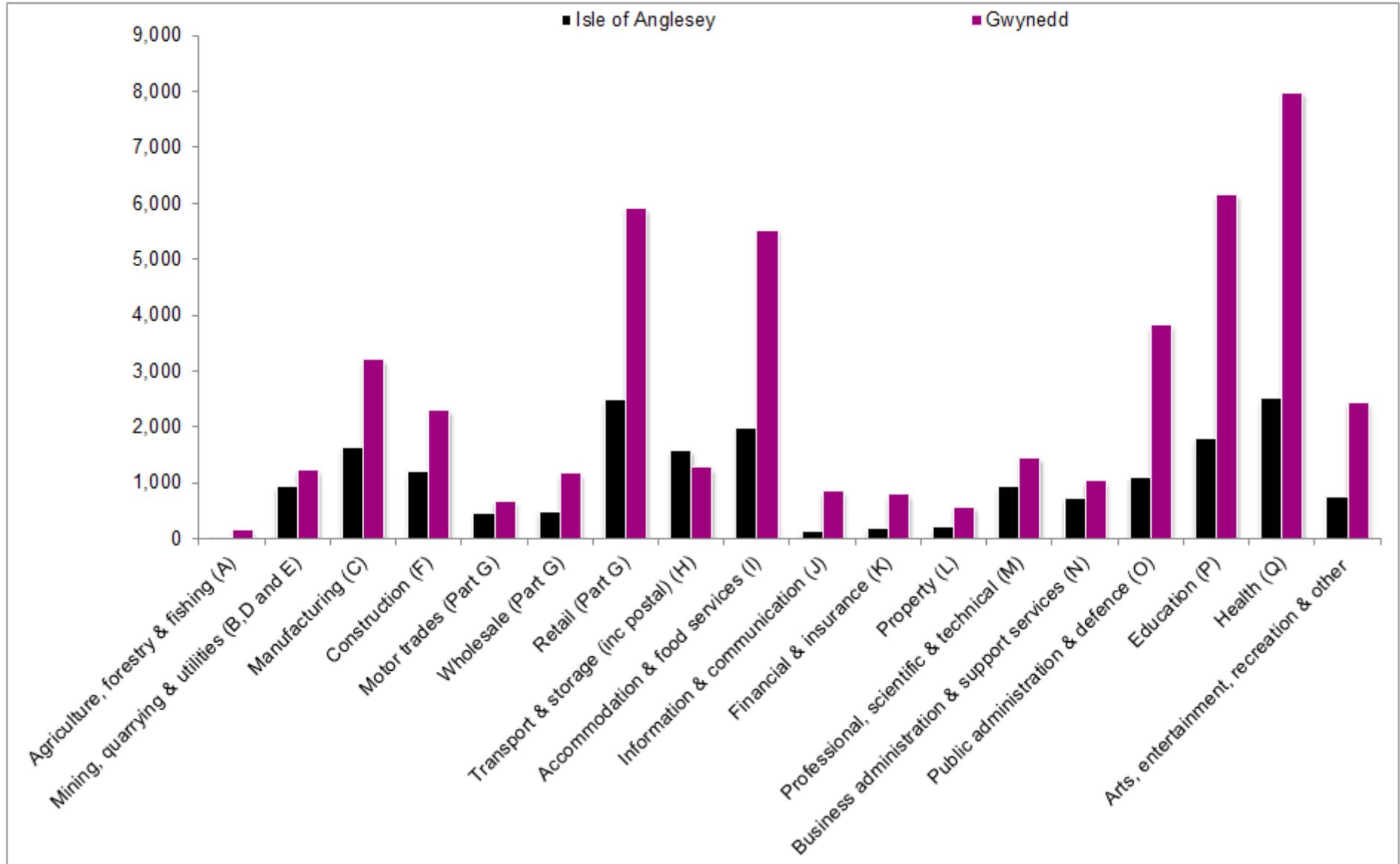


Figure 2.11 - 2011 BRES Employee Jobs

2.2.29

The 2011 Census Journey to Work data (*Figure 2.12*) indicates that 9,150 people commuted out of the Isle of Anglesey for work, with Gwynedd the primary destination for 6,616 of these people, travelling to employers at Bangor, Caernarfon and the Parc Menai Business Park, located just off the A55 at junction 9. A further 3,127 people travelled to the Isle of Anglesey for work from the rest of Wales and England. Additional detail is provided below for trips to and from the Isle of Anglesey and Gwynedd. Of the 12,277 people crossing the Menai Straits for work in both directions, 87% travelled by car, either as a driver or passenger, highlighting the importance of the existing road crossings of the straits for commuters.

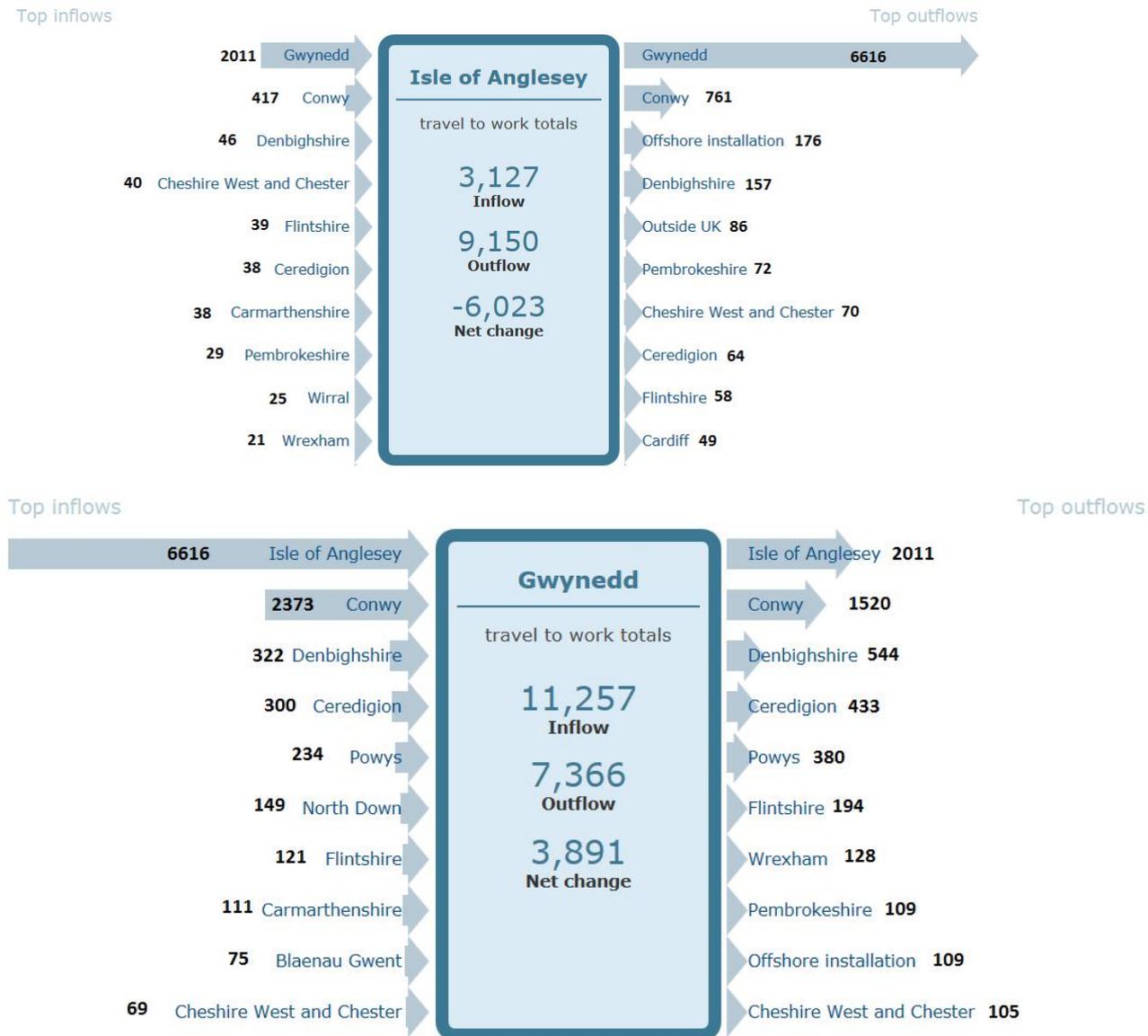


Figure 2.12 – 2011 Journey to Work Statistics

2.2.30

Figure 2.13 shows the home locations of people working in Holyhead. This highlights that Bangor, Caernarfon and Colwyn Bay are key home origins for people commuting to Holyhead. *Figure 2.14* shows the home locations of people commuting to Bangor and again highlights that a large volume of people travel across the Menai Strait from Anglesey to access work opportunities in Bangor. It does however further demonstrate the potential constraints that limited connectivity between Anglesey and the mainland has on employment catchments. Enhanced connectivity through faster and more

reliable transport connections may assist increasing access to labour markets for existing and future businesses located on Anglesey.

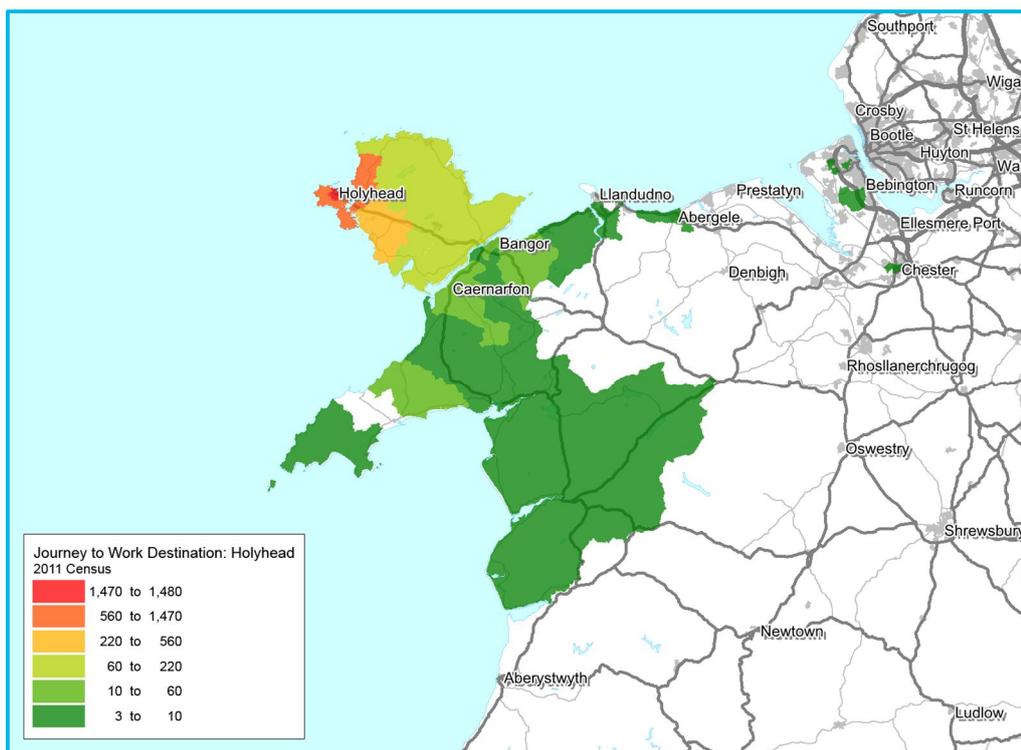


Figure 2.13 – 2011 Census – Home Origins of Workers at Holyhead

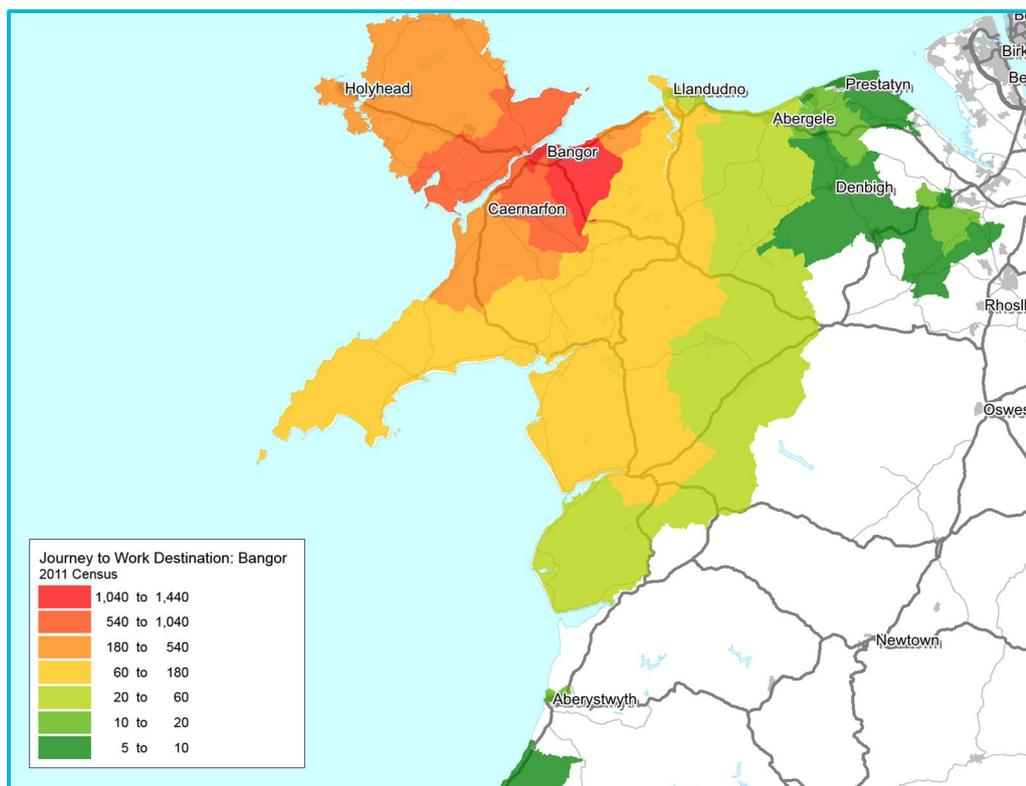


Figure 2.14 – 2011 Census – Home Origins of Workers at Bangor

2.2.31

Public consultation on the issues, opportunities and options for improving capacity across the Menai Straits was undertaken in 2007 at different locations in Gwynedd and Anglesey. This indicated that 94% of respondents wanted improvements to the road crossings, with 70% preferring a new bridge to the alternative options. Further details of the public consultation can be seen in *Section 2.6*.

2.2.32 A number of major employment centres are located on Anglesey including the Port of Holyhead and RAF Valley, as well as smaller industrial and business parks at Llangefni and Gaerwen. Parc Cybi is also a future major employment site near on the edge of Holyhead. Bangor University is a major trip generator in the area for education and work trips, with facilities located on both sides of the Menai Strait. Gwynedd Hospital in Bangor is also a major destination for health trips for people living on Anglesey. Outside of Holyhead, Anglesey is predominantly rural; therefore the population of the island is very reliant on facilities on the mainland in the nearby towns of Bangor and Caernarfon for healthcare, education, shopping and leisure trips.

2.2.33 Anglesey is a popular tourist destination, with local attractions including the Isle of Anglesey Area of Outstanding Natural Beauty (AONB), South Stack Lighthouse and RSPB Reserve, Anglesey Sea Zoo as well as a number of beaches, castles and golf courses.

Port Connectivity and Movement of Freight

2.2.34 Stena Line and Irish Ferries operate passenger and car services between Holyhead and Dublin, facilitating tourist trips to and from Ireland. Cruise liners also dock at the Port of Holyhead. The A55 provides convenient accessibility to these tourist destinations for people living in North Wales and the nearby major conurbations of Merseyside and Greater Manchester. Journey times and journey time reliability are key factors influencing decisions regarding the choice of tourist destinations and current congestion issues during the summer months could influence decisions to holiday elsewhere.

2.2.35 The Port of Holyhead has over 6,000 ferry movements per year and over 300 visits from bulk carriers, cruise liners, coasters and large fishing vessels. Over 2.5 million passengers, 500,000 cars and 360,000 freight units pass through the port on an annual basis. Countless numbers of small fishing vessels and leisure craft also call at the port.

2.2.36 As a key destination on the E22 route, the Port of Holyhead is also a key route for the transit of goods to and from Ireland and the rest of Europe. 35% (126,000) of the trailers that used the Port of Holyhead in 2014 originated or were destined for mainland Europe. Key exports from Ireland include pharmaceutical goods and food produce. The port is the second busiest ferry port in the United Kingdom with only Dover handling more cars and road goods vehicles each year. The Port of Holyhead accommodates over 70% of road vehicles passing through all Welsh Ports and managed over 2.8 million tonnes of cargo in 2009 including a wide variety of imports; general cargo, gas oil, metals, petroleum coke and aggregates. The Port Authority, its Ferry operators and users of these services are all heavily reliant on the effective operation of the A55 to ensure the efficient operation of the Port and its ferry services to avoid costly missed crossings and associated delays.

2.2.37 A North Wales freight review undertaken in March 2016 highlighted several key factors that should be considered. While the report focuses on rail freight, several key findings provide further detail on the market demand, and the needs of the freight industry in the area, and are as follows:

- Despite the Port of Holyhead being well placed with regards to connectivity to Ireland, hauliers consider Liverpool to be better connected to key transport routes, highlighting a weakness of Holyhead that could partially be rectified by a 3rd crossing of the Menai Strait;
- Delays in the summer are commonplace as a result of capacity of the existing crossings being exceeded. This results in unreliable journey times for road freight, especially pertinent as Holyhead is a desirable route for time-sensitive goods to and from Ireland;

- A recommendation was made for a new rail freight terminal to be built to serve the Port of Holyhead. However, this would require several upgrades to the current rail infrastructure in North Wales (detailed below);
- Stimulation of the market by increasing the attractiveness of the Port of Holyhead would be welcomed by freight operators; and
- The strong recovery of the Irish economy means the Port of Holyhead is well placed to capture additional growth, as it is the shortest central crossing to Ireland with a higher frequency of sailings than Liverpool.

2.2.38

Network Rail have identified several schemes in CP5 and CP6 as part of a scheme to modernise the signalling on the line from Holyhead to Chester which would also increase capacity and increase line speeds along the North Wales Coast Main Line. The Network Rail Wales Route Study (published 24th March 2016) has also highlighted the existing single line section across the Britannia Bridge as a major timetable constraint. If the utility services that are currently occupying the second track bed are relocated to a new crossing (either the proposed 3rd Menai crossing, or a stand-alone project), the reinstatement of a two track railway across the Britannia Bridge could be undertaken. Combined with re-signalling, this would enable an increased number of freight and passenger services to be run. This scheme would also support the wider business case for the electrification of the North Wales Coast Line which is (has) been submitted to the Department for Transport. In enabling additional passenger and freight trains to run as part of the proposed service specification for the line.

Experience from Elsewhere

2.2.39

The A249 Iwade to Queenborough Improvement was a new 3 mile dual carriageway connecting Sittingbourne with the Isle of Sheppey, including the replacement of a single carriageway bridge to a dual carriageway. Completed in 2006, two Post Opening Project Evaluations have now been completed, as part of Highway Agency reporting programme. A summary of the Five Years After opening evaluation⁴ is presented in the text box below.

Objectives

- Reduce journey times along the A249 to and from the Isle of Sheppey;
- Improve accessibility and reduce community severance for motorised, non-motorised and public transport users;
- To improve integration through improved public transport links and reinforce benefits for the 1996 Iwade to M2 scheme; and
- Promote regeneration and development.

Findings

- Traffic numbers have increased by 6% - lower than forecast, however this can be attributed to the impact of the economic downturn;
- Journey times and journey time reliability have improved considerably, although not as much as forecast, primarily due to the lower traffic numbers;
- Accidents have reduced by around 18%;
- Anecdotal evidence from stakeholder discussions show the scheme has been a success and is critical to support the economic growth aspirations of the Isle of

⁴ Available from [http://assets.highways.gov.uk/our-road-network/pope/major-schemes/A249%20Iwade%20-%20Queenborough%20Improvement%20\(DBFO\)/POPE_A249_Iwade_Queenborough_FYA_FINAL.pdf](http://assets.highways.gov.uk/our-road-network/pope/major-schemes/A249%20Iwade%20-%20Queenborough%20Improvement%20(DBFO)/POPE_A249_Iwade_Queenborough_FYA_FINAL.pdf), accessed 15th April.

Sheppey and North Kent; and

- Provision of a shared foot / cycle path has considerably improved conditions for pedestrians and cyclists.

2.2.40 There are some similarities in the objectives of the A429 improvement scheme and the proposed new crossing of the Menai Strait, particularly with reference to journey time and reliability benefits, promoting development and improving facilities for active modes. The evaluation of the scheme five years after opening shows clear benefits for pedestrians and cyclists, and a good opinion of the scheme in relation to economic benefit. Journey time benefits are less comparable as they are more reliant on local conditions, and increased journey time savings were expected on the A429 as the old bridge was lifted around 6 times a day to allow shipping movements.

Past Evidence of Barriers and Behaviour Change

2.2.41 The proposed scheme has been informed by a number of previous studies which provided evidence of the key constraints to connectivity along the A55 corridor:

- A 2006 study undertaken by the North Wales Trunk Road Agency looked at current and predicted traffic congestion and considered all options to provide additional capacity over the Britannia Bridge in order to resolve this issue as part of the study;
- A 2008 study which included extensive stakeholder liaison, traffic modelling, structural assessments, options development and assessment, including a WeITAG Planning stage assessment and public consultation. This concluded that a new bridge should be progressed to provide additional capacity; and
- A 2011 A55 Britannia Bridge Review study looked at traffic and accident data and considered the various solutions to the identified traffic problems. This reaffirmed the findings from previous studies that the need for and associated benefits of the project were undiminished.

2.2.42 A public consultation exercise undertaken in 2007 with over 1,000 respondents indicated that 94% of respondents wanted improvements to be made to the road crossing, with 70% preferring a new bridge. This indicates that there should be no behavioural change barriers to use of the new bridge.

2.2.43 A 2016 report into rail freight in North Wales discussed above found there is no feasibility for a shift from road to rail freight in the short term, due to a lack of rail facilities at the Port of Holyhead, and technical constraints associated with the load gauge and maximum train length. This demonstrates it would be unrealistic to expect the travel behaviours and patterns of freight operations to change significantly in the short term.

2.2.44 It has been proposed to improve public transport options across the Menai Strait to reduce peak demand for private vehicles and the resultant congestion. However, the 2008 Summary Options Report noted there was not enough demand for a high quality public transport link such as a tram, and Park and Ride had previously been found to not be feasible by Gwynedd County Council.

SWOT Analysis

2.2.45 To understand the market demand and rationale for the scheme, it is important to understand existing transport conditions and future opportunities for transport infrastructure. The provision of a 3rd Menai crossing should facilitate the overcoming of the existing issues outlined above, in addition to supporting longer term sustainable economic growth on Anglesey. SWOT analysis is an analytical method which is used to

identify and categorise significant internal (Strengths and Weaknesses) and external (Opportunities and Threats) factors faced in the area.

2.2.46

The SWOT analysis provides the context for the scheme and why it is required. It highlights a number of weaknesses with the existing transport infrastructure along the route, and associated threats to delivery. However, the delivery of the improvements will overcome a number of weaknesses in relation to growth and accessibility. In addition, a well-managed procurement exercise and delivery phase, allied with a robust monitoring process will ensure that any threats associated with the delivery of the scheme can be mitigated or removed. The following SWOT analysis summary provides an insight into the findings.

		EXTERNAL			
		<ul style="list-style-type: none"> Strong public and institutional support for improvements; Significant levels of forecast growth in terms of economic and residential development on the Isle of Anglesey; and Prime geographic location for the Port of Holyhead in terms of proximity to Ireland. 	<ul style="list-style-type: none"> Distance from English SRN and major populations diminishes the attractiveness of Anglesey for investment and the Port of Holyhead; High levels of road congestion on the local and strategic network discourages investment; Low use of cycling and walking for local journeys; Poor resilience of the road network across the Menai Strait; and Substandard level of provision compared to remainder of A55. 		
		S	W		
		O	T		
P O S I T I V E	<ul style="list-style-type: none"> Relieve congestion at a significant weak link on the A55 / E22; Improve journey time reliability; Accessibility and connectivity improvements for all modes, especially emergency services; Enhanced facilities for pedestrians and cyclists for safe mobility and tie ins into existing national walking and cycling routes; New inward investment could result from improved local connectivity and reduced congestion; Support of the Anglesey EZ; Assists in facilitating the aspirations of the Nuclear Power Programme; Provide improved resilience and capacity for National Grid; and Opportunity for rail enhancements on the Britannia Bridge. 	<ul style="list-style-type: none"> Attractiveness of alternate gateway ports to Ireland may reduce demand for the Port of Holyhead; Failure to invest adequately will cause a decline in network availability and reduce the attractiveness for inward investment; Failure to provide effective connectivity in the area and to national and international networks limits contributions to productivity and economic recovery; and Timescales for the 3rd Menai Crossing do not align with delivery timescales of National Grid capacity enhancements. 			N E G A T I V E
			INTERNAL		

2.3 Scope

2.3.1 The proposed scheme will see a new highway crossing of the Menai Strait which will effectively double the capacity of the A55 (Figure 2.15).



Figure 2.15 – Location of Proposed Scheme

2.3.2 The new bridge (located immediately adjacent to the west or east of the existing Britannia Bridge) will provide two lanes in each direction, potentially with an additional hard shoulder on a new westbound carriageway. The new bridge will tie into the existing A55 crossing where two lanes currently filter into one, currently to the south of J8a (on Isle of Anglesey County), and to the north of J9, in Gwynedd County. This means minimal junction re-modelling will be required to accommodate the new crossing. It is anticipated the new bridge will have segregated facilities for pedestrians and cyclists, as these are not currently provided on the existing Britannia Bridge.

2.3.3 Specific details relating to the bridge design are still under consideration; however feedback from stakeholder and public engagement, as well as fit to transport policy and the scheme objectives has informed the scope. The options assessment work undertaken in 2011 assumes the following level of service specification will be delivered as part of the scheme:

- A cross section of 15.85m between bridge parapets, comprised of:
 - 2.75m non-motorised users route;
 - 0.3m pedestrian barrier;
 - 0.6m set-back to the barrier to the carriageway; and
 - 11.6m carriageway consisting of two 3.65m lanes, a 3.3m hard shoulder on the nearside and a 1.0m hard strip on the offside.

2.3.4 Work to date has progressed towards the shortlisting of four key options, which have

been costed by Corderoy in 2015:

- New Multi Span viaduct 10m north east of the existing bridge;
- New Multi Span viaduct 10m west of the existing bridge;
- New Cable stayed bridge more than 10m to the north east of the existing bridge; and
- New Cable stayed bridge 10m to the west of the existing bridge.

2.3.5 Further context regarding how the above options were derived and assessed is provided later in this section.

2.4 Objectives

2.4.1 Following on from the problems identified with regards to the existing crossings of the Menai Strait, a key aim of the project is to provide additional network capacity for both local and strategic movements. This increased network capacity would lead to improved journey times along the A55 during peak periods and improved journey time reliability. The additional crossing will also improve the resilience of the network to events such as scheduled maintenance and emergencies, such as accidents or the impacts of bad weather. The project would also aim to ensure no negative road safety impacts are created as a result of the scheme while also improving the safety of the crossing.

2.4.2 The scheme will also aim to provide a segregated link for pedestrians and cyclists to improve accessibility between the counties of the Isle of Anglesey and Gwynedd for active modes.

2.4.3 In order to assess the options in accordance with the WeITAG guidance and building on the problems identified, a set of proposed Transport Planning Objectives (TPOs) have been identified. WeITAG states that TPOs should focus on the outcomes to be achieved, be specific, relate directly to the identified problems and opportunities, be sufficiently detailed to enable the comparative assessment of options and that it should be possible to test their success in a consistent manner. Building on earlier proposals, the TPOs for the 3rd Menai Crossing are as follows:

- **TPO1: To improve journey times** between Junctions 7 and 10 of the A55 during the peak periods, and to maintain improved levels of journey time when compared to the traffic forecast until 2027 (the current design year);
- **TPO2: To improve journey time reliability** between Junctions 7 and 10 of the A55, as measured by the standard deviation from the mean;
- **TPO3: To improve network resilience** and reduce reliance on the use of the Menai Bridge as an alternative route during maintenance or emergencies, by ensuring that at least two lanes of traffic are available to cross the Menai Straits at all times in each direction;
- **TPO4: To improve accessibility for non-motorised users** crossing the Menai Strait through the provision of additional walking and cycling links. These should facilitate access to existing long distance routes includes the Lon Ias Cymru (North) cycle route, which passes the A55 at junction 8 and 9, and crosses the Menai Strait on the Menai Bridge; and
- **TPO5: To promote road safety** by ensuring that the number of personal injury accidents for vehicle trips crossing the Menai Strait, and their severity ratio, do not increase.

2.4.4 At the next stage in the Business Case process, and as part of the development of a Monitoring and Evaluation framework for the project, a series of targets will be set for

each of these TPOs. These will be Specific, Measurable, Realistic, Achievable and Time-bound (SMART), ensuring a verifiable route to measuring the success of the scheme has been made. *Table 2.2* below outlines how the key problems identified in *Section 2.3* align with the TPOs outlined.

Problem	To improve journey times	To improve journey time reliability	To improve network resilience	To improve accessibility for active modes	To promote road safety
Congestion at commuter peak periods over Britannia Bridge	ü	ü	ü		
Congestion during peak summer holiday periods over Britannia Bridge	ü	ü	ü		
Congestion affecting tourism and business development on Anglesey	ü	ü	ü		
Congestion due to irregular waves of ferry traffic to and from Holyhead	ü	ü	ü		
Poor performance of the E22, part of the TEN-T	ü	ü			
Lack of any pedestrian and segregated cycle route across Britannia Bridge resulting in severance				ü	ü
Poor resilience for all vehicles, especially emergency services			ü		
Reliance on both the Britannia Bridge and Menai Bridge being fully operational			ü		
No alternative to Britannia Bridge for wide loads			ü		
Need to close the bridge to high sided vehicles during high winds			ü		ü
Close spacing of the junctions and the impacts of the merging traffic either side of the Britannia Bridge					ü
Safety concerns due to a lack of central reserve over the bridge and merging traffic close to junctions					ü

Table 2.2 – Alignment of Key Problems Identified and Proposed TPOs

2.4.5

A high level review of the dependencies, constraints and risks was undertaken to analyse if there were any significant barriers to achieving the TPOs. The main items are summarised in *Table 2.3*. This was completed using RAG analysis, which is as follows:

- **Red – Critical** – the identified dependencies, constraints or risk is highly significant, and may fundamentally undermine the overall business case during Key Stage 2;
- **Amber – Important** – the identified dependencies, constraints or risk is of concern however mitigation of it will provide a higher degree of confidence when moving forward to Key Stage 2; and
- **Green – Routine** – the identified dependencies, constraints or risk is not of significant concern, but may be useful to give due regard to appropriate mitigation during Key Stage 2.

Dependency / Constraint / Risk	RAG Status	Mitigation
C: Existing National Grid crossing reduces options for crossing location	Orange	Consultation and effective planning with National Grid will ensure the line to the Isle of Anglesey is not at risk. Opportunity for National Grid to contribute funding in return for accommodating a new link.
C: Significant environmental constraints	Orange	The risk of landscape and water impacts have been clearly identified during previous work, with preferred options identified to minimise environmental constraints. It is understood that there is a geological fault line through the Menai Strait, the activity of which is unknown. Further consideration and mitigation of these constraints will be undertaken as part of the design process.
R: Demand for freight accessing Port of Holyhead declines	Green	Benefits will still be realised through other economic developments and congestion relief in peak times for non-HGVs.
R: Currently proposed developments on Anglesey do not go ahead	Orange	The improved connectivity provided by the bridge would encourage further development to come forward.
R: Traditional journey time benefits are not significant enough to provide an attractive BCR	Orange	Give appropriate consideration to wider economic impacts (unlocking development potential)/ update modelling and economic forecasts prepared in previous Atkins studies. The latter are significantly out of date.

Table 2.3 – RAG Analysis of Risk

2.4.6 It can be seen that while there are some areas of concern, effective and early mitigation should not prevent the scheme from progressing into Key Stage 2.

2.5 Strategic Fit

National Policy Fit

2.5.1 The Welsh Government is responsible for the proposed scheme. The government has a devolved responsibility for a number of policy areas for Wales, including of particular relevance to this project; transport, planning, and economic development. The 2008 Wales Transport Strategy⁵ outlines the strategic aims of the Welsh Government in relation to transport.

2.5.2 The long term outcomes with regards to ambitions for social, economic and environmental agendas of the strategy are as follows in *Table 2.4*. Strategic priorities are also detailed as follows.

Social Objectives	Economic Objectives	Environmental Objectives
<ul style="list-style-type: none"> • Improve access to healthcare • Improve access to education, training and lifelong learning • Improve access to shopping and leisure facilities • Encourage healthy lifestyles • Improve the actual and perceived safety of travel 	<ul style="list-style-type: none"> • Improve access to employment opportunities • Improve connectivity within Wales and internationally • Improve the efficient, reliable and sustainable movement of people • Improve the efficient, reliable and sustainable movement of freight • Improve access to visitor attractions 	<ul style="list-style-type: none"> • Increase the use of more sustainable materials • Reduce the contribution of transport to greenhouse gas emissions • Adapt to the impacts of climate change • Reduce the contribution of transport to air pollution and other harmful emissions • Improve the impact of transport on the local environment • Improve the impact of transport on our heritage • Improve the impact of transport on biodiversity

Table 2.4 – Strategic Objectives of Wales Transport Strategy

2.5.3 These strategic objectives have been shaped by five key areas where the Assembly Government says that substantial progress needs to be made, and are as follows;

⁵ Available from <http://gov.wales/docs/det/publications/140909-transport-strategy-en.pdf>. Accessed 14th March 2016.

- Increasing safety and security;
- Reducing greenhouse gas emissions and other environmental impacts from transport;
- Integrating local transport;
- Improving access between key settlements and sites; and
- Enhancing international connectivity.

2.5.4

Table 2.5 below outlines how the proposed project objectives fit with these wider objectives, indicating how the project will contribute to the wider transport objectives of the Welsh Government. As shown within this table, all objectives of the project will contribute towards the ambitions of the strategy outlined above. Although not an explicit objective of the project at the detailed design stage consideration will be given to the use of sustainable materials as part of the bridge design.

2008 Wales Transport Strategy Outcomes	TPO1: To improve journey times	TPO2: To improve journey time reliability	TPO3: To improve network resilience	TPO4: To improve accessibility for non-motorised users	TPO5: To promote road safety
Social Outcomes					
Improve access to healthcare	ü	ü	ü	ü	
Improve access to education, training and lifelong learning	ü	ü	ü	ü	
Improve access to shopping and leisure facilities	ü	ü	ü	ü	
Encourage healthy lifestyles		ü	ü	ü	
Improve the actual; and perceived safety of travel				ü	ü
Economic Outcomes					
Improve access to employment opportunities	ü	ü	ü	ü	
Improve connectivity within Wales and internationally	ü	ü	ü		
Improve the efficient, reliable and sustainable movement of people	ü	ü	ü		
Improve the efficient, reliable and sustainable movement of freight	ü	ü	ü		
Improve access to visitor attractions	ü	ü	ü		
Environmental Outcomes					
Increase the use of more sustainable materials					
Reduce the contribution of transport to greenhouse gas emissions		ü		ü	
Adapt to the impacts of climate change		ü		ü	
Reduce the contribution of transport to air pollution and other harmful emissions		ü		ü	
Improve the impact of transport on the local environment		ü		ü	
Improve the impact of transport on our heritage			ü	ü	
Improve the impact of transport on biodiversity		ü		ü	
Strategic priorities					
Reducing greenhouse gas emissions and other environmental impacts from transport				ü	
Integrating local transport					
Improving access between key settlements and sites	ü	ü	ü	ü	
Enhancing international connectivity	ü	ü	ü		
Increasing safety and security			ü		ü

Table 2.5 – Alignment of Wales Transport Strategy Outcomes and Proposed TPOs

Local Policy Fit

2.5.5 The local authorities in North Wales; Conwy, Denbighshire, Flintshire, Gwynedd, Anglesey and Wrexham, have produced a Joint Local Transport Plan for the period from 2015 to 2020, published in January 2015⁶. This identified the A55 corridor as being of key importance to the region as a catalyst for wider economic growth. Improving the A55 corridor to increase resilience was specifically identified as a key strategic high level transport intervention for action. Working with the Welsh Government the local authorities saw improvements to the strategic corridor including the Menai Crossings as a medium to long term aspiration.

2.5.6 In addition to specific aspirations for a 3rd Menai Crossing, strategic regional priorities have been set. Key priorities are as follows:

- Efficiently meeting North Wales' diverse transport needs - Providing a transport network for north Wales that recognises the geographic and social diversity of the region, making best use of the available resources to give efficient movement of both people and freight;
- Passenger transport profile and performance - Raising the profile and performance of public transport services in North Wales within an integrated system including trains, high quality fast interurban bus and coach services, improved local bus networks and an appropriate mix of services involving smaller vehicles for rural areas;
- Reducing congestion and journey times - Resolving congestion and highway access issues;
- Supporting development - Supporting the development of towns and other key centres to increase their economic viability and to promote sustainable development and environmental improvement;
- Safe, efficient, sustainable transport networks - Maintaining safe, efficient, more sustainable transport networks;
- Improving rail services for North Wales - Seeking improvements to all North Wales rail passenger services and facilities;
- Environmentally-friendly and efficient freight movement - Implementing road, rail and terminal improvements in conjunction with national and regional agencies and companies;
- Smart traffic planning and management - Establishing an integrated North Wales traffic monitoring, information and control network and seeking to promote more sustainable travel behaviour through travel planning and better education in efficient travel choices and driving techniques; and
- Sustainable transport - Increasing current levels of cycling and walking by residents and visitors.

2.5.7 The proposed scheme will meet at least four of these objectives, through reduced journey times, supporting economic development on the Isle of Anglesey, improving safety on the crossing for vehicles as well as pedestrians and cyclists, and increasing sustainable active transport through provision of segregated facilities.

Contribution to Key Objectives

2.5.8 The National Transport Finance Plan, published in 2015, contains two schemes relating to the A55 Menai Crossing which are to be taken forward in the plan period from 2015 to 2020:

⁶ Available from <http://www.taith.gov.uk/publications/>. Accessed 14th March 2016.

- R27c A55 Menai Crossing – Maintenance and operation of the Trunk and Motorway Network; and
- R19 Improvements to the A55 Crossing of the Menai.

2.5.9

R27c was undertaken by the Welsh Government in 2015 and included assessment of whether it was feasible to provide three lanes on the existing Britannia Bridge, as a lower cost option than providing a new crossing. The study concluded that the three lane tidal flow option was considered but discarded as it did not meet the required safety standards. In addition, there were no low cost solutions which could address the congestion problems and the Transport Minister confirmed in November 2015 that Welsh Government would proceed with preparation of a business case to confirm the need for introducing a third crossing of the Menai Strait (R19). Welsh Government confirmed in March 2016 that business case development had commenced, highlighting that the existing Britannia Bridge is the only single carriageway section of the Trans European Road Network route E22 and acts as a significant bottleneck to commuter and holiday traffic.

Other Priorities and Initiatives

2.5.10

The project aligns with a number of other Welsh Government priorities and initiatives:

- The current Freight Task and Finish Group set up to advise the Minister for Economy, Science and Transport on issues affecting freight transport made a recommendation that “The Welsh Government delivers as quickly as possible all commitments it has made to improve and enhancing the A55 expressway in North Wales”;
- In 2011 Anglesey was given Enterprise Zone status to complement the existing Energy Island Programme and bring additional high skilled jobs within the energy sector to the island. A number of key sites for investment have been identified, however the provision of a third crossing is considered by the Anglesey Enterprise Zone Board to be a key priority in facilitating this planned development; and
- The A55 is a part of the TEN-T network and hence the European Union TEN-T policy applies to this corridor, which seeks to remove bottlenecks and promote and strengthen seamless transport chains for passengers and freight.

2.5.11

A Ministerial Task Force on North Wales Transport was established in 2013 to provide advice about transport connectivity in North Wales. A final report was published in December 2014, and made recommendations on how to improve transport connectivity. Responses have now been made by the Minister for Economy, Science and Transport, accepting all of the proposals. The full report and response can be seen in *Appendix D*. A summary of the recommendations that are relevant, or specifically reference the 3rd Menai Crossing are shown *Table 2.6* below.

Ref	Recommendation Details	Relevance to 3 rd Menai Crossing	Response from Minister for Economy, Science and Transport
A1	The Task Force highlights the importance of an investment forward programme of infrastructure for North Wales that not only improves connectivity but supports local business to retain and grow jobs through a seamless flow of schemes that mitigates peaks and troughs in workload.	The scheme will enable the strategic trunk road network to provide better connectivity, supporting planned development and tourism on the Isle of Anglesey. Connectivity to Enterprise Zones will be enhanced. Additional resilience will be provided. Congestion on the A55 was highlighted as a significant issue, as was lack of resilience.	Accept. Priorities published in the National Transport Plan 2015 include ‘improvements to the A55 crossing of the Menai’.

Ref	Recommendation Details	Relevance to 3 rd Menai Crossing	Response from Minister for Economy, Science and Transport
A2	The Task Force recommends that the responsible bodies adopt the Strategic Transport Interventions set out in Appendix A2 as the priorities for transport improvement in North Wales.	Appendix A2 makes specific reference to capacity enhancements / pinchpoint improvements on the A55, and that improvements to the A55 corridor are required to increase resilience.	Accept in principle. A list of 'possible Strategic High Level transport Interventions' identified at appendix A2 are welcomed.
A3	The Task Force supports the existing commitments made by the Minister and noted in the report at Appendix A3. The Task Force recommends that where the commitment only extends to an initial study that the project should be taken through to delivery, subject to a viable business case.	A study into a scheme at the A55 Britannia Bridge is a committed project (this report).	Accept in principle. Schemes will be taken through to delivery subject to consideration of a viable business case.
A4	The Task Force has identified a prioritised list of infrastructure projects to support the North Wales economy, which are set out in Appendix A4, which should inform the development of future investment priorities.	A new crossing across the Menai Strait was identified as priority 5, with an implementation timescale of 5-10 years. Priority is likely to remain the same or increase due to short term measures found to be unsuitable (see <i>Section 2.9</i>)	Accept in principle. A list of 'further priority transport connectivity projects' identified at appendix A4 are welcomed. Projects detailed in the National Transport Plan 2015 (including the A55 Menai Crossing) highlight priorities.
A5	A number of the identified interventions in the report are projects for local delivery that are expected to be contained in the emerging Local Transport Plans and should inform investment priorities for local transport schemes.	See A4. The North Wales Joint Local Transport Plan, published in January 2015 specifically highlighted improvements to the A55 corridor as a key strategic high level transport intervention for action.	Accept in principle. Local authorities are required to identify their priorities for transport in their area their Local Transport Plans under the Transport Wales Act 2000.
A6	The Task Force has identified the importance of additional resilience and capacity on the key strategic networks and corridors in the region which should inform the prioritisation of infrastructure resilience investments and Task Force members would welcome the opportunity to engage in the prioritisation of improvements.	See A4. The proposed scheme will provide additional capacity and resilience for the A55.	Accept. Projects detailed in the National Transport Plan 2015 (including the A55 Menai Crossing) highlight commitment to undertaken further work to inform investment.
A7	The Task Force has identified the importance of infrastructure that supports the successful development of key transformational projects, access to employment sites and strategic employment zones. These include improving the Menai Crossing.	See A4. The recommendation specifically mentions improvements to the Menai Crossing, as it will support development proposals on the Isle of Anglesey.	Accept. Projects detailed in the National Transport Plan 2015 (including the A55 Menai Crossing) contain interventions to support delivery of key transformational projects.
A8	The Task Force recognises that improving access to employment sites and to services, particularly by non-car modes, is important to support the economy and jobs and reduce poverty. Interventions to increase accessibility, particularly for disadvantaged communities are set out in Appendix A4 and should inform future investment priorities.	See A4. The proposed crossing includes provision for a segregated facility for active modes.	Accept in principle. A list of 'further priority transport connectivity projects' identified at appendix A4 are welcomed. Projects detailed in the National Transport Plan 2015 (including the A55 Menai Crossing) highlight priorities for investment that improve access to employment and key services through active travel.

Table 2.6 – Relevance of North Wales Taskforce Recommendations to Scheme

2.5.12

It is clear that there is substantial high level support for this scheme as it is identified as a key priority across several policy documents.

2.6 Internal and External drivers for change

2.6.1 The Welsh Government is currently in discussions with Horizon Nuclear Power regarding wider strategic improvements, which could provide a lasting legacy for the communities on Anglesey and the wider area. A new Menai crossing is seen as a potential part of this strategy through providing improved connectivity for residents, businesses and tourists.

2.6.2 The following external drivers in support of the scheme have been identified:

- The EU Core TEN-T network is a network of key routes through Europe which promote connectivity between EU member states. EU policy is to promote ways to improve these routes to facilitate improved connectivity between member states. The A55 is part of the TEN-T road network and therefore a European Priority. This is in recognition of the strategic importance of the route in connecting Ireland, Wales, England and mainland Europe. The efficient operation of this route is therefore of importance to a large number of businesses both locally, nationally and internationally;
- The National Grid is committed to providing additional electricity capacity and supply across the Menai Strait. This will require the construction of a new structure and presents a potential opportunity to coordinate resources;
- The North Wales Economic Ambition Board has identified enhancements to the A55, as a TEN-T route, as well as access to and from this route as a regional priority in promoting economic growth in North Wales, providing improved access and connectivity to regional employment sites;
- The Network Rail Wales Route Study has identified the single line section of the North Wales Coast Main Line as a key constraint on increasing capacity and linespeeds on this route as well as the future potential for electrification of the line. The relocation of utilities located on the second track bed of the existing bridge to a new bridge could facilitate the reinstatement of a two track railway across the existing Britannia Bridge; and
- The National Assembly for Wales Enterprise and Business Committee undertook an inquiry into developing the potential of the maritime economy including consideration of the future of the Port of Holyhead. This considered how Welsh ports, ferry operators and related businesses can benefit from and support the development of the Maritime economy, including marine energy. The need for effective road networks to ports was widely highlighted by consultation respondents, particularly the A55 corridor in north Wales. A key recommendation was that appropriate and effective road projects are developed to improve traffic flow on the A55 given the risks to ports from marginal changes in efficiency.

Attitudes of Key groups and Stakeholders

2.6.3 As part of the development of the current proposals a number of consultation activities have been undertaken with the general public, residents, businesses and other strategic stakeholders to inform an understanding of the problems and opportunities in the area and impacts of proposals.

2.6.4 In November 2007 a public consultation was undertaken lasting 12 weeks with public exhibitions at different locations in Isle of Anglesey and Gwynedd counties. Over 1,000 people responded to this consultation. The key findings were as follows:

- 94% of respondents wanted improvements to the road crossing;

- 84% of respondents wanted improvements now and a further 10% in the next 10 years; and
- 70% of respondents identified a new bridge as the preferred option.

2.6.5 This feedback indicates a high degree of support for change and has also assisted in identifying a preferred option to be taken forward for delivery.

2.6.6 Consultation with statutory consultees was also undertaken including the Environment Agency Wales, the Countryside Council for Wales and Cadw (although no formal response was received from Cadw). This has helped to inform subsequent stages in the planning and design process including the need for an Environmental Impact Assessment, Habitats Regulations assessment and formal consent in relation to proximity to SSSI sites.

2.6.7 Public consultation is also involved significantly within official policy documents outlined above, such as the Wales Transport Strategy, and North Wales Joint Local Transport Plan. Both of these documents specify the need for improvements to the A55 at the Menai Strait.

2.7 Measures for success

2.7.1 This project would be considered a success if the identified objectives of improving journey times and journey time reliability, improving accessibility for non-motorised users and promoting road safety are achieved. As part of a Monitoring and Evaluation Plan further targets will be set to allow these overall objectives to be measured and monitored to allow the success, or otherwise, of the project to be evaluated.

2.7.2 A logic map has been developed for the scheme, as illustrated below in *Figure 2.16*. It can be seen that each element of the scheme results in outputs which form part of the causal pathway towards achieving the above identified scheme objectives.

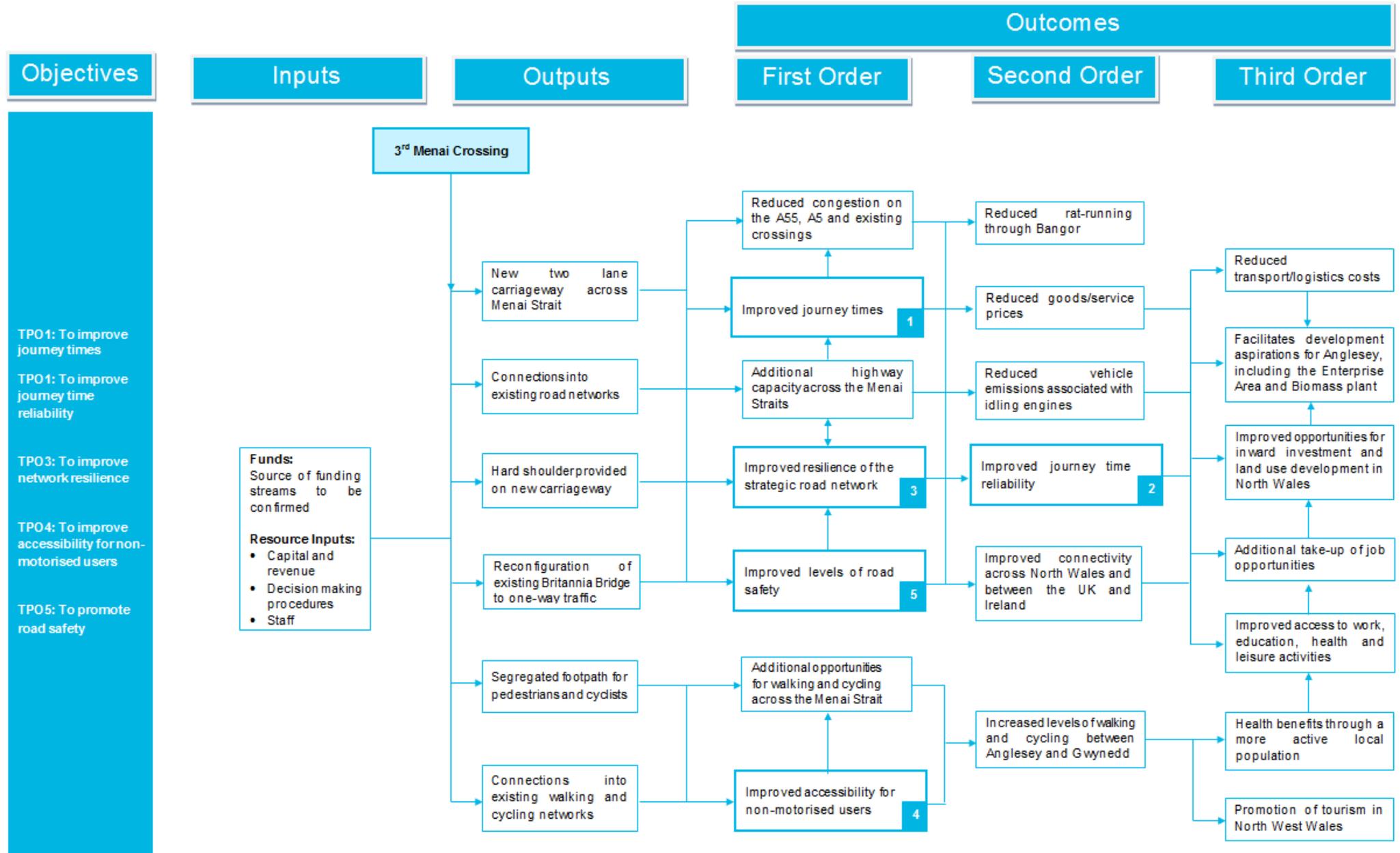


Figure 2.16 – Scheme Logic Map

2.7.3 As outlined in the Logic Map, it is anticipated that through the creation of additional highway capacity and the resolution of existing congestion and resilience issues the project will have significant wider benefits. It is expected there will be a reduction in vehicle emissions associated with idling engines, reduced transport and logistics costs for individuals and freight organisations as well as a consequent reduction in the price of goods and services. It will also help to encourage additional tourism, with associated spending within the local area and promote the creation of additional job opportunities within Anglesey's Enterprise Zone areas and growth of Holyhead port. Overall, it is anticipated the Isle of Anglesey will become more attractive for investment, with increased economic developments taking place.

2.8 Options Assessed

Option Generation and Sifting Process

2.8.1 A variety of options were assessed within the 2008 Menai Third Crossing Summary Options Report. The focus of this expanded from an original highway-only assessment to comply with WeITAG assessment, considering all possible transport options.

2.8.2 This long list was then subjected to a sifting process utilising WeITAG guidance. This approach was adopted to ensure competing proposals were appraised in an even handed manner across different modes, taking an account of a wide range of effects. All transport proposals requiring public funding and / or the approval of the Welsh Assembly are required to be planned and appraised according to this uniform and accepted framework. Comparisons were made against the Transport Planning Objectives as well as wider policy objectives.

2.8.3 The options outlined in *Table 2.7* that were taken forward to a stakeholder workshop are detailed in the table below, along with key benefits and dis-benefits. Initial sifting of these options was undertaken, and is detailed in the WeITAG Planning Stage Report, January 2008. A total of eight options or variations were taken forward and reviewed in more detail in the 2008 Summary Options Report.

Type	Scheme	Benefits	Dis-Benefits	Status
New Highway	New road bridge for eastbound carriageway traffic	Provides significant new capacity and resilience to the crossing. Little disruption during construction. Provision for pedestrians and cyclists.	Expensive. Requires land take. Environmental and visual concerns regarding the Menai Strait and existing listed bridge.	Taken forward to Summary Options Report (Option 7, 8).
	New tunnel	Same as new road bridge, while also avoiding environmental and visual dis-benefits.	Extremely expensive for construction and maintenance. Current road elevations and bed rock depth would require extensive realignment either side of the existing crossing and new junctions.	Discounted.
	New causeway, including a tidal barrage	Same as new road bridge, as well as potential for energy generation. Lower risk of closure due to high wind.	Significant earthworks required to tie into existing junctions. Unacceptable environmental benefits.	Discounted.

Type	Scheme	Benefits	Dis-Benefits	Status
Major modifications to existing crossing	Widening the existing bridge	No additional environmental impact in Menai Strait. Reduced land take required.	Bridge is owned by Network Rail. Subject to structural capacity of bridge. Major disruption during modifications. Heritage impact of removing towers.	Taken forward to Summary Options Report (Option 3, 4, 5).
	Extra deck on top of existing Britannia Bridge	Same as new road bridge, while also avoiding environmental impact to Menai Strait.	Structurally not viable due to increased loads, wind loading and visual impact. Difficult tie-in to existing junctions.	Discounted.
	Replacement bridge	Same as extra deck on top of existing bridge.	Would require a full closure of the existing bridge, with significant impacts on accessibility and the Menai bridge during construction. Loss of rail link to Anglesey.	Discounted.
	Addition of a new structure on either side of the existing Britannia Bridge	Same as bridge widening.	Same as new bridge, with additional safety concerns through a lack of central reservation.	Taken forward to Summary Options Report (Option 6).
Minor modifications to existing crossing	Tidal flow – three lanes - within existing carriageway width	Avoids significant modifications to existing bridge. Allows additional capacity in one direction for each peak.	Narrow lanes create unacceptable safety and operational issues. Limited capacity benefits and reduced speed limits would be needed. Operational concerns regarding wide loads	Taken forward to Summary Options Report (Option 2).
	Fixed flow – three lanes – within existing carriageway width	Same as tidal flow option, however avoiding increased operational costs and safety risks of variable lanes.	Same as tidal flow option, as well as increased flow only in one direction.	Taken forward to Summary Options Report (Option 1).
	Closing slips and re-routing traffic	Reduced demand on bridge. Reduced cost.	No additional capacity. May increase rat-running through residential areas. Reduced accessibility.	Discounted.
	Remove railway and replace with new road deck (below existing road deck)	Additional capacity with reduced cost and land take.	Bridge owned by Network Rail, and is not acceptable for them.	Discounted.
	New tram line running alongside railway	Provision of high quality public transport to reduce demand for private vehicles on bridge.	Demand for such a facility is seen as low. Would require extensive networks on either side to be of use to regular private vehicle users of the bridge.	Discounted.
Traffic and / or demand management	Active Traffic Management – speed control	Improving of traffic flows.	Limited capacity benefits.	Discounted.
	Influencing planning process and travel patterns	Significantly reduced cost.	Mix of traffic would limit effectiveness - ferries and tourist trips would be hard to influence.	Discounted.
	Road user charging (local or national)	Reduced demand. Support of sustainable alternative modes.	Not acceptable to local bodies or Welsh Assembly. National charging is seen as distant possibility.	Discounted.

Type	Scheme	Benefits	Dis-Benefits	Status
	Promotion of park and ride facilities	Reduced demand. Support of sustainable alternative modes.	Park and Ride services previously discounted for Bangor due to size and number of arterial roads.	Discounted.
	Promote freight movements by rail	Reduced demand. Support of sustainable alternative modes.	Majority of freight traffic is not suitable for inter-modal rail containers.	Discounted.
	Promote commuter movements by rail	Reduced demand. Support of sustainable alternative modes.	High diversity of trips and limited rail network.	Discounted.
Other	Do nothing	No additional cost.	No benefits, and unacceptable to local businesses and councils.	Discounted.

Table 2.7 – Initial Options Assessed

2.8.4

The eight options that were selected for further analysis are summarised in the table below. They can be broken down into four categories: 3 lane options which utilise the existing 10 metre carriageway width and therefore do not significantly affect the bridge (options 1 and 2); 4 lane options (options 3, 4 and 5) provided by widening the bridge and lowering the towers; Anglesey 4 lane option (option 6); and off line options (option 7 and 8). Viability of the highway options included assessment of the proposals against the following criteria:

- Structural impact;
- Highway safety;
- Environmental impact;
- Construction cost and traffic benefits; and
- Maintenance and operational issues.

2.8.5

A summary of each option and comparisons against scheme and wider policy objectives is outlined below in *Table 2.8*. Full details can be found in the 2008 Summary Options Report. A RAG assessment was undertaken to clearly identify schemes with common benefits and dis-benefits, and is as follows:

- **Red – Negative** – the scheme performs poorly compared to other options and TPOs, with significant dis-benefits;
- **Amber – Mixed** – there are some benefits and dis-benefits to the scheme, in comparison to other options and TPOs; and
- **Green – Positive** - the scheme performs well against other schemes and TPOs.

	Effects of Scheme	0 Do Nothing	1 Three Fixed Lanes	2 Three Tidal Flow Lanes	3 Four Narrow Lanes within Existing Parapets	4 Compact Dual Carriageway	5 Standard Dual Carriageway	6 New Twin Replica Structures (Anglesey)	7 New Multi-Span Concrete Box Bridge	8 New Long Span Cable Stayed Bridge
TPO1	Congestion	Traffic congestion will grow during peak periods and throughout the day during the summer periods.	Congestion would be relieved in one direction only.	Congestion would be relieved in one direction only at any one time.	Traffic delays on approach to bridge removed by providing two lanes in each direction.	Traffic delays on approach to bridge removed by providing two lanes in each direction.	Traffic delays on approach to bridge removed by providing two lanes in each direction.	Traffic delays on approach to bridge removed by providing two lanes in each direction.	Traffic delays on approach to bridge removed by providing two lanes in each direction.	Traffic delays on approach to bridge removed by providing two lanes in each direction.
TPO2	Disruption during construction	None.	Low.	Low.	High - A single lane would be maintained in each direction for the majority of the works.	High - A single lane would be maintained in each direction for the majority of the works.	High - A single lane would be maintained in each direction for the majority of the works.	Low - The majority of the works could be carried out off line from the existing highway.	Low - The majority of the works could be carried out off line from the existing highway.	Low - The majority of the works could be carried out off line from the existing highway.
	Network resilience and future maintenance	High - Continued reliance on Menai Bridge as an alternative and disruption during maintenance works. Severe congestion experienced during maintenance in 2011 and 2014.	High - Continued reliance on Menai Bridge as an alternative and disruption during maintenance works. Severe congestion experienced during maintenance in 2011 and 2014.	High - Continued reliance on Menai Bridge as an alternative and disruption during maintenance works. Severe congestion experienced during maintenance in 2011 and 2014.	High - Continued reliance on Menai Bridge as an alternative and disruption during maintenance works. Severe congestion experienced during maintenance in 2011 and 2014.	Medium / High - Continued reliance on Menai Bridge as an alternative and disruption during maintenance works. Severe congestion experienced during maintenance in 2011 and 2014.	Medium - Continued reliance on Menai Bridge as an alternative, but most maintenance works without major disruption. Severe congestion experienced during maintenance in 2011 and 2014.	Low - Greater options for reducing reliance on Menai bridge with minimal disruption during maintenance works.	Low - Greatly reduced reliance on Menai Bridge as an alternative, with minimal disruption during maintenance works.	Low - Greatly reduced reliance on Menai Bridge as an alternative, with minimal disruption during maintenance works.
TPO3	Non-motorised users	Pedestrians banned from bridge and no segregated cyclist facility.	Pedestrians and cyclists banned from bridge.	Pedestrians and cyclists banned from bridge.	Pedestrians and cyclists banned from bridge.	Segregated pedestrian and cyclist facility on east side of the bridge.	Segregated pedestrian and cyclist facility on east side of the bridge.	This level of detail has not been determined. It is likely that some provision could be made.	Segregated pedestrian and cyclist facility on east side of the bridge.	Segregated pedestrian and cyclist facility on east side of the bridge.
TPO4	Safety – lane width	5.0m	3.1m to 3.65m	3m to 3.5m	3.25m	3.25m to 3.65m	Standard lane width of 3.65m	Standard lane width of 3.65m	Standard lane width of 3.65m	Standard lane width of 3.65m
	Speed limits	Increase in traffic volumes may require current speed limit of 50mph to be reduced for safety.	40mph - No central reserve and narrow lanes.	30mph during tidal flow, 50mph off peak.	40mph - No central reserve and narrow lanes.	50 to 60mph – Dual carriageway may allow speed limit to be raised.	50 to 60mph – Dual carriageway may allow speed limit to be raised.	40 to 50mph - Depending on risk Assessments.	50 to 60mph – Dual carriageway may allow speed limit to be raised.	50 to 60mph – Dual carriageway may allow speed limit to be raised.
	Central reserve	No.	No.	No.	No.	Narrow 2 metre central reserve provided with vertical concrete barrier protection.	Narrow 2 metre central reserve provided with vertical concrete barrier protection.	Lane 1 segregated. Lane 2 not segregated.	Carriageways run on separate bridges.	Carriageways run on separate bridges.
Constraints / Wider	Impact on strait environment	None.	None.	None.	None.	None.	None.	New foundations required in the straits. Advice required On acceptability of	New foundations required in the straits. Advice required On acceptability of	None.

Effects of Scheme	0 Do Nothing	1 Three Fixed Lanes	2 Three Tidal Flow Lanes	3 Four Narrow Lanes within Existing Parapets	4 Compact Dual Carriageway	5 Standard Dual Carriageway	6 New Twin Replica Structures (Anglesey)	7 New Multi-Span Concrete Box Bridge	8 New Long Span Cable Stayed Bridge
							work in the Menai Straits Special Area of Conservation.	work in the Menai Straits Special Area of Conservation.	
Impact on landscape	None.	None.	None.	Low / Medium - Towers removed.	Low / Medium - Towers removed.	Low / Medium - Towers removed.	Medium - New low level structure.	Medium - New low level structure.	High - New structure prominent in the landscape.
Heritage impact to listed structure	None.	None.	None.	High - Towers removed to road deck level to allow widening of carriageway	High - Towers removed to road deck level to allow widening of carriageway.	High - Towers removed to road deck level to allow widening of carriageway.	None.	None.	None.
Present Value Cost (2002)	£0	£8m	£15m	£24m	£51m	£87m	£135m	£95m	£154m
Present Value Benefits (2002)	£0	£50m	-£10m	£92m	£150m	£150m	Unknown (likely similar to option 3)	£181m	£181m
BCR (2002)	N/A	N/A - rejected on safety grounds	N/A - rejected on safety grounds	3.8	2.9	1.7	< 1.0	1.9	1.2
Wales Transport Strategy Policy - Social	No fit – no improved access or encouraging healthy lifestyles	Some fit – limited improved access. Reduced safety of travel.	Some fit – limited improved access. Reduced safety of travel.	Some fit –improved access. Reduced safety of travel.	Good fit –improved access. Improved safety of travel.	Good fit –improved access. Improved safety of travel.	Good fit –improved access. Improved safety of travel.	Good fit –improved access. Improved safety of travel.	Good fit –improved access. Improved safety of travel.
Wales Transport Strategy Policy - Economic	No fit – no improvement to access or connectivity, worsening journey times, reduced efficiency of road network	Some fit – limited improved access, connectivity and transport efficiency. No resilience improvement.	Some fit – limited improved access, connectivity and transport efficiency. No resilience improvement.	Good fit – improved access, connectivity and transport efficiency. No resilience improvement.	Good fit – improved access, connectivity and transport efficiency. No resilience improvement.	Good fit – improved access, connectivity and transport efficiency. No resilience improvement.	Strong fit - improved access, connectivity and transport efficiency. Improved resilience.	Strong fit - improved access, connectivity and transport efficiency. Improved resilience.	Strong fit - improved access, connectivity and transport efficiency. Improved resilience.
Wales Transport Strategy Policy - Environmental	Some fit – no impact on biodiversity or on heritage. No improvement to congestion impacting local environment.	Some fit – no impact on biodiversity or on heritage. Limited improvement to congestion impacting local environment.	Some fit – no impact on biodiversity or on heritage. Limited improvement to congestion impacting local environment.	Poor fit - no impact on biodiversity. No improvement to congestion impacting local environment. High heritage impact.	Poor fit - no impact on biodiversity, reduced congestion impacting local environment. High heritage impact.	Poor fit - no impact on biodiversity, reduced congestion impacting local environment. High heritage impact.	Some fit - no impact on biodiversity, reduced congestion impacting local environment. Some visual impact.	Some fit - no impact on biodiversity, reduced congestion impacting local environment. Some visual impact.	Some fit - no impact on biodiversity, reduced congestion impacting local environment. High visual impact
Wales Transport Strategy Policy – Strategic Priorities	Contributes to 0 / 5 priorities.	Contributes to 2 / 5 priorities. Negatively impacts 1 priority.	Contributes to 2 / 5 priorities. Negatively impacts 1 priority.	Contributes to 2 / 5 priorities. Negatively impacts 1 priority.	Contributes to 3 / 5 priorities.	Contributes to 3 / 5 priorities.	Contributes to 3 / 5 priorities.	Contributes to 3 / 5 priorities.	Contributes to 3 / 5 priorities.
Local Transport Plan Policy fit	Contributes to 0 / 9 priorities.	Contributes to 2 / 9 priorities. Negatively impacts 1 priority.	Contributes to 2 / 9 priorities. Negatively impacts 1 priority.	Contributes to 3 / 9 priorities. Negatively impacts 1 priority.	Contributes to 4 / 9 priorities.	Contributes to 4 / 9 priorities. Assists key strategic intervention to improve A55 resilience.	Contributes to 4 / 9 priorities. Assists key strategic intervention to improve A55 resilience.	Contributes to 4 / 9 priorities. Assists key strategic intervention to improve A55 resilience.	Contributes to 4 / 9 priorities. Assists key strategic intervention to improve A55 resilience.

	Effects of Scheme	0 Do Nothing	1 Three Fixed Lanes	2 Three Tidal Flow Lanes	3 Four Narrow Lanes within Existing Parapets	4 Compact Dual Carriageway	5 Standard Dual Carriageway	6 New Twin Replica Structures (Anglesey)	7 New Multi-Span Concrete Box Bridge	8 New Long Span Cable Stayed Bridge
Stakeholder opinion		Unanimous support of do something option.	Low - safety concerns. Does not fully address the problems raised. Ranked 6 th .	Low - safety concerns. Does not fully address the problems raised. Ranked 7 th .	Low - safety concerns. Does not fully address the problems raised. Ranked 7 th .	High - addresses most raised concerns. High heritage impact. Ranked 1 st .	High - addresses most raised concerns. High heritage impact. Ranked 3 rd .	Medium – poor in comparison with options 7 and 8. Ranked 5 th .	High - addresses most raised concerns. High environmental impact. Ranked 2 nd .	High - addresses most raised concerns. High environmental landscape impact. Ranked 4 th .
Status		Taken forward for Public Consultation.	Discounted – safety, reduced speed limit, limited congestion benefits.	Discounted – safety, reduced speed limit, limited congestion benefits.	Discounted – option 4 was best performing widening option.	Taken forward for Public Consultation.	Discounted – significant strengthening required. Option 4 was best performing widening option.	Discounted – safety, poor access to single lane section, weaving, reduced speed limit, expensive maintenance, increased footprint in strait.	Taken forward for Public Consultation.	Taken forward for Public Consultation.

Table 2.8 – Assessment of Initial Options

2.8.6 For the purposes of public consultation, further sifting was undertaken. Stakeholders expressed the view that only a small number of viable projects should be displayed. Three options were discounted as they were seen to be unviable – options 1, 2 and 6. As it was requested only one widening option was presented, the best performing (option 4) was selected, discounting options 3 and 5. Finally, options 7 and 8 were highly ranked and seen as viable options.

2.8.7 To summarise, the following options were selected for the public consultation.

- Option A – Do Nothing (option 0);
- Option B – Compact Dual Carriageway (option 4);
- Option C – New Multi Span Bridge (option 7); and
- Option D – New Long Span Bridge (option 8).

2.8.8 Feedback was sought from the Consultation by the completion of a questionnaire, or by letter. Over a thousand members of the public completed and returned the questionnaire and a number of formal responses were received by letter from stakeholders. The findings of the questionnaire were as follows:

- 94% of respondents wanted improvements to the road crossing;
- 84% of respondents wanted improvements now and a further 10% in the next 10 years;
- 70% of respondents preferred a new bridge (option C or D);
- The majority of respondents stated the removal of the original stone towers of the Britannia Bridge required for option D was unacceptable;
- The preferred option was option C with 39%; and
- The majority of stakeholders who stated a preference preferred Option C.

Routing Options

2.8.9 During 2009, a second study took forward the preferred option for a new bridge and reviewed five potential routing zones, A to E, spanning west to east along the entire length of the Menai Strait. Full details can be found within the Summary Study Report. Zones A, D and E were discounted due to significant lengths of link road to tie into the existing crossing, higher number of constraints regarding existing property and utilities, topography and the increased width of the Menai Strait.

2.8.10 Zones B and C, to the west of the current Britannia Bridge, and between the two existing crossings respectively were chosen for further review. Four potential routes were selected, all in the vicinity of the existing Britannia Bridge, and can be seen in *Figure 2.17*, below.

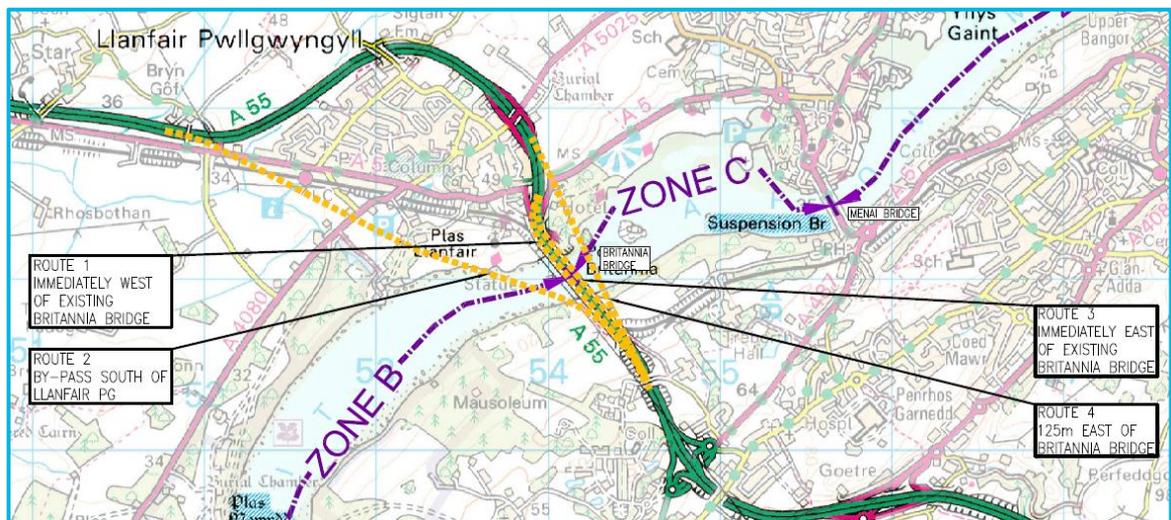


Figure 2.17 – Alignment Options

2.8.11 Potential unique benefits and constraints for each alignment option were reviewed, and can be seen in Table 2.9. Full detail of the options were discussed in the 2009 Summary Study Report.

Option	Benefits	Dis-Benefits	Status
1: Westbound bridge, Immediately west of Britannia Bridge	Avoids two SSSI's. Avoids disrupting visual relationship between existing crossings.	Close proximity with existing overhead power cables; mitigation required. Requires tight radius curve at north end of bridge.	Preferred option.
2: Two-way bridge, bypassing south of Llanfair Pwllgwyngyll	Higher design quality with higher speed limits for both directions. Existing A55 alignment and bridge can be used for local traffic, utilities or active modes.	Complex solution with number of additional crossings of road, rail and services. Significant additional cost. Longer crossing of the Menai Strait.	Discounted.
3: Eastbound bridge, Immediately east of Britannia Bridge	Avoids conflict with existing overhead power cables.	Impacts with two SSSI's, slight impact to National Trust land. Breaks visual relationship between existing crossings. Requires tight radius curve at north end of bridge.	Discounted.
4: Two-way bridge, 125m east of Britannia Bridge	Removes tight radius bends on existing alignment. Existing bridge can be used for local traffic, utilities or active modes.	Conflict with private properties. Significant additional cost. Longer crossing of the Menai Strait. Impacts with two SSSI's, major impact to National Trust land. Breaks visual relationship between existing crossings. Significant additional cost.	Discounted.

Table 2.9 – Alignment Options

2.8.12 Consideration of the cross section of the proposed bridge was also undertaken. Two options were discussed; a minimum two lane section with provision for non-motorised users, or an enhanced two lane cross section, with a hard shoulder and a hard strip. The preferred option was for an enhanced two lane cross section, as this would provide future flexibility in terms of emergency access, resilience and options for maintenance, including the potential for contra-flow where required. The overall width of 15.85m was used for evaluating potential structural forms of the new bridge, discussed below.

2.8.13 The second stage of optioneering within the 2009 study was to review the potential structural forms a new bridge could take. These are as follows:

- Cable Stayed Bridge;
- Post Tensioned Concrete Box Bridge;
- Steel Truss and Post Tensioned Concrete Box Bridge;

- Tied Arch Bridge;
- Thrust Arch Bridge; and
- Extrados Bridge.

2.8.14 An initial review of potential structural forms found there were clear benefits to the cable stayed, both post-tensioned concrete box variants, and the thrust arch bridge.

2.8.15 An extrados bridge is a cable stayed, box girder hybrid bridge, offering shorter towers but deeper bridge decks. It was not considered suitable due to the lack of engineering advantage it would offer, compared to the additional complexity and cost.

2.8.16 A tied arch bridge consists of a single arch supporting the road deck. It was discounted due to the required height of the road deck and corresponding arch, which would be out of character for the existing landscape, especially when compared to a thrust arch design.

2.8.17 *Table 2.10* summarises the remaining four forms, in terms of unique benefits and dis-benefits. All four options consisted of single spans, avoiding the need for a pier within the Menai Strait, an environmentally sensitive area. Of the remaining options, no structural form was selected as the clear favourite, although the cable stay bridge option was highlighted as providing the greatest flexibility to deal with the potential risks, including the possibility of increasing the span length to deal with aesthetic objectives or physical constraints.

	Cable Stayed	Post Tensioned Concrete Box	Steel Truss and Post Tensioned Concrete Box	Thrust Arch
Details	Two 80m tall pylons with reduced cable thickness and shallower (2m) deck. 340m span.	Conventional solid concrete box form. 6m – 21m deep deck. 320m span.	Two leaf piers to support concrete top slab. 6m – 21m deep deck. 320m span.	Two arches rising 22m above road deck. 350m span length.
Image				
Benefits	Slender profile, towers set back to existing towers on land. Flexibility with span length. Proposed structure is standard and normal. Foundation loads least problematic. Lowest financial risks.	Materials can all be locally sourced. Maintenance likely to be least-problematic. Lowest cost estimate for standalone structure. No visual impact above existing structures.	Reduced weight compared to concrete box results in reduced construction risk. Less visually obtrusive of existing bridge than concrete box. No visual impact above existing structures.	Less visually intrusive than concrete box options at deck level, or cable stayed in terms of height. Sympathetic to arches on existing bridge.

	Cable Stayed	Post Tensioned Concrete Box	Steel Truss and Post Tensioned Concrete Box	Thrust Arch
Limitations	Highest cost estimate for standalone structure. Cables can become obtrusive in some light conditions. Would require imported steel.	Existing bridges of this form are limited to 300m. Significant construction risks. Limited flexibility in increasing span length. Deep deck will obstruct views of Britannia Bridge from the west.	Significant span length with higher strength concrete required. Potential for increased maintenance risks on steel truss. Limited flexibility in increasing span length.	Risk that geology may be unsuitable to cope with horizontal stresses. Significant financial risk through volatile steel prices.
Cost (Q2 2007)	£112m	£119m	£115m	£110m

Table 2.10 – Summary of Structural Forms Considered

Further Development of Preferred Option

2.8.18 In 2011 further work was undertaken to make recommendations to progress the scheme from Key Stage 2. Five structural forms were considered, demonstrating the various potential aesthetic, functional and environmental considerations for appraisal. The various options and their assessment is outlined in *Table 2.11*, below. Each of the eight criteria were discussed, with the best performing option for each set at a score of 9 or 10. The remaining options were then scored by comparing its performance with the highest. The weightings of each criteria were initially set at 10, but were adjusted to reflect the relevance and importance of each. The total score is the sum of each score multiplied by the weighting.

2.8.19 Two options from the 2009 study, discussed above, were considered, as well as three multi-span options. These were introduced to allow consideration for a lower cost option with less visual intrusion (through shallower decks), but greater environmental impacts on the Menai Strait. This summary clearly outlines where shared benefits and risks are, as well as the best performing options overall. Full details can be found within the 2011 Options Review Report.

2.8.20 A new opportunity was also considered to accommodate planned National Grid upgrades. A number of proposed and foreseen new generation connections around North Wales, as well as resilience and security issues require the National Grid to investigate options for network upgrades and diversions. Additional capacity is required to accommodate new power generation from new nuclear build at Wylfa Newydd as well as new renewable power sources. Additional circuit capacity is required to connect the Isle of Anglesey to the mainland, and is likely to cross the Menai Strait. There is an opportunity to combine the new highway and power crossings required to share costs and reduce the environmental impact on the Menai Strait.

Category (weighting)	Long Span		Multi Span		
	Cable Stayed	Post Tensioned Concrete Box	Post Tensioned Concrete Box	Steel Box	Steel Arches
	Two 80m tall pylons either side of strait. Main span 340m. Slender depth.	One 320m span across strait. Significant depth.	Two spans across strait. Less significant depth.	Two spans similar to original bridge	Two spans with steel arches supporting deck, similar to existing bridge
Safety (10)	10	10	10	10	10
Environment – Landscape (7)	8	3	8	9	7
Environment - Impact on Strait (10)	9	9	5	5	5

Category (weighting)	Long Span		Multi Span		
	Cable Stayed	Post Tensioned Concrete Box	Post Tensioned Concrete Box	Steel Box	Steel Arches
	Two 80m tall pylons either side of strait. Main span 340m. Slender depth.	One 320m span across strait. Significant depth.	Two spans across strait. Less significant depth.	Two spans similar to original bridge	Two spans with steel arches supporting deck, similar to existing bridge
Environment – Other (3)	10	10	10	10	10
Potential to Accommodate National Grid (6)	4	7	3	10	10
Buildability (8)	10	2	7	7	6
Acceptability (10)	10	10	10	10	10
Maintenance (8)	7	8	9	10	5
Total Score (Weighting x Score)	536	463	482	539	477

Table 2.11 – Scoring of Preferred Structural Forms

2.8.21 The three new bridges were introduced into the 2011 Options Review Report to ensure various potential aesthetic and functional considerations of different options were reviewed at this stage.

2.8.22 The multi-span post-tensioned concrete box bridge option is a variant of ‘Option C’ that was presented during the public consultation, and discussed in *Section 2.8.6*. It offers benefits over the long span bridge in that it is not pushing the limits of technological capabilities, and has a reduced deck depth, reducing the visual impact on the area. However, as with all multi-span options, there are greater environmental impacts on the Menai Strait.

2.8.23 The multi-span steel box bridge would replicate the original design of the Britannia Bridge before it was damaged by fire. The steel arch bridge in contract would replicate the existing Britannia Bridge design.

2015 Maintenance and Operation Review, and Revised Cost Estimates

2.8.24 A review of the A55 Menai Crossing was commissioned as part of the National Transport Finance Plan 2015 (study R27c), in terms of the maintenance and operation. The primary outcome of the report was to scrap any short term solutions that had been identified, primarily proposals to introduce three lanes. This short term solution was discounted due to safety concerns and lack of width available on the existing bridge deck.

2.8.25 In 2015, an ‘Option Estimates’ report was written to update cost estimates to 2015 prices. Two options, one multi and one long span were selected for final review. Two variants of these options were produced, one for a crossing to the east, and one to the west, of the existing Britannia Bridge:

- New post tensioned concrete box multi span viaduct 10m north east of the existing bridge;
- New post tensioned concrete box multi span viaduct 10m west of the existing bridge;
- New cable stayed bridge more than 10m to the north east of the existing bridge; and
- New cable stayed bridge 10m west of the existing bridge.

2.8.26 The potential of a scheme routing to the east of the existing Britannia Bridge was costed

to allow comparisons of options that avoid any potential impact or conflict with the existing National Grid power cables.

2.9 Constraints and Inter-dependencies

2.9.1 There are a small number of constraints or that may impact upon this scheme. While there are no current programmes or projects underway, there are some planned in the future that may cause concern. These are outlined in *Table 2.12*, below.

Programme or Project	Date	Constraint	Mitigation and Opportunity
A55 Maintenance	2017/18	Maintenance will be undertaken on the existing Britannia Bridge, as per the National Transport Finance Plan ² .	Impact on the programme should be negligible, as the majority of the proposed scheme is offline. May be an opportunity to use any traffic management set up to undertake online works related to this scheme to avoid duplication and to reduce costs.
National Grid – North Wales Connection	Planning application to be submitted in 2017.	Proposal to create a new power connection across the Menai Strait. May include new cable bridges or tunnels in the vicinity proposed alignments.	Consultation with National Grid to ensure any proposed crossing, above or below ground, does not unduly constrain the proposed scheme. If timetable slips, the new required connection could be incorporated into the 3 rd Menai Crossing proposal to share costs and reduce environmental impacts.

Table 2.12 – Potential Constraints and Inter-dependencies

2.9.2 As discussed in *Section 2.2* a number of developments are proposed for Anglesey which the 3rd Menai Crossing would help to facilitate through the provision of additional highway capacity. Whilst the 3rd Menai Crossing scheme is not explicitly dependent upon any one of these developments there is an interdependence between the scheme and these developments and future levels of development on Anglesey is a key factor determining the business case for the scheme.

2.9.3 It is considered that the main risk to the Welsh Government in taking the project forward as a whole is related to the overall affordability of the project. This is discussed in more detail within the commercial case. If there are major cost overruns due to unforeseen circumstances, further impacts will be felt in relation to the affordability of the scheme, however, this can be mitigated through the correct use of optimism bias and a quantified risk assessment.

2.9.4 There is a slight risk that some of the economic benefits in terms of growth and new developments on the Isle of Anglesey may not be realised, due to market conditions, or other factors beyond the Welsh Government's control. However, this will not reduce the positive impacts of the scheme discussed within this Strategic Case, and may only reduce slightly the wider economic benefits realised in part through this scheme. Further detail on project risks is included in the Commercial Case.

2.9.5 There are a series of environmental constraints that will impact on this project. In particular there are two SSSIs to the east of the existing Menai Bridge, and the whole Menai Strait is a SAC. This may impact on any options for alignment to the east of the existing Britannia Bridge or whether a pier can be placed within the Menai Strait, required for a multi-span solution.

2.10 Stakeholders

2.10.1 Public consultation on the issues, opportunities, objectives and options for improving capacity across the Menai Straits was undertaken in 2007 at different locations in Gwynedd and Anglesey. *Table 2.13* outlines the main stakeholder groups and their anticipated contribution to the project.

Stakeholder	Influence	Contribution / Interest	Potential Conflict	Mitigation
Network Rail	High	Own existing bridge. New bridge will cross live rail lines. Have interest in future use of Britannia Bridge.	Must agree with construction plans over live rail lines.	Coordinate fully through the planning process. Engage with utility companies currently occupying 2 nd track bed on the existing Britannia Bridge to explore possibility of moving services to a new crossing, thus allowing Network Rail to implement a new rail line.
North and Mid Wales Trunk Road Agency	High	Manage existing road. Will manage new crossing. Previously engaged as part of stakeholder workshops.	Must support proposals. May have issues with alignment of new carriageway in terms of departures form standards.	Coordinate fully throughout the design process to ensure continued support.
Gwynedd and Isle of Anglesey Councils	High	Scheme straddles both councils. Previously engaged as part of stakeholder workshops.	Disagreement with proposals.	Keep informed. Ensure the most disruptive construction is undertaken outside peak times to avoid rat running in local settlements.
Environment Agency Wales, Countryside Council for Wales	Medium	Significant environmental constraints in the Menai Strait and the vicinity of the proposed bridge. Previously engaged as part of stakeholder workshops.	Against proposals due to environmental benefit.	Ensure relevant statutory procedures are followed with regards to statutory designated sites.
Ferry companies	Low	May benefit from increased capacity. Previously engaged as part of stakeholder workshops.	Significant disruption through roadworks will disrupt operations or deter potential customers.	Keep informed. Ensure the most disruptive construction is undertaken outside peak times.
Land owners	High	Owners of land along the proposed alignment.	Disagreement over selling of land.	Engage with land owners as soon as possible to ensure a smooth process, and to minimise delay or need for compulsory purchase orders.
Developers	Low	May benefit from increased attractiveness of Isle of Anglesey to investors, or increased accessibility and reduced travel time.	Disagreement with proposals, or concern over continued delay.	Keep informed.
Freight Transport Association	Low	A55 links Wales and England to Holyhead port, a key freight gateway to Ireland. Previously engaged as part of stakeholder workshops.	Significant disruption through roadworks will disrupt operations.	Keep informed. Ensure the most disruptive construction is undertaken outside peak times to avoid congestion impacting on services.
North Wales Emergency Services	Medium	Access between Anglesey and the mainland crucial to maintain emergency services. Previously engaged as part of stakeholder workshops.	Significant disruption through roadworks will disrupt operations.	Coordinate with regards to emergency access and procedures on the new crossing. Keep informed. Ensure the most disruptive construction is undertaken outside peak times to avoid congestion impacting on services.
TEN-T Executive Agency	Low	A55 is a TEN-T route and forms a key link between Ireland, Wales and England.	Disagreement with proposals.	Keep informed.

Stakeholder	Influence	Contribution / Interest	Potential Conflict	Mitigation
UK Highways	Medium	Design Build Finance Operate Contractor for Britannia bridge and Menai bridge. Previously engaged as part of stakeholder workshops.	Disagreement with proposals on Britannia Bridge post-construction of new crossing.	Coordinate regularly regarding works to Britannia Bridge after the new crossing opens.
Sustrans	Low	Provision of pedestrian and cycle facilities has been proposed. Previously engaged as part of stakeholder workshops.	Disagreement with proposals.	Coordinate and consult with to ensure proposed pedestrian and cycle facilities are of a good standard and are supported by the stakeholder.
National Grid	Medium	High voltage cable in close proximity to proposed crossing. Exploring options to increase capacity to Isle of Anglesey. Previously engaged as part of stakeholder workshops.	Refuse construction in close proximity to existing high voltage crossing. Unwilling to engage with regards to accommodating new high voltage lines in new bridge.	Coordinate and consult with to ensure stakeholder remains engaged with the proposals to accommodate new power lines. Ensure construction proposals are agreeable with regards to existing high voltage lines.

Table 2.13 – Analysis of Stakeholders

2.11 Impact of not changing

- 2.11.1** As part of previous option review studies which included extensive consultation a number of potentially lower cost options have been considered to improve the capacity of existing Menai crossings, without the requirement for a third crossing. However none of the options were deemed to be suitable. A ‘Do nothing’ option was also put forward at stakeholder and public consultation events, which was found to be unacceptable.
- 2.11.2** The 2015 National Transport Finance Plan included a short term action to consider maintenance and operational measures which could be undertaken on the A55 Menai Crossing. This study has now been completed and has concluded that there were no viable low cost solutions that would be successful in address existing congestion issues.
- 2.11.3** The 2008 Model Forecasting and Economics Report (*Appendix B*) included a summary of the impacts of a ‘do minimum’ scenario in 2027. It found a number of network problems and that as a whole the present network would be unable to cope with the forecast levels of growth. The increase in length and frequency of significant tailbacks caused by lower capacity on the Britannia Bridge causes congestion at a larger number of existing junctions on the network.
- 2.11.4** Significant investment is planned on the Isle of Anglesey as part of the Nuclear Power Programme. Congestion and resilience issues associated with the existing Menai Crossings may impact on the Nuclear Power Programmes ability to achieve its objectives, through reducing the attractiveness of Isle of Anglesey.
- 2.11.5** Not addressing the current issues in this area will essentially risk the development and regeneration potential of Anglesey and the surrounding area. If the scheme were not to go ahead the following impacts are likely to be experienced:
- Worsening traffic congestion on the existing Menai crossings, exacerbating congestion. TEMPRO predicts a 9% growth in car trips across North Wales between 2015 and 2030;

- Continued strategic network resilience issues, which will be a particular issue when one of the existing crossings require inevitable major maintenance work;
- Worsening transport costs for businesses transporting goods between Ireland, Wales, the rest of Great Britain and mainland Europe affecting trade;
- Worsening accessibility for local people on either side of the Menai Strait, leading to difficulties recruiting and accessing work opportunities, as well as worsening access to key services;
- Loss of potential tourist trips to and through North Wales and associated spending;
- Loss of economic competitiveness to the North Wales region, leading businesses to set up elsewhere; and
- Diversion of trade for the Port of Holyhead as companies choose alternative freight distribution routes.



Transport Case

03

Transport Case

3.1 Introduction

3.1.1 The scheme Transport Case has been developed based on initial forecasting and economic study undertaken in 2008. The purpose of the Transport Case is to demonstrate that the proposed scheme offers good value for money in terms of transport objectives. Overall, this section details:

- The options that have been appraised;
- Assumptions used during the modelling;
- Economic appraisal;
- Sensitivity and risk profile;
- Appraisal summary tables; and
- Value for money statement.

3.1.2 Since 2008, there has been some progression in the development of options and their associated costs. These will be discussed separately to the rest of the transport case as they are not directly comparable due to different price bases and scheme design. From the outset of this study, the use of the traffic model was intended to provide general forecast traffic flows to help inform the assessment and selection of the most suitable A55 Britannia Bridge options to take forward for a more detailed study.

3.2 Options appraised

3.2.1 In total, five options have been appraised:

- **DM:** Do Minimum – no improvements to the A55 across the Menai Strait;
- **DS 1E:** Do Something: Multi-Span (East) – a new multi-span bridge across the Menai Strait, to the east of the existing bridge;
- **DS 1W:** Do Something: Multi-Span (West) – a new multi-span bridge across the Menai Strait, to the west of the existing bridge;
- **DS 2E:** Do Something: Single Span (East) – a new single span bridge across the Menai Strait, to the east of the existing bridge; and
- **DS 2W:** Do Something: Single Span (West) – a new single span bridge across the Menai Strait, to the west of the existing bridge.

3.2.2 A summary of these options in relation to key performance indicators can be seen *Table 3.1*, below. Additional details on each option, and the narrative behind the selection of these options can be found in *Section 2.8*. A RAG assessment was undertaken to provide a clear comparison between the five options appraised, and is as follows:

- **Red – Negative** – the option performs poorly against key performance indicators;
- **Amber – Mixed** – the option has mixed impacts compared to the key performance indicator;

- **Green – Positive** – the option performs well against key performance indicators; and
- **Grey – Neutral** – no change or impact to key performance indicators.

Option		Transport benefits	Safety improvements	Improved resilience	Facilitating growth	Impact to Menai Strait	Visual impact - general	Visual disconnect between bridges	Conflict with National Grid	Conflict with Network Rail
DM	Do Minimum									
DS 1E	Do Something: Multi-Span (East)									
DS 1W	Do Something: Multi-Span (West)									
DS 2E	Do Something: Single Span (East)									
DS 2W	Do Something: Single Span (West)									

Table 3.1 – Key Performance Indicators of Options

3.3 Assumptions

- 3.3.1** Traffic forecasting work undertaken in 2008 was based on outputs from a PARAMICS model (base year 2002). Traffic forecasts were modelled for 2012 and 2027. Both the AM (08:00-09:00) and PM (17:00-18:00) peaks have been modelled for four different user classes (cars, LGVs, OGV1 and OGV2).
- 3.3.2** TEMPRO as well as National Road Traffic Forecast growth factors have been used in the forecasting of future travel demand. This ensures general growth factors as well as changes to local economic activity are accounted for. Overall, the matrix totals increased by approximately 7% and 21% for the forecast years of 2012 and 2027 respectively.
- 3.3.3** Total vehicle hours, vehicle kilometres and average network speed were provided for each modelled scenario, time period and user class. Data presented represents all vehicle journeys which commence their journey in the traffic model during the AM and PM peak hours respectively. Wider network problems were encountered with the 2027 forecast PM peak traffic model assignments resulting in excess congestion. Due to the problems of the PM peak hour, analysis and economic assessment was undertaken using the AM peak only, with suitable adjustments made for the PM peak.
- 3.3.4** The assessment of benefits was calculated using TUBA which is used to assess the change in travel time and vehicle operating costs. With the modelled data assessing the AM peak only periods, factors were derived from existing automatic traffic count data to generate an estimate of the economic benefits associated with the whole week, including inter-peak, off-peak and weekend periods.
- 3.3.5** It has been assumed that all do something options will have the same benefit in terms of journey time savings.
- 3.3.6** Further details on how these assumptions may introduce risk and sensitivity into the Transport Case are detailed in *Paragraph 3.4.18*.

3.4 Economic Appraisal

Journey Time Benefits

- 3.4.1** The economic benefits of each option have been defined solely on the travel time benefits. While there are wider benefits that could be quantified, including emissions, accidents and wider economic benefits, these will be consistent across all four Do Something schemes. However, it should be recognized that the Present Value of Benefits presented as follows represent a conservative estimate of the full economic benefits.
- 3.4.2** Average network speeds in the AM peak are 6.5km/h greater than in the do minimum scenario in opening year, and 6.7km/h greater in the future year. Modelled flows along the A55 in the peak hours increase by 7.5% to around 2,250 vehicles per hour for the eastbound carriageway (AM peak) and by 9.3% to 2,190 vehicles per hour for the westbound carriageway (PM peak).
- 3.4.3** Modelled journey times fall in both directions in the peak hours; during the PM peak hour in opening year the westbound journey time of 5 minutes 53 seconds in the do minimum scenario is reduced to 3 minutes 55 seconds in the do something scenario. Corresponding journey times for the eastbound AM peak hour fall from an average of 12 minutes 58 seconds to 4 minutes 29 seconds under the do something option.
- 3.4.4** A summary output of the flow and journey time benefits on the A55 in opening year (2012) and forecast year (2027) is illustrated in *Table 3.2* and *Table 3.3* respectively.

Scenario	08:00 2012 Eastbound		08:00 2012 Westbound	
Option	AM Peak Flow (vph)	Journey Time (s)	AM Peak Flow (vph)	Journey Time (s)
Do Minimum	2,093	778	1,458	257
Do Something – All	2,251	269	1,528	240
Scenario	17:00 2012 Eastbound		17:00 2012 Westbound	
Option	PM Peak Flow (vph)	Journey Time (s)	PM Peak Flow (vph)	Journey Time (s)
Do Minimum	1,549	245	1,999	353
Do Something – All	1,552	223	2,186	235

Table 3.2 –Journey Time Benefits – Opening Year

Scenario	08:00 2027 Eastbound		08:00 2027 Westbound	
Option	AM Peak Flow (vph)	Journey Time (s)	AM Peak Flow (vph)	Journey Time (s)
Do Minimum	2,057	1,052	1,594	259
Do Something – All	2,132	445	1,682	246
Scenario	17:00 2027 Eastbound		17:00 2027 Westbound	
Option	PM Peak Flow (vph)	Journey Time (s)	PM Peak Flow (vph)	Journey Time (s)
Do Minimum	1,510	587	1,708	882
Do Something – All	1,774	226	2,171	500

Table 3.3 –Journey Time Benefits – Forecast Year

- 3.4.5** It can be seen that the most significant benefit in the AM peak in both years is eastbound, from the Isle of Anglesey to Gwnedd. While there is some benefit for westbound traffic, it is more limited as the capacity of the existing crossing is not forecast to be exceeded. The reverse is true for the PM peak. In addition to this, journey times between 2012 and 2027 do not differ significantly in the do something scenarios,

demonstrating the capacity of the proposed scheme will not be exceeded. However, in the do minimum there is over a doubling of journey times for flows opposite the main peak direction by 2027 (for example westbound in the AM peak). This shows that journeys in both directions will be affected by traffic growth, adversely affecting journey times.

3.4.6 The total value of these time savings is shown below in *Table 3.4*, and are presented in a price base of 2002, and discounted to 2012. Benefits in the inter-peak, off-peak and weekend have been undertaken as detailed in *Section 3.3*.

Period	Time Benefit (£,000)	Fuel Cost (£,000)	Non-Fuel Cost (£,000)	Indirect Taxation (£,000)	Total (£,000)
AM Peak	41,479	1,553	1,059	-1,037	43,054
PM Peak	41,576	1,714	1,042	-1,143	43,189
Inter-peak	44,210	1,545	1,094	1,031	45,817
Off-Peak	16,704	695	416	-464	17,351
Weekend	30,775	1,393	650	-929	31,889
Total	174,744	6,900	4,260	-4604	181,299

Table 3.4 – Summary of Quantified Benefits over Forecast period

Accident Benefits

3.4.7 There has been no quantification of accident benefits at this stage of analysis. It is expected however that benefits will assist in securing a safer road environment for pedestrians and cyclists and for motorised users through bring the service levels up to modern specification. All four do something options will likely have broadly the same accident benefits, although there will be some differences in alignment between the east and west options that may result in differences in accident rates.

3.4.8 The 2008 model was developed to enable calculation of cost benefit of reduction in accidents. However, the analysis was not undertaken at this stage of scheme development. Qualitative benefits derived from past accident locations and scheme details will be included in the wider appraisal process, in *Section 3.5*.

Environmental Benefits

3.4.9 Environmental impacts other than those outlined in *Table 3.4* (with fuel cost savings resulting in lower emissions) have not been considered at this stage of analysis. It is expected however that some benefits will arise from promotion of cycling and walking trips across the Menai Strait.

3.4.10 While the environmental benefits are likely to be similar across all options, there will be differences in the tradable carbon impact of the construction of different options. DS1 will require a significant amount of concrete, while DS2 will have lower levels of concrete, with cables used for structural integrity instead. In addition to this, non-quantifiable dis-benefits will be different, including the visual impacts, and impacts on SSSIs. These are discussed in more detail in *Section 3.5*.

Construction Costs

3.4.11 As part of the original forecasting and economics undertaken in 2008, high level costs were calculated for options DS 1E and DS 2E, and include provisions for the following:

- Design and preparation fees;
- Supervision fees;
- Network Rail fees;
- Preliminaries;

- Demolition and site clearance;
- Structures;
- Roadworks;
- Communications;
- Land;
- Optimism Bias and risk; and
- VAT.

3.4.12 These original costs have a price base of 2002, with no adjustment for inflation. Risk and optimism bias have been included at 44% due to the early stage of the appraisal process. Costs are not available for options DS 1W and DS 2W from the 2008 report as they came forward after this initial assessment.

3.4.13 In 2015, costs for options DS 1E and DS 2E were updated, and two additional options to the west of the existing Britannia Bridge were costed for the first time – DS 1W and DS 2W. For these four new costs, a 2015 Q2 base have been used. The new western options for each bridge are broadly similar, however they include further allowances for the following items:

- The road will cross the existing railway line on the Isle of Anglesey, instead of Gwnedd as previously priced;
- Allowances have been made for the relocation during construction of overhead high voltage power cables to the west of the existing bridge. This is the most significant additional cost, with a £18m allowance;
- The first pier on the Isle of Anglesey will require further engineering as less of the rock shows above the tide to the west of the existing Britannia Bridge; and
- The central pier in the Menai Strait will require further engineering as less of the rock shows above the tide to the west of the existing Britannia Bridge (DS 1W only).

3.4.14 Full costs of options DS 1E and DS 2E can be seen in the *Financial Case and Appendix C*. It can be seen that costs have increased by 6.6% and 4.1% respectively. The cost of placing the bridge to the west of the existing bridge (DS 1W and DS 2W) is 59.1% and 24.1% higher respectively.

3.4.15 A summary of the original 2008 costs, and revised costs in 2015 have been included at a 2015 base, and deflated to 2002 levels using the Department for Transport's Databook (where 2015 is 100; 2002 is 73.60) can be seen below in *Table 3.5*. This is for comparison purposes only, and demonstrates that there has been a reduction in costs in real terms.

Option	DS E1 (£,000)	DS E2 (£,000)	DS W1 (£,000)	DS W2 (£,000)
2008 Report Cost (2002 base)	110,959	N/A	180,682	N/A
2015 Estimate Cost (2015 base)	118,281	188,174	170,007	233,430
2015 Estimate Cost (2002 base)	90,603	138,496	125,125	171,804

Table 3.5 – Summary of Scheme Costs across Various Price Bases

Maintenance Costs

3.4.16 There has been no allowance for maintenance at this stage of analysis. It is reasonable to assume that both the east and west options will be broadly similar in terms of maintenance. During the 2011 Options Review, it was considered the multi-span bridge (option DS 1E/W) would have fewer maintenance issues than a long span cable stayed bridge (option DS 2E/W).

- 3.4.17** An initial review of DfT guidance and previous experience was undertaken to provide outline considerations with regards to maintenance costs. Generally, it is considered best practice for all structural forms to have built-in under-deck inspection and maintenance facility, such as a mounted underbridge moveable gantry. This will add to the construction cost for all options, but will ensure maintenance costs are reduced.
- 3.4.18** Steel structures such as the cable stayed option will require painting. Potential use of weathering steel with self-rusting protection that will reduce painting requirements is unlikely to be acceptable due to increased visual impact of a rusty brown structure in relation to the sensitive location.
- 3.4.19** While up to date guidance is not available, an evaluation of maintenance costs was given in the 1992 'Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures'⁷. These documents have been adopted by Welsh Government. Annual commuted rates per square metre of bridge deck and bridge substructures have been provided for concrete and steel bridges, taking into account items including typical frequency of routine maintenance, nature of maintenance and allowance for general access.
- 3.4.20** The superstructure maintenance rates given are as £5.20 per m² of deck plan for concrete structures and £6.17 per m² of deck plan for steel structures, in 1988 prices. While these rates will not reflect any advances in technology, it can be seen that painted steel structures are general more expensive to maintain than concrete structures.
- 3.4.21** Taking all these factors into account it can be concluded that on cost grounds a post-tensioned concrete multispan structure will provide lower ongoing maintenance costs. However, other factors may counter this, in particular costs through an additional pier in contact with water and geological considerations for foundations.

Analysis of Monetised Costs and Benefits

- 3.4.22** A summary of the Analysis of Monetised Costs and Benefits (AMCB) table for each option can be seen in *Table 3.6* below. The costs are in a price base of 2002, discounted to 2002.

Option	DS E1 (£,000)	DS E2 (£,000)	DS W1 (£,000)	DS W2 (£,000)
Present Value of Benefits	180,000	180,000	180,000	180,000
Present Value of Costs	95,000	154,000	N/A	N/A
Net Present Value	85,000	26,000	N/A	N/A
Benefit to Cost Ratio	1.89	1.17	N/A	N/A

Table 3.6 –AMCB Summary

Sensitivity

- 3.4.23** Risks and constraints of the options have been identified, and are discussed in greater detail elsewhere in this report. Sensitivity testing will need to be undertaken at a later date, significant consideration also needs to be given to updating the model forecasts prepared in earlier studies.
- 3.4.24** There are several uncertainties with the Present Value of Costs and Benefits that will impact the associated BCR. These include, but are not necessarily limited to the following, with further detail on some items provided in *Section 2.4* (risk):

- Construction costs – these have dropped in real terms between 2002 and 2015;

⁷ Department of Transport, documents BA/28/92 and BD36/92.

- Costs – no allowances for monitoring and evaluation have been included;
- Costs – no allowances scheme development were included in the original 2008 costs;
- Costs – no allowances for whole life costs have been included;
- Benefits – no allowances for residual value of the new crossing have been included;
- Reliability of model – a review of the transport model has not been undertaken; Some concerns were raised regarding the PM peak in particular in the 2008 report (*Appendix B*);
- Traffic forecasts – there is uncertainty around the growth factors used, in light of the recession since the original 2008 report and any future general traffic growth;
- Development impacts – there is uncertainty over the impact of developments on Anglesey and north west Wales, and the impact these will have on traffic flows;
- Utilities – there is uncertainty over the crossing of a new national grid connection between the Isle of Anglesey and the mainland, the future status of the existing power cables adjacent to the Britannia bridge, and the risks associated with construction in close proximity to power cables;
- Network Rail – alignment and viability of the crossing of National Rail land needs to be reviewed in more detail, and may add significant cost. This will differ between the east and west options due to the place where the proposed bridge would cross the railway line; and
- Any deviation of standards of bend radii will differ between the east and west options, and will require further analysis with regards to viability. Lower speed limits that may be required will reduce journey time savings.

3.5 Appraisal Summary Table

3.5.1 An Appraisal Summary Table has been completed for each of the do something options. These can be found in *Appendix A*. These tables can be used for comparison between each do something option, for a wide range of appraisal criteria.

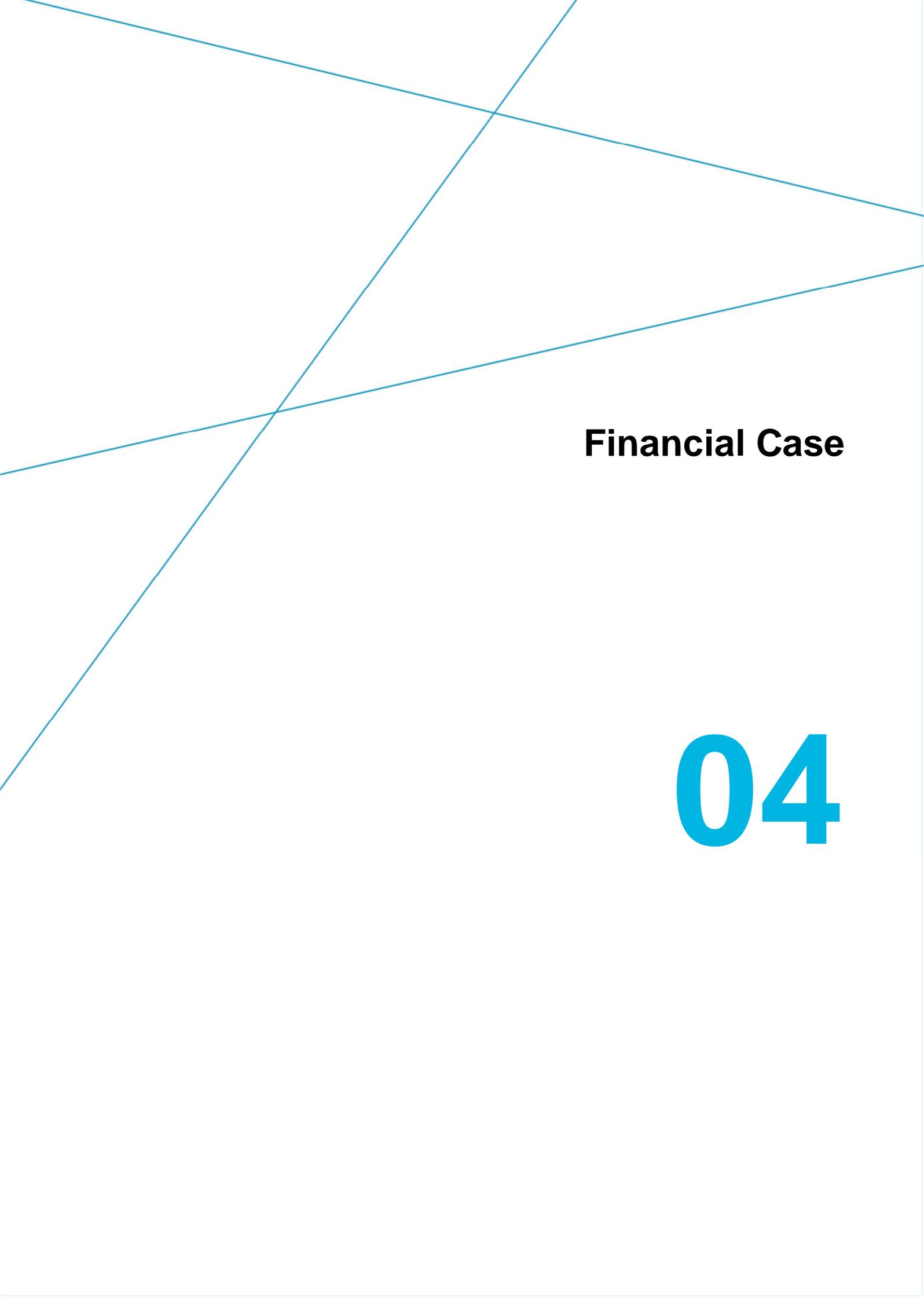
3.5.2 A formal Equality Impact Assessment has not been undertaken. As the scheme progresses a review will need to be undertaken to understand any specific impacts the proposed scheme will have on ‘protected characteristics’, as identified in the 2010 Equality Act:

- Age;
- Disability;
- Gender reassignment;
- Marriage and Civil Partnerships;
- Pregnancy and Maternity;
- Race;
- Religion or Belief;
- Sex; and
- Sexual Orientation.

3.5.3 At this stage, it is not considered there are any impacts. It is considered that the scheme will provide equal benefits for all, and not discriminate on any grounds, including those listed above. The TPOs of this scheme will bring benefits to all sectors of the population, particularly those with access to a private vehicle, but also to those who do, or would like to cross the Menai Strait using active modes, or those utilising public transport in the A55 corridor.

3.6 Value for Money Statement

- 3.6.1** An up to date BCR has not been calculated. However, based on previous benefits forecast in 2008 (*Table 3.4*), and a review of costs deflated to a similar year (*Table 3.5*), it can be expected that this scheme will have a **Medium** Value for Money, representing a BCR in the range of **1.5 to 2.0**.
- 3.6.2** The benefits of this scheme are based upon journey time savings over a 60 year appraisal period. It is likely other quantified benefits, including residual value of any structure, accident benefits and wider economic benefits will increase the overall Present Value of Benefits. There are also likely to be significant non-monetised benefits, such as reduced severance and increased resilience of the crossing. The costs of this scheme are based on construction only, with no allowances made for whole life costs.
- 3.6.3** Economic appraisal and the Value for Money assessment will need to be updated as part of Key Stage 2 work, due to the age of the current forecasts.



Financial Case

04

Financial Case

4.1 Introduction

4.1.1 The financial case will outline the current forecast costs, and how these have been developed. In addition, detail on the cost profile and funding streams will be presented.

4.2 Approach to Assessing Affordability

4.2.1 Construction costs have been calculated and enhanced throughout the development of this scheme. Further details regarding items including cost bases and exclusions can be found within the respective reports:

- 2008 Summary Options Report– Outline cost estimates to aid option sifting from eight proposed options to three for a public consultation;
- 2009 Summary Study Report – Cost for single span option enhanced for crossing to the west of the existing Britannia Bridge, for four different single span bridge forms;
- 2011 Options Review Report– Costs for two structural forms in 2009 updated to 2010 cost base; costs for three newly developed multi-span concepts; and
- 2015 Option Estimates– Budget cost estimates for four options; two long span options (more than 10m east, and 10m west of the existing bridge) and two multi-span options (10m east, and 10m west of the existing bridge).

4.2.2 No estimate of whole life costs have been undertaken at this stage. A comparison of costs across various reporting stages is presented in *Section 4.3*, where appropriate.

4.2.3 This Financial Case will focus on the cost estimates undertaken in 2015. The following assumptions and exclusions are relevant for the costs provided, full details can be seen within *Appendix C*:

- Estimates are based on drawings provided in the 2008, 2009 and 2011 reports listed above;
- No specific site visits have been undertaken;
- Measurements have been undertaken using the Method of Measurement for Highway Works, and standard highway design principles;
- Only limited information has been provided regarding design information, existing construction and utilities;
- No construction programme, phasing, availability of work areas or other constraints have been considered;
- Costs have been prepared to a cost base of Q2 2015;
- Risk in connection with construction is included, however no allowance has been made for risks on land, compensation, design and supervision, and utility; and
- It is assumed that high voltage power cables to the west of the existing crossing will be related for the construction period.

4.3 Costs

4.3.1 A summary of the cost breakdown can be seen in *Table 4.1*. While it is not possible to apply a new PVC to the previously calculated PVB to generate four new BCRs, they provide an indication of how costs have changed from the initial feasibility report, and how costs for a western option, which would avoid some significant environmental impacts, compare.

Option	DS E1 (£,000)	DS E2 (£,000)	DS W1 (£,000)	DS W2 (£,000)
Design and Preparation Base Cost – Key Stage 3	2,500	2,750	2,500	2,750
Design and Preparation Base Cost – Key Stage 4	1,500	1,500	1,500	1,500
Sub Total	4,000	4,250	4,000	4,250
Preliminaries (30%)	11,192	18,538	13,487	20,113
Roadworks	4,551	5,361	8,551	9,361
Bridge works	29,006	52,682	32,006	53,682
Design and Supervision	3,750	3,750	4,400	4,000
Contractor's Risk Allowance (20%)	9,700	16,066	11,689	17,431
Sub Total	58,199	96,397	70,133	104,587
Payments to Statutory Undertakers	2,000	2,000	20,000	20,000
Land and Compensation	2,000	2,000	2,000	2,000
Network Rail Fees	250	250	250	250
Sub Total	4,250	4,250	22,250	22,250
Employer's Agent Costs	2,000	4,000	2,000	4,000
Employer's Risk and Optimism Bias (44%)	30,118	47,915	43,289	59,438
Sub Total	32,118	51,915	45,289	63,438
Total Excluding VAT	98,567	156,812	141,672	194,525
VAT (20%)	17,713	31,362	28,334	38,905
TOTAL	118,281	188,174	170,007	233,430

Table 4.1 – Cost Estimates

4.3.2 As seen in *Table 4.1*, optimism bias has been included at 44%. This is to reflect the level of detail and stage of the project. Risk has been included in this as a specific quantified risk analysis has not yet been undertaken.

4.3.3 Whole life costs have not yet been calculated for the scheme. Discussion around differences in maintenance costs between each option can be found in *Section 3.4*. In addition, monitoring and evaluation cost have not yet been estimated. Further details of monitoring and evaluation can be found in *Section 6.9*.

4.4 Budgets/Funding Cover

4.4.1 The 3rd Menai Crossing Project is included in the 2015 National Transport Finance Plan to be delivered using WG Transport capital funding. However, opportunities are being explored to supplement/assist the Transport capital funding of the project including:

- Funding through Welsh Government's transport budget by borrowing powers available for capital investment;

- Match funding through European Union, as part of TENS funding or otherwise;
- Tolling, either shadow or physical;
- Potential contribution from National Grid as part of their overhead power line upgrade plans; and
- Potential contribution from Nuclear Power Programme.



Commercial Case

05

Commercial Case

5.1 Introduction

- 5.1.1** The Welsh Government follows the good practice set out in 'Transport Division's Procurement Strategy and 'Selection and Monitoring Processes' guide. Known as the 'Chwarae Teg' guide ('Fair Play' in English), its objective is: choosing businesses using whole life considerations to achieve value for money results through the award and execution of contracts to deliver transport related economic growth.
- 5.1.2** The Welsh Government's guide, Community Benefits: Delivering Maximum Value for the Welsh Pound, also outlines good practice for ensuring community benefits are realised from public procurement. This document points towards the importance of training and recruitment opportunities benefitting the local community.

5.2 Output based specification

- 5.2.1** Specific details relating to the bridge design are still under consideration; however feedback from stakeholder and public engagement, as well as fit to transport policy and the scheme objectives has informed the scope.
- 5.2.2** The new bridge (located immediately adjacent to the west or east of the existing Britannia Bridge) will provide two lanes in each direction, potentially with an additional hard shoulder on a new westbound carriageway. The new bridge will tie into the existing A55 crossing where two lanes currently filter into one, currently to the south of J8a (on Isle of Anglesey County), and to the north of J9, in Gwynedd County. This means minimal junction re-modelling will be required to accommodate the new crossing. It is anticipated the new bridge will have segregated facilities for pedestrians and cyclists, as these are not currently provided on the existing Britannia Bridge.
- 5.2.3** The options assessment work undertaken in 2011 assumes the following level of service specification will be delivered as part of the scheme:
- A cross section of 15.85m between bridge parapets, compromised of:
 - 2.75m non-motorised users route;
 - 0.3m pedestrian barrier;
 - 0.6m set-back to the barrier to the carriageway; and
 - 11.6m carriageway consisting of two 3.65m lanes, a 3.3m hard shoulder on the nearside and a 1.0m hard strip on the offside.

5.3 Procurement Strategy

- 5.3.1** The overall delivery of a 3rd Menai Crossing will be managed by Welsh Government Transport Division with an appropriate technical and commercial advisor procured to provide support as required.

- 5.3.2** The intention is for the 3rd Menai Crossing to use a New Engineering Contract (NEC) Professional Services and Engineering Construction target cost contracts. These types of contract have been successfully used on a number of other schemes within Wales by the Welsh Government and throughout the UK.
- 5.3.3** It is proposed for the 3rd Menai Crossing scheme to adopt an Early Contractor Involvement (ECI) design and build contract in accordance with Transport Division Procurement guidelines. The choice of procurement type for each project is based on a number of basic principles applied to achieve best value including:
- Selection of contractors on the basis of quality and price;
 - Fair allocation of risk;
 - Optimising quality of design, buildability and sustainability; and
 - Adopting a non-contractual partnering approach.
- 5.3.4** ECI is a well-established procurement method for projects of this type where the contractor's team is involved early in the development stage, to bring buildability expertise to influence the design development and to drive efficiency and manage costs and risk.
- 5.3.5** A team will initially be appointed to design the scheme via an ECI design and build contract. Should the proposed scheme be successfully approved and the statutory consent process negotiated, the intention would be for the same contractor to then deliver the global project.
- 5.3.6** The ECI approach involves the appointment of a contractor at the tender phase. This approach motivates the Contractor to find a cost effective design solution during the tender period as the overall construction will be fixed by the Contractor's tender offer and assessed as part of the tender selection process.
- 5.3.7** As a result the Contractor has a considerable stake and commitment in the engineering and environmental design and can carry this through to the construction phase. The Contractor will be motivated to save programme time and construction costs throughout the construction process as any saving or overspend on the contract price is shared between the contractor and Employer (unless there are Employer changes).
- 5.3.8** There will be scope for design innovation in this scheme, and the Contractor responsible for construction will be appointed prior to the detailed design phase. This is part of the construction phase under the ECI form of contract. This form of contract has been successfully used on several highways contracts for the Transport Department, including M4 Widening, A465 Section 3, A470 Cwmbach to Newbridge-on-Wye and A477 St Clears to Red Roses Improvements.
- 5.3.9** The advantage of this form of contract is that the Contractor's team is responsible for the detailed design. This ensures a contractor with buildability expertise is involved on the contract at an early stage to influence the design development and to manage costs.

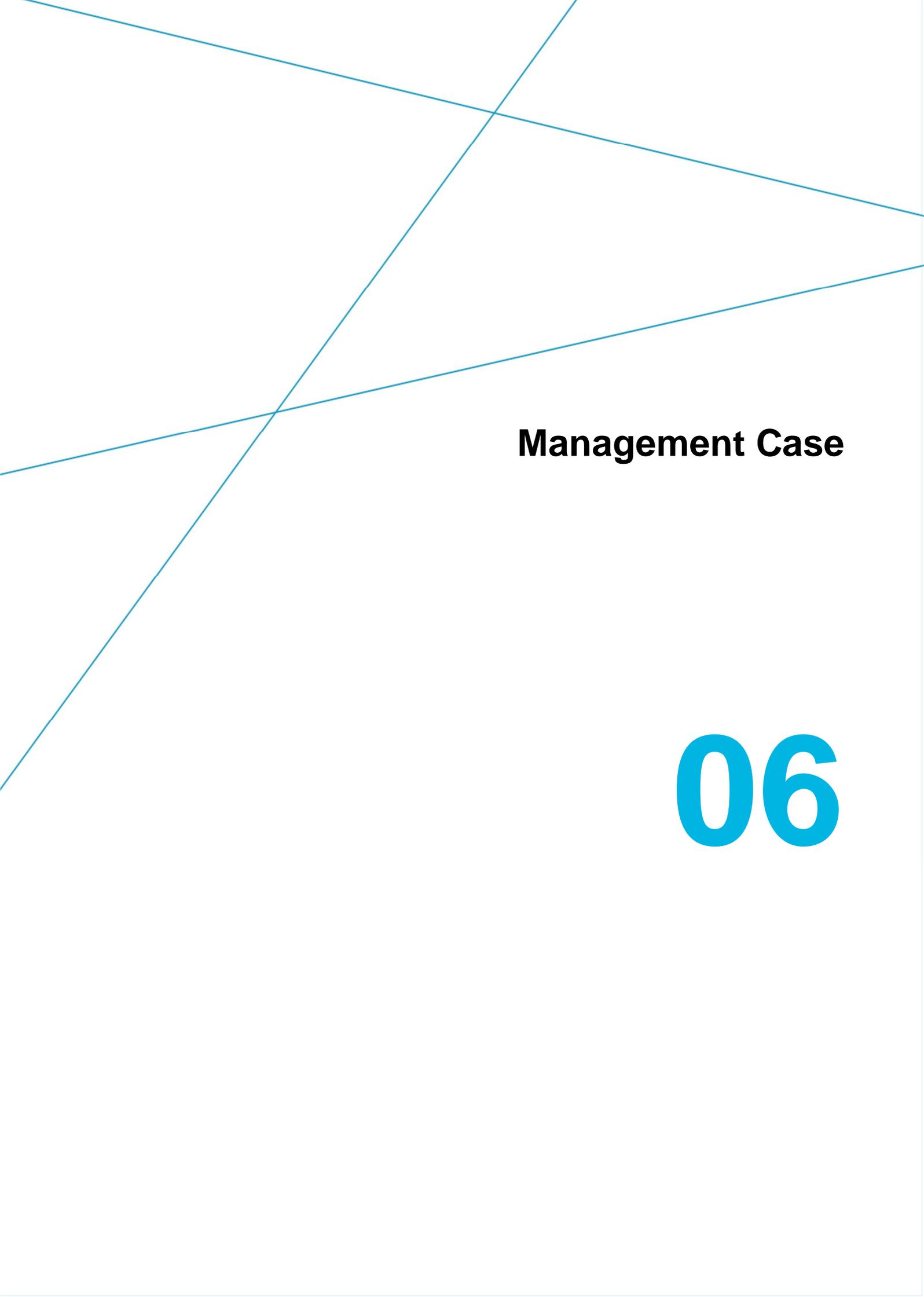
Delivery

- 5.3.10** The scheme will be split into key stages which cover design, planning process, construction and aftercare:
- Key Stage 2 – development of business case and selection of the procurement route;
 - Key Stage 3 – Completion of options review and Preliminary Design;
 - Key Stage 4 – Statutory procedures (Section 24 Highways Act 1980);

- Key Stage 5 – Assessment of Design and Build options (Only required for the Intermediate Option); and
- Key Stages 6 and 7 – Detailed Design, Construction and Aftercare.

5.3.11

Based on the objectives of earliest start and completion date for construction, earliest understanding of the contractor's tendered cost, and the minimum exposure to construction risk, Early Contractor Involvement is the preferred procurement strategy for this scheme.



Management Case

06

Management Case

6.1 Introduction

6.1.1 The role of the management case is to outline the steps being taken to ensure that the scheme is deliverable.

6.2 Evidence of Similar Projects

6.2.1 The ECI form of Contract that has been proposed for this scheme (as detailed in Section 5.3) has been successfully used on several highways contracts for the Transport Department, including M4 Widening, A465 Section 3, A470 Cwmbach to Newbridge-on-Wye and A477 St Clears to Red Roses Improvements.

6.3 Dependencies with other projects and programmes

6.3.1 The delivery of the scheme would not be dependent on any other programmes or projects. However, National Grid are currently looking to upgrade their overhead power lines across the Menai and the Welsh Government have had discussions relating to upgrade options and National Grid programme. There is potential for the 3rd Menai Crossing to be delivered in tandem with this programme, as detailed in *Section 2*.

6.4 Governance, organizational structure and roles

6.4.1 Overall responsibility for the delivery of major road schemes in Wales lies with the Deputy Director of Infrastructure Projects, who reports directly to the Director for Transport.

6.4.2 The Core Management Team will be responsible for the day-to-day detailed management of the scheme. The Core Management Team will be led by the Welsh Government Project Managers and will, when appointed, includes representatives of the Employer's Agent and members of the Contractor team procured to deliver the scheme. The primary activities will include:

- Promoting the scheme both internally and to external partners and stakeholders;
- Ensuring the scheme delivered is the optimum solution;
- Ensuring scheme activities comply with Welsh Government policy;
- Ensure the scheme complies with its commitment to the Sustainability Objective of the Welsh Government;
- Ensuring the scheme is delivered to budget & programme; and
- Ensuring the scheme delivers Value for Money within delegated financial commitments.

6.4.3 The Core Management Team will report to a Strategic Board who will oversee the strategic direction of the scheme. The Strategic Board will comprise of senior personnel from the Transport Division within Welsh Government. The role of the Strategic Board is to:

- Consider and approve the on-going Business Case to enable scheme development to continue;
- Agree the final procurement option;
- Approve the preferred bidder;
- Agree on a high level project timetable for delivery; and
- Review the scheme against Policy objectives at agreed milestones and provide continued commitment and endorsement where appropriate.

6.4.4 The scheme will also include arrangements for strategically managing the scheme between key milestones. The role will manage by exception and only intervene with the work of the Project Team where necessary:

- Create an environment in which the scheme can thrive;
- Advise and support the Project Team;
- Setting boundaries between key decision points;
- Championing early dispute resolution where possible; and
- Promoting the ethos of partnering.

6.5 Programme/Project Plan and Reporting

6.5.1 Day to day progress on project will be managed by the Transport Division's Project Director against an agreed delivery programme and expenditure profile.

6.5.2 Formal progress meetings will be held monthly to exchange information, discuss scheme progress, contentious issues and take a forward look at the work ahead. The progress meetings will be minuted and attended by the Welsh Government, the Employer's Agent, the contractor and the engineering and environmental design representatives.

6.5.3 Quarterly Finance Meetings review matters of cost and programme which are presented via dashboards by the project team to the Programme Manager and Head of Procurement.

6.5.4 A Project Board comprising senior personnel from each of the main parties to the scheme will be established. The Project Board manages by exception to monitor performance of the scheme intervening with the work of the project team for issues such as early dispute resolution that cannot be achieved by the project team.

6.5.5 The Welsh Government Community Benefits Measuring Toolkit will be used on the scheme to track primarily the direct contribution made by schemes to the local and national economy in accordance with the Welsh Government guide, "Community Benefits: Delivering Maximum Value for the Welsh Pound." This information is recorded quarterly.

6.5.6 Key Performance Indicators (KPIs) will be used to monitor and track the performance of consultants and contractors KPIs are evidence-based and standardised, and will consider the following criteria for evaluation:

- Client Satisfaction – Service;
- Client Satisfaction – Product;
- Stakeholder and Community Engagement;
- Management of Programme and Cost;
- Health and Safety Performance; and
- Environmental Performance.

6.5.7 KPI assessments are conducted quarterly between Employers Agent, Contractor and Client. Contractors and consultants are required to provide evidence to Welsh Government to justify why certain marks are warranted.

6.6 Assurance and approvals plan

6.6.1 The scheme will be progressed in line with the Transport Divisions linear Key Stage Approval process to obtain financial approval for projects through all stages of design and construction. The next stage is to appoint design consultants to undertake a detailed Key Stage 2 appraisal which will lead to the announcement of a preferred option.

6.6.2 The Infrastructure Delivery Division of the Welsh Government are continually constructing highway improvements and have a policy of continual enhancement of the highway network.

6.6.3 Following Key Stage 2 and the announcement of the preferred option there is a requirement to submit a Key Stage Approval form which seeks assurances and approvals to move onto the next stages of design development.

6.7 Communication and stakeholder management

6.7.1 A detailed stakeholder and communications plan will be prepared as part of Stage 2. As discussed in *Section 2.8* and *Section 2.10* a range of initial stakeholder engagement has taken place which demonstrates strong internal and external support for a scheme. A detailed stakeholder mapping exercise should be undertaken in Key Stage 2 assessment, but key audiences will likely include:

- Welsh Ministers;
- Assembly Members;
- Council Members;
- Welsh Government Project Team;
- Welsh Government Network Management;
- North & Mid Wales Trunk Road Agent;
- Local Authorities;
- All transport users in the vicinity of the scheme;
- Local residents and landowners directly affected by the scheme;
- Local businesses;
- Statutory organisations (including environmental bodies);
- Public Utility Companies; and
- National and local interest groups.

6.7.2 The proposed methodology for engaging stakeholders and determining the Communications Plan will focus on demonstrating:

- What are the key messages to be communicated?
 - Scheme objectives;
 - Impacts and mitigation proposals;
 - Costs;
 - Key project milestone dates;
 - Points of contact; and
 - Methods of engagement.

- Who are the stakeholders and why are they interested in the project?
- When and how will stakeholder management be administered?
- What mediums of communication will be used and when?

6.7.3 The Communications Plan will be used to record the details of the stakeholders, their attitude to the scheme, their level of power, interest and engagement and how this will be managed.

6.8 Risk Management Strategy

6.8.1 Effective identification and management of risk is a key aspect in the management of the final costs and programme of the global action.

6.8.2 The process undertaken in analysing and managing risk on projects is outlined in Part 4 of the Welsh Government's "Value for Money Manual: Risk Analysis and Management."

6.8.3 The scheme has a formal risk management approach to enable informed decision-making, reduce the likelihood of unanticipated events and address unresolved risk items at the earliest opportunity. The action will have a dedicated Risk Manager to oversee the risk management process, management of the risk register and allocation of owners for each risk. A risk register will be developed for all project activities. A quantitative risk assessment methodology will be developed which will be actively managed as a live process throughout the project.

6.8.4 Risks will be considered throughout the development of the project and the risk profile forms a key component of the Key Stage Approval process. Much of the project team's development work in KS3 & KS4 will involve understanding, quantifying and controlling project risks whilst driving value through the design process.

6.8.5 ECI procurement has advantages in relation to managing risk as it provides the opportunity to gain contractor input into the process at the earliest opportunity and enables thorough and transparent analysis. At the start of construction risks are clearly allocated to the parties on the basis of which is best able to positively influence the outcome.

6.9 Monitoring and Evaluation

6.9.1 While a full monitoring and evaluation strategy is not required at the SOC level, some consideration has been made in relation to future requirements. The scheme objectives as outlined in *Section 2.4* and logic map will help to define the scope of the monitoring and evaluation required. The M&E Plan will be developed in detail at Key Stage 2 and will follow best practice prescribed by the DfT and in HM Treasury's Magenta guidance.

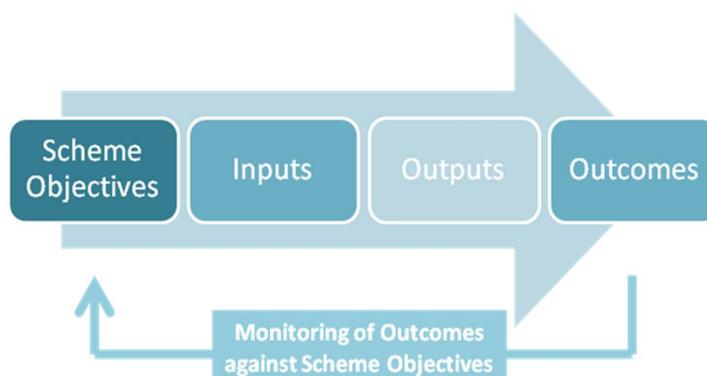
6.9.2 Proportionate and regular monitoring and evaluation of the scheme delivery process and its outcomes is key to ensuring:

- The scheme is performing as intended and demonstrates value for money;
- Any problems and/or possible improvements are identified;
- Key performance indicators are monitored;
- Established objectives are being achieved; and
- The delivery body learn lessons for future major scheme delivery.

6.9.3 Monitoring of the outcomes of the scheme will aid in the valuation of the project as a whole. This will enable an understanding of the impacts of the scheme and determine whether the scheme has been successful in achieving its intended objectives. It is

proposed to produce a Monitoring Plan for the 3rd Menai Crossing which will clearly define the scope, context and rationale for the monitoring, set out the objectives and present the input, output and outcome monitoring, including the indicators to be used. The main components of the monitoring plan are set out below, along with the likely benefits of the scheme.

- 6.9.4** Logic mapping assists in the clarification of what is being delivered, the anticipated outcomes and the opportunities for monitoring. The Logic Map produced and discussed in *Section 2.7* and *Figure 2.16* will play a crucial role in the development of a Monitoring and Evaluation Plan. The logic map outlines the objectives for the scheme and links the inputs and outputs with the outcomes that can be derived from the scheme. It is anticipated that the logic map will be reviewed and updated as baseline monitoring is developed.
- 6.9.5** A critical decision to be made in developing a robust yet proportional Monitoring Plan is the extent of outcome monitoring. The logic map prepared highlights a range of first, second and third order outcomes considered likely to result from investment. Another way of considering first, second and third order changes is to present them as scheme specific, network and wider area outcomes.
- 6.9.6** The derivation of simple key indicators for each scheme objective aims to capture the impacts fully, but without waste. The use of SMART (Specific, Measurable, Achievable, Realistic and Time scaled) indicators, where appropriate, will enable the Welsh Government to draw accurate comparisons over time. It is important that the measurement of change can be related back to the scheme objectives and beyond that, to the overall vision for the scheme.

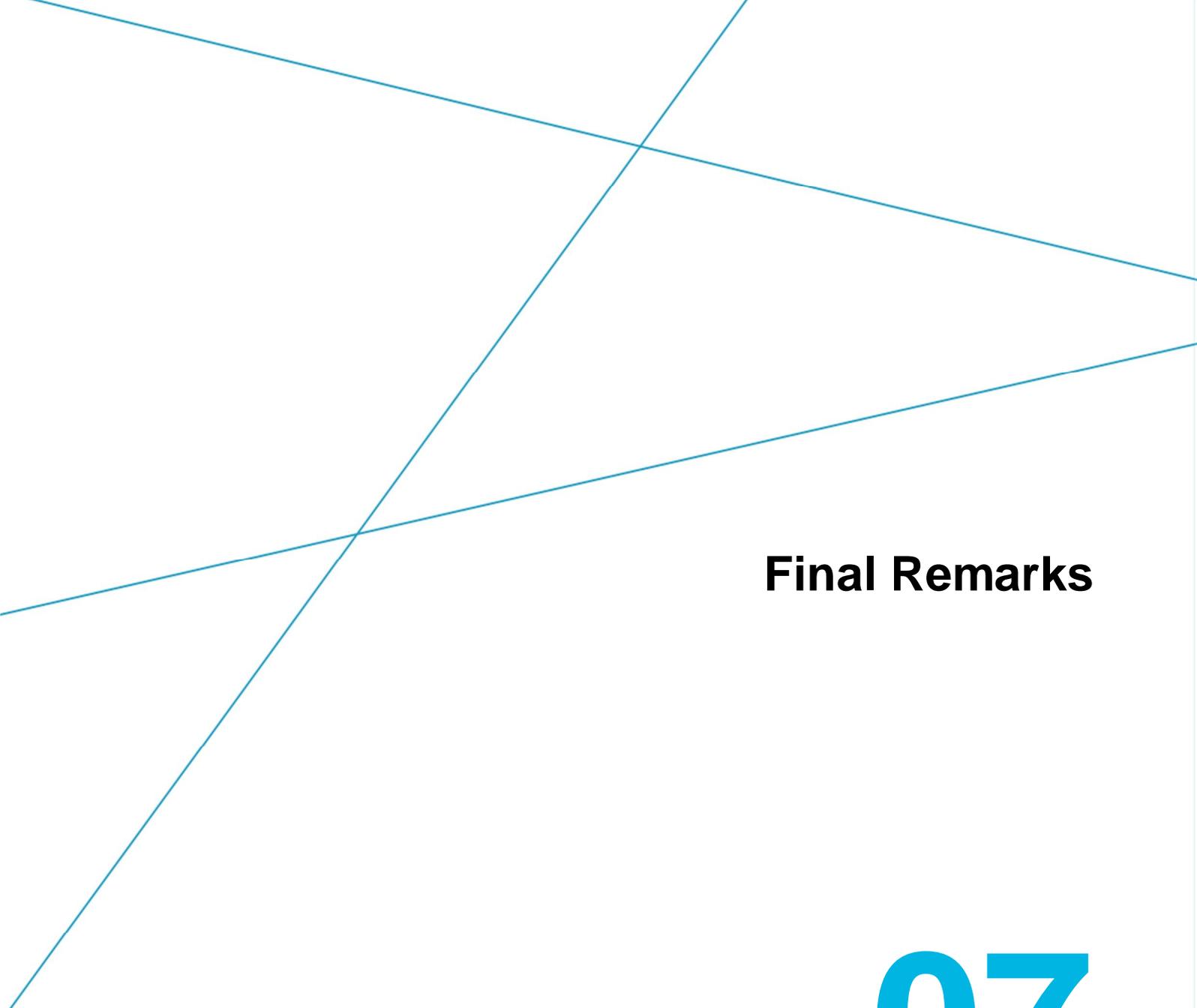


- 6.9.7** While it is premature to define the parameters that will be monitored and the precise evaluation methodology at this stage, consideration will be given to the availability of data, the practicality of obtaining it, whether it will properly reflect the indicators and the cost of obtaining it. Monitoring of several key performance indicators are likely to already occur on a regular basis by local, regional or national government organisations.

6.10 Project Management Options

- 6.10.1** At this stage of the project, the project will be managed by the Transport Division's Project Director with assistance from the Project Engineer against an agreed delivery programme and expenditure profile.
- 6.10.2** Formal progress meetings will be held monthly to exchange information, discuss scheme progress, contentious issues and take a forward look at the work ahead. The progress meetings will be minuted and attended by the Welsh Government and the Key Stage 2 consultant comprising of the engineering and environmental design representatives.

- 6.10.3** Quarterly Finance Meetings review matters of cost and programme which are presented via dashboards by the project team to the Programme Manager and Head of Procurement.
- 6.10.4** A Project Board comprising senior personnel from each of the main parties to the scheme will be established. The Project Board manages by exception to monitor performance of the scheme intervening with the work of the project team for issues such as early dispute resolution that cannot be achieved by the project team.

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Final Remarks

07

Final Remarks

7.1 Summary

7.1.1 This Strategic Outline Case has built on previous options reports in 2008, 2009 and 2011 to produce a report, complying to WelTAG standards that set out the business case for investment in a new crossing.

7.1.2 The proposed 3rd Menai Crossing is a scheme to construct a new bridge adjacent to the existing A55 Britannia Bridge.

Aims, objectives and anticipated outcomes

7.1.3 The fit of the scheme to local and national strategic policy and objectives has been clearly demonstrated in *Section 2.5*. It aims to improve journey times, journey reliability, resilience, access for non-motorised users and promote road safety. More specifically the scheme will aim to address the following objectives.

- **TPO1: To improve journey times** between Junctions 7 and 10 of the A55 during the peak periods, and to maintain improved levels of journey time when compared to the traffic forecast until 2027 (the current design year);
- **TPO2: To improve journey time reliability** between Junctions 7 and 10 of the A55, as measured by the standard deviation from the mean;
- **TPO3: To improve network resilience** and reduce reliance on the use of the Menai Bridge as an alternative route during maintenance or emergencies, by ensuring that at least two lanes of traffic are available to cross the Menai Straits at all times in each direction;
- **TPO4: To improve accessibility for non-motorised users** crossing the Menai Strait through the provision of additional walking and cycling links. These should facilitate access to existing long distance routes includes the Lon las Cymru (North) cycle route, which passes the A55 at junction 8 and 9, and crosses the Menai Strait on the Menai Bridge; and
- **TPO5: To promote road safety** by ensuring that the number of personal injury accidents for vehicle trips crossing the Menai Strait, and their severity ratio, do not increase.

7.1.4 The impact of not investing in the scheme has been clearly set out, with detrimental effects on the economy of the Isle of Anglesey and north west Wales, poor international connectivity and worsening performance of the trunk road network in terms of journey times, reliability and resilience. All of which will constrain the opportunity for future growth in Anglesey, surrounding areas and in particular impact on the ability of the Nuclear Power Programme to achieve its full potential. Initial modelling will need to be updated as part of Key Stage 2 to confirm the extent of existing and future network constraints – including the role of the scheme in addressing local connectivity constraints across the Menai.

Value for Money and Costs

7.1.5 The estimated whole life scheme cost (PVC) for a new provision across the Menai is in the range of £95m to £154m. This includes an allowance for risk and optimism bias (44%).

7.1.6 The Transport Case of the scheme has been set out, demonstrating the benefits of journey time improvements and costs of construction. Appraisal Summary Tables have been completed to demonstrate the impacts of the four options. Sensitivity and risk to the BCRs calculated have been outlined. A medium to high Value for Money has been estimated, based on benefits calculated, a real decrease in costs and case studies of similar schemes implemented elsewhere. This again will require further modelling verification as part of key stage 2 to ensure the BCR and associated wider economics are accurately reflected and up to date.

Risks and dependencies

7.1.7 Constraints, risks and dependencies have been identified and will need to be continued to be managed to ensure delivery of the scheme. Potential mitigation of these risks has been outlined, along with a review of stakeholders. A quantified risk assessment is recommended for completion as part of Key Stage 2. Key risks for WG to consider at this stage are listed as follows:

- Funding for progression of the scheme;
- Existing National Grid crossing reduces options for crossing location;
- Significant environmental constraints;
- Demand for freight accessing Port of Holyhead declines;
- Currently proposed developments on Anglesey do not go ahead; and
- Traditional journey time benefits are not significant enough to provide an attractive BCR (it is critical that existing forecasts are updated as part of key stage 2).

7.2 Next Steps and Other Recommended Short Term Tasks

7.2.1 It is apparent from previous work prepared by Atkins and this updated document that there is a case to take the scheme forward to Key Stage 2. A key focus of Key Stage 2 will be to update and develop a more current understanding of the likely traffic impacts of the scheme and associated scheme impacts and costs.

7.2.2 Proposals regarding the immediate next steps in the project development process are outlined below. Furthermore, a number of recommendations have been made on transport modelling requirements for KS2 based on review of work undertaken to date and WebTAG.

Next Steps

7.2.3 There are a number of tasks that need to be progressed to move the scheme forward, these are listed as follows:

- Funding submission to Nuclear Power Programme needs to be prepared by end of June 2016, if intention is to seek funding for Key Stage 2 from this source;
- Seek approval from Minister to progress to Key Stage 2; and
- Commence procurement exercise for KS2 Consultant.

Other Short Term Technical Tasks

7.2.4 Prior to appointment of KS2 Consultant, there is merit in progressing with certain technical tasks which will assist in mitigating risks which have been identified during the development of the SOC. These are generally desktop studies, and allow a cost

effective way to identify potential show stoppers, or opportunities for reducing cost risk.

7.2.5 Prior to formal reporting in accordance with HD 22/08, a high level geotechnical review will be undertaken for each of the options being considered. The purpose of the high level geotechnical review will be to identify any key ground hazards which will require to be taken into consideration when selecting the preferred route. This will include:

- A review of the geological maps;
- A review of the readily available historic ground investigation data;
- A review of the available historic OS maps; and
- A review of the past seismic activity in the Menai area.

7.2.6 A “C2” level utilities search across the study area will be beneficial, as this can be a time consuming task. This information can then be presented on a single set of drawings and made available to KS2 consultant.

Transport Modelling Recommendations

7.2.7 The current case is primarily based on dated modelling, and has little consideration for local growth in investment and jobs. A development of a case for investment in both these areas will strengthen the argument in terms of local benefits to the scheme, such as economic growth and an improvement in the localised transport situation.

7.2.8 To date the modelling work in the study area has focused on development of a Paramics model. As detailed in *Appendix B*, this model was last updated in 2007 and currently has a base year of 2007. Whilst this model may have been appropriate for operational testing undertaken to date, there is a requirement for a modelling platform that meets WelTAG modelling criteria, and critically meets the robust requirements needed for economic appraisal of options.

7.2.9 For Key Stage 2 a new strategic model should be developed that is compliant with latest WebTAG modelling standards and includes:

- Highway model – covering the current A55 Britannia Bridge crossing as well as local roads in Bangor and A5 Menai Bridge and the existing local Menai crossing.
- Public transport model – including road based modes (bus) and rail; and
- Demand model – to capture changes in mode as a result of additional road capacity and reduced road congestion in option scenarios.

7.2.10 It is recommended that the model developed at Key Stage 2 should be specified so that it is appropriate for use at Key Stage 3.

7.2.11 Analysis of TrafficMaster average speed data in this report indicates there is significant congestion on local roads and the existing alternative Menai crossing used by local traffic. This means that while the objectives of the study relate to the trunk road network and congestion on the A55 Britannia Bridge the modelling will need to cover a sufficiently wide area, to a sufficient level of detail, to capture the local roads, alternative routes and approaches to the existing alternative Menai crossing. It is likely that additional capacity and reduced congestion on the A55 crossing may draw some trips from the local road network and congested existing alternative crossing.

7.2.12 Given the nature of the 3rd Menai crossing scheme particular emphasis will need to be given to the development assumptions adopted during the forecasting stage, with particular emphasis on the role the scheme could play in facilitating nuclear power related development. It is likely that a series of future development scenarios will need to be developed based on the level of new development that is expected and feasible under varying levels of new infrastructure provision.

- 7.2.13** Further consideration is also required as to whether there is a need, or value, in developing a holiday period model to capture the benefits of scheme options during high flow holiday peaks when significant volumes of strategic traffic use the existing crossing to access the Isle of Anglesey and onward destinations via the Port of Holyhead. This analysis should consider flow volumes across existing A55 crossing with an aim to identify the range of times within the year when flows fall outside the standard AM peak, IP and PM peak periods, and whether this is large enough to significantly impact the benefit calculations. This analysis will inform the scale of 'lost' benefits which may result from adopting a more standard model period structure allowing an informed decision on which periods a Key Stage 2/3 model should consider.
- 7.2.14** To allow the development of the three models outlined above, additional surveys will be required. New origin – destination (OD) trip data is required to develop the base year model. The traditional techniques for collecting such data would be roadside interviews (RSI) and traffic counts (MCC and ATC). These surveys would need to be undertaken in a neutral month avoiding main and local holiday periods, local school holidays and half terms, and other abnormal traffic periods.
- 7.2.15** WebTAG Unit M1.2 section 3.3.6 identifies that national experience is that the following Monday to Thursdays can be considered as neutral:
- Late March and April – excluding the weeks before and after Easter;
 - May - excluding the Thursday before and all of the week of each Bank Holiday;
 - June;
 - September – excluding school holidays or return to school weeks;
 - All of October; and
 - All of November – provided adequate lighting is available.
- 7.2.16** To give programme benefits Welsh Government may want to consider bringing forward the data collection to allow surveys to be undertaken in Autumn 2016 window (September to November) and to avoid delaying subsequent modelling work by having to wait until spring 2017 to collect new data.
- 7.2.17** An alternative to RSI data would be the use of mobile phone data which the Welsh Government is currently reviewing on a national basis. Use of this type of data would, however, have to be reviewed in the context of the rural nature of the study area with reference to the spatial scale of trip origin and destination disaggregation achievable given by the level of coverage of mobile phone masts in the study area. It has typically been the case that mobile trip data underrepresents short distance trips and that the length of trips below which representation is weak is greater in rural areas (where mast density is generally lower) than urban areas.

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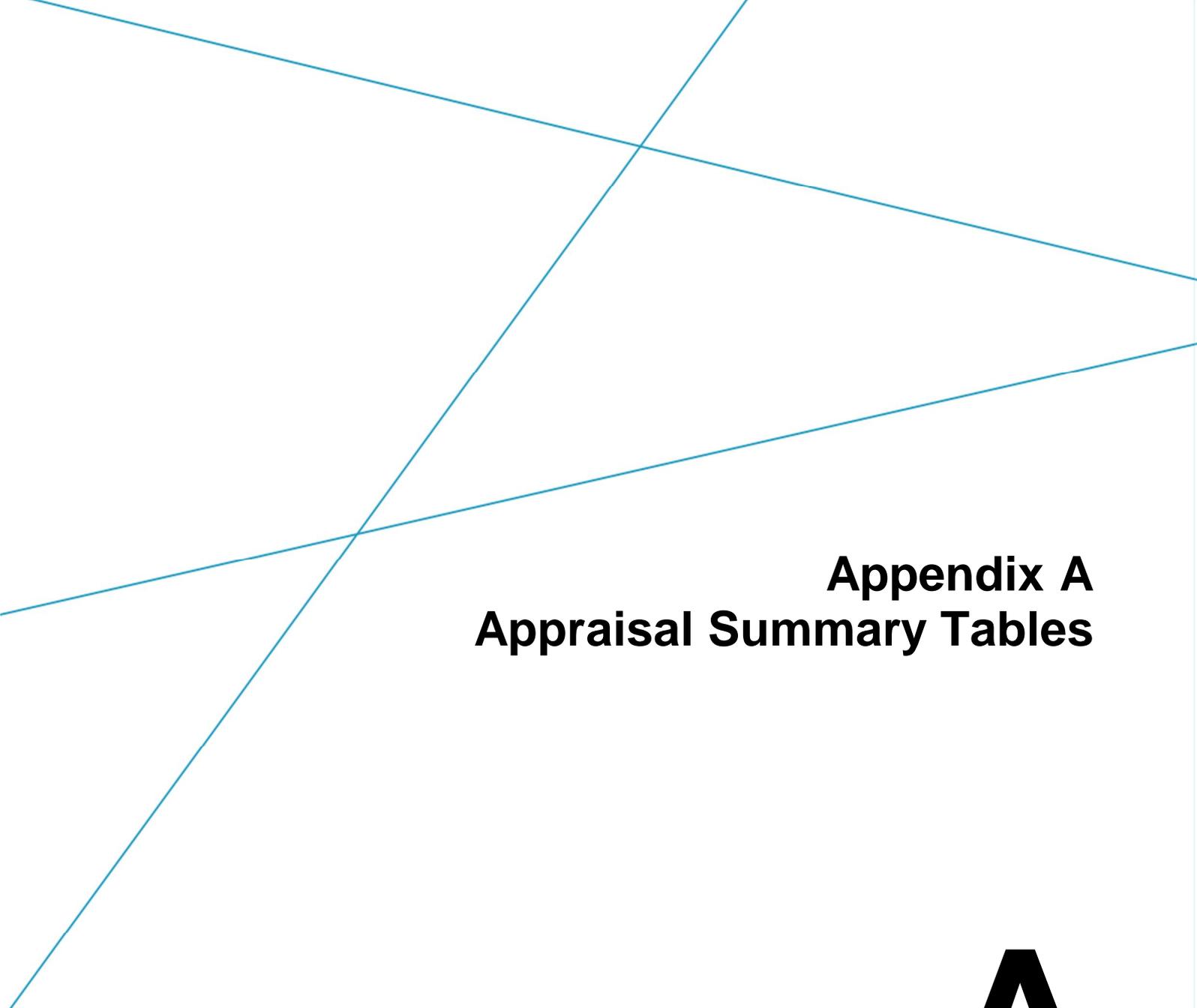
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3rd Menai Crossing

**Strategic Business Case
Appendices**

May, 2016



Appendix A
Appraisal Summary Tables

A

Appendix A – Appraisal Summary Tables

1.1 Introduction

1.1.1 Appraisal summary tables have been created for each proposed option to allow easy comparison. The significance of each criteria has been ranked according to a qualitative 7-scale colour coding system as follows:

Large Beneficial
Moderate Beneficial
Slight Beneficial
No (or Minimal) Impact
Slight Adverse
Moderate Adverse
Large Adverse

1.2 Option DS 1E – Multi-Span Bridge East



Option DS 1E – Multi-Span Post Tensioned Concrete Box, east of Britannia Bridge

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Welsh Impact Areas			
Economy			

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Transport Economic Efficiency	A significant reduction in travel time in AM and PM peaks is expected. A NPV in 2002 prices was calculated at £85m, with a BCR of 1.89, demonstrating medium value for money. This will improve efficiency and reliability of people and freight movements. Provision will be made for cyclists and pedestrians, improving connectivity and efficiency for active modes, improving the sustainable movement of people.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists. Active modes.	Moderate Beneficial
Economic Activity and Location Impact	Scheme will improve connectivity on a key trunk road and TEN-T, benefitting local, national and international trips to Ireland, England and continental Europe. Access to employment opportunities and future development sites will be improved. Peak summer flows on the existing bridge demonstrate the importance of the connectivity to visitor attractions, which will be improved with a new crossing. A new crossing will reduce delay, improve connectivity and resilience, thereby increasing the attractiveness of the Isle of Anglesey for a wide range of economic activity.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists.	Moderate Beneficial
Environment			
Noise	There will be a slight increase in noise due to increased flows as a result of releasing suppressed demand. Some residents alongside the road either side of the Menai Strait may experience an increase in noise as a result. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of noise will not change.	Properties in close proximity to the A55 either side of Menai Strait	Slight Adverse
Local Air Quality	There may be a slight decrease in local air quality due to increased flows. However, less queuing traffic will mean more efficient engine operation. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of exhaust fumes will not change.	Properties in close proximity to the A55 either side of Menai Strait	Neutral

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Greenhouse Gas Emissions	An increase in the number of trips may be realised as a result of improvements releasing suppressed demand. However, less queuing traffic will mean more efficient engine operation and fewer emissions.	No significant distributional impacts	Neutral
Landscape and Townscape	A new low level structure will impact on the landscape. The profile of the new crossing will be matched as closely as possible to the existing Britannia Bridge to minimise the impact. The new bridge will pass between the two existing historical crossings, thereby breaking the visual connect between the two. The bridge will be visible from local communities including Menai Bridge and Capel-y-graig.	Residents in the vicinity of the Menai Strait	Slight Adverse
Biodiversity	The Coedydd Afon Menai Site of Special Scientific Interest (SSSI) lies directly to the east of the existing crossing on the Gwyndd side, meaning this scheme will have a direct impact on the woodland area. The proposed scheme will pass through Glannau Portaethwy SSSI, directly to the east of the existing crossing on the Isle of Anglesey. This site is designated for marine purposes so a new crossing will have limited impact if pier locations are carefully considered.	SSSI sites	Moderate Adverse
Heritage	The existing Britannia Bridge is a listed structure, with the proposed scheme passing close to, but not directly impacting upon it. The view of the Britannia Bridge will be impacted by the new structure, although a low profile and careful pier placement will limit this to views looking west towards the bridge only. The visual connect between the two historical crossings will be lost.	Communities and sites that have current views of the Britannia Bridge	Moderate Adverse

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Water Environment	A new pier would be required in the middle of the Menai Strait, although part of the structure could rest upon the natural island. The Y Fenai A Bae Conwy (Menai Strait and Conwy Bay) Special Area of Conservation (SAC) lies underneath the existing crossing and thus will be impacted by a new crossing. However, the SAC boundary is at mean low water level, and therefore coastal construction is likely to be adjacent but not within the SAC. The central pier of this option is required to be built inside the SAC, partially on a small island in the Strait. Careful consideration of the location of the piers can limit impact on the environment and water dynamics by utilising the existing island and central pier of the Britannia Bridge.	SAC sites	Moderate Adverse
Soil	There will be limited construction on the ground as the scheme is predominantly a bridge. Careful consideration of the location of the piers can limit impact on soils.	No significant distributional impacts	Neutral
Society			
Transport Safety	A quantitative review of safety benefits has not yet been undertaken. However the creation of a new carriageway will likely improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Moderate Beneficial
Personal Security	The scheme will have limited impact on personal security. Consideration can be made to ensure adequate lighting is in place for pedestrians and cyclists on the crossing and any new paths that connect the scheme to the existing network of paths.	No significant distributional impacts	Neutral

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Permeability	Connectivity between the Isle of Anglesey and Gwynedd will improve for all users due to improved journey times and increased resilience. Pedestrians will benefit significantly as they are currently banned from the Britannia Bridge. Cyclists will benefit through provision of a segregated path, meaning the crossing will become significantly more attractive as the route will avoid a busy trunk road.	All road users, including active modes	Large Beneficial
Physical Fitness	Provision of a segregated facility for pedestrians and cyclists will encourage more use of active modes across the Menai Strait, through improved connectivity and personal safety. There is an existing cycle and pedestrian paths are in the area demonstrating demand for both local residents and tourists. Linking two areas together will likely improve the attractiveness of cycling and walking in the area, improving physical fitness.	Active modes	Moderate Beneficial
Social Inclusion	Improved connectivity and permeability will improve social inclusion by better connecting communities. Employment opportunities will be more accessible to all, and the attractiveness of the area to new businesses and residents will increase.	Local residents	Moderate Beneficial
Equality, Diversity & Human Rights	The proposed crossing will aim to meet the needs of all groups of people, with no barriers to equality, diversity or human rights.	No significant distributional impacts	Neutral
Transport Planning Objectives			
TPO1: To improve journey times	The scheme will improve journey times through the provision of a new carriageway during both AM and PM peaks, as well as during peak summer weekends.	All road users	Moderate Beneficial
TPO2: To improve journey time reliability	Reduction of congestion will improve journey time reliability, with less queueing and more predictable journey times	All road users	Moderate Beneficial

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
TPO3: To improve network resilience	Addition of a new crossing will improve network resilience by providing alternate options during essential maintenance. Provision of a hard shoulder will reduce issues related to accidents or broken down vehicles, and ensure emergency vehicle access is greatly improved in the event of an incident.	All road users Emergency services	Large Beneficial
TPO4: To improve accessibility for non-motorised users	Provision of a segregated path for pedestrians and cyclists will improve accessibility for active modes, with the former banned from the existing crossing and the latter disincentivised from using the crossing due to sharing space with motorised vehicles.	Active modes	Large Beneficial
TPO5: To promote road safety	The creation of a new carriageway will improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Large Beneficial
Other Considerations			
Public Acceptability	There is significant public support of a new crossing. During public consultation in 2007 there was overwhelming support for a new crossing, with the option that has evolved into DS 1E ranked highest, with 39% preferring it.		
Acceptability to other stakeholders	There is significant stakeholder support for a new crossing. During a 2007 stakeholder workshop, the option that has evolved into DS 1E was ranked 2 nd out of 8. A formal Environmental Impact Assessment will be required to comply with Environment Agency Wales requirements due to the pier in the Menai Strait, a SAC, as well as proximity and interaction with other SSSIs. The eastern alignment will ensure there is no conflict with existing or proposed National Grid high voltage crossings of the Menai Strait.		
Technical and operational feasibility	This option has been determined to be technically feasible, with other construction methods and designs ruled out during the option appraisal process. The bridge will operate with two running lanes, a hard shoulder, a verge and a segregated pedestrian and cycle path. These elements are considered suitable and would not cause any feasibility issues at this stage.		

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Financial affordability and deliverability	This option has a cost of £98.6m in 2015 prices. There are numerous options to be explored with regards to funding sources. It is considered this option is deliverable by 2021/22.		
Risks	<p>Several risks to the project are detailed within the main SOBC. Risks that are unique to this or some (but not all) options are as follows:</p> <ul style="list-style-type: none"> · Impact to SAR due to multi-span bridge deemed unacceptable; and · Impact to SSSI due to eastern alignment deemed unacceptable. 		

1.3 Option DS 2E – Single Span Bridge East



Option DS 2E – Single Span Cable Stayed, east of Britannia Bridge

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Welsh Impact Areas			
Economy			

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Transport Economic Efficiency	A significant reduction in travel time in AM and PM peaks is expected. A NPV in 2002 prices was calculated at £26m, with a BCR of 1.17, demonstrating low value for money. This will improve efficiency and reliability of people and freight movements. Provision will be made for cyclists and pedestrians, improving connectivity and efficiency for active modes, improving the sustainable movement of people.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists. Active modes.	Moderate Beneficial
Economic Activity and Location Impact	Scheme will improve connectivity on a key trunk road and TEN-T, benefitting local, national and international trips to Ireland, England and continental Europe. Access to employment opportunities and future development sites will be improved. Peak summer flows on the existing bridge demonstrate the importance of the connectivity to visitor attractions, which will be improved with a new crossing. A new crossing will reduce delay, improve connectivity and resilience, thereby increasing the attractiveness of the Isle of Anglesey for a wide range of economic activity.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists.	Moderate Beneficial
Environment			
Noise	There will be a slight increase in noise due to increased flows as a result of releasing suppressed demand. Some residents alongside the road either side of the Menai Strait may experience an increase in noise as a result. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of noise will not change.	Properties in close proximity to the A55 either side of Menai Strait	Slight Adverse
Local Air Quality	There may be a slight decrease in local air quality due to increased flows. However, less queuing traffic will mean more efficient engine operation. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of exhaust fumes will not change.	Properties in close proximity to the A55 either side of Menai Strait	Neutral

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Greenhouse Gas Emissions	An increase in the number of trips may be realised as a result of improvements releasing suppressed demand. However, less queuing traffic will mean more efficient engine operation and fewer emissions.	No significant distributional impacts	Neutral
Landscape and Townscape	A new tower structure will impact on the landscape. The new bridge will pass between the two existing historical crossings, thereby breaking the visual connect between the two. The bridge will be visible from a wide area, with towers approximately 80m high.	Residents in the vicinity of the Menai Strait	Moderate Adverse
Biodiversity	The Coedydd Afon Menai SSSI lies directly to the east of the existing crossing on the Gwyndd side, meaning this scheme will have a direct impact on the woodland area. The proposed scheme will pass through Glannau Portaethwy SSSI, directly to the east of the existing crossing on the Isle of Anglesey. This site is designated for marine purposes so a new crossing will have limited impact if pier locations are carefully considered.	SSSI sites	Moderate Adverse
Heritage	The existing Britannia Bridge is a listed structure, with the proposed scheme passing close to, but not directly impacting upon it. The view of the Britannia Bridge will be impacted by the new structure, with new towers dwarfing the existing structure from all view points. However the profile of the road deck will be less obstructive than other options. The visual connect between the two historical crossings will be lost.	Communities and sites that have current views of the Britannia Bridge	Moderate Adverse

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Water Environment	New piers would be required adjacent to the Menai Strait but the new structure itself would pass over the Y Fenai A Bae Conwy (Menai Strait and Conwy Bay) SAC. There is less restriction on span length due to the cable stayed design, meaning it will be easier to mitigate any impacts as the location of piers can be redesigned to reflect environmental concerns.	No significant distributional impacts	Neutral
Soil	There will be limited construction on the ground as the scheme is predominantly a bridge. Careful consideration of the location of the piers can limit impact on soils.	No significant distributional impacts	Neutral
Society			
Transport Safety	A quantitative review of safety benefits has not yet been undertaken. However the creation of a new carriageway will likely improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Moderate Beneficial
Personal Security	The scheme will have limited impact on personal security. Consideration can be made to ensure adequate lighting is in place for pedestrians and cyclists on the crossing and any new paths that connect the scheme to the existing network of paths.	No significant distributional impacts	Neutral

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Permeability	Connectivity between the Isle of Anglesey and Gwynedd will improve for all users due to improved journey times and increased resilience. Pedestrians will benefit significantly as they are currently banned from the Britannia Bridge. Cyclists will benefit through provision of a segregated path, meaning the crossing will become significantly more attractive as the route will avoid a busy trunk road.	All road users, including active modes	Large Beneficial
Physical Fitness	Provision of a segregated facility for pedestrians and cyclists will encourage more use of active modes across the Menai Strait, through improved connectivity and personal safety. There is an existing cycle and pedestrian paths in the area demonstrating demand for both local residents and tourists. Linking two areas together will likely improve the attractiveness of cycling and walking in the area, improving physical fitness.	Active modes	Moderate Beneficial
Social Inclusion	Improved connectivity and permeability will improve social inclusion by better connecting communities. Employment opportunities will be more accessible to all, and the attractiveness of the area to new businesses and residents will increase.	Local residents	Moderate Beneficial
Equality, Diversity & Human Rights	The proposed crossing will aim to meet the needs of all groups of people, with no barriers to equality, diversity or human rights.	No significant distributional impacts	Neutral
Transport Planning Objectives			
TPO1: To improve journey times	The scheme will improve journey times through the provision of a new carriageway during both AM and PM peaks, as well as during peak summer weekends.	All road users	Moderate Beneficial
TPO2: To improve journey time reliability	Reduction of congestion will improve journey time reliability, with less queueing and more predictable journey times	All road users	Moderate Beneficial

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
TPO3: To improve network resilience	Addition of a new crossing will improve network resilience by providing alternate options during essential maintenance. Provision of a hard shoulder will reduce issues related to accidents or broken down vehicles, and ensure emergency vehicle access is greatly improved in the event of an incident.	All road users Emergency services	Large Beneficial
TPO4: To improve accessibility for non-motorised users	Provision of a segregated path for pedestrians and cyclists will improve accessibility for active modes, with the former banned from the existing crossing and the latter disincentivised from using the crossing due to sharing space with motorised vehicles.	Active modes	Large Beneficial
TPO5: To promote road safety	The creation of a new carriageway will improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Large Beneficial
Other Considerations			
Public Acceptability	There is significant public support of a new crossing. During public consultation in 2007 there was overwhelming support for a new crossing. There was some concern that a cable stayed option would overwhelm the existing Britannia Bridge.		
Acceptability to other stakeholders	There is significant stakeholder support for a new crossing. During a 2007 stakeholder workshop, the option that has evolved into DS 1E was ranked 4 th out of 8. A formal Environmental Impact Assessment will be required due to proximity and interaction with SSSIs. The eastern alignment will ensure there is no conflict with existing or proposed National Grid high voltage crossings of the Menai Strait. In 2007, stakeholder engagement with the Countryside Council for Wales declared the long span cable stayed option was unacceptable to them.		
Technical and operational feasibility	This option has been determined to be technically feasible, with other construction methods and designs ruled out during the option appraisal process. The bridge will operate with two running lanes, a hard shoulder, a verge and a segregated pedestrian and cycle path. These elements are considered suitable and would not cause any feasibility issues at this stage.		

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Financial affordability and deliverability	This option has a cost of £156.8m in 2015 prices. There are numerous options to be explored with regards to funding sources. It is considered this option is deliverable by 2021/22.		
Risks	<p>Several risks to the project are detailed within the main SOBC. Risks that are unique to this or some (but not all) options are as follows:</p> <ul style="list-style-type: none"> Impact to SSSI due to eastern alignment deemed unacceptable; and Visual impact of tower for cable stayed solution deemed unacceptable. 		

1.4 Option DS 1W – Multi-Span Bridge West

Option DS 1W – Multi-Span Post Tensioned Concrete Box, west of Britannia Bridge

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Welsh Impact Areas			
Economy			
Transport Economic Efficiency	A significant reduction in travel time in AM and PM peaks is expected. A BCR has not been calculated; an indicative cost in 2015 prices, rebased to 2002 is £125m. A PVB in 2002 prices was calculated for the eastern variant, which is likely to perform extremely similarly, was £180m. This will improve efficiency and reliability of people and freight movements. Provision will be made for cyclists and pedestrians, improving connectivity and efficiency for active modes, improving the sustainable movement of people.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists. Active modes.	Moderate Beneficial

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Economic Activity and Location Impact	Scheme will improve connectivity on a key trunk road and TEN-T, benefitting local, national and international trips to Ireland, England and continental Europe. Access to employment opportunities and future development sites will be improved. Peak summer flows on the existing bridge demonstrate the importance of the connectivity to visitor attractions, which will be improved with a new crossing. A new crossing will reduce delay, improve connectivity and resilience, thereby increasing the attractiveness of the Isle of Anglesey for a wide range of economic activity.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists.	Moderate Beneficial
Environment			
Noise	There will be a slight increase in noise due to increased flows as a result of releasing suppressed demand. Some residents alongside the road either side of the Menai Strait may experience an increase in noise as a result. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of noise will not change.	Properties in close proximity to the A55 either side of Menai Strait	Slight Adverse
Local Air Quality	There may be a slight decrease in local air quality due to increased flows. However, less queuing traffic will mean more efficient engine operation. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of exhaust fumes will not change.	Properties in close proximity to the A55 either side of Menai Strait	Neutral
Greenhouse Gas Emissions	An increase in the number of trips may be realised as a result of improvements releasing suppressed demand. However, less queuing traffic will mean more efficient engine operation and fewer emissions.	No significant distributional impacts	Neutral

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Landscape and Townscape	A new low level structure will impact on the landscape. The profile of the new crossing will be matched as closely as possible to the existing Britannia Bridge to minimise the impact. The new bridge will not pass between the two existing historical crossings but will be visible when looking west from the Menai Bridge. The bridge will be less visible than other options from local communities including Menai Bridge and Capel-y-graig.	Residents in the vicinity of the Menai Strait	Slight Adverse
Biodiversity	The Coedydd Afon Menai Site of Special Scientific Interest (SSSI) lies directly to the west of the existing crossing on the Gwyndd side, meaning this scheme will have a direct impact on the woodland area.	SSSI sites	Slight Adverse
Heritage	The existing Britannia Bridge is a listed structure, with the proposed scheme passing close to, but not directly impacting upon it. The view of the Britannia Bridge will be impacted by the new structure, although a low profile and careful pier placement will limit this to views looking east towards the bridge only.	Communities and sites that have current views of the Britannia Bridge	Slight Adverse

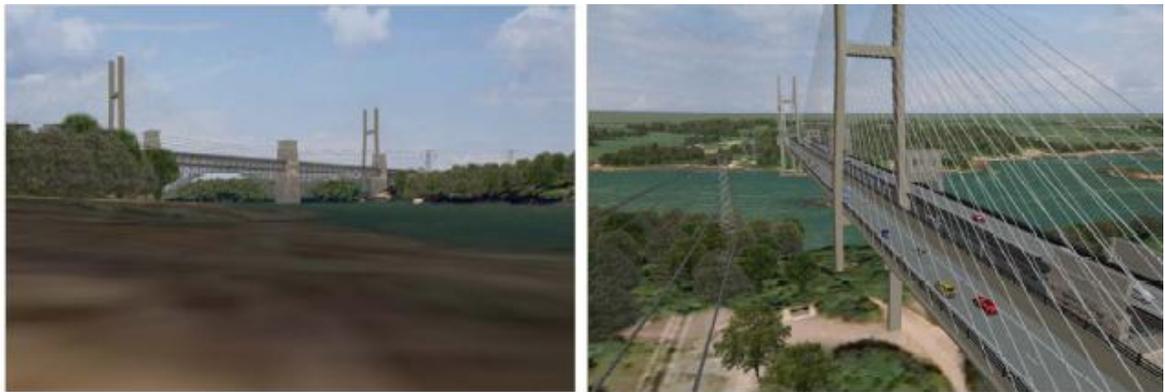
Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Water Environment	<p>A new pier would be required in the middle of the Menai Strait, although part of the structure could rest upon the natural island. The Y Fenai A Bae Conwy (Menai Strait and Conwy Bay) Special Area of Conservation (SAC) lies underneath the existing crossing and thus will be impacted by a new crossing. However, the SAC boundary is at mean low water level, and therefore coastal construction is likely to be adjacent but not within the SAC. The central pier of this option is required to be built inside the SAC, partially on a small island in the Strait. Some additional construction may be required due to the lack of space to the west of the existing bridge on this island.</p> <p>Careful consideration of the location of the piers can limit impact on the environment and water dynamics by utilising the existing island and central pier of the Britannia Bridge.</p>	SAC sites	Moderate Adverse
Soil	<p>There will be limited construction on the ground as the scheme is predominantly a bridge. Careful consideration of the location of the piers can limit impact on soils.</p>	No significant distributional impacts	Neutral
Society			
Transport Safety	<p>A quantitative review of safety benefits has not yet been undertaken. However the creation of a new carriageway will likely improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.</p>	All road users, including active modes	Moderate Beneficial

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Personal Security	The scheme will have limited impact on personal security. Consideration can be made to ensure adequate lighting is in place for pedestrians and cyclists on the crossing and any new paths that connect the scheme to the existing network of paths.	No significant distributional impacts	Neutral
Permeability	Connectivity between the Isle of Anglesey and Gwynedd will improve for all users due to improved journey times and increased resilience. Pedestrians will benefit significantly as they are currently banned from the Britannia Bridge. Cyclists will benefit through provision of a segregated path, meaning the crossing will become significantly more attractive as the route will avoid a busy trunk road.	All road users, including active modes	Large Beneficial
Physical Fitness	Provision of a segregated facility for pedestrians and cyclists will encourage more use of active modes across the Menai Strait, through improved connectivity and personal safety. There is an existing cycle and pedestrian paths are in the area demonstrating demand for both local residents and tourists. Linking two areas together will likely improve the attractiveness of cycling and walking in the area, improving physical fitness.	Active modes	Moderate Beneficial
Social Inclusion	Improved connectivity and permeability will improve social inclusion by better connecting communities. Employment opportunities will be more accessible to all, and the attractiveness of the area to new businesses and residents will increase.	Local residents	Moderate Beneficial
Equality, Diversity & Human Rights	The proposed crossing will aim to meet the needs of all groups of people, with no barriers to equality, diversity or human rights.	No significant distributional impacts	Neutral
Transport Planning Objectives			
TPO1: To improve journey times	The scheme will improve journey times through the provision of a new carriageway during both AM and PM peaks, as well as during peak summer weekends.	All road users	Moderate Beneficial

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
TPO2: To improve journey time reliability	Reduction of congestion will improve journey time reliability, with less queueing and more predictable journey times	All road users	Moderate Beneficial
TPO3: To improve network resilience	Addition of a new crossing will improve network resilience by providing alternate options during essential maintenance. Provision of a hard shoulder will reduce issues related to accidents or broken down vehicles, and ensure emergency vehicle access is greatly improved in the event of an incident.	All road users Emergency services	Large Beneficial
TPO4: To improve accessibility for non-motorised users	Provision of a segregated path for pedestrians and cyclists will improve accessibility for active modes, with the former banned from the existing crossing and the latter dis-incentivised from using the crossing due to sharing space with motorised vehicles.	Active modes	Large Beneficial
TPO5: To promote road safety	The creation of a new carriageway will improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Large Beneficial
Other Considerations			
Public Acceptability	There is significant public support of a new crossing. While the western route options were not proposed during the 2007 public consultation, there was overwhelming support for a new crossing in general.		
Acceptability to other stakeholders	There is significant stakeholder support for a new crossing. A formal Environmental Impact Assessment will be required to comply with Environment Agency Wales requirements due to the pier in the Menai Strait, a SAC, as well as proximity and interaction with other SSSIs. The western alignment will be in close proximity to existing and potentially proposed National Grid high voltage crossings of the Menai Strait. The existing crossing may need to be moved, at substantial costs, due to the high risk of constructing in close proximity to high voltage cables.		

Appraisal Criteria	Assessment – DS 1E	Distribution	Significance
Technical and operational feasibility	<p>This option has been determined to be technically feasible, with other construction methods and designs ruled out during the option appraisal process.</p> <p>The bridge will operate with two running lanes, a hard shoulder, a verge and a segregated pedestrian and cycle path. These elements are considered suitable and would not cause any feasibility issues at this stage.</p>		
Financial affordability and deliverability	<p>This option has a cost of £141.7m in 2015 prices. There are numerous options to be explored with regards to funding sources.</p> <p>It is considered this option is deliverable by 2021/22.</p>		
Risks	<p>Several risks to the project are detailed within the main SOBC. Risks that are unique to this or some (but not all) options are as follows:</p> <ul style="list-style-type: none"> · Impact to SAR due to multi-span bridge deemed unacceptable; and · Conflict with existing or proposed National Grid high voltage crossings result in option being unfeasible. 		

1.5 Option DS 2W – Single Span Bridge West



Option DS 2E – Single Span Cable Stayed, west of Britannia Bridge

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Welsh Impact Areas			
Economy			

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Transport Economic Efficiency	A significant reduction in travel time in AM and PM peaks is expected. A BCR has not been calculated; an indicative cost in 2015 prices, rebased to 2002 is £172m. A PVB in 2002 prices was calculated for the eastern variant, which is likely to perform extremely similarly, was £180m. This will improve efficiency and reliability of people and freight movements. Provision will be made for cyclists and pedestrians, improving connectivity and efficiency for active modes, improving the sustainable movement of people.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists. Active modes.	Moderate Beneficial
Economic Activity and Location Impact	Scheme will improve connectivity on a key trunk road and TEN-T, benefitting local, national and international trips to Ireland, England and continental Europe. Access to employment opportunities and future development sites will be improved. Peak summer flows on the existing bridge demonstrate the importance of the connectivity to visitor attractions, which will be improved with a new crossing. A new crossing will reduce delay, improve connectivity and resilience, thereby increasing the attractiveness of the Isle of Anglesey for a wide range of economic activity.	All road users, including business, commuting, and other trips, road freight users. Local residents and tourists.	Moderate Beneficial
Environment			
Noise	There will be a slight increase in noise due to increased flows as a result of releasing suppressed demand. Some residents alongside the road either side of the Menai Strait may experience an increase in noise as a result. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of noise will not change.	Properties in close proximity to the A55 either side of Menai Strait	Slight Adverse

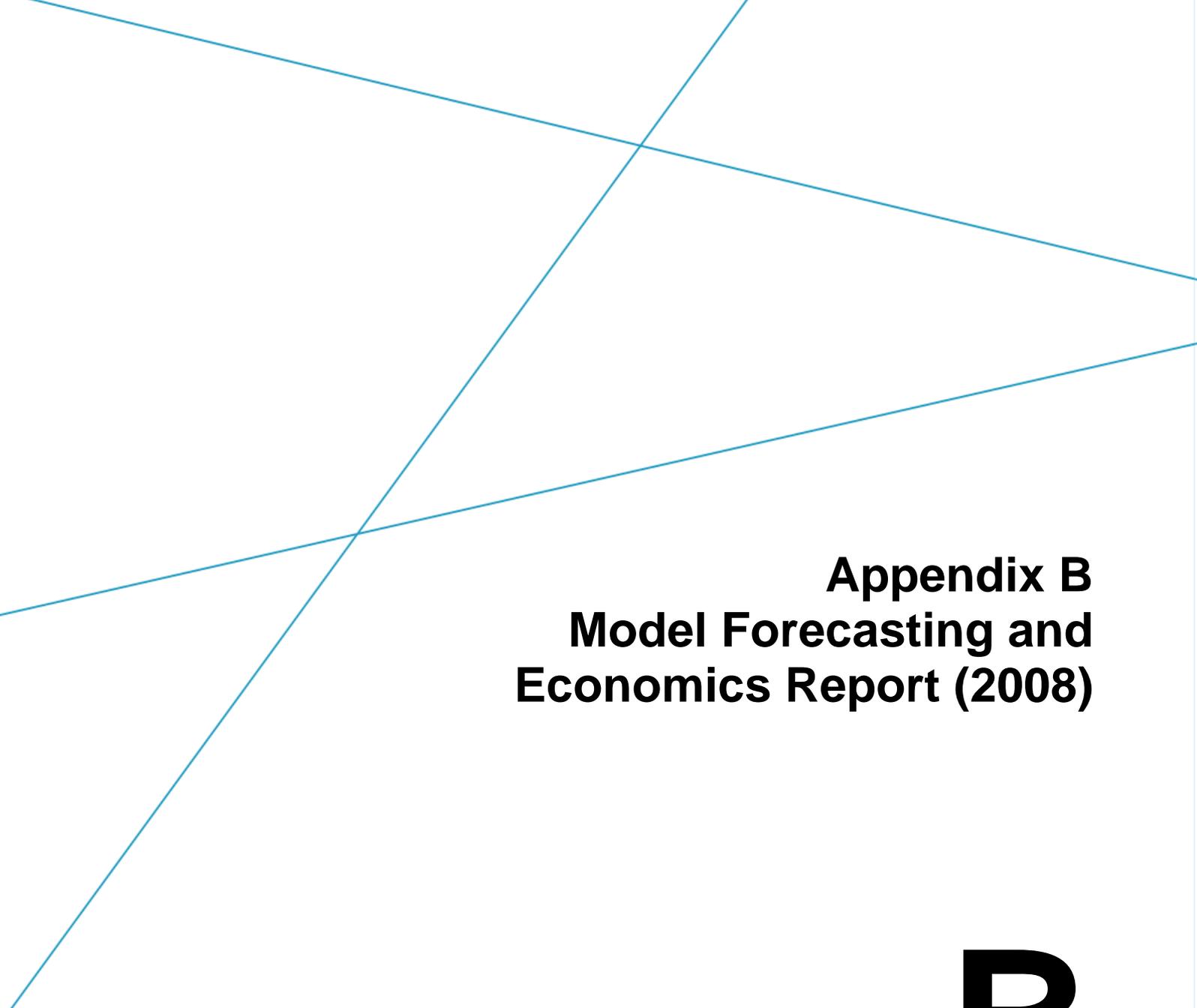
Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Local Air Quality	There may be a slight decrease in local air quality due to increased flows. However, less queuing traffic will mean more efficient engine operation. The new crossing itself will be alongside the existing crossing and over water, with no local residents meaning the distribution of exhaust fumes will not change.	Properties in close proximity to the A55 either side of Menai Strait	Neutral
Greenhouse Gas Emissions	An increase in the number of trips may be realised as a result of improvements releasing suppressed demand. However, less queuing traffic will mean more efficient engine operation and fewer emissions.	No significant distributional impacts	Neutral
Landscape and Townscape	A new tower structure will impact on the landscape. The new bridge will not pass between the two existing historical crossings but will be visible from the Menai Bridge. The bridge will be visible from a wide area, with towers approximately 80m high.	Residents in the vicinity of the Menai Strait	Moderate Adverse
Biodiversity	The Coedydd Afon Menai SSSI lies directly to the west of the existing crossing on the Gwyndd side, meaning this scheme will have a direct impact on the woodland area.	SSSI sites	Slight Adverse
Heritage	The existing Britannia Bridge is a listed structure, with the proposed scheme passing close to, but not directly impacting upon it. The view of the Britannia Bridge will be impacted by the new structure, with new towers dwarfing the existing structure from all view points. However the profile of the road deck will be less obstructive than other options.	Communities and sites that have current views of the Britannia Bridge	Slight Adverse
Water Environment	New piers would be required adjacent to the Menai Strait but the new structure itself would pass over the Y Fenai A Bae Conwy (Menai Strait and Conwy Bay) SAC. There is less restriction on span length due to the cable stayed design, meaning it will be easier to mitigate any impacts as the location of piers can be redesigned to reflect environmental concerns.	No significant distributional impacts	Neutral

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Soil	There will be limited construction on the ground as the scheme is predominantly a bridge. Careful consideration of the location of the piers can limit impact on soils.	No significant distributional impacts	Neutral
Society			
Transport Safety	A quantitative review of safety benefits has not yet been undertaken. However the creation of a new carriageway will likely improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Moderate Beneficial
Personal Security	The scheme will have limited impact on personal security. Consideration can be made to ensure adequate lighting is in place for pedestrians and cyclists on the crossing and any new paths that connect the scheme to the existing network of paths.	No significant distributional impacts	Neutral
Permeability	Connectivity between the Isle of Anglesey and Gwynedd will improve for all users due to improved journey times and increased resilience. Pedestrians will benefit significantly as they are currently banned from the Britannia Bridge. Cyclists will benefit through provision of a segregated path, meaning the crossing will become significantly more attractive as the route will avoid a busy trunk road.	All road users, including active modes	Large Beneficial

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Physical Fitness	Provision of a segregated facility for pedestrians and cyclists will encourage more use of active modes across the Menai Strait, through improved connectivity and personal safety. There is an existing cycle and pedestrian paths are in the area demonstrating demand for both local residents and tourists. Linking two areas together will likely improve the attractiveness of cycling and walking in the area, improving physical fitness.	Active modes	Moderate Beneficial
Social Inclusion	Improved connectivity and permeability will improve social inclusion by better connecting communities. Employment opportunities will be more accessible to all, and the attractiveness of the area to new businesses and residents will increase.	Local residents	Moderate Beneficial
Equality, Diversity & Human Rights	The proposed crossing will aim to meet the needs of all groups of people, with no barriers to equality, diversity or human rights.	No significant distributional impacts	Neutral
Transport Planning Objectives			
TPO1: To improve journey times	The scheme will improve journey times through the provision of a new carriageway during both AM and PM peaks, as well as during peak summer weekends.	All road users	Moderate Beneficial
TPO2: To improve journey time reliability	Reduction of congestion will improve journey time reliability, with less queueing and more predictable journey times	All road users	Moderate Beneficial
TPO3: To improve network resilience	Addition of a new crossing will improve network resilience by providing alternate options during essential maintenance. Provision of a hard shoulder will reduce issues related to accidents or broken down vehicles, and ensure emergency vehicle access is greatly improved in the event of an incident.	All road users Emergency services	Large Beneficial

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
TPO4: To improve accessibility for non-motorised users	Provision of a segregated path for pedestrians and cyclists will improve accessibility for active modes, with the former banned from the existing crossing and the latter dis-incentivised from using the crossing due to sharing space with motorised vehicles.	Active modes	Large Beneficial
TPO5: To promote road safety	The creation of a new carriageway will improve the safety of the crossing by segregating opposing flows. Provision of a cycle path will remove cyclists from the existing crossing onto a segregated facility. Improved facilities for emergency services will allow access onto, and to either side of the crossing, in the event of an emergency, improving response times to an accident on or either side of the crossing.	All road users, including active modes	Large Beneficial
Other Considerations			
Public Acceptability	There is significant public support of a new crossing. During public consultation in 2007 there was overwhelming support for a new crossing. There was some concern that a cable stayed option would overwhelm the existing Britannia Bridge.		
Acceptability to other stakeholders	There is significant stakeholder support for a new crossing. A formal Environmental Impact Assessment will be required to due to proximity and interaction with SSSIs. The western alignment will be in close proximity to existing and potentially proposed National Grid high voltage crossings of the Menai Strait. The existing crossing may need to be moved, at substantial costs, due to the high risk of constructing in close proximity to high voltage cables. In 2007, stakeholder engagement with the Countryside Council for Wales declared the long span cable stayed option was unacceptable to them.		
Technical and operational feasibility	This option has been determined to be technically feasible, with other construction methods and designs ruled out during the option appraisal process. The bridge will operate with two running lanes, a hard shoulder, a verge and a segregated pedestrian and cycle path. These elements are considered suitable and would not cause any feasibility issues at this stage.		
Financial affordability and deliverability	This option has a cost of £233.4m in 2015 prices. There are numerous options to be explored with regards to funding sources. It is considered this option is deliverable by 2021/22.		

Appraisal Criteria	Assessment – DS 2E	Distribution	Significance
Risks	<p>Several risks to the project are detailed within the main SOBC. Risks that are unique to this or some (but not all) options are as follows:</p> <ul style="list-style-type: none"> · Visual impact of tower for cable stayed solution deemed unacceptable; and · Conflict with existing or proposed National Grid high voltage crossings result in option being unfeasible. 		



**Appendix B
Model Forecasting and
Economics Report (2008)**

B

Britannia Bridge Feasibility Study

Model Forecasting and Economics Report

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Contents

<i>Section</i>	<i>Page</i>
1. Introduction	1-1
2. Model Forecasting	2-3
Methodology	2-3
Forecasting Results	2-8
Economic Assessment	2-19
Overview	2-19
Transport Users Benefit Appraisal (TUBA)	2-19
COst Benefit Appraisal (COBA) to Derive Accident Benefits	2-23
Summary of Economic Appraisal Results	2-26
3. Summary and Conclusions	3-1
Appendix A	i
TEMPRO Growth Factors	i
Appendix B	iii
Whole Week Economics	iii
Introduction	iv
Option 1	iv
Option 2	v
Option 3	v
Option 8	vi
List of Tables	
Table 2.1 – Underlying Forecasting Assumptions	2-3
Table 2.2 – Base & Future Year Trips	2-7
Table 2.3 – AM and PM Peak Forecast Model Assignment Summary Statistics	2-10
Table 2.4 – A55 Eastbound Carriageway Journey Times AM Peak 2012	2-12
Table 2.5 – A55 Westbound Carriageway Journey Times AM Peak 2012	2-12
Table 2.6 – A55 Eastbound Carriageway Journey Times PM Peak 2012	2-12
Table 2.7 – A55 Westbound Carriageway Journey Times PM Peak 2012	2-13
Table 2.8 – A55 Eastbound Carriageway Journey Times AM Peak 2027	2-13
Table 2.9 – A55 Westbound Carriageway Journey Times AM Peak 2027	2-13
Table 2.10 – A55 Eastbound Carriageway Journey Times PM Peak 2027	2-14

Table 2.11 – A55 Westbound Carriageway Journey Times PM Peak 2027	2-14
Table 2.12 - A55 Local Accident Rates (2002 – 2006 incl.)	2-24
Table 2.13 AST Summary (Table 15C) - Analysis of Monetised Costs and Benefits in Market Prices (£M)	2-26
Table A.1 –Growth Factors	ii
Table B.1 – Option 1 – Three Fixed Lanes (40mph limit in both directions) (£000s)	iv
Table B.2 – Tidal Flow (30mph limit during tidal flow, 50mph otherwise) (£000s)	v
Table B.3 – Four Narrow Lanes (40mph limit in both directions) (£000s)	v
Table B.5 – Parallel Bridge to carry Eastbound Traffic (60mph limit in both directions) (£000s)	vi

List of Figures

Figure 2.1- Extent of the COBA Network	2-24
Figure 2.2 – Accident Locations	2-25

1. Introduction

- 1.1 As part of the Framework contract with the North Wales Trunk Road Agency (NWTRA), in December 2006, Atkins was commissioned to investigate all options to improve traffic flow over the Britannia Bridge and hold a Public Consultation on the options in November 2007. The outcomes of the Britannia Bridge Feasibility Study are to be reported to the Welsh Assembly Government (WAG).
- 1.2 The initial goal was to provide a short to medium term solution which can be implemented in 2010 and be coordinated with any planned maintenance by Network Rail. As the study developed the range of options expanded to include longer term options such as additional structures.
- 1.3 As part of the study, Atkins have been commissioned to update and revalidate the existing Britannia Bridge Paramics model. The traffic model is being developed to assist in the assessment of a range of options for improving traffic flow in the vicinity of Britannia Bridge.
- 1.4 This phase of work is required to achieve the WelTAG Planning Stage assessment and the required public consultation exercise in order to screen and test options against the Transport Planning Objectives.
- 1.5 This **Forecasting and Economics Report** describes the methodology used in the forecasting and economic assessment of the schemes. It provides an overview of the principles behind the development of the future year traffic models, examines the impact of the proposed schemes on network operation in the surrounding area and provides conclusions as to the relative transport benefits that could be generated by the proposed improvements to Britannia Bridge.
- 1.6 The economic assessments of the Britannia Bridge schemes are undertaken by conducting a cost/benefit analysis for each proposal. The costs and benefits are calculated for a common price year (2002) and are discounted over a 60 year period to 2002 in line with the latest transport assessment guidance.
- 1.7 In order to carry out such an assessment it is necessary to establish the benefits that the schemes will impart and compare these to the costs incurred in their completion.

Scope of Forecasting

- 1.8 The Paramics models used in developing forecast year scenarios were created as part of a formal calibration and validation procedure. Full details of this process, and the models developed, are contained in the 'Model Development Report'.
- 1.9 The requirement that the forecast models be used for economic forecasting means that models are required for an opening year and design year (fifteen years after the opening year), for both a 'Do Minimum' scenario, comprising of underlying traffic growth and any committed transport/development schemes, and a 'Do Something' scenario, which adds the scheme proposals forming the assessment.

- 1.10 For this study, forecasts have been produced for an opening year of 2012 and a design year of 2027. The same opening year of 2012 was used for all options for consistency and this year was chosen as the earliest date for the opening of a new bridge given for the planning constraints. The 'Do Something' networks include the proposed Britannia Bridge schemes only.
- 1.11 Economic assessment has been undertaken as part of this study, the results of which are discussed later in this report. The assessment requires an estimation of the costs of travel through the network at various representative times of day. Two versions of the model have been calibrated, one for each of the following time periods:
- ◆ A morning peak period for the period 0700 to 1000 hours; and
 - ◆ An evening peak period for the period 1600 to 1900 hours.
- 1.12 This means that four assignments are required for each 'Do Minimum' or 'Do Something' case tested, one for each of the two time periods for each of two forecast years. This report is consequently based on the results of a large number of traffic assignments which are consequently used to undertake economic assessments.

Structure of the Report

- 1.13 Following this introduction, the remainder of the report is structured as follows:
- ◆ **Chapter 2** describes the **Model Forecasting** process, including details of network and matrix development for the Paramics assignment models and examining in particular changes in traffic flows on the future year transport networks;
 - ◆ **Chapter 3** presents the **Economic Assessment**, including details of the application of the DfT's software TUBA and COBA to derive user benefits and accident benefits of the proposed schemes;
 - ◆ **Chapter 4** provides **Conclusions** following the development of the future year traffic models and economic assessment;
 - ◆ **Appendix A** presents the **TEMPRO Growth Factors** applied to the base year matrices to produce forecast year demand matrices;
 - ◆ **Appendix B** contains the results obtained from the **economic analysis**.

2. Model Forecasting

METHODOLOGY

Overview

2.1 A number of assumptions are made in developing traffic models to represent the best estimate of future traffic conditions. This section of the report contains a description of the assumptions adopted in developing the future year models, and an overview of the forecasting methodology adopted for the study. The following elements are discussed in subsequent sections of this chapter:

- ◆ Summary of Key Assumptions;
- ◆ Data Sources Utilised for Forecasting;
- ◆ Development of the Future Year Networks;
- ◆ Development of the Future Year Matrices; and
- ◆ Method of Assignment.

Summary of Key Assumptions

2.2 Table 2.1 provides a summary of the key underlying assumptions forming the starting point for future year forecasting.

Table 2.1 – Underlying Forecasting Assumptions

Forecasting Assumption				
	Options	Years	Time Periods	User Classes
Number	7	2	2	4
Description	Do Minimum DS Option 1 DS Option 2 DS Option 3 DS Option 4 DS Option 5 DS Option 6 DS Option 7 DS Option 8	2012 2027	AM Peak PM Peak	Cars LGVs OGV1 OGV2

2.3 The above assumptions are critical to developing robust and realistic forecasts of traffic growth, which is discussed later in this chapter.

Development of the Future Year Networks

- 2.4 Under the 'Do Minimum' scenario, the A55 Britannia Bridge and the surrounding network remain unchanged from the Base scenario.

Do Something

- 2.5 The 'Do Minimum' is converted into a 'Do Something' network by including the proposed transport scheme, in this instance the A55 Britannia Bridge Options one to eight. The proposed schemes under consideration in this report are described in detail in the following sections.

Proposed Alignments

- 2.6 The proposed alignments of the A55 Britannia Bridge Options one to eight are as follows:

Option one – Three Lane Fixed

- ◆ Single lane westbound – 3.65 metres.
- ◆ Two lanes eastbound – 3.1 metres and 3.25 metres.
- ◆ Due to the lack of central reserve, and the narrow lane arrangement, a speed limit of 40mph would be required on road safety grounds.

Option two – Three Lane Tidal Flow

- ◆ Lane 1 in each direction – 3.5 metres.
- ◆ Tidal flow lane – 3.0 metres and limited to cars only.
- ◆ Tidal Flow lane opened at peak times in the direction of most need.
- ◆ During tidal flow operation the speed limit would be limited to 30mph to maintain road safety.
- ◆ If the central lane was closed at off peak times the existing 50mph restriction could be maintained.

Option three – Four Lanes Between Existing Parapets

- ◆ 4 narrow lanes of 3.25 metres width between the existing parapets.
- ◆ No central reserve.
- ◆ This option enables the existing parapets to be retained over the majority of the bridge.
- ◆ This option requires the towers to be lowered to road deck level in order to provide 4 lanes.
- ◆ Due to the narrow lanes and the lack of a central reserve, a speed limit of 40mph would be imposed over the bridge.

Option four – Compact Dual Carriageway

- ◆ Lane 1 in each direction – 3.65 metres.
- ◆ Lane 2 in each direction – 3.25 metres.
- ◆ Central reserve – 2.0 metres with a vertical concrete barrier.
- ◆ Road deck requires widening including the addition of supporting steelwork and new parapets.
- ◆ The assessment of the existing steel arches infers that strengthening of the lower steelwork would not be required.
- ◆ This option requires the towers to be lowered to road deck level.
- ◆ A footpath/cycleway is provided on the north side of the structure which would tie into the local roads and footpaths.
- ◆ The existing speed limit of 50mph could be retained and possibly increased to 60mph.

Option five – Standard Dual Carriageway

- ◆ Lane widths - 3.65 metres with a 4.5 metre central reserve and 1metre hard strips.
- ◆ Wide verges would provide routes for pedestrians and cyclists on both sides of the carriageway.
- ◆ This arrangement provides a cross-section to standard and therefore requires significant widening to the structure.
- ◆ This option requires the towers to be lowered to road deck level.
- ◆ Significant supporting steelwork would be required to support the widened deck.
- ◆ In addition the assessment of the arches suggests that this loading configuration would require strengthening of the rail arches.
- ◆ The existing speed limit of 50mph could be retained and possibly increased to 60mph.

Option six – Anglesey 4 Lane Option

- ◆ Isle of Anglesey County Council has proposed a 4 lane option which enables the existing towers to remain.
- ◆ The proposal requires new steelwork arches and foundations to be constructed on each side of the existing bridge.
- ◆ The current bridge has 3 trusses in each steel arch. The proposal would add a further 4 trusses to each steel arch.
- ◆ The arrangement would provide two lanes in each direction over the bridge but the nearside lane (lane 1) would run separately on the new structure.
- ◆ The existing road deck over the arch and land spans would be unaffected by the proposals and carry lane 2 in each direction.

- ◆ At each end of the structure the approach spans would require widening to allow the single lanes to merge and diverge.
- ◆ Due to the additional merge and diverge points a speed limit of 40mph is recommended.

Option seven – New Multi Span Concrete Box Bridge

- ◆ Provide a separate carriageway for the eastbound traffic on a parallel bridge to the north of the existing structure with spans that match the existing Bridge.
- ◆ The structure would carry two lanes of 3.65 metres width and a footpath/cycleway.
- ◆ On the mainland side the structure would run parallel with the existing approach span.
- ◆ The existing structure would be re-designated to provide two lanes in the westbound direction.
- ◆ Provision could then be provided for pedestrians and cyclists on the existing bridge by narrowing the carriageway past the towers.
- ◆ The existing speed limit of 50mph could be retained and possibly increased to 60mph.

Option eight – New Long Span Cable Stayed Bridge

- ◆ Provide a separate carriageway for the eastbound traffic on a parallel bridge to the north of the existing structure with spans that match the existing Bridge.
- ◆ The structure would carry two lanes of 3.65 metres width and a footpath/cycleway.
- ◆ On the mainland side the structure would run parallel with the existing approach span.
- ◆ The existing structure would be re-designated to provide two lanes in the westbound direction.
- ◆ Provision could then be provided for pedestrians and cyclists on the existing bridge by narrowing the carriageway past the towers.
- ◆ The existing speed limit of 50mph could be retained and possibly increased to 60mph.

Development of the Future Year Matrices

- 2.7 From the outset of this study, the use of the traffic model was intended to provide 'general' forecast traffic flows which help to inform on the assessment and selection of the most suitable A55 Britannia Bridge options to take forward for a more detailed study.
- 2.8 The forecasting of travel demand has been undertaken in accordance with current DfT guidance contained in WebTAG Unit 3.1, which recommends the use of TEMPRO for the derivation of travel demand growth factors. As recommended in section 5.13 of the TEMPRO Guidance Note, to reflect changes to the local economic activity, the growth in trip ends for the local area from TEMPRO for each forecast year was used to derive local adjustment factors with which to modify NRFT growth. These methods used to calculate/generate forecast traffic growth through the combination of local TEMPRO rates and NRFT are acceptable for this initial study stage.
- 2.9 The TEMPRO and NRFT growth factors used in deriving future year trip-ends are presented in Appendix A. The total number of trips at the end of this procedure in each time period and year are shown in Table 2.2.

Table 2.2 – Base & Future Year Trips

Time Period	Number of Trips in Modelled Periods (PCUs)		
	2007	2012	2027
AM Peak	21592	23152	26234
PM Peak	24595	26372	29882

- 2.10 Table 2.2 shows that after application of the Traffic growth factors, the matrix totals increased by approximately 7% and 21% for the forecast years of 2012 and 2027 respectively.

Method of Assignment

Overview

- 2.11 This section focuses on those aspects of traffic assignment and its input that are of particular concern to this study, such as values of time.

Generalised Costs

- 2.12 Generalised cost combines time and money into a composite measure of the cost of travel. It is conventional to express generalised cost in units of time. In order to transform monetary costs into an equivalent amount of time, it is necessary to apply the concept of a value of time.
- 2.13 The value of time can be measured in units of pence per minute. Dividing a monetary cost in pence by the value of time in pence per minute gives an equivalent cost in minutes.
- 2.14 Values of time have been calculated for this study according to the method set out in Transport Analysis Guidance (TAG) Unit 3.5.6, published by the Department for Transport in December 2004. The values are expressed in 2002 prices.
- 2.15 The value of time is assumed to change over time in real terms in line with GDP per head with an elasticity of 1.0 for time while working and 0.8 for other time. The value of time is also assumed to differ between types of traveller and purposes of travel. For this study, values of time are calculated for each combination of time period and year of forecast. These values of time are expressed as pence per minute in 2002 prices.
- 2.16 Vehicle operating costs are an important element of generalised cost. These costs are calculated in Paramics according to an input rate measured in pence per mile. Paramics calculates generalised cost as the sum of two parts, one based on distance and the other based on time. The generic cost calculation is applied to the model which is as follows;
- $$\text{Cost} = 1.0 \text{ Time} + 0.00 \text{ Distance (min/mile)}$$
- 2.17 The parameters represent the cost of travel for a vehicle and its occupants (driver and passengers). Average occupancies have been calculated using values taken from WebTAG Unit 3.5.6 for each model year. The values represent average generalised cost parameters weighted according to observed average vehicle proportions for each time period.

FORECASTING RESULTS

Overview

- 2.18 Forecast year models have been developed for two future year scenarios (2012 and 2027) for the 'Do Minimum' and the separate 'Do Something' scenarios. Fixed Assignment Models have been created to represent traffic conditions in both the weekday morning peak and the weekday evening peak.

- 2.19 This section of the report presents the assignment summary statistics for the whole network and forecast traffic impacts along a 7.0km section of the A55, including Britannia Bridge, from Junction 7 to the south of Junction 10.
- 2.20 Modelling results presented for Do something Option 5 are also assumed for options 4, 7 and 8 due to similarities in the modelled networks – they all encompass 2 lanes in both directions with a 60mph speed limit.
- 2.21 Option 6 results are not presented due to difficulties in getting the proposals to operate within the model. Whilst the closest indication for Option 6 would be Option 3 as both options have two lanes with 40mph speed limits across the bridge, Option 3 incorporates single carriageway compared with segregated lanes in Option 6.
- 2.22 The model results for Option 6 indicate considerable dis-benefits as a result of congestion. The carriageway splits into two separate lanes before the traffic merges from Holyhead Road onto the A55 Eastbound. Consequently, there is no opportunity for traffic on the A55 to move out for merging traffic which results in tailbacks from the slip road.

Network Summary Statistics

- 2.23 Table 2.3 presents the assignment summary statistics from the future year traffic models for the proposed alignments and the Do Minimum scenario during the AM Peak hour (08:00-09:00) and PM Peak hour (17:00-18:00). Total vehicle hours, vehicle kilometres and average network speed are provided for each modelled scenario. Data presented represents all vehicle journeys which commence their journey in the traffic model during the AM and PM Peak hours respectively.
- 2.24 Wider network problems were encountered with the 2027 forecast PM Peak traffic model assignments resulting in excess congestion, which is discussed later in this report. This provides explanation as to the higher total distance and travel times predicted during the PM Peak, compared with the AM Peak.
- 2.25 Due to the problems of the PM Peak hour, it is worth noting that in heavily congested networks where excessive queuing occurs and vehicles are unable to enter the modelled network within the reported AM and PM Peak hours, analysis of the data presented here may not be truly comparable and representative. For example, if summary data is collected from a smaller vehicle set due to queuing preventing access to the network, total travel distance predicted will be low, whilst travel time may remain high.

Table 2.3 – AM and PM Peak Forecast Model Assignment Summary Statistics

Forecast Option	2012			2027		
	Veh-Hrs	Veh-Kms	Avg Spd (kph)	Veh-Hrs	Veh-Kms	Avg Spd (kph)
AM Peak						
Do Minimum	537	30785	57.3	1053	34941	33.2
DS Option 1	493	30778	62.5	915	34819	38.1
DS Option 2	553	30694	55.5	1071	34761	32.4
DS Option 3	496	30840	62.2	937	34892	37.3
DS Option 4	483	30785	63.8	878	35010	39.9
DS Option 5	483	30785	63.8	878	35010	39.9
DS Option 6						
DS Option 7 & 8	483	30785	63.8	878	35010	39.9
PM Peak						
Do Minimum	727	41961	57.7	2961	39855	13.5
DS Option 1	708	41918	59.2	1368	47659	34.8
DS Option 2	719	41766	58.1	721	41787	58.0
DS Option 3	659	41942	63.7	1359	47679	35.1
DS Option 4	639	42099	65.9	1372	47950	35.0
DS Option 5	639	42099	65.9	1372	47950	35.0
DS Option 6						
DS Option 7 & 8	637	42100	66.0	1309	47892	36.6

Forecast Traffic Impacts

- 2.26 Tables 2.4 – 2.11 present the forecast impacts to traffic flows across the Britannia Bridge, and journey times along the 7.0km section of the A55, including Britannia Bridge, from Junction 7 to south of Junction 10 within each hour of the peak periods.
- 2.27 In developing the 2027 model, a number of network problems elsewhere within the model have been predicted as a result of 21 years of traffic growth added to the Base scenario. The analysis that follows displays a reduction in average speeds throughout the network in 2027 and indicates that as a whole the present network would be unable to cope with the forecast levels of growth.
- 2.28 Tailbacks predicted as a result of narrowing from two lanes to one lane over the Britannia Bridge are generally eliminated through the implementation of the Options. However, there are particular areas of the network which are predicted to experience additional difficulties.
- 2.29 In 2027, during the AM Peak hour queuing develops on the A55 eastbound Junction 9 off-slip from the roundabout with the A487 as a result of higher levels of right turn movements from the off-slip. As a result of the higher peak hour demands queuing stacks back onto the A55 eastbound over the Britannia Bridge. In some severe instances queuing can reach the A55 Junction 8A and prohibit movements in the vicinity of this junction, including A55 westbound movements. This helps to explain the higher journey times predicted in Table 2.8 from 08:00 and 09:00.
- 2.30 In 2027, during the PM Peak hour queuing develops on the A55 Junction 10 westbound off-slip from the roundabout with the A4087 as a result of higher traffic flows. This queue stacks back on the off-slip throughout the PM Peak hour and causes tailbacks onto the A55 westbound. This provides explanation as to the higher journey times predicted in Table 2.11 from 17:00 and 18:00.
- 2.31 The model suggests that the single lane over the Britannia Bridge can carry over 2000 vehicles an hour. This may be unlikely as historic data shows maximum flows eastbound of 1900 and westbound 1750. In developing more accurate traffic forecasts at the next stage of the assessment this is to be addressed, which would result in increased benefits for the proposed schemes associated with increasing the carriageway to two lanes in each direction over the Britannia Bridge due to greater delays and congestion in the do-minimum scenario.
- 2.32 However, for Option 1 (three lane fixed) the benefits presented in the following tables may be overestimated. Journey times predicted for the direction of travel over the Bridge which remains at one lane (westbound) in Option 1 during the PM Peak in 2027 predict savings compared with the Do Minimum scenario. This is due to the wider network problems experienced in 2027 which are described above, and assuming that these problems are resolved there should be little difference in journey time between Option 1 and the Do-Minimum in this direction.

Table 2.4 – A55 Eastbound Carriageway Journey Times AM Peak 2012

Forecast Option		Flow (vph)			Journey Time (seconds)		
		07:00	08:00	09:00	07:00	08:00	09:00
Do Minimum		1192	2093	1580	248	778	354
DS Option 1	Three Lane Fixed	1171	2196	1374	243	281	248
DS Option 2	3 Lane Tidal	1126	2018	1377	261	364	305
DS Option 3	Four Lanes	1166	2182	1388	251	288	258
DS Option 4	Compact Dual C'way	1214	2251	1426	234	269	236
DS Option 5	Standard Dual C'way	1214	2251	1426	234	269	236
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1214	2251	1426	234	269	236

Table 2.5 – A55 Westbound Carriageway Journey Times AM Peak 2012

Forecast Option		Flow (vph)			Journey Time (seconds)		
		07:00	08:00	09:00	07:00	08:00	09:00
Do Minimum		858	1458	1141	259	257	259
DS Option 1	Three Lane Fixed	854	1455	1139	270	270	270
DS Option 2	3 Lane Tidal	770	1340	1031	290	289	289
DS Option 3	Four Lanes	855	1459	1133	272	270	272
DS Option 4	Compact Dual C'way	889	1528	1179	245	240	244
DS Option 5	Standard Dual C'way	889	1528	1179	245	240	244
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	889	1528	1179	245	240	244

Table 2.6 – A55 Eastbound Carriageway Journey Times PM Peak 2012

Forecast Option		Flow (vph)			Journey Time (seconds)		
		16:00	17:00	18:00	16:00	17:00	18:00
Do Minimum		1441	1549	963	240	245	231
DS Option 1	Three Lane Fixed	1394	1493	919	242	241	236
DS Option 2	3 Lane Tidal	1340	1451	889	270	271	259
DS Option 3	Four Lanes	1394	1490	922	250	251	245
DS Option 4	Compact Dual C'way	1449	1552	967	222	223	216
DS Option 5	Standard Dual C'way	1449	1552	967	222	223	216
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1449	1552	967	222	223	216

Table 2.7 – A55 Westbound Carriageway Journey Times PM Peak 2012

Forecast Option		Flow (vph)			Journey Time (seconds)		
		16:00	17:00	18:00	16:00	17:00	18:00
Do Minimum		1582	1999	1058	254	353	249
DS Option 1	Three Lane Fixed	1583	2043	1016	267	330	259
DS Option 2	3 Lane Tidal	1422	1888	886	280	278	274
DS Option 3	Four Lanes	1590	2067	1006	265	264	261
DS Option 4	Compact Dual C'way	1690	2186	1086	235	235	231
DS Option 5	Standard Dual C'way	1690	2186	1086	235	235	231
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1690	2186	1086	235	235	231

Table 2.8 – A55 Eastbound Carriageway Journey Times AM Peak 2027

Forecast Option		Flow (vph)			Journey Time (seconds)		
		07:00	08:00	09:00	07:00	08:00	09:00
Do Minimum		1354	2057	1948	243	1052	1230
DS Option 1	Three Lane Fixed	1317	2083	1828	244	457	423
DS Option 2	3 Lane Tidal	1269	1923	1846	262	555	516
DS Option 3	Four Lanes	1325	2120	1800	252	467	461
DS Option 4	Compact Dual C'way	1362	2132	1890	226	445	377
DS Option 5	Standard Dual C'way	1362	2132	1890	226	445	377
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1362	2132	1890	226	445	377

Table 2.9 – A55 Westbound Carriageway Journey Times AM Peak 2027

Forecast Option		Flow (vph)			Journey Time (seconds)		
		07:00	08:00	09:00	07:00	08:00	09:00
Do Minimum		974	1594	1343	262	259	260
DS Option 1	Three Lane Fixed	969	1592	1309	273	283	366
DS Option 2	3 Lane Tidal	867	1467	1210	292	293	292
DS Option 3	Four Lanes	970	1603	1279	273	285	423
DS Option 4	Compact Dual C'way	1002	1682	1364	246	246	271
DS Option 5	Standard Dual C'way	1002	1682	1364	246	246	271
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1002	1682	1364	246	246	271

Table 2.10 – A55 Eastbound Carriageway Journey Times PM Peak 2027

Forecast Option		Flow (vph)			Journey Time (seconds)		
		16:00	17:00	18:00	16:00	17:00	18:00
Do Minimum		1619	1510	214	249	587	3889
DS Option 1	Three Lane Fixed	1569	1695	1045	243	245	237
DS Option 2	3 Lane Tidal	1353	1443	886	271	272	260
DS Option 3	Four Lanes	1569	1697	1042	252	253	245
DS Option 4	Compact Dual C'way	1640	1774	1099	223	226	215
DS Option 5	Standard Dual C'way	1640	1774	1099	223	226	215
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1640	1774	1099	223	226	215

Table 2.11 – A55 Westbound Carriageway Journey Times PM Peak 2027

Forecast Option		Flow (vph)			Journey Time (seconds)		
		16:00	17:00	18:00	16:00	17:00	18:00
Do Minimum		1730	1708	432	375	882	2345
DS Option 1	Three Lane Fixed	1790	2050	1406	271	569	407
DS Option 2	3 Lane Tidal	1422	1891	893	278	278	274
DS Option 3	Four Lanes	1786	2080	1401	266	519	369
DS Option 4	Compact Dual C'way	1905	2171	1503	237	500	353
DS Option 5	Standard Dual C'way	1905	2171	1503	237	500	353
DS Option 6	Anglesey Option						
DS Option 7 & 8	Parallel Bridge	1905	2171	1503	237	500	353

Do Minimum

- 2.33 The peak hours for journeys along the A55 are between 08:00-09:00 in the eastbound direction and between 17:00-18:00 in the westbound direction. The modelled journey times along the modelled section of the A55 in the 2007 Base model are 5 minutes 53 seconds and 5 minutes 01 seconds respectively.
- 2.34 Adjusted for growth between 2007 and 2012, these journey times are predicted to rise to 12 minutes 58 seconds and 5 minutes 53 seconds respectively.
- 2.35 Traffic growth between 2007 and 2027 predicts further increases in journey times, of up to 17 minutes 33 seconds and 14 minutes 42 seconds respectively. Traffic growth at this point causes congestion at a number of existing junctions on the network.

Option one – Three Lane Fixed

- 2.36 During the AM Peak hour the proposed improvements reduce overall vehicle hours on the highway network by 9%; this is further reduced by 13% in 2027. In both cases the total number of vehicle kilometres is similar, with reduction in vehicle hours being almost entirely due to an increase in vehicle speeds.
- 2.37 Eastbound in 2012 the capacity of the bridge appears to be improved when compared to the Do Minimum scenario, the number of cars crossing the bridge heading eastbound in the AM Peak hour increasing by nearly 5% to approximately 2200 vehicles per hour. During the same period, journey times along the modelled section of the A55 are reduced from an average of 12 minutes 58 seconds to 4 minutes 41 seconds.
- 2.38 In 2012 the westbound direction benefits are less pronounced with journey times in the peak hour falling from 5 minutes 53 seconds in the Do Minimum scenario to 5 minutes 30 seconds in option one.
- 2.39 Journey times are generally increased in the westbound direction where a single carriageway remains with a reduced speed limit.

Option two – Three Lane Tidal Flow

- 2.40 The Three Lane Tidal Flow option has negative impacts upon vehicle speeds during both forecast years; average speeds across the modelled network fall by 3% when compared to the Do Minimum scenario.
- 2.41 Across the bridge journey times are improved in the peak flow direction, the corresponding journey time in the opposite direction generally increases due to the retention of a single carriageway with a reduced speed limit.
- 2.42 There appears to be an element of re-routing within the model with fewer vehicles crossing the bridge in the improvement option than in the Do Minimum.

Option three – Four Lanes between Existing Parapets

- 2.43 During the AM Peak, when the primary movement across the bridge is in the eastbound direction benefits are similar to the 'Three Lane Fixed' option one. However, the scenario offers greater improvements to journey times in the westbound direction during peak hours due to the additional carriageway.
- 2.44 The capacity of the bridge is improved in the Do Something scenario with flows increasing by 4% eastbound in the AM Peak hour and by over 3% in the PM Peak hour. There is a corresponding fall in vehicles crossing the bridge in the following hour suggesting the lower peak hour flows in the Do Minimum scenario are due to congestion.
- 2.45 Modelled journey times fall in both directions in the 2012 peak hours; from 5 minutes 53 seconds to 4 minutes 23 seconds in the westbound direction, and from 12 minutes 58 seconds to 4 minutes 48 seconds in the eastbound direction.

- 2.46 In 2012, journey times increase in the non peak direction due to the reduced speed limit in operation when compared to the Do Minimum scenario.

Option four – Compact Dual Carriageway

- 2.47 In modelling terms, Option four is the same as Option 5 and as such has not specifically been modelled at this stage.

Option five – Standard Dual Carriageway

- 2.48 As with the other improvement options the total number of vehicle kilometres on the modelled network is broadly similar to the Do Minimum scenario. The option offers the greatest improvements to vehicle speeds and travel time when compared to the Do Minimum scenario. Average network speeds in the AM Peak are 6.5 kph greater than in the Do Minimum scenario in 2012, and 6.7 kph greater in 2027.
- 2.49 Modelled flows along the A55 in the peak hours increase by 7.5% to approx 2,250 vehicles per hour for the eastbound carriageway (AM Peak) and by 9.3% to approx 2,190 vehicles per hour for the westbound carriageway (PM Peak).
- 2.50 Modelled journey times fall in both directions in the peak hours; during the PM Peak hour in 2012 the westbound journey time of 5 minutes 53 seconds in the Do Minimum scenario is reduced to 3 minutes 55 seconds in the Do Something scenario. Corresponding journey times for the eastbound AM Peak hour fall from an average of 12 minutes 58 seconds to 4 minutes 29 seconds under the improvement option.
- 2.51 Journey times are improved during all time periods predominantly due to the increased speed limit in the Do Something scenario.

Option six – Anglesey 4 Lane Option

- 2.52 As described earlier, Option six has not been reported on due to problems associated with model operation.

Option seven – New Multi Span Concrete Box Bridge

- 2.53 Assignment results from Option Five were used to represent Option seven as discussed earlier.

Option eight – New Single Span Cable Stayed Bridge

- 2.54 Assignment results from Option Five were used to represent Option eight as discussed earlier.

Recommendation

- 2.55 A reduction in average speeds throughout the network, during the modelled year 2027, particularly during the PM Peak Period, indicated that as a whole the present network would be unable to cope with the forecast levels of growth. Aside from the tailbacks predicted as a result of narrowing from two lanes to one lane over the Britannia Bridge, which are generally eliminated through the implementation of the Options, particular areas of the network that are predicted to experience difficulties include:
- ◆ From the A55 Junction 10 westbound off slip road onto the roundabout with the A4087 causes tailbacks onto the A55;
 - ◆ On the A55 J9 eastbound off-slip approach to the A487 roundabout and between the dumb-bell roundabouts at A55 Junction 9; and
 - ◆ The B5420/A5025 roundabout.
- 2.56 The problems described above have reduced the accuracy of the forecast improvements to Britannia Bridge during this future year as regardless of the improvements to the bridge the forecast growth in traffic results in capacity issues at these existing junctions.
- 2.57 A key feature of the Stakeholder presentation (held at Parc Menai, 25 September 2007) was the realisation into the level of committed and potential land-use regeneration that is being scheduled for the 'Mon a Menai' area. During the next stage of any A55 Britannia Bridge study, the levels of traffic generated by these developments must be incorporated into any forecast traffic model. Perhaps more importantly the distribution of the traffic associated with these developments must also be understood. The locations of these developments and the likely areas of trip origin and destination will potentially have a dramatic effect on local roads such as the A55 (between junctions 7 to 11), the A487 (between Bangor and Caernarfon but especially at the Parc Menai junction), the A5 (both at Menai Bridge and Bangor) and the A4087.

- 2.58 Examples of locations that have been identified as committed and potential developments include:
- ◆ Bryn Cegin, Bangor - up to 750,000 sq ft of B1 (Office) and B2 (General Industrial) Land-use
 - ◆ Bangor Menai Retail Centre - 190,000 sq ft of new Retail units scheduled to open Spring 2008
 - ◆ Continued expansion of the Parc Menai site - possibly including 200,000 sq ft of Office development
 - ◆ the Ty Mawr site at Llanfairpwll - a major mixed land-use site generating up to 1300 new jobs
 - ◆ Parc Cybi, Holyhead - a new employment park with the potential to generate 1200 jobs
- 2.59 If these developments go ahead, then there will be a clear implication on the local road network. It is recommended that contact should be made with the Economic and Regeneration Planning Units of Anglesey and Gwynedd Councils at the earliest possible stage of the assessment beyond the Feasibility Study.
- 2.60 It is recommended that beyond the feasibility study the base network is developed to produce an improved future year network including more accurate traffic growth assessment including major developments as well as transport schemes that are likely to be in place in future years.

ECONOMIC ASSESSMENT

OVERVIEW

- 2.61 The assessment of the benefits measures the impact that the schemes will have on the users of the A55 Britannia Bridge in relation to the existing situation; this is achieved by using two computer programs to calculate the effect of the schemes on various aspects of their journeys i.e.:
- ◆ The change in travel time and vehicle operating costs (VOC) – assessed by TUBA; and
 - ◆ The change in the number and/or severity of accidents – assessed by COBA.
- 2.62 Whilst it is conventional to calculate the cost of the schemes and input into the TUBA program, based on the estimated costs of the construction and maintenance of the schemes (including preparation, land and supervision), in this instance TUBA has been run with no scheme costs included, to enable comparison of the operation of the seven improvement schemes compared with the Do Minimum scenario.
- 2.63 Changes in the users VOC will have a secondary impact on the indirect tax revenue received by the Government and this impact is included in the costs of the scheme.
- 2.64 Where necessary, the programs convert non-monetary values (e.g. time, number of accidents) to monetary ones using standard parameter values provided by DfT.
- 2.65 The results of the economic assessment described above need to be summarised in a way which brings the results from the discrete elements together into a format which shows the overall result. This is achieved by summarising the output from each program in the following tables:
- ◆ 15A Transport Economics and Efficiency (TEE) Table;
 - ◆ 15B Public Accounts Table; and,
 - ◆ 15C Analysis of Monetised Costs and Benefits Table.

TRANSPORT USERS BENEFIT APPRAISAL (TUBA)

- 2.66 The Transport Users Benefit Appraisal (TUBA) program is a software package developed for the UK Department for Transport (DfT) and used in the economic assessment of transport schemes.
- 2.67 It calculates the discounted value of the expected costs/benefits for users, private operators and the public purse for a scheme over a given appraisal period and presents these costs and benefits in 2002 values and prices.

- 2.68 The benefits are calculated by considering changes in user's journey times and vehicle operating costs (VOC) between the existing (Do Minimum) scenario and the 'with scheme' (Do Something) scenario.
- 2.69 Where necessary, TUBA converts non-monetary values (i.e. time) to monetary ones using standard parameter values outlined in the Transport Appraisal Guidance (TAG) produced by DfT. All of the monetary costs/benefits are then discounted over the appraisal period which is defined by WebTAG as being for 60 years, including the opening year. The discount rate for the first 30 years is 3.5% per annum after which it reduces to 3.0% per annum.
- 2.70 For this project the opening year was assumed to be 2012 and the end of the appraisal period (the horizon year) was 2071 (i.e. 2012 + 59 years).
- 2.71 For the study at this stage, as a result of the particular problems encountered with the over congested PM Peak period 2027 traffic model assignments described above, the TUBA assessment is based solely on the results derived from the AM Peak period traffic model assignment results, the PM results were deemed to be unrepresentative and have not been incorporated into economic assessment.
- 2.72 More detailed traffic model forecasting is recommended at the next stage of assessment to ensure that problems are resolved within the wider network and develop accurate representation of the PM peak period. This is discussed in more detail at a later stage in this report.

Inputs to TUBA

- 2.73 TUBA runs using two main input files together with matrices of trip numbers, distances and times taken from a transport model. The main input files are:
- ◆ Economic parameters file – this contains standardised data such as values of time (VOT), VOC and tax rates; and
 - ◆ Scheme specific file – contains scheme specific data such as the transport model matrices to be used.

Economic Parameter Inputs

- 2.74 A standard TUBA economics parameters file was used with the number of input modes reduced from the default eight to the five noted previously.

Traffic Model Matrices

- 2.75 Paramics models were developed for the existing (Do minimum) situation and for each of the schemes. The output matrices from these models which were used in the economic assessment were:
- ◆ Trip (demand) matrices;

- ◆ Distance matrices; and
 - ◆ Journey time matrices.
- 2.76 There are a total of thirty six origin-destination zones in the model so all matrices can be expressed simply as thirty six by thirty six arrays. These matrices are the key determinants of the user benefits.

Forecasting Years

- 2.77 Matrices were produced from the Paramics model for each of the following forecast years:
- ◆ 2012 – Opening year; and
 - ◆ 2027 – ‘Design’ year;

Vehicle Classification

- 2.78 The trip matrices output from the model were divided into the following five sub-modes:
- ◆ Car;
 - ◆ LGV;
 - ◆ OGV1;
 - ◆ OGV2; and
 - ◆ Bus / Coach.

Time Periods

- 2.79 The trip and journey time matrices produced by the transport model were broken down into two time periods (AM (average hour between 07:00 - 10:00) and PM (average hour between 16:00 - 19:00)). However, as described above only AM period data was used in the assessment at this stage.
- 2.80 Data for a full seven day period was required to establish economic benefits, an estimate was made of the remaining weekly periods namely:
- ◆ PM Peak period (average hour between 16:00 - 19:00);
 - ◆ Inter Peak period (average hour between 10:00 – 16:00);
 - ◆ Off Peak period (average hour between 19:00 - 07:00); and
 - ◆ Weekend (average hour between 00:00 Saturday – 23:59 Sunday).
- 2.81 In order to establish economic benefits for these periods the matrices for demand from the AM Peak were factored according to ATC counts to cover the other periods. Traffic count data obtained from four automatic traffic count (ATC) sites

located at various locations along the route was used in determining the above factors.

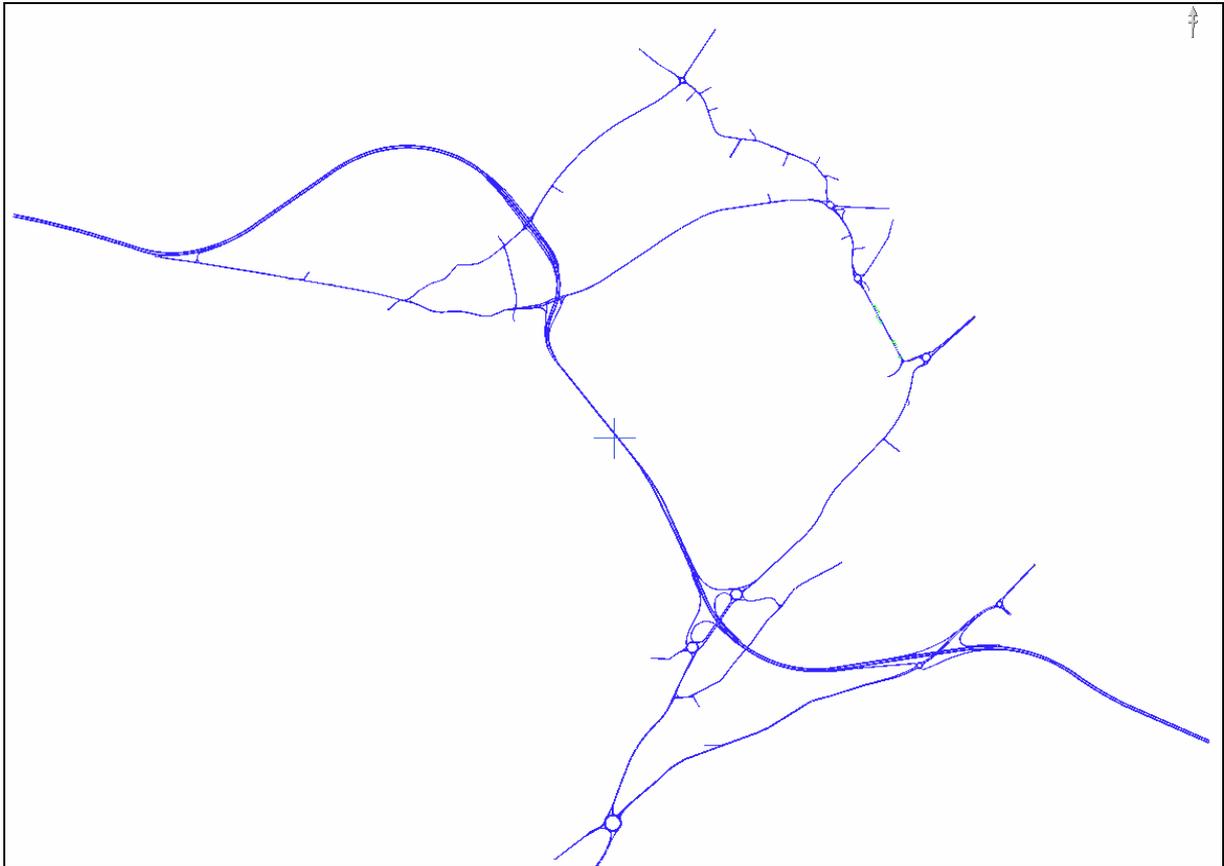
- 2.82 TUBA results were then produced for these matrices, this produced results based on the factored traffic levels but does not account for the effect this will have on journey times which are still based upon the AM Peak period. As a result the economics from TUBA were adjusted to reflect traffic flows during the PM and non-peak periods as shown in Appendix B.

Outputs

- 2.83 The TUBA output includes a series of tables which show the user benefits, operator revenues and government indirect tax revenues, disaggregated by various categories. It also includes three tables showing the results of the assessment in a format which closely corresponds to the Transport Economics and Efficiency (TEE) Table, Public Accounts Table and Analysis of Monetised Costs and Benefits Table described in WebTag.

COST BENEFIT APPRAISAL (COBA) TO DERIVE ACCIDENT BENEFITS

- 2.84 The number of accidents which occur are liable to change with the introduction of the proposed schemes. These impacts form an important element of an economic appraisal of a scheme.
- 2.85 Whilst full COBA analysis has not been undertaken for this stage of the assessment, COBA models have been developed ready for detailed analysis at the next stage. Their development is described below for completeness.
- 2.86 The DfT's COBA (COst Benefit Appraisal) program (version 05) was used to estimate the impact the schemes will have on the number of accidents occurring along each of the affected sections of the A55 Britannia Bridge and adjacent network. This is achieved by considering both the 'Do minimum' and 'Do something' scenarios and comparing the difference between them. The program puts a monetary value on the accident benefit and produces a valuation of the accident costs/savings associated with the scheme which can be used in the economic assessment.
- 2.87 The COBA network to be used consists of a 7.0km stretch of the A55, encompassing the Britannia Bridge. The limits of this are the junction of the A55/A5/Holyhead Road to the west, and just east of the junction of the A55/A4087. To the south, the network boundary is the junction of the A487/A4087, and to the north, most of the town of Menai Bridge is included, as well as the bridge itself. The extent of the network can be seen below in Figure 2-1.

Figure 2.1- Extent of the COBA Network

Local Accident History

2.88 Accident data was obtained for the A55 for years 2002 to 2006 inclusive. Below in Table 2.12 is a summary of the accident data, for each of these years, split by severity.

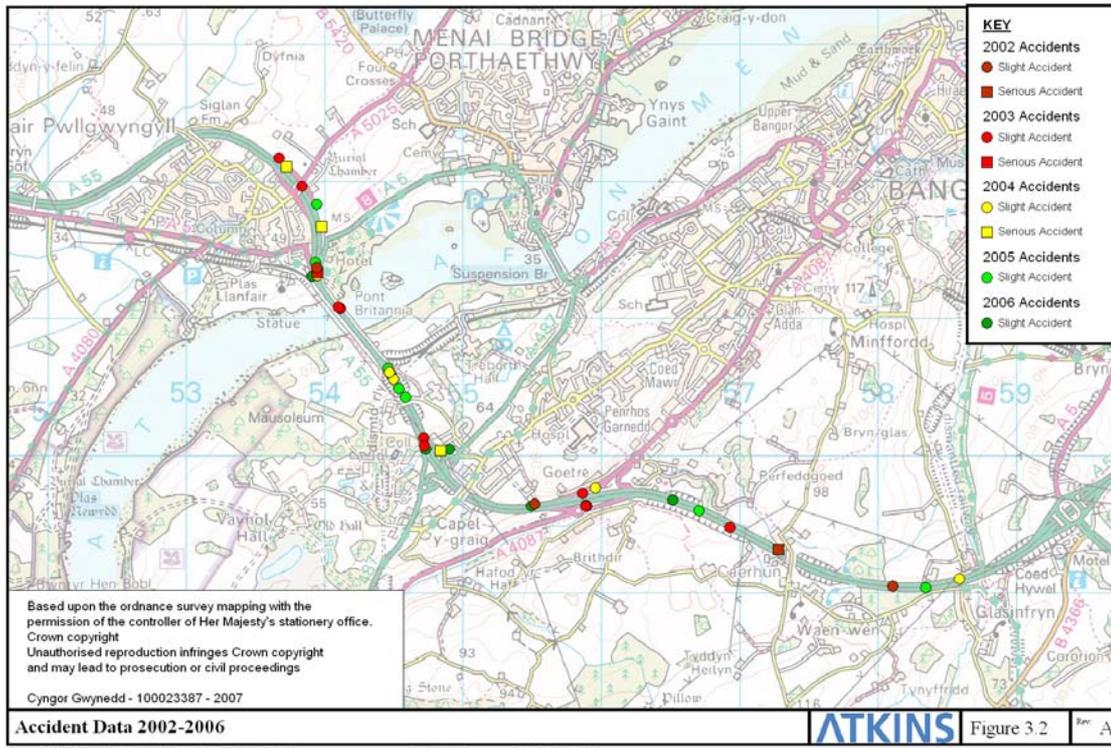
Table 2.12 - A55 Local Accident Rates (2002 – 2006 incl.)

Year	Slight	Serious	Fatal
2002	3	1	0
2003	10	1	0
2004	5	3	0
2005	8	0	0
2006	8	0	0

2.89 This accident data was input into COBA on the relevant links to obtain an accident rate for those links. Default COBA rates were used along other links, obtaining rates as a function of the link characteristics. Changes in link characteristics and

flow as a result of each scheme will cause a change in any accident rates, and are expected to show an overall benefit as a result of the scheme. The locations of these accidents can be seen below in Figure 2.2.

Figure 2.2 – Accident Locations



Projected Impact of the Road Improvement

2.90 The road safety benefits expected from the proposed schemes include:

- ◆ Improved vertical and horizontal geometry leading to improved sightlines;
- ◆ Improved junction layouts providing better visibility and safer turning opportunities;
- ◆ Greater opportunities for safe overtaking;
- ◆ Downstream improvements in safety due to a reduction in driver frustration;
- ◆ Introduction of a central reserve and barrier.

2.91 Detailed COBA analysis will be undertaken at the next stage of development.

SUMMARY OF ECONOMIC APPRAISAL RESULTS

Results

- 2.92 Table 2.13 summarises the outputs from the TUBA program. Costs are in 2002 prices (in multiples of a million pounds) and discounted to 2002. A positive value indicates a benefit whereas a negative value is a cost.
- 2.93 The discount rate used is 3.5% per annum for the first 30 years and 3.0% per annum for the next 30 years of the 60 year appraisal period. The results are presented as differences from the 'Do Minimum'.

Table 2.13 AST Summary (Table 15C) - Analysis of Monetised Costs and Benefits in Market Prices (£M)

IMPACT	Do Something Option, £ (M)							
Scheme	1	2	3	4	5	6	7	8
TEE Impacts								
User Benefits	50	-10	92		150		181	181
Government Funding								
Present Value of Costs (PVC)	8.5	17	23.5		55		100	155

3. Summary and Conclusions

Overview

- 3.1 Traffic models have been developed for two time periods (AM and PM peak) and for two forecast years (2012 and 2027) to support the A55 Britannia Bridge Feasibility Study.
- 3.2 The models build upon those developed for the base year of 2007, which were described in detail in the Model Development Report. This Forecasting and Economics Report describes the development of the forecast year networks and matrices, the traffic impacts and economic assessment of the proposed Britannia Bridge options.

Forecasting Methodology

- 3.3 The forecast year models have been developed in accordance with guidance set out in the DfT's WebTAG. A combination of parameters has been used in developing the forecast models, based on default national averages and, where possible, locally-observed traffic data.
- 3.4 Future year traffic demand has been developed in accordance with TEMPRO and NRTF.

Forecast Traffic Impacts

- 3.5 In the eastbound direction under the Do Minimum scenario, peak hour journey times along the modelled section of the A55 are forecast to increase from 5 minutes 53 seconds in 2007 to 12 minutes 56 seconds in 2012. The westbound journey times are forecast to increase from just over 5 minutes in 2007 to just under 6 minutes in 2012. By 2027 the eastbound journey time is projected to be over 17 minutes with the westbound journey time taking almost 15 minutes on average
- 3.6 The improvement options vary in their impact upon the journey times across the bridge, although improvements to the 2007 peak hour journey times could be expected beyond 2012 under a number of the improvement options.
- 3.7 Journey times in 2027 are considerably shorter under the improvement options than in the Do Minimum scenario; the options with the greatest impact (Parallel Bridge, Standard Dual Carriageway) reduce journey times to 7 minutes 25 seconds in the eastbound direction and 8 minutes 20 seconds in the westbound direction. Although these are both greater than the journey times at the present date this is due to congestion on other parts of the network where no improvements have been modelled.

Recommendation

- 3.8 Taking into consideration the economic impacts alongside the safety and environmental impacts of each option, the following options were taken to public consultation:
- ◆ Do Minimum
 - ◆ Option 4 – Compact Dual Carriageway
 - ◆ Option five – Standard Dual Carriageway
 - ◆ Option 7 – New Multi Span Concrete Box Bridge
 - ◆ Option 8 – New Long Span Cable Stayed Bridge
- 3.9 It is recommended that more detailed analysis is undertaken at the next stage of development to address the difficulties encountered with the forecasting and appraisal process.
- 3.10 In particular, expansion of the traffic model to include the inter peak period (10:00-16:00) and weekends to provide more detail on the operation and interaction of traffic outside of the peak periods, and inclusion of detailed data corresponding to local developments is recommended to improve the accuracy of the economic assessment process. Traffic modelling would greatly benefit from Road Side Interview (RSI) survey data to provide further detail on trip routing and choice within the region.

Appendix A

TEMPRO Growth Factors

Table A.1 –Growth Factors

Location	2007-2012	2007-2027
TEMPRO: Menai Bridge\Llandegfan	105.5%	110.7%
TEMPR: GB	106.2%	116.7%
NRTF (Central Forecast)	107.8%	128.1%
Adjusted Growth	107.2%	121.5%

Appendix B

Whole Week Economics

INTRODUCTION

- 3.11 Without a model of these periods these values are subjective and they require a qualitative assessment as to how much congestion will be on the network relative to the AM Peak Period, and how the options impact upon this.
- 3.12 Values in the report have been based around the values below unless otherwise stated and are shown in appendix B of the report. Benefits may be negative in some off-peak periods where speed limits are reduced, although this is not quantified.

OPTION 1

- 3.13 Appendix Table B1 illustrates the assumptions taken forward for this option which includes some benefits in the inter-peak period and weekends but only in one direction. Results for the off-peak period would be little different from Do Minimum.
- 3.14 Benefits during the inter-peak period and weekends is set to 16.5% of the AM Peak value as benefits are in one direction only, and the speed limit is reduced.

Table B.1 – Option 1 – Three Fixed Lanes (40mph limit in both directions) (£000s)

Period	Proportion	Time Benefit	Fuel Cost	Non-Fuel Cost	Indirect Taxation	Total
AM peak	100%	32017	2033	905	-1436	33519
PM peak	0%	0	0	0	0	0
Inter-peak	17%	11273	667	308	-471	11777
Off-peak	0%	0	0	0	0	0
Weekend	17%	8036.24	620.16	195.5	-437.41	8414.5
Total		47538	3001	1331	-2119	49751

OPTION 2

3.15 Appendix Table B2 illustrates the assumptions taken forward for option 2. As the road runs at 50mph when the tidal is not operating, it is assumed that the inter-peak, off-peak and weekend periods would not be different from the Do Minimum scenario.

Table B.2 – Tidal Flow (30mph limit during tidal flow, 50mph otherwise) (£000s)

Period	Proportion	Time Benefit	Fuel Cost	Non-Fuel Cost	Indirect Taxation	Total
AM peak	100%	-5143	904	124	-657	-4772
PM peak	100%	-5219	998	151	-724	-4794
Inter-peak	0%	0	0	0	0	0
Off-peak	0%	0	0	0	0	0
Weekend	0%	0	0	0	0	0
Total		-10362	1902	275	-1381	-9566

OPTION 3

3.16 Appendix Table B3 illustrates the assumptions taken forward for option 3. Benefits during the inter-peak and weekends are assumed to be 33% of those for the AM Peak. This is less than in the Options which incorporate two lanes and a 60mph speed limit under the assumption that congestion will have to be worse before a benefit is seen with the 40 mph speed limit.

Table B.3 – Four Narrow Lanes (40mph limit in both directions) (£000s)

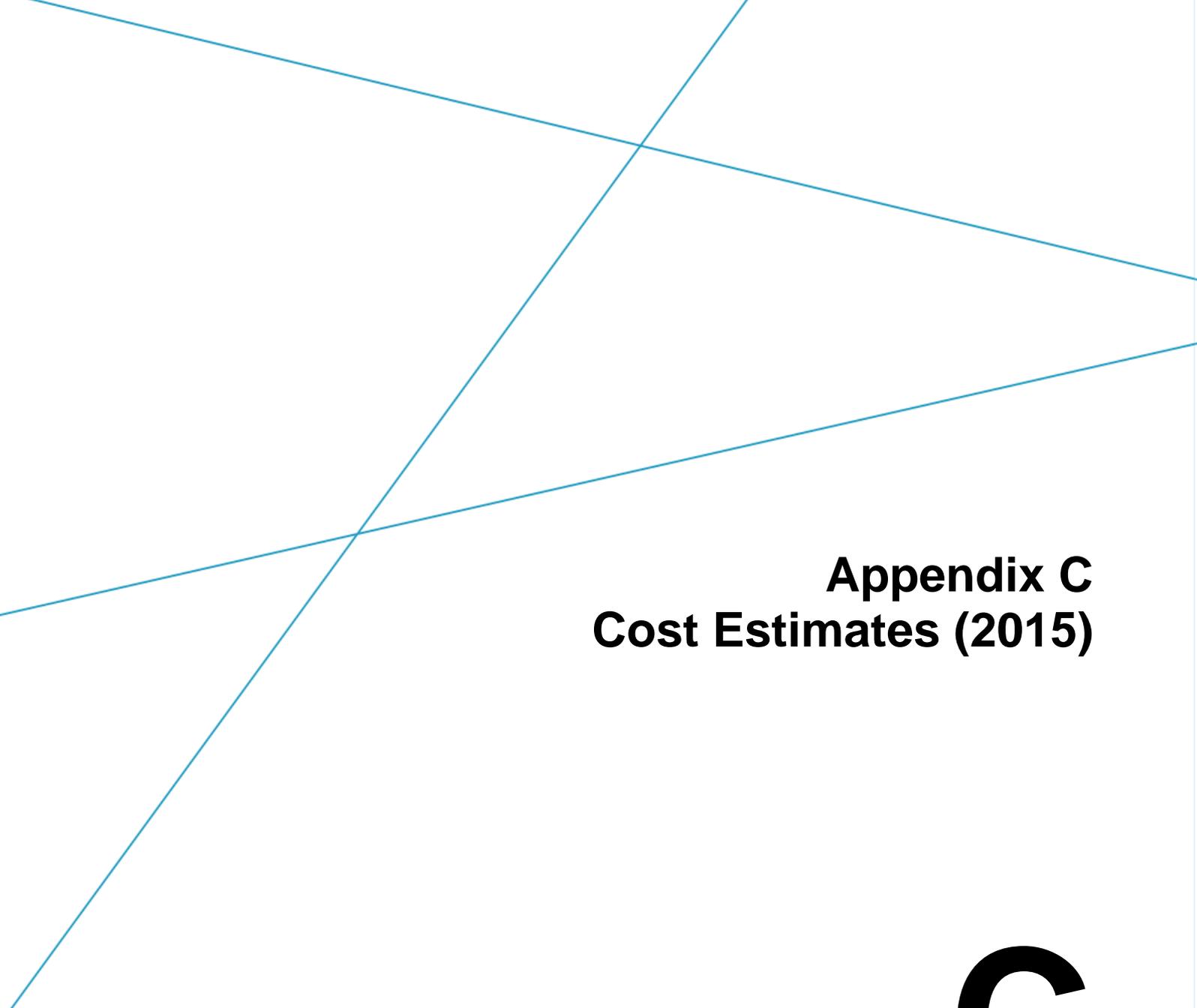
Period	Proportion	Time Benefit	Fuel Cost	Non-Fuel Cost	Indirect Taxation	Total
AM peak	100%	27453	1853	755	-1254	28807
PM peak	100%	27401	2045	745	-1383	28808
Inter-peak	33%	19368	1216	514	-823	20275
Off-peak	0%	0	0	0	0	0
Weekend	33%	13273	1097	309	-742	13937
Total		87495	6211	2323	-4202	91827

OPTION 8

3.17 Appendix Table B5 illustrates the assumptions taken forward for option 8 (and also option 7). Assumptions include the inter-peak, weekend and off-peak period values set to 50% of those from the TUBA, under the assumption that there is less congestion than in the peak but there is an increased speed limit.

**Table B.4 – Parallel Bridge to carry Eastbound Traffic (60mph limit in both directions)
(£000s)**

Period	Proportion	Time Benefit	Fuel Cost	Non-Fuel Cost	Indirect Taxation	Total
AM peak	100%	41479	1553	1059	-1037	43054
PM peak	100%	41576	1714	1042	-1143	43189
Inter-peak	50%	44210	1545	1094	-1031	45817
Off-peak	50%	16704	695	416	-464	17351
Weekend	50%	30775	1393	650	-929	31889
Total		174744	6900	4260	-4604	181299



Appendix C
Cost Estimates (2015)

C

Project: A55 Britannia Bridge Improvements

Title: Option Estimates

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Document Verification

Revision	Date		Prepared	Reviewed	Approved
0	07/07/15	Name	J Angell	G Barker	R Gibson
		Position	Senior Estimator	Principal Surveyor	Project Director
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		Signature			

Contents

1.0	Introduction	1
2.0	Information Used and General Assumption	1
3.0	Option 7 – Specific Assumptions and Estimate Summary	4
4.0	Option 8 – Specific Assumptions and Estimate Summary	5
5.0	Summary	6
6.0	Supplementary Report	7

1.0 Introduction

Corderoy has been appointed by the Welsh Government to provide budget cost estimates and an accompanying report in respect of two options being considered for the improvement of the A55 Britannia Bridge crossing of the Menai Strait. This improvement is being made to reduce traffic congestion at the present Britannia Bridge.

The two options considered are:

1. Option 7 – New multi-span viaduct 10m north east of the existing Bridge
2. Option 8 – New cable stayed bridge more than 10m to the north east of the existing Britannia Bridge.

These respectively are as the new off-line structure options number 7 and 8 from the March 2008 A55 'Britannia Bridge Improvements – Feasibility Study, Summary Options Report' prepared for the North Wales Trunk Road Agency by Atkins.

No specific site visit has been undertaken but the existing bridge and surrounding area is known to the author of this report.

After the issue of the original report dated 07.07.2015, Welsh Government asked that two additional options be considered. These two new options are for a crossing to the west of the existing Britannia Bridge and are:

1. A multi span concrete box bridge as Option 7 above.
2. A long span cable stay bridge as Option 8 above.

It must be noted that no drawings have been produced to show a new bridge to the west of the existing Britannia Bridge. Costings and other issues relating to these two additional options are covered within Section 6.0 'Supplementary Report'.

2.0 Information Used and General Assumption

2.1 Information Used

The budget estimates has been based on the following works prepared by Atkins Limited:

- Drawing Option C highway alignment for new multi-span bridge, 504208/0802/SK7 Rev C
- Drawing Option 7 post tensioned concrete box, 5049208/401/SK36 Rev D
- Drawing Option 8 cable stay bridge option, 5049208/401/SK37 Rev A2
- Drawing Alternative Option 8 cable stay bridge option, 5049208/401/SK49 Rev P3

2.2 Measurement

As far as possible, measurement has been undertaken using the Method of Measurement for Highway Works and standard highway design principles. The measurement is based on limited design information and limited information on the existing construction and utilities. No construction programme, information on phases, availability of work areas or other constraints has been provided.

2.3 Pricing

The budget estimate has been prepared using analytical estimating techniques employing market rates and prices. All pricing has been base dated to Q2 2015. Lump sums have been allowed for some current elements of the work such as Land/Compensation, Utilities and De-trunking where there is currently no detail. The Statutory Undertakers costs have been assessed based on very limited design information provided.

The estimate includes for Risk in connection with the construction element only at this stage, so no allowance has been made for further risks on land, compensation, design and supervision and utility. There is however an Optimism Bias of 44% applied to all costs.

2.4 Assumptions and Exclusions

2.4.1 Preliminaries

An allowance of 30% has been added to the construction cost estimate for Preliminary requirements such as temporary accommodation, information boards, photographs and the like. This allowance is deemed reasonable based upon the complexity of the work, envisaged construction period, with appropriate estimations for staff, establishment, and other standard Preliminary costs.

2.4.2 Traffic Management

Traffic management for both options will relate to the tie in between the new road and the existing at both ends of the scheme, this is not considered to be a major cost and is included within the cost of the roadworks.

2.4.3 General Roadworks

An 'Option C' roadworks scheme has been presented, that is in line with the proposed Option 7 multi span viaduct. An allowance has been made for the typical roadworks sections which is based upon information from recently completed highway schemes. There is no general roadworks scheme for Option 8, the cable stay bridge. This bridge will be located further from the existing Britannia Bridge and the junctions with the existing road network will be more complex. In recognition of this the costs associated with Option 8 have been taken as those for Option 7 but with a 20% mark-up applied.

2.4.4 Structures

The Structures measurement and cost is based upon the drawings listed above and the Summary Options Report.

- Where no dimensions are shown these have been scaled from the drawings.
- The construction of both bridge forms has been assumed as post tensioned precast concrete deck elements.
- For the cable stay option the spans as shown on drawing SK49 have been used for the cost build up.

2.4.5 Works for Statutory Undertakers

There is no information available with regard to work for Statutory Undertakers. Therefore at this stage an allowance of £2,000,000 has been allowed assuming that all existing services from the present Britannia Bridge will be moved to the new bridge.

2.4.6 Accommodation Works

No detail for Accommodation Works has been provided however an allowance of £500,000 for an underpass has been included within the Roadworks sections for both options.

2.4.7 Landscaping & Ecology

Only top soiling and seeding with some replacement of mature trees has been allowed at this stage for each option. No allowances have been made for special planting or for ecological measures.

2.4.9 Contractor's Risk

For each option a 20% allowance is included for contractor's risk and contingency.

2.4.10 Procurement

We have assumed an ECI form of procurement and allowances have been made for the Contractor's costs at Key Stages 3, 4 and 6. These allowances are consistent with recent pricing data from other schemes in North and Mid-Wales.

2.4.11 Other Works Costs

For Option 7 an allowance of £2,000,000 has been made for Land and Compensation costs and the same allowance has been made for Option 8. No allowance has been made for de-trunking costs and at this stage we are assuming none are required.

2.4.12 Employer's Costs

For Option 7 an allowance of £2,000,000 has been made for the Employers Agent Costs for Key Stage 3, 4 and 6 and an allowance of £4,000,000 for Option 8 for the same costs.

2.4.13 Employer's Risks and Optimism Bias

A further allowance is included for Employers Risks and Optimism Bias. Under WeITAG guidelines the standard approach given the status of the scheme is to add 44% as there is no preferred route status.

2.4.14 VAT

VAT included at 20% for the entire scheme for all options at this stage.

3.0 Option 7 – Specific Assumptions and Estimate Summary

- Viaduct 830m long – 8 spans ranging from 40 m to 95 m for the landward spans and two spans at 152 m for the water crossing.
- Viaduct superstructure constructed using post tensioned precast concrete units
- Precast units manufactured local to the site in a bespoke factory.
- The new road will cross the existing railway on the Caernarfon side.
- The new road will merge with the existing road where this reduces from a 2-lane dual carriageway to a 2-lane single carriageway.

WORKS COST		
ECI Contractor's Key Stage 3 and 4 Design and Preparation Base Cost		
Key Stage 3 Base Cost	2,500,000	
Key Stage 4 Base Cost	1,500,000	
Sub-Total	4,000,000	
ECI Contractor's Key Stage 6 Base Cost		
Preliminaries	11,192,194	Allowed at 30%
Roadworks	4,550,891	
Bridge works	29,006,421	
Key Stage 6 Design and Supervision	3,750,000	
Contractor's Risk Allowance	9,699,901	Allowed at 20%
Sub-Total	58,199,407	
Other Works Costs		
Payments to SU's	2,000,000	
Land and Compensation	2,000,000	
Network Rail Fees	250,000	
Sub-Total	4,250,000	
Employer's Agent Costs	2,000,000	
Employer's Risks and Optimism Bias	30,117,739	Allowed at 44%
Sub-Total	32,117,739	
Total excluding VAT	98,567,146	
VAT on a, b, c and d	19,713,429	Allowed all new at 20%
SCHEME FORECAST COST	118,280,575	a, b, c, d & VAT

4.0 Option 8– Specific Assumptions and Estimate Summary

- Two alternatives are given for Option 8, the first with a centre cable stayed span of 460 m and an overall length of 900 m the second with a centre cable stayed span of 320 m. The overall length of this alternative is not given but has been assumed as 830m. The number of side spans varies considerably between the two alternatives, with 8 for the longer span and 15 for the shorter.
- For this report a bridge of overall 830m long has been taken with 8 side spans and a single cable stayed centre span of 320 m crossing the Menai Strait with towers 79 m tall above the road deck level.
- The superstructure is assumed to be constructed using post tensioned precast concrete units
- Precast units manufactured local to the site in a bespoke factory.
- The new road will cross the existing railway on the Caernarfon side.
- The new road will merge with the existing road where this reduces from a 2-lane dual carriageway to a 2-lane single carriageway.

WORKS COST		
ECI Contractor's Key Stage 3 and 4 Design and Preparation Base Cost		
Key Stage 3 Base Cost	2,750,000	
Key Stage 4 Base Cost	1,500,000	
Sub-Total	4,250,000	
ECI Contractor's Key Stage 6 Base Cost		
Preliminaries	18,537,869	Allowed at 30%
Roadworks	5,361,069	
Bridge works	52,681,828	
Key Stage 6 Design and Supervision	3,750,000	
Contractor's Risk Allowance	16,066,153	Allowed at 20%
Sub-Total	96,396,919	
Other Works Costs		
Payments to SU's	2,000,000	
Land and Compensation	2,000,000	
Network Rail Fees	250,000	
Sub-Total	4,250,000	
Employer's Agent Costs	4,000,000	
Employer's Risks and Optimism Bias	47,914,644	Allowed at 44%
Sub-Total	51,914,644	
Total excluding VAT	156,811,563	
VAT on a, b, c and d	31,362,313	Allowed all new at 20%
SCHEME FORECAST COST	188,173,876	a, b, c, d & VAT

5.0 Summary

From the information provided, it is currently estimated that Option 7 will be the least costly. However this option requires a bridge pier in the Menai Strait this will be located on the Britannia Rock adjacent to the existing centre pier of the Britannia Bridge and as such this will reduce any environmental and ecological impact of the construction on the Strait. Notwithstanding this, heavy marine plant will be required to construct this pier and this may have consequential effects on the Strait.

The cable stayed option, Option 8, will have a much larger visual impact but will require no construction works within the Strait. Because it will be constructed further away from the existing Britannia Bridge the road links to the existing network will be more complex, require more land take and require the demolition of buildings on the line of the new road.

The form of construction for the deck, post tensioned precast units, will require that land be made available in order to build a temporary factory for the production of these units. The costs given in this report have assumed that this factory is close by the works such that transport costs are reduced by moving the units by wheeled vehicles to the point of construction. It would be perfectly practical to have the factory remote from the site and then bring the units in by barge, however this would increase the construction costs for both options.

6.0 Supplementary Report

6.1 Introduction

This section refers to two additional bridge options that are to be considered for a new crossing of the Menai Strait. These two options are both to the west of the existing Britannia Bridge on an alignment between the existing bridge and the present high voltage overhead power cables that span the Strait between the mainland and Anglesey at a point some 50m to the west of the bridge.

6.2 Information used and general assumptions

This supplementary report has been prepared from information contained within "The A55 Britannia Bridge Review, Options Review Report" dated October 2011. Section 3 of the October 2011 report describes the reasons for proposing a new crossing on this alignment and considers 5 different forms for the new bridge. Of these five forms only two are to be considered here. These are the Long Span Cable Stay Bridge as shown in Figure 3.2 of the October 2011 report and the Multi Span Post Tensioned Concrete Box Bridge as shown in figure 3.4 of the October 2011 report.

The base construction cost for these two bridges will be as the two similar structures, Option 7 and Option 8 covered elsewhere in this report. However there are additional costs to be considered. The alignment to the west of the existing Britannia Bridge leads to a more complex tie in to the existing A55 at either end of the bridge particularly at the Anglesey end of the bridge at the junction of the A55 with the A5 Holyhead Road.

There is the added complication at the Anglesey end of the bridge of having to cross the main rail line just before the A5 junction. The geometry of this rail bridge and the road junction will require careful consideration.

The central pier construction for the multi span option will be constructed on the Britannia Rock as will the similar bridge, Option 7. However less of the rock shows above the tide to the west of the existing Britannia Bridge, this will increase the construction costs.

The pier on the Anglesey shore for both bridge types will be constructed below the tidal range so increasing construction costs.

6.3 Risk

The construction of a large bridge structure to the west of the existing Britannia Bridge carries with it a very high risk factor due to the proximity of existing high voltage overhead power cables. These power cables provide the only electricity supply to/from Anglesey and are therefore an extremely important power connection.

The distance from the nearest suspended cable to the west side of the Britannia Bridge is of the order of 50m. If the new bridge is 20m wide this would give a clearance of only 15m from the west side of the new bridge to the nearest suspended cable if the new bridge is equidistant from the cable and the existing Bridge.

To construct a Long Span Cable Stay Bridge adjacent to the live power cables is so high risk that consideration should be given to temporarily re-locate the power cables further to the west. It is recognised that this will also be problematical due to planning and land ownership issues and the costs are not known at this time.

To construct a Multi Span Post Tensioned Concrete Box Bridge adjacent to the live power cables is also high risk but is considered a practical but costly proposition. Again consideration should be given to temporarily re-locate the power cables further to the west.

6.4 A multi span concrete box bridge as Option 7

- Viaduct 830m long – 8 spans ranging from 40 m to 95 m for the landward spans and two spans at 152 m for the water crossing.
- Viaduct superstructure constructed using post tensioned precast concrete units
- Precast units manufactured local to the site in a bespoke factory.
- The new road will cross the existing railway on the Anglesey side.
- The new road will merge with the existing road where this reduces from a 2-lane dual carriageway to a 2-lane single carriageway.
- *It is assumed that the overhead high voltage power cables to the west of the existing Britannia Bridge have been re-located for the construction period.*

WORKS COST		
ECI Contractor's Key Stage 3 and 4 Design and Preparation Base Cost		
Key Stage 3 Base Cost	2,500,000	
Key Stage 4 Base Cost	1,500,000	
Sub-Total	4,000,000	
ECI Contractor's Key Stage 6 Base Cost		
Preliminaries	13,487,194	Allowed at 30%
Roadworks	8,550,891	
Bridge works	32,006,421	
Key Stage 6 Design and Supervision	4,400,000	
Contractor's Risk Allowance	11,688,901	Allowed at 20%
Sub-Total	70,133,407	
Other Works Costs		
Payments to SU's	20,000,000	
Land and Compensation	2,000,000	
Network Rail Fees	250,000	
Sub-Total	22,250,000	
Employer's Agent Costs	2,000,000	
Employer's Risks and Optimism Bias	43,288,699	Allowed at 44%
Sub-Total	45,288,699	
Total excluding VAT		141,672,106
VAT on a, b, c and d	28,334,421	Allowed all new at 20%
SCHEME FORECAST COST	170,006,527	a, b, c, d & VAT

6.5 A long span cable stay bridge as Option 8.

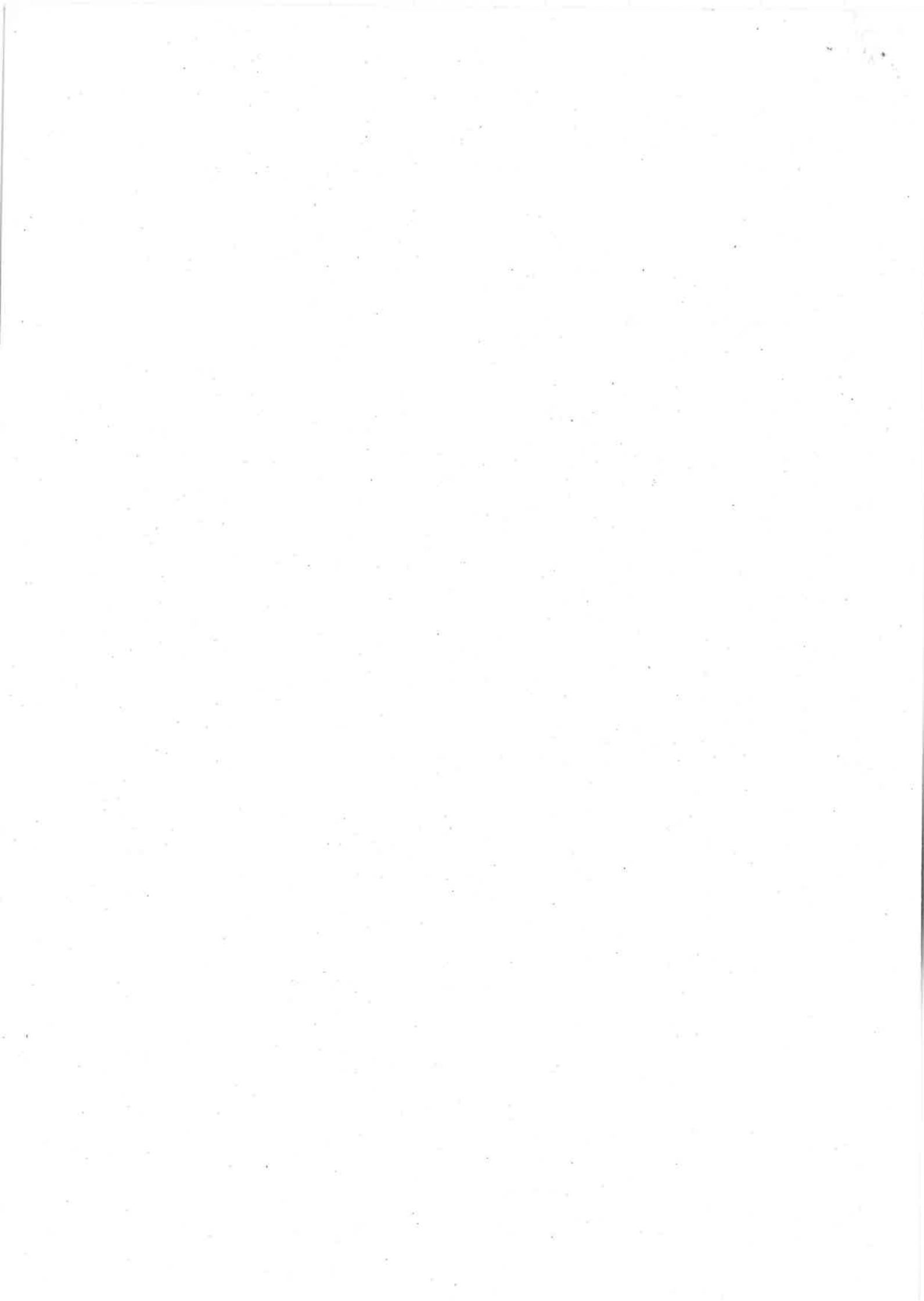
- Two alternatives are given for Option 8, the first with a centre cable stayed span of 460 m and an overall length of 900 m the second with a centre cable stayed span of 320 m. The overall length of this alternative is not given but has been assumed as 830m. The number of side spans varies considerably between the two alternatives, with 8 for the longer span and 15 for the shorter.
- For this report a bridge of overall 830m long has been taken with 8 side spans and a single cable stayed centre span of 320 m crossing the Menai Strait with towers 79 m tall above the road deck level.
- The superstructure is assumed as constructed using post tensioned precast concrete units
- Precast units manufactured local to the site in a bespoke factory.
- The new road will cross the existing railway on the Anglesey side.
- The new road will merge with the existing road where this reduces from a 2-lane dual carriageway to a 2-lane single carriageway.
- *It is assumed that the overhead high voltage power cables to the west of the existing Britannia Bridge have been re-located for the construction period.*

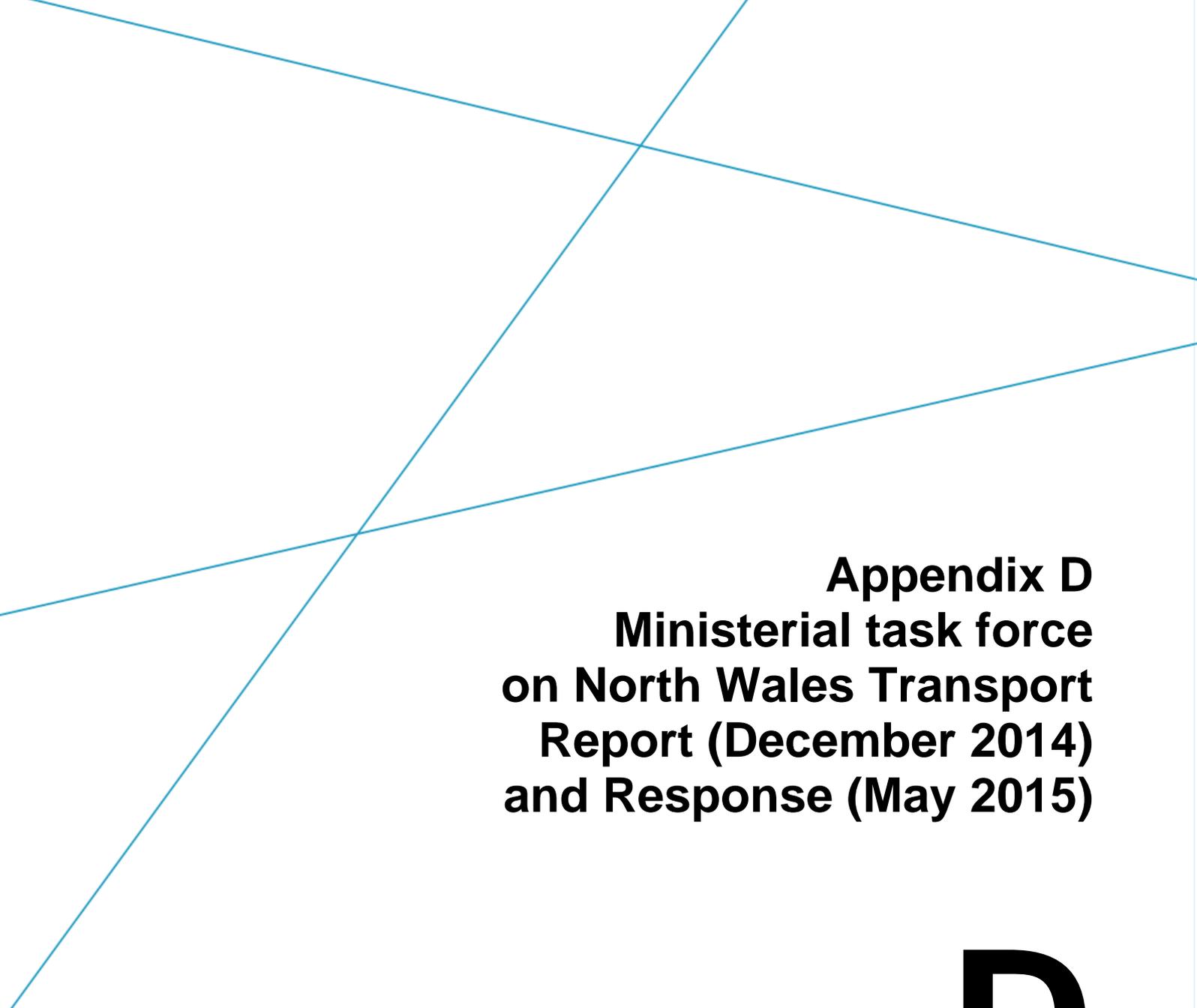
WORKS COST		
ECI Contractor's Key Stage 3 and 4 Design and Preparation Base Cost		
Key Stage 3 Base Cost	2,750,000	
Key Stage 4 Base Cost	1,500,000	
Sub-Total	4,250,000	
ECI Contractor's Key Stage 6 Base Cost		
Preliminaries	20,112,869	Allowed at 30%
Roadworks	9,361,069	
Bridge works	53,681,828	
Key Stage 6 Design and Supervision	4,000,000	
Contractor's Risk Allowance	17,431,153	Allowed at 20%
Sub-Total	104,586,919	
Other Works Costs		
Payments to SU's	20,000,000	
Land and Compensation	2,000,000	
Network Rail Fees	250,000	
Sub-Total	22,250,000	
Employer's Agent Costs	4,000,000	
Employer's Risks and Optimism Bias	59,438,245	Allowed at 44%
Sub-Total	63,438,245	
Total excluding VAT	194,525,164	
VAT on a, b, c and d	38,905,033	Allowed all new at 20%
SCHEME FORECAST COST	233,430,197	a, b, c, d & VAT

6.6 Summary

The Scheme Forecast Cost shown for both of the bridge types has assumed that the high voltage overhead power cables will be moved to enable construction of a new bridge to take place. Costs for this re-location is not known so a sum of £20m has been allowed within the forecast for the work involved in this re-location and subsequent reinstatement.

If the overhead high voltage power cables cannot be moved, it is recommended, that due to the very high risk involved in the construction of a new bridge to the west of the existing Britannia Bridge, the option is not pursued.





**Appendix D
Ministerial task force
on North Wales Transport
Report (December 2014)
and Response (May 2015)**

D

**REPORT TO THE MINISTER FOR ECONOMY,
SCIENCE AND TRANSPORT**

**MINISTERIAL TASK FORCE ON NORTH WALES
TRANSPORT**

FINAL REPORT DECEMBER 2014

FOREWORD BY THE CHAIR – LESLEY GRIFFITHS AM, MINISTER FOR COMMUNITIES AND TACKLING POVERTY



I am delighted to present to the Minister for Economy, Science and Transport the final report of the Ministerial Task Force on North Wales Transport.

The Task Force were set the challenge of providing advice about transport connectivity in North Wales, the delivery and prioritisation of improvements and the most appropriate mechanism to secure effective coordination of transport improvements and services. This report sets out the Task Force's response to that challenge. The Task Force has also provided support for the development of the business case for the modernisation / electrification of the North Wales Coast Rail Line and developed a strategy to secure business and wider political and public support to the project.

The arrangement proposed to co-ordinate the projects which will transform the North Wales economy, provides the mechanism to take forward, in conjunction with other partners, the transport priorities identified by the Task Force.

I would like to thank all members of the Task Force for their commitment and contributions over the last fourteen months. Special thanks are also due to Dr Elizabeth Haywood for her support on the rail modernisation / electrification work stream.

CONTENTS

	Page No.
1. Introduction	4
2. Recommendations	4
3. Task Force Work Streams:	8
A. Improving Transport Connectivity	8
B. North Wales Rail Modernisation	15
C. Improving Transport Co-ordination	27
4. Task Force Terms of Reference	37
5. Task Force Membership	39
Appendix A1: North Wales Transport Issues Identified	40
Appendix A2: Potential Strategic Transport Intervention Options	42
Appendix A3: Welsh Government Transport Commitments	44
Appendix A4: Further Priority Transport Connectivity Projects	45
Appendix B1: North Wales Rail Modernisation Briefing Paper To Stakeholders	48
Appendix B2: North Wales Rail Modernisation Rebuttal Paper	52
Appendix B3: North Wales Rail Modernisation Stakeholders	55
Appendix B4: North Wales Rail Modernisation Short Term Communications Plan	63
Appendix C1: North Wales Economic Ambition Board's Future Key Priorities (Draft)	69
Appendix C2: North Wales Economic Ambition Board Future Direction	81

1. INTRODUCTION

The Task Force was established by the Minister for Economy, Science and Transport to provide advice about transport connectivity in North Wales, the delivery and prioritisation of improvements and the most appropriate mechanism to secure effective coordination of transport improvement. The Task Force was also asked to champion the case for rail electrification in North Wales and modernisation of the rail wider network. The Task Force Terms of Reference are included at Section 3 and the membership is set out in Section 4.

The Task Force identified three work streams to deliver the aims as set out in its Terms of Reference. These work streams were:

- A. Promoting a shared understanding of the economic development opportunities that can be underpinned by improved transport connectivity in North Wales;
- B. Oversee the development of the business case for North Wales Rail Modernisation;
- C. Reviewing the effectiveness of current arrangements for planning transport services and infrastructure improvements and the most appropriate mechanism for co-ordinating transport in North Wales and across the border.

2. RECOMMENDATIONS

Twenty three recommendations have been made by the Task Force as follows:

A. Improving Transport Connectivity

Recommendation A1

The Task Force highlights the importance of an investment forward programme of infrastructure for North Wales that not only improves connectivity but supports local business to retain and grow jobs through a seamless flow of schemes that mitigates peaks and troughs in workload.

Recommendation A2

The Task Force recommends that the responsible bodies adopt the Strategic Transport Interventions set out in Appendix A2 as the priorities for transport improvement in North Wales.

Recommendation A3

The Task Force supports the existing commitments made by the Minister and noted in the report at Appendix A3. The Task Force recommends that where

the commitment only extends to an initial study that the project should be taken through to delivery, subject to a viable business case.

Recommendation A4

The Task Force has identified a prioritised list of infrastructure projects to support the North Wales economy, which are set out in Appendix A4, which should inform the development of future investment priorities.

Recommendation A5

A number of the identified interventions in the report are projects for local delivery that are expected to be contained in the emerging Local Transport Plans and should inform investment priorities for local transport schemes.

Recommendation A6

The Task Force has identified the importance of additional resilience and capacity on the key strategic networks and corridors in the region which should inform the prioritisation of infrastructure resilience investments and Task Force members would welcome the opportunity to engage in the prioritisation of improvements.

Recommendation A7

The Task Force has identified the importance of infrastructure that supports the successful development of key transformational projects, access to employment sites and strategic employment zones. These include:

- Modernising the rail network
- Improving the Menai Crossing
- Improving the A494 / A55 corridors as the main gateways to North Wales

Recommendation A8

The Task Force recognises that improving access to employment sites and to services, particularly by non car modes, is important to support the economy and jobs and reduce poverty. Interventions to increase accessibility, particularly for disadvantaged communities are set out in Appendix A4 and should inform future investment priorities.

B. North Wales Rail Modernisation

Recommendation B1

Further work should be undertaken to investigate whether investment in rail links can improve Business to Business (B2B) connectivity and employment opportunities arising from major developments in the region.

Recommendation B2

Task Force members continue to press the agreed communication strategy for electrification.

Recommendation B3

Welsh Government continues to participate in the North of England Task Force on Electrification to safeguard the interests of North Wales.

Recommendation B4

Welsh Government continues dialogue with the Department for Transport and the Secretary of State for Transport to realise the benefits to Wales from HS2.

Recommendation B5

Welsh Government should continue to make the case to the Secretary of State for Transport for the following:

- For electrification from Crewe to Holyhead
- To maximise opportunities from rail investments in the Northern Hub and North Wales areas
- To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for electrification of the North Wales main line
- For line speed improvements on the North Wales main line in CP5 to complement planned investments
- To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for additional capacity between Wrexham and Chester

Recommendation B6

Welsh Government should draw on the work developed under the Rail Modernisation project to inform future specifications for the North Wales rail services.

Recommendation B7

Welsh Government should consider how business and local authorities can be engaged in the development of the specification for a new franchise and informing its ongoing management.

Recommendation B8

Rail infrastructure improvements should accommodate possible future rail freight demand.

Recommendation B9

Welsh Government should continue to engage on rail modernisation project (including electrification) with partners in North Wales.

C. Improving Transport Co-ordination**Recommendation C1**

The Task Force proposes that the North Wales Economic Ambition Board should be the lead body for the co-ordination of strategic transport interventions, land use planning and economic development activity in North Wales among partner organisations.

Recommendation C2

The Task Force proposes the key priorities identified for the Economic Ambition Board should include supply chain, infrastructure, skills, and marketing and communication.

Recommendation C3

That the membership of the Economic Ambition Board be revised to include senior representatives from the six Local authorities, three from North Wales Business Council, one from Higher Education, one from Further Education, the three Chairs of the Enterprise Zones and one representative from the Mersey Dee Alliance

Recommendation C4

That a core programme office is established to manage the implementation of the agreed work streams and to deliver identified outcomes as set by the Economic Ambition Board.

Recommendation C5

That Welsh Government should consider nominating representatives to sit on the Economic Ambition Board and on the Programme Group.

Recommendation C6

The current Memorandum of Understanding of the Economic Ambition Board is revised to take account of the revised roles and responsibilities proposed by the Task Force and the review undertaken to date. The review and revised constitutional arrangements to be completed by 31 March 2015.

3. TASK FORCE WORK STREAMS

A. IMPROVING TRANSPORT CONNECTIVITY

In November 2013 the Task Force agreed its role as *promoting a shared understanding of the economic development opportunities that can be underpinned by improved transport connectivity in North Wales*. In taking forward this work, Task Force members identified the need to review and agree the issues relating to transport connectivity and the actions necessary to deliver the transport networks required to support economic and social development in the region.

This report sets out:

- The key issues, constraints and opportunities relating to transport connectivity with respect to supporting the Enterprise Zones, major employment centres, business and the wider economy, accessing health and other services and reducing poverty.
- The strategic vision for improved connectivity to facilitate economic and social development
- Prioritised transport projects identified that will contribute to the delivery of the strategic vision and support planned major developments within the region.

Transport Issues, Constraints and Opportunities – The Case for Change

The Task Force has examined evidence from a number of transport studies and reports produced over the last 12-18 months that have identified issues relating to transport connectivity in North Wales. These are the report of the North East Wales Integrated Transport Task Force, the Taith North West and Mid Wales Transport study and the Taith Bus and Community Transport Network Strategy. The Task Force has also engaged with, and sought input from, the six north Wales local authorities, the Enterprise Zones, representatives of the Business Sector and Sustrans to agree the key transport issues and opportunities and the strategic high level transport interventions required to address transport issues in the region.

Twenty nine transport issues were identified and these are included in Appendix A1, however the key issues for the region can be summed up as follows:

- The ability of the strategic trunk road and rail corridors to provide the necessary good connectivity, for people and freight, within North Wales, to the ports and to the rest of the UK to support the economy and jobs, including tourism
- The lack of resilience of the road and rail networks to planned and unplanned events including extreme weather
- The need for good access to and between the three Enterprise Zones in North Wales

- The lack of viable and affordable alternatives to the car to access key employment sites and other services
- The need for good road links to / from the trunk road network into the rural areas to help retain the viability of local businesses and support the Welsh language and culture.

A further important issue identified is the need for an investment programme that not only improves and sustains connectivity but that provides a continuous pipeline of projects supporting local businesses to retain jobs and skills within North Wales.

Recommendation A1

The Task Force highlights the importance of an investment forward programme of infrastructure for North Wales, that not only improves connectivity but supports local business to retain and grow jobs through a seamless flow of schemes that mitigates peaks and troughs in workload.

Strategic Vision for Improved Connectivity

Twenty eight potential strategic high level interventions were identified by the Task Force as being required to respond to the transport issues identified. These are included in Appendix A2. Some of the interventions would be for the Welsh Government to deliver; others would be delivered through the local authorities or Network Rail.

The Task Force advises that the key actions required are:

- **Transport Network Resilience Improvements** – improvements to the rail and road networks to increase resilience, particularly to the A55 corridor
- **Highway Capacity Enhancements / Pinchpoint Improvements** – improvements on the strategic highway network, in particular on the A55, A494, A483 and A487
- **Rail modernisation** - including new stations and faster and more frequent rail services to key destinations and the development of transport hubs
- **Direct rail links** from North Wales to Liverpool and to Manchester and Liverpool airports
- **Improved links** to and between Enterprise Zones, ports and other key employment sites, including those in rural areas
- **Strategic integrated transport measures** to improve access to employment and other services by non car modes, including regional and cross border bus routes, rail station multi modal hubs, active travel routes and car share sites
- **Facilitating the provision of rail freight** facilities subject to a viable business case

Recommendation A2

The Task Force recommends that the responsible bodies adopt the Strategic Transport Interventions set out in Appendix A2 as the priorities for transport improvement in North Wales.

Delivering the Vision for Improved Connectivity

There are a number of existing transport commitments made by Welsh Government, Network Rail and the Highways Agency that will contribute to achieving the vision for improved connectivity to/from and within North Wales. These are set out in Appendix A3.

The Task Force supports the continued delivery of the existing transport commitments. Some of the commitments are also considered under the North Wales Rail Modernisation Work Stream. Key messages are:

- Rail Modernisation is a critical project for North Wales. In particular Welsh Government should:
 - make the case for the infrastructure improvements needed to reduce journey times and allow for increased service frequency between North Wales and key cities and to Manchester, Liverpool and Birmingham airports
 - move quickly to specify increased frequency of services, with mix of limited stop and commuter stopping services, so that they can be included in the next Wales and Borders franchise and seek to influence other franchises that impact on North Wales
 - work with the rail industry to address issues around the availability and quality of rolling stock
 - recognise the need for improved passenger facilities, access to stations, station parking and new stations, such as at Broughton and North Wrexham, to be facilitated as part of the rail modernisation project
 - Seek to optimise the benefits of HS2 to North Wales and promote the benefit of investment in the North Wales rail network as contributing to strengthening the business case for HS2
 - Seek to safeguard and enhance the potential for rail freight
 - Continue to build on current cross border working arrangements

- If the case for rail modernisation is successful over time it should attract mode switch from road to rail. However, there is still a need to tackle congestion at key pinch points on the strategic road network. The Task Force requests that the Minister gives due consideration to accelerating the development of a scheme, through to completion, to address traffic problems on the A494/A55 at Deeside.

- It is important that the initial commitment to fund the development of schemes to improve access to Enterprise Zones, at Llangefni,

Llanbedr and A496 Maentwrog Junction to Blaenau Ffestiniog, is carried forward through to construction.

The Task Force believes it is essential that the commitments in Appendix A3 are carried through to implementation.

Recommendation A3

The Task Force supports the existing commitments made by the Minister and noted in the report at Appendix A3. The Task Force recommends that where the commitment only extends to an initial study that the project should be taken through to delivery, subject to a viable business case.

Over and above implementation of the commitments, the Task Force has also identified further transport improvements that it believes are needed to deliver its vision for a transport system that provides the necessary connectivity to support the economy and jobs. These improvements are listed in Appendix A4. It is recognised that delivery of the additional improvements would need to be phased and the Task Force has undertaken an initial prioritisation of those projects, however it should be recognised that the prioritisation should be subject to review to reflect changing circumstances or opportunities. The initial prioritisation is also shown in Appendix A4.

The North Wales Transport Connectivity Vision Map at Figure 1 illustrates the Task Force's vision for improved connectivity to / from and within North Wales to promote economic and social development.

Recommendation A4

The Task Force has identified a prioritised list of infrastructure projects to support the North Wales economy, which are set out in Appendix A4, which should inform the development of future investment priorities.

Recommendation A5

A number of the identified interventions in the report are projects for local delivery that are expected to be contained in the emerging Local Transport Plans and should inform investment priorities for local transport schemes.

Recommendation A6

The Task Force has identified the importance of additional resilience and capacity on the key strategic networks and corridors in the region, which should inform the prioritisation of infrastructure resilience investments and Task Force members would welcome the opportunity to be engaged in the prioritisation of improvements.

Recommendation A7

The Task Force has identified the importance of infrastructure that supports the successful development of key transformational projects,

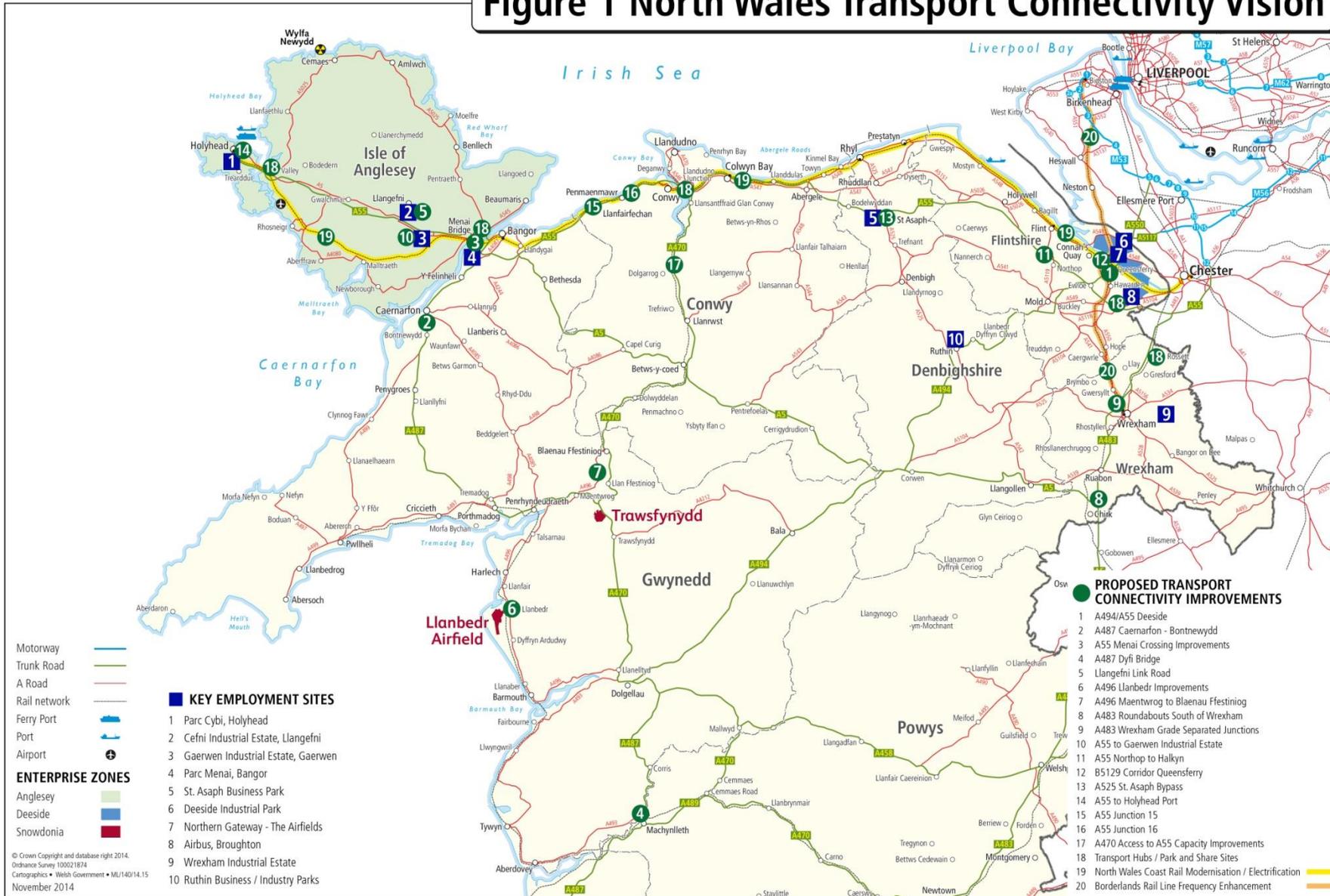
access to employment sites and strategic employment zones. These include:

- **Modernising the rail network**
- **Improving the Menai Crossing**
- **Improving the A494 / A55 corridors as the main gateways to north Wales**

Recommendation A8

The Task Force recognises that improving access to employment sites and to services, particularly by non car modes, is important to support the economy and jobs and reduce poverty. Interventions to increase accessibility, particularly for disadvantaged communities are set out in Appendix A4 and should inform future investment priorities

Figure 1 North Wales Transport Connectivity Vision



B. NORTH WALES RAIL MODERNISATION

The Task Force members welcome the opportunity that has been given by the Minister for Economy, Science and Transport to discuss rail modernisation in the region including electrification of the North Wales main line. Given its strong Local Government and business representation, the Task Force has been able to develop a strategic approach to the development proposed.

Under the Terms of Reference the Task Force were given the role of overseeing the development of the business case for North Wales Rail Modernisation.

In December 2013 the Task Force members agreed their role as:

- Helping to build the business, political, and social case for modernisation;
- Overseeing the development of the strategic outline case;
- Securing the commitment and support of their organisations / sectors;
- Developing a long-list of schemes to align with high-level options;
- Identifying stakeholders and secure support for the business case;
- Providing resources (funding and / or expertise) to support the development of the business case;
- Supplying economic and other data to support the business case.

The Task Force has engaged with Network Rail and with the HS2 Growth Task Force to inform them about its work on the Rail Modernisation Project. It has also been supported by Dr Elizabeth Haywood to develop a communication strategy relating to securing support for electrification. The Task Force strongly believes it is vital Wales is seen as a modern well connected country with modern infrastructure, and an electrified rail network supports this image.

Importance of rail modernisation for North Wales

Investing in rail transport is critical if we are to maximise the potential for economic growth in the Enterprise Zones within the region. Building on the impetus already generated by the Enterprise Zones, improving rail connectivity to and between the Zones will contribute towards unlocking this potential and at the same time, reduce demand on congested sections of the road network.

As well as the importance of rail modernisation to the Enterprise Zones and the North Wales region as a whole, the potential supply chain opportunities for businesses within Wales arising from the Wylfa Newydd and Wrexham Prison developments justify further investigation into investing in improvements to the rail links.

Recommendation B1

Further work should be undertaken to investigate whether investment in rail links can improve Business to Business (B2B) connectivity and employment opportunities arising from major developments in the region

Economic Business Case

To determine the economic potential in the region from rail modernisation including electrification, the North Wales Regional Leadership Board members on the Task Force commissioned a study through the North Wales Economic Ambition Board (EAB). The Study investigated the economic and social justification for rail modernisation and was carried out by Greengauge 21 in two Phases. Mersey Dee Alliance and Merseytravel contributed towards both phases. The Study has developed the case for improvement based on sound evidence and identified benefits accruing to the economies on both the Welsh and English sides of the border.

Phase 1¹ focused on the broad case for improving service frequencies and providing better connectivity. It also looked at measures to better integrate rail services with local bus networks and with international airports. An initial assessment of the prospects for increased freight on rail was also considered. The most beneficial routes and service improvements identified from Phase 1 were then subjected to further testing in Phase 2.

Phase 2² was an econometric study which measured the conventional or transport benefits and the wider economic benefits of resulting from rail modernisation including electrification. The measure of the Transport Benefits followed the Network Rail methodology and the Webs were measured following the Department for Transport's prescribed Guidelines. There was a strong focus on understanding the benefits of linking to HS2 and HS3. Some additional work was also done to measure the benefits to the Tourism Industry and the opportunity for rail travel to Manchester and Liverpool airports.

The 'Do Minimum' services used for the Phase 2 work were based on the Network Rail Indicative Train Service Specification 2043 (ITSS). These services are set out in the Table below and are compared to the Baseline (i.e. current timetable) Services.

1 Economic Growth and Social Benefit Potential from Modernisation of rail services North Wales, Phase 1 Report, Greengauge 21, for TAITH March 2014

2 Economic Growth and Social Benefit potential from Modernisation of rail services in North Wales Phase 2 Report Greengauge 21 for Denbighshire County Council on behalf of North Wales Economic Activity Board, Mersey Dee Alliance and Merseytravel, September 2014

Line	Baseline Service Assumptions	Do Minimum Service Assumptions
North Wales Coast (Crewe/Wrexham – Holyhead)	1 tph London – Chester (Bangor/Holyhead in same hours)	1 tph London – Wrexham & Bangor (in alternate hours)
	1 tph Birmingham/Cardiff (alternate hours) – Wrexham – Chester – Holyhead	1 tph Birmingham/Cardiff (alternate hours) – Wrexham – Chester – Holyhead
	No current service	1 tph Cardiff/Shrewsbury (alternate hours) – Wrexham – Chester – Liverpool via Halton
	1 tph Manchester Piccadilly – Warrington – Llandudno	2 tph Manchester Piccadilly – Warrington – Llandudno
	No current service	1 tph Holyhead – Liverpool via Halton
	1 tph Crewe – Chester	1 tph Crewe – Chester
Bidston Line	1 tph Wrexham Central – Bidston	1 tph Wrexham Central – Bidston
	No current service	1 tph Wrexham Central – Hawarden Bridge
Wirral Line	4 tph Chester – Liverpool Central	4 tph Chester – Liverpool Central

The Do Minimum services are not based on electrification but would in themselves deliver wider economic benefits to both the North Wales and regional English economies. It is also assumed that HS2 has been completed with connectivity at a Crewe hub.

Three scenarios were tested in Phase 2 against the do minimum case:

- Scenario 1 – electrification of the main line to Holyhead and Llandudno from Crewe and between Warrington and Chester;
- Scenario 2 – electrification terminates at Chester;
- Scenario 3 – a wider electrification network including Scenario 1 plus Chester to Birmingham/Cardiff via Wrexham, Manchester airport via Crewe, Holyhead to Liverpool via Halton Curve, Cardiff/Shrewsbury to Liverpool via Chester and Halton Curve, and connectivity to Yorkshire from North Wales via Manchester. This Scenario also assumes classic compatible HS2 rolling stock running from Crewe into North Wales. The Wrexham – Bidston service is extended (beyond scenario 1) into Liverpool Central.

The Benefits (or dis-benefits) for each scenario are set out in the Table below

Scenario	Scenario 1 £m PV	Scenario 2 £m PV	Scenario 3 £m PV
Total Transport Benefits	£312.6	-£589.9	£1,487.6
B2B Connectivity Benefits	£89.7	-£476.3	£453.8
Labour Market Benefits	£5.9	-£0.8	£56.5

NB All figures are discounted Present Values (PV)

Scenario 1

The study concluded there is firm evidence of significant transport economic benefits and wider economic benefits resulting from electrification of the main line rail services in North Wales (Scenario 1). The wider economic benefits adds one third or nearly £100m to the £312m transport economic benefits.

Scenario 2

If electrification terminated at Chester it would result in a very large economic cost and economic loss. There would be a £590m of transport cost because diesels would have to be retained with all the additional costs over and above electric units, for operation between Chester and Holyhead. Furthermore, passengers would have the inconvenience of changing at Chester for services into and out of North Wales. Because Rail operation is a central government function the £590m would be a cost to the UK.

Changing at Chester would also rupture seamless B2B connectivity making it more awkward for suppliers and customers to be in contact with each other. That would result in a dis-benefit or economic loss of £476m. That economic loss affects the economies on both sides of the border with an identifiable loss of around £264m to the Welsh economy and over £210m to the English economy.

Scenario 3

With a much wider electrified network beyond North Wales the benefits would be concomitantly greater. Transport benefit and wider economic benefits are much higher due to electrified rolling stock replacing diesels over a more comprehensive route network and easier faster access to more widespread

markets for businesses. In this Scenario the transport benefit is calculated at nearly £1.5bn – 5 times more than Scenario 1. B2B Benefits would be £450m reflecting the significantly enhanced economic activity in this Scenario.

By introducing direct rail services to Liverpool and Manchester Airports, it would provide an opportunity to increase the rail's share of business traveller journeys and relieve pressure on the increasingly congested M56. Tourism industry would also benefit from better rail connections.

The Phase 2 Study also investigated the viability of a new station at Broughton principally serving the Airbus site and relieving road congestion in the area. Initial findings indicate a net benefit if a new station was developed but this would require further detailed work.

The findings from the Greengauge 21 commission on the wider package of outputs electrification can deliver have been shared with Welsh Government for inclusion in the Strategic Outline Business Case.

Securing support for electrification

The outcome from securing electrification in South Wales had shown the importance of a well organised political lobby supporting a project. Dr Elizabeth Haywood's guidance to the Task Force on how to build such support and basing this on her experience in building a coalition to support the case for electrification of the Great Western Mainline from Cardiff to Swansea, has been invaluable.

The Task Force has identified several communication strands which will be taken forward:

- Building alliances with English Local Authorities particularly given the evidence Network Rail has presented on the different strength of the business case for electrification of Crewe - Chester and Chester to Holyhead as two separate schemes.
- Securing public support for the business case and demonstrating the social benefits and economic opportunities rail modernisation will bring and the positive impact it will have on communities;
- Building consensus with business representatives and others in South Wales about the importance of the project;
- Securing cross-party support to rail modernisation in Cardiff and Westminster;
- Involving the Republic of Ireland in the project especially if European funding is to be sought;
- Engaging with Holyhead and Mostyn Ports to discuss freight opportunities especially as the Welsh ports are better positioned in terms of reducing travelling times;
- Developing and maintaining close working relationship with Welsh Government, UK Government, key partners in England and Ireland and continuing dialogue with the HS2 Growth Task Force.

To convey a consistent message across all partners the Task Force and its Communication Sub Group has worked with Dr Haywood to develop a briefing paper to stakeholders (Appendix B1). As well as conveying the impact of not having electrification on running costs, the importance of investing in rail to switch traffic from the road network and relieve congestion, the briefing also links with the tackling poverty agenda.

A Rebuttal Paper (Appendix B2) has also been developed to help present a positive case and handle objections.

The Task Force has considered whether messages should be around electrification or rail modernisation. There was consensus on electrification being part of a modernisation programme - other improvements would be possible without it but a North Wales link to HS2 and HS3 will not happen without it. Electric trains can lead to more frequent services due to their superior performance.

As well as developing high level messages set around better connectivity, improved services and access to international markets, the Task Force have identified:

- A list of stakeholders and classification into “partner”, “inform”, “involve” and “consider” categories (Appendix B3);
- Agreed to prioritise a small group from the full stakeholder list for the initial communications phase. A Short Term Communication Plan (Appendix B4) has been developed for this purpose;
- Steps that need to be taken to engage with businesses to seek their support and views on electrification. Individuals have been identified to act as business champions;
- The need for early engagement with Train Operating Companies in order to influence the next franchise agreements and discuss rolling stock requirements;
- An e-newsletter should be used as one form to communicate messages and update on progress. Welsh Government has agreed to assist with resourcing this work.

Recommendation B2

Task Force members continue to press the agreed communication strategy for electrification

The Task Force welcomes Welsh Government’s involvement with the North of England Task Force on Electrification and urges this relationship continues in order to safeguard future rail developments in North Wales and to convey the importance of adopting a holistic approach to electrification and working across borders.

Recommendation B3

Welsh Government continues to participate in the North of England Task Force on Electrification to safeguard the interests of North Wales

Opportunities arising from HS2 development

The Task Force is keen to work with others to unlock the potential from HS2. A similar commitment has also been made by the North Wales Regional Leadership Board and the Mersey Dee Alliance.

Benefits to North Wales can only be realised if connectivity into the HS2 network is substantially improved. To secure such improvement, it is key that there is regular dialogue between Welsh Government and UK Government to discuss opportunities to North Wales from the development of HS2. Completing electrification in CP6 will mean that connecting services are ready to start once the Crewe hub is completed in 2027.

Recommendation B4

Welsh Government continues dialogue with the Department for Transport and the Secretary of State for Transport to realise the benefits to Wales from HS2

The Task Force believes there is now a greater realisation of the potential impact of HS2 if it can be integrated with the wider rail network and thus the importance of developing a business case around the opportunities to unlock the benefits of HS2. Unlocking the benefits from HS3 should also be considered.

If electrification does not take place and HS2 proceeds, Wales will lose out.

Strategic Outline Business Case

The Task Force have agreed the draft Strategic Outline Business Case which pulls together the findings from the Network Rail report on electrification of the North Wales mainline, the Greengauge 21 Phase 2 study, and reflects the impact of HS2 as well as integrating with developments to the Halton Curve.

The Task Force is concerned about electrification terminating at Chester rather than Holyhead. It is important the Department for Transport looks at this project holistically considering the line between Holyhead and Crewe as a whole because a stand alone scheme for Crewe to Chester electrification and for Chester to Warrington electrification would otherwise result in significant dis-benefits to passengers interchanging at Chester. Figure 2 shows the rail network that should be electrified.

Further work is now being done to strengthen the Strategic Outline Case by considering the potential benefits to franchises operating along the North Wales Coast main line.

Whilst recognising the low Benefit Cost Ratio for Chester to Holyhead, adopting a holistic approach will unlock benefits arising from electrifying from Crewe to Chester. It is therefore important the business case for electrification of the North Wales main line is not undermined by a separate business case being developed for the Chester to Crewe section alone.

The Task Force suggest Welsh Government convey this approach to the Department of Transport as well as highlighting:

- The importance of capitalising on current Network Rail planned investments to support the case for electrification;
- The North Wales mainline appears in Tier 3 of Network Rail's Electrification Route Utilisation Strategy and, in order to be considered for the Initial Industry Plan for Control Period 6 in 2016, a scheme developed to GRIP 2 standard is likely to be required which Network Rail should start now. The CP6 development fund should be released to allow this to happen.
- By treating electrification from Crewe to Chester as the Do Minimum reference case the benefit to cost ratio for Crewe to Holyhead increases to between 3.3 and 4.2 depending on the option selected;
- Forcing passengers to change between diesel and electric services at Chester incurs a high interchange penalty. Electrifying the entire Crewe to Holyhead route (and Warrington to Chester) would eliminate this;
- If the interchange penalty is avoided by retaining diesel services on routes east of Chester, the significant operational cost savings associated with electrification are lost;
- As North Wales is on the TEN-T core passenger network, the route should be electrified by 2030. However, if electrification of Chester – Holyhead is deferred until some after the Crewe – Chester section then all the dis-benefits and costs set out previously will be realised for the interim period;
- Electrifying the entire route from Crewe to Holyhead as one scheme will be significantly cheaper and therefore better value for money, than two separate schemes at two different times;
- The economic benefits of electrification accrue on both the Welsh and English sides of the border.

Recommendation B5

Welsh Government should continue to make the case to the Secretary of State for Transport for the following:

- ***For electrification from Crewe to Holyhead***
- ***To maximise opportunities from rail investments in the Northern Hub and north Wales areas***
- ***To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for electrification of the North Wales main line***
- ***For line speed improvements on the North Wales main line in CP5 to complement planned investments***
- ***To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for additional capacity between Wrexham and Chester***

Rail Franchises

The refranchising arrangements for North of England in 2016 and for the Wales and Borders in 2018 provide the opportunity to address the increase in demand identified in the Business Case.

Since service frequency has a significant bearing on the overall business case for the scheme, future passenger service specification for the franchises using the line needs to be considered. Shadowing developments on the franchising front is also viewed as important in particular the ability to influence integration of services and safeguarding capacity needs of North Wales.

Recommendation B6

Welsh Government should draw on the work developed under the Rail Modernisation project to inform future specifications for the North Wales rail services.

Recommendation B7

Welsh Government should consider how business and local authorities can be engaged in the development of the specification for a new franchise and informing its ongoing management.

Freight Opportunities

Whilst the current demand for freight service along the coast main line is low, any investment in rail modernisation should cater for possible upturn in demand.

With the industry forecasting growth in imports into UK generally and a growth in inter-modal freight networks, it is important to integrate freight requirements and opportunities into transport planning, infrastructure developments and economic development sites.

Recommendation B8

Rail infrastructure improvements should accommodate possible future rail freight demand.

Continuing with Rail Modernisation

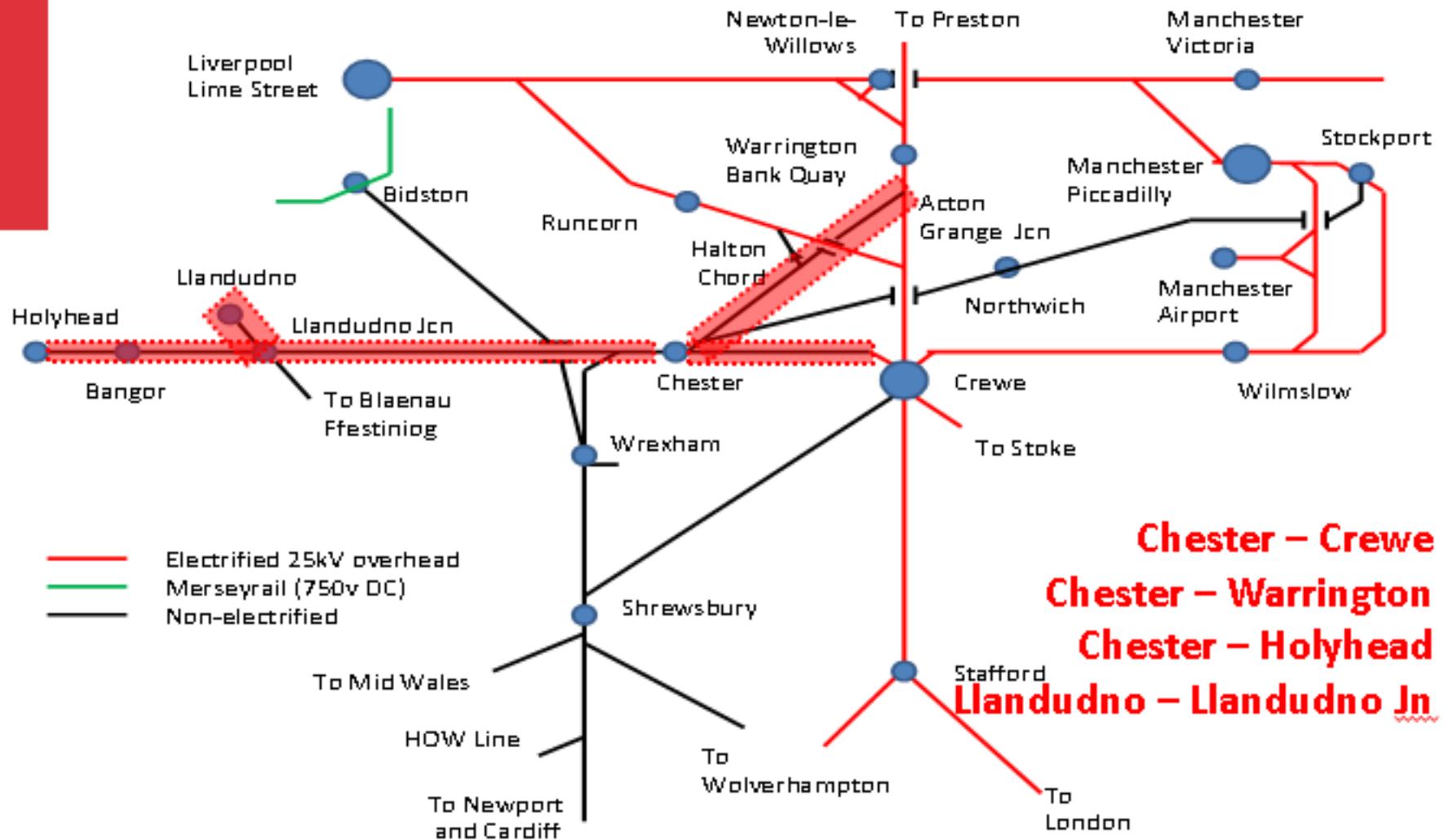
The business case for electrification of the North Wales coastal line will be competing against investment proposals elsewhere in the United Kingdom. The Task Force, therefore, sees the following actions as instrumental in establishing an advantage: building a consensus of cross border support, sharing an understanding of the dis-benefits to the North Wales and English economies of not having electrification west of Chester, and emphasising the benefits to other parts of UK of good connectivity across the region. Ongoing engagement between Welsh Government, business and local government and businesses will be critical.

The model developed by the Task Force to deliver improvements to transport services and infrastructure provides the vehicle to continue such engagement between the local authorities, Enterprise Zone Boards and businesses in the region.

Recommendation B9

Welsh Government should continue to engage on rail modernisation project (including electrification) with partners in North Wales.

Fig 2 Extent of Network to be Electrified



C. IMPROVING TRANSPORT CO-ORDINATION

The work undertaken by the Task Force to develop a more effective mechanism to plan transport services and infrastructure improvements in North Wales, provides a vehicle to deliver, or work with other partners to deliver, major transport infrastructure projects. This could include schemes arising from the rail modernisation and transport connectivity work streams. This workstream has been led by local government.

The Task Force recognise transport is not an end in itself and that transport planning and priorities should be considered within the context of broader economic and social aspirations and priorities for the area. It also appreciates the importance of good transport links across boundaries and between areas of administrative responsibility such as:

- With the rest of Wales
- Across the border with economies in England
- With strategic international gateways – to Ireland through Holyhead but also globally through proximity to Manchester and Liverpool airports.

A review by the Task Force of recent reports and studies confirms the importance of effective transport systems across boundaries. Recent evidence¹ suggests that connections across the border and internationally are most significant with regard to stimulating transformational growth in the North Wales economy.

Existing Arrangements

Previous reports which make reference to transport planning and delivery, highlight the complexity of some of the arrangements for strategic planning of transport and other economic growth interventions. In particular, some reports highlighted the complexity of current arrangements and a lack of clarity over responsibility to develop strategy and deliver prioritised projects and interventions.

This situation has arisen because a number of organisational structures have been developed in the past to deliver specific tasks. This has resulted in duplication between some groups and poor links between others. The proposed work stream offered an opportunity to both rationalise existing structures and bodies as well as improve effectiveness and efficiency.

¹ Economic Growth & Social Benefit Potential from Modernisation of Rail Services North Wales: Phase 1 Report, Greengauge 21, March 2014.

There are a number of bodies involved in transport and economic development at the present time. These include:

- **Welsh Government** – Principal funder, responsible for the Wales Transport Strategy, National Transport Plan, responsible for lead economic strategies and investment programmes.
- **Local Authorities** – substantial funders, responsible for the Local Transport Plan, Local Development Plan, and local economic growth strategies. Drive joint work through the **Regional Leadership Board**
- **TAITH** – Prior to the 1st April 2014, strategic transport planning for North Wales was carried out by TAITH, a Joint Committee of the 6 North Wales Local Authorities.
- **Economic Ambition Board** – The North Wales Economic Ambition Board (NWEAB) was created in 2012 as a collaborative forum to progress transformational development of the North Wales economy. Its membership comprises Lead Members for Economic Development from each of the 6 North Wales Local Authorities, 3 representatives from the North Wales business sector and representatives from the key Further & Higher Education establishments in the region.
- **Mersey Dee Alliance** – Cross border consultative forum between North East Wales authorities and Local Authorities / Local Enterprise Partnerships in Cheshire, Wirral and Merseyside.
- **Transport Ministerial Task Force** – Short term group initiated by Welsh Government in place of City Region bodies elsewhere to identify strategic transport interventions, progress rail modernisation and identify future delivery mechanisms

NWEAB has identified a number of priority work streams to grow the North Wales economy linked to its Enterprise Zones and other key economic strengths / attributes. These include Advanced Manufacturing, Energy & Environment, and Tourism. The Board has also prioritised Skills Development and Infrastructure and Connectivity as areas of focus. There is a connection at officer level between current transport planning arrangements and the economic development priorities.

Both TAITH and NWEAB report to the North Wales Regional Leadership Board, comprising Leaders / Chairs and Chief Officers from the six Councils, Police, Fire, and Health.

Given the requirement for transport to be seen in the context of economic growth, there was merit in considering the role of TAITH and the current EAB in more detail.

Issues considered during the appraisal stage

In determining the preferred model, the Task Force identified a number of issues as requiring to be addressed:

- Despite intervention over many years, the economy of North Wales has not improved its relative GDP levels with other parts of the UK and Europe. Future arrangements should support improvement in this performance.
- There should be an accountable body in North Wales to prioritise the use of scarce resource to develop and deliver key strategic projects.
- Whilst cross border relationship is important and effective communication mechanisms essential, this should not compromise accountability within Wales.
- The exercise provided an opportunity to streamline some existing bodies and partnerships and to increase project capacity across partner organisations through better integration of activity.
- The opportunity to integrate Welsh Government funded schemes with regional priorities to drive economic growth was essential.
- There was scope to develop a strategic approach to initiating economic growth, transport and land use strategies:-
 - In partnership with Welsh Government
 - In consultation with cross border partners
 - In support of and working with business and the community

Evaluating Options

In evaluating different models for ensuring effective integrated transport planning for the region, the following criteria were used in the assessment:

1. Form should follow function: Options were tested against the degree to which they support effective decision making through:
 - a) combining technical transport expertise with consideration of the underlying social and economic policy priorities for North Wales
 - b) taking into account key stakeholder interests
 - c) ensuring alignment with decisions and priorities of neighbouring transport systems

2. Integrated approach: Governance models should facilitate both vertical and horizontal integration. Strategic transport planning decisions should ensure integration across modes of transport at regional, sub-regional and local level and across transport systems / networks within and outside the region.
3. Accountability: Accountability at both local and regional level, with residents, businesses and other stakeholders was clear with regard to where decisions are made, by whom and on what basis.
4. Value for money: Arrangement had to demonstrate value for money, both in the efficiency of the governance model itself and in the cost/benefit effectiveness of the investment priorities and decisions being made.

Based on discussions at the Ministerial Task Force, and in order to be able to evaluate alternative options, the following were agreed as Essential Criteria:

- Enable effective, transparent and accountable decision making by regional leaders
- Provide clear connection to other strategic agendas such as land use planning and economic development
- Improve integrated planning between different modes of transport and between different transport systems/networks at local, sub-regional and regional levels
- Promote cost effective transport interventions based on clearly understood outcomes and benefits
- Enable effective collaboration between Local Authorities
- Enable effective collaboration with business and voluntary sector
- Enable effective cross border collaboration with North West England, Mid Wales and Ireland

Additional Desirable Criteria could include:

- Relationship with other public sector bodies such as Health Boards, Police and Local Service Boards
- Promotes consideration of transport and access in service delivery and design proposals across public services
- Costs less than current arrangements
- Enables representation across the region

Using the adopted criteria the Task Force considered the following long list of options:

1. **Status Quo** – Retention of the existing Joint Committee for Transport and North Wales Economic Ambition Board, reporting through the Regional Leadership Board
2. **Integrated Transport Authority model** – Enhance existing arrangements to create a formal authority or delivery body (Passenger Transport Executive) focusing solely on Transport planning but across the region. More extensive powers than the existing Joint Committee model. Similar to the Transport for London or Strathclyde Partnership for Transport models.
3. **City Region model** – explicitly combining economic growth and transport planning into a single cross sector organisation, similar to the 2 city region boards established in South Wales or to City Region arrangements in England
4. **Local Economic Partnership model** – English model formal partnerships between local authorities and businesses with the power to decide priorities for investment in roads, buildings and facilities, and agree tactics for stimulating local economic growth.
5. **International models** – International models of collaborative economic growth and strategic infrastructure planning that could be appropriate for North Wales. For example, Economic Development Alliances of public, private and community stakeholders which appeared to have been successful in some quarters. European and North American models may offer some food for thought.
6. **Combined Authority** – Consideration of integrating relevant service areas through a combined authority, as is being developed in many English City Regions.

Of these, the City Region was ruled out by the Task Force as not being an option for the region as there was no dominant single conurbation.

Consultation on High Level Options

A workshop was undertaken in June 2014 to discuss and consider the high level options. The debate focused in the main on the following broad options.

1. Status Quo (Retain EAB / Taith / Planning group)
2. Enhanced Collaboration (Improve / harmonise existing arrangements focussed on outcomes)
3. Integrated Transport Executive / Delivery Body
4. Combined Authority

There was a consensus of opinion at the workshop in relation to the following:

1. There was strong support for better and more effective joint working to support economic growth in the region. In particular better joint work linking land use planning, transport planning and economic development was seen as essential.
2. There was recognition that business should be at the core of what is done. It is the private sector that creates employment and the role of the public sector is to support and deliver specific interventions that will support and stimulate the private sector. Therefore, this body has to deliver the Welsh Government growth agenda
3. Achieving outcomes is more important than discussing governance structures. There was recognition that accountability and governance is important, but should flow from the outcomes needed rather than being an end in itself.
4. Whatever delivery structures are in place they need to engage with and respond to the private sector and be seen to support growth / resolve barriers for the benefit of the regional economy.
5. There is some good work being carried out, but it is not always effectively joined up. An example being the report on strategic sites and land use being prepared by the Chief Planning Officers group not being linked to the work on strategic transport interventions or the key economic growth sectors work of the EAB.

6. There is some strong work being done on the major employment opportunities in the region (Wylfa Newydd, Wrexham Prison, Enterprise Zone developments). But there was also recognition that where work is needed to ensure the opportunity crosses boundaries into neighbouring areas, we are not always effective at joint work to maximise these opportunities.
7. The role of the EAB was seen as essential however there was recognition that a greater focus on outcomes and delivery is needed.
8. The potential for a specific cross region delivery body was also considered a realistic option

Preferred Option Development

The consensus that emerged from the discussions and the evaluation carried out at the workshop, was that a review and harmonisation of existing mechanisms was the best approach for the immediate future. This should be seen as a starting point and a practical solution in the short term, with a view to shifting to a more progressive model in the medium term.

In effect this amounts to the Enhanced Collaboration approach. There was recognition that further merits that may be bestowed by the Integrated Transport or Combined Authority models should be considered as a natural progression from April 2015 onwards. However, building on and improving current arrangements to ensure a greater focus on outcomes and joint working / decision making was a positive and realistic option, especially given the wider public service reform agenda.

A significant issue raised at the workshop was the need for the approach to be broader than just transport. There was a clear consensus that the role of the new arrangements should incorporate not only transport interventions but also coordination of strategic land use planning and coordination of the local authority input into regeneration and economic development work.

The Task Force subsequently agreed with the conclusions of the workshop and to the departure from the terms of reference as provided to it initially.

Further development of the preferred model confirmed a revision to the existing Economic Ambition Board arrangement could fulfil future requirements and provide North Wales with an equivalent arrangement to the City Region Boards in South Wales.

Proposed Model

The Economic Ambition Board (EAB) was established in 2012 to support growth in the economy of North Wales. A range of work streams were established and a Board identified to monitor progress with the agreed work streams. Some good progress has been made, but the discussions that took place as a result of the requirement to report to the Ministerial Task Force triggered a review of the EAB and discussions about the way forward.

The review identified a number of issues and some positive views about how the EAB could add value to supporting economic growth in North Wales.

1. Management and governance processes whilst reasonably effective could be streamlined and improved. In particular the need for a programme office to link the various work streams better was needed.
2. Membership of the Board should be reviewed and the attendees at the EAB in support of Board members should be reduced.
3. The role of the EAB should be expanded to include Strategic Transport and Infrastructure and Strategic land use planning.
4. The role of the Taith Joint Committee and its relationship with the EAB should be clarified.
5. Importantly, the EAB should focus its energy and resources to support the delivery of transformational projects in the region and to cascade the impact of such projects as widely as possible throughout north Wales.

Recommendation C1 – The Task Force proposes that the North Wales Economic Ambition Board should be the lead body for the coordination of strategic transport interventions, land use planning and economic development activity in North Wales among partner organisations

Further consideration will be given to the detail of the key priorities that will become the focus for the EAB. In order to increase the productivity, competitiveness and growth of the North Wales economy, these will include:

- To strengthen supply chains in the region, in particular within high value sectors such as energy and advanced manufacturing
- To develop the region's infrastructure to facilitate and support economic investment
- To improve and upgrade the region's skills base and promote employment growth
- To promote the marketing of North Wales as a destination for businesses and visitors, as well as ensuring that due attention is given to communication issues and information sharing

These activities will be supported by giving attention to improved communication, information sharing and to raise the profile of North Wales. Coordination of funding streams, especially in relation to the potential for EU funding supporting the key priorities identified, will also be improved.

Appendix C1 sets out a draft description of the objectives, deliverables and roles and accountability for the four key priorities.

Recommendation C2 – The Task Force proposes the key priorities identified for the Economic Ambition Board should include supply chain, infrastructure, skills, and marketing and communication.

Delivery arrangements will be revised, to ensure that a clear and accountable structure is in place. The proposed arrangements are detailed in Appendix C2.

A review of the membership of the EAB has been carried out. Membership of the EAB in the future will consist of senior representatives from the public and private sectors (six from LAs, three from NW Business Council, one HE, one FE, and with the three Chairs of the Enterprise Zones and one representative from the Mersey Dee Alliance). Consideration will be given to whether the MDA representative is there as an observer.

Recommendation C3 – That the membership of the EAB be revised to include senior representatives from the six Local authorities, three from North Wales Business Council, one from Higher Education, one from Further Education, the three Chairs of the Enterprise Zones and one representative from the Mersey Dee Alliance

The Board will be supported by a core Programme Office. It is suggested it consists of a Programme Manager, Project Executives for each of the key priorities, European SET officers, funded posts representing the private sector and possible secondments from various organisations such as Welsh Government, Further and Higher Education and Local Authorities. The structure and makeup of the Programme Office will be further developed once approval for the proposed approach has been obtained from Welsh Government.

Recommendation C4 – That a core programme office is established to manage the implementation of the agreed work streams and to deliver identified outcomes as set by the EAB

Recommendation C5 – That Welsh Government should consider nominating representatives to sit on the EAB Board and on the Programme Group.

Consultation

The proposals contained in this report have been subject to consultation with the following groups:-

- The Chairs of the three Enterprise Zones in North Wales have been consulted on the emerging proposals.
- The North Wales Business Council (NWBC) on 2 December 2014.
- Members of the NWBC for comment.
- Consultation has taken place with local authority partners through Heads of Service Group of the EAB and at the North Wales Environment Strategic Directors Group. Leaders have been consulted.

Subject to the proposals being approved by Welsh Government, Regional Leadership Board and EAB, formal ratification and approval of the revised remit and governance arrangements for the EAB will require approval from each of the six local authority partners, through the appropriate scheme of delegation.

EAB Constitution Review

As part of the work undertaken a review of the current EAB Constitution has been undertaken.

The EAB is currently governed by a Memorandum of Understanding (MOU) between the 6 local authorities represented on the EAB. The MoU is a relatively informal document that sets out some aims for the EAB and some process by which partners should act. The current MoU does not impose any limitations or obligations on partners, but does provide an informal framework that allows joint work to be delivered by agreement.

Analysis of the aims and objectives in the MoU and the current governance process, highlight the limitations of the current arrangements, as the EAB becomes a more executive body.

In light of the revised approach proposed in this report it is considered that the current MoU will need to be reviewed extensively to reflect the changed role envisaged. This will incorporate a broader remit than just economic development, given that skills, land use planning and strategic transport will be part of the considerations for the EAB in future. Subject to the preferred model being approved, a revised framework for governance will be prepared.

Given that the revised remit proposes an executive role for the EAB, and the potential for funding being allocated directly to the EAB this strengthens the case for a revised constitutional arrangement.

Recommendation C6 – The current Memorandum of Understanding of the Economic Ambition Board be revised to take account of the revised roles and responsibilities proposed by the Task Force and the review undertaken to date. The review and revised constitutional arrangements to be complete by 31 March 2015.

Role of Taith

The discussions regarding the development of the EAB propose a stronger role for the Board in identifying, promoting and developing strategic transport interventions

for North Wales, among others. This duplicates the role of the Taith Board. The July workshop also considered whether the Taith joint committee could in future become a delivery body for the EAB should such a requirement exist in the future. There is no such requirement at the moment although this situation could change. As a result, the Taith Board has a number of possible options to consider.

1. Continue to meet under its current constitution
2. Wind up the Joint Committee
3. Mothball the Joint Committee pending the identification of a potential future role
4. Merge the EAB and Taith under the current Joint Committee Constitution

The Taith Board will receive a report at its next meeting, with a recommendation that option 3 is the preferred approach, an approach which is in line with the proposals contained in this report.

4. TASK FORCE TERMS OF REFERENCE

Purpose

To provide the Minister for Economy, Science and Transport with advice about transport connectivity in North Wales, the delivery and prioritisation of improvements and the most appropriate mechanism to secure effective coordination of transport improvement.

The Ministerial Task Force will build on the recommendations made in a number of relevant reports including the Dr Elizabeth Haywood's Dee Region Cross Border Economy Report and the report of the North East Wales Integrated Transport Task Force.

The Ministerial Task Force will champion the case for rail electrification in North Wales and modernisation of the rail wider network.

Aims

- To engage relevant stakeholders from the public and private sectors to maintain a high-level dialogue and provide advice on transport connectivity in North Wales.
- To consider the effectiveness of current arrangements for planning transport services and infrastructure improvements and the most appropriate mechanism for co-ordinating transport in North Wales and across the border.
- To promote a shared understanding of the economic and social development opportunities that can be underpinned by improved transport connectivity in North Wales.
- Oversee the development of the business case for North Wales rail modernisation.

Duration

The Ministerial Task Force will be established initially for an 18 month period, coming to an end in December 2014.

The Ministerial Task Force will provide an initial report by the end of December 2013 and provide regular updates throughout 2014 on key issues.

Membership and Secretariat

The Ministerial Task Force's membership will be flexible so that it is broad enough to be representative of key stakeholders in North Wales, yet focussed enough to ensure action orientated and meaningful discourse.

Flexibility will be retained to allow the membership to vary from meeting to meeting depending upon the issue / or issues under discussion. However, at a minimum membership will include:

- Minister for Local Government and Government Business (Chair)
- Senior representatives from each of the six Local Authorities in North Wales (Anglesey; Gwynedd; Conwy; Denbighshire; Flintshire; Wrexham)
- The Chairs of the Enterprise Zones in Anglesey; Deeside and Snowdonia
- At least three private sector representatives from North Wales based business, suggestions will be sought from representative organisations

The Secretariat function will be provided by Welsh Government officials, supported as appropriate by Local Authorities, as appropriate.

Meetings – frequency and venues

Meetings will be held in Welsh Government or Local Authority offices.

Frequency of meetings will be decided upon by the Ministerial Task Force with a maximum of one meeting per month and a minimum of at least two meetings a year.

5. TASK FORCE MEMBERSHIP

Leaders of the North Wales Councils

Councillor Dilwyn Roberts, Conwy CBC
Councillor Hugh Evans, Denbighshire CC
Councillor Dyfed Wyn Edwards, Gwynedd Council
Councillor Ieuan Williams, Isle of Anglesey CC
Councillor Aaron Shotton, Flintshire CC
Councillor Neil Rogers, Wrexham CBC (To September 2014)
Councillor Mark Pritchard, Wrexham CBC (From September 2014)

Chairs of the North Wales Enterprise Zones

Neil Rowlands, Anglesey Enterprise Zone
David Jones, Deeside Enterprise Zone
John Idris Jones, Snowdonia Enterprise Zone

Business Sector Representatives

Andy Billcliff, Morlais Energy
Huw Jones, Jones Bros Ruthin (Civil Engineering) Co. Ltd
Mario Kreft, Pendine Park Care Homes

Observer

Lee Robinson, Strategic and Performance Director, Wrexham CBC

**Response by the Minister for Economy, Science and Transport to the
Recommendations of the Ministerial Task Force on North Wales
Transport**

Improving Transport Connectivity		
Recommendation Reference	Recommendation	Response
A1	The Task Force highlights the importance of an investment forward programme of infrastructure for North Wales that not only improves connectivity but supports local business to retain and grow jobs through a seamless flow of schemes that mitigates peaks and troughs in workload.	Accept The Welsh Government's draft National Transport Plan (NTP) 2015 published for consultation in December 2014, sets out our priorities for investment in transport infrastructure that will improve connectivity in north Wales and support economic growth and job creation. The Delivery Schedule that will be published alongside the NTP will set out a forward plan of infrastructure projects that will be delivered over a rolling three year period.
A2	The Task Force recommends that the responsible bodies adopt the Strategic Transport Interventions set out in Appendix A2 as the priorities for transport improvement in North Wales.	Accept in principle The Welsh Government welcomes the list of " <i>possible Strategic High Level transport Interventions</i> " identified at appendix A2. While this list may not be exhaustive, it does provides a helpful list of options for consideration in the development of transport schemes across Wales
A3	The Task Force supports the existing commitments	Accept in Principle Where the Welsh Government has the power to deliver the

	made by the Minister and noted in the report at Appendix A3. The Task Force recommends that where the commitment only extends to an initial study that the project should be taken through to delivery, subject to a viable business case.	commitments set out in appendix A3, the schemes will be taken through to delivery subject to the consideration of a viable business case. For schemes for which powers are not devolved to the Welsh Ministers, the Welsh Government will continue to robustly press for their delivery.
A4	The Task Force has identified a prioritised list of infrastructure projects to support the North Wales economy, which are set out in Appendix A4, which should inform the development of future investment priorities.	Accept in Principle The Welsh Government welcomes the list of “ <i>further priority transport connectivity projects</i> ” set out at appendix A4. The Welsh Government’s draft National Transport Plan (NTP) 2015 sets out our priorities for investment in transport infrastructure that will improve connectivity in north Wales. For projects identified within Appendix A4 that are the responsibility of the local authority, the Welsh Government would expect local authorities to consider as part of their Local Transport Plans.
A5	A number of the identified interventions in the report are projects for local delivery that are expected to be contained in the emerging Local Transport Plans and should inform investment priorities for local transport schemes.	Accept in Principle Local authorities are required to identify their priorities for transport in their area their Local Transport Plans under the Transport Wales Act 2000.

<p>A6</p>	<p>The Task Force has identified the importance of additional resilience and capacity on the key strategic networks and corridors in the region which should inform the prioritisation of infrastructure resilience investments and Task Force members would welcome the opportunity to engage in the prioritisation of improvements.</p>	<p>Accept</p> <p>The Welsh Government's draft National Transport Plan (NTP) 2015 published for consultation in December 2014, sets out our commitment to undertake further work to identify resilience and capacity issues on the network in the region and which will inform future infrastructure resilience investment. The Welsh Government welcomes the opportunity to engage with key stakeholders in taking forward these schemes.</p>
<p>A7</p>	<p>The Task Force has identified the importance of infrastructure that supports the successful development of key transformational projects, access to employment sites and strategic employment zones. These include:</p> <ul style="list-style-type: none"> • Modernising the rail network • Improving the Menai Crossing • Improving the A494 / A55 corridors as the main gateways to North Wales 	<p>Accept</p> <p>The Welsh Government's draft National Transport Plan (NTP) 2015 published for consultation in December 2014, contains interventions to support delivery of the key transformational projects identified by the Taskforce. The Welsh Government will engage with key stakeholders in taking forward this work.</p>
<p>A8</p>	<p>The Task Force recognises that improving access to employment sites and to</p>	<p>Accept</p> <p>The Welsh Government welcomes the list of "<i>further priority transport connectivity projects at</i></p>

	<p>services, particularly by non car modes, is important to support the economy and jobs and reduce poverty. Interventions to increase accessibility, particularly for disadvantaged communities are set out in Appendix A4 and should inform future investment priorities.</p>	<p>appendix "A4. The Welsh Government's draft National Transport Plan (NTP) 2015 sets out our priorities for policy development and investment in transport infrastructure that will improve access to employment and key services through active travel and improved bus and rail services in Wales.</p>
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Rail Modernisation

Recommendation Reference	Recommendation	Response
B1	<p>Further work should be undertaken to investigate whether investment in rail links can improve Business to Business (B2B) connectivity and employment opportunities arising from major developments in the region.</p>	<p>Accept</p> <p>The aim of developing B2B connectivity and employment opportunities arising from major developments in the region remains central to our objectives and priorities for rail modernisation. The Welsh Government notes in particular, the extent of the work undertaken by the Task Force through the Greengauge 21 commission which has informed the development of the Strategic Outline Business Case for electrification in North Wales.</p>
B2	<p>Task Force members continue to press the agreed communication strategy for electrification.</p>	<p>Accept</p> <p>The Welsh Government welcomes the commitment of Task force members to continue to press the agreed communication strategy for electrification and has</p>

		commissioned Dr Elizabeth Haywood to support this work.
B3	Welsh Government continues to participate in the North of England Task Force on Electrification to safeguard the interests of North Wales.	Accept. The Welsh Government continues to engage with the North of England Task Force through membership of the North of England steering group.
B4	Welsh Government continues dialogue with the Department for Transport and the Secretary of State for Transport to realise the benefits to Wales from HS2.	Accept The Welsh Government recognises the potential impact of HS2 on the Welsh economy and will continue to work with all parties to maximise the benefits for Wales.
B5	Welsh Government should continue to make the case to the Secretary of State for Transport for the following: <ul style="list-style-type: none"> • For electrification from Crewe to Holyhead • To maximise opportunities from rail investments in the Northern Hub and North Wales areas • To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for electrification of the North Wales main line 	Accept. The Welsh Government will continue to press the UK Government and Network Rail to deliver rail infrastructure and service improvements in North Wales.

	<ul style="list-style-type: none"> • For line speed improvements on the North Wales main line in CP5 to complement planned investments • To make available Control Period 6 Development Fund to allow Network Rail to continue to develop the case for additional capacity between Wrexham and Chester 	
B6	<p>Welsh Government should draw on the work developed under the Rail Modernisation project to inform future specifications for the North Wales rail services.</p>	<p>Accept</p> <p>The work developed under the Rail Modernisation project will be considered in preparation for future franchise specifications in Wales. The Welsh Government is to gain executive rail franchising functions from January 2017 to award and manage the next Wales and Borders franchise.</p>
B7	<p>Welsh Government should consider how business and local authorities can be engaged in the development of the specification for a new franchise and informing its ongoing management.</p>	<p>Accept</p> <p>The Welsh Government will engage with a wide range of stakeholders in development of the new Wales and Borders franchise specification</p>
B8	<p>Rail infrastructure improvements should accommodate possible future rail freight demand.</p>	<p>Accept in Principle</p> <p>While rail infrastructure is not devolved to the Welsh Government, we recognise the importance of future proofing the rail footprint to meet potential</p>

		future opportunities for rail freight.
B9	Welsh Government should continue to engage on rail modernisation project (including electrification) with partners in North Wales.	Accept The Welsh Government will continue to consider the work developed under the Rail Modernisation project during the preparation of the specification for the franchise and the planning of future rail infrastructure improvements. It will engage with all partners as this work is taken forward.
Improving Transport Co-ordination		
Recommendation Reference	Recommendation	Response
C1	The Task Force proposes that the North Wales Economic Ambition Board should be the lead body for the co-ordination of strategic transport interventions, land use planning and economic development activity in North Wales among partner organisations.	Accept in Principle The Welsh Government fully recognises the importance of the coordination of strategic transport interventions, land use planning and economic development to maximise the benefits to Wales. This is a high priority for the Welsh Government and we will continue to provide representation on the Economic Ambition Board and regular dialogue between the Chair and the Minister for the Economy Science and Transport.
C2	The Task Force proposes	Accept in Principle The Welsh Government

	<p>the key priorities identified for the Economic Ambition Board should include supply chain, infrastructure, skills, and marketing and communication.</p>	<p>welcomes the Economic Ambition Board (EAB) proposed priorities as areas that will add value to the Welsh Governments activities in the area. The Welsh Government note the commitment within the Report that <i>further consideration will be given to the detail of the key priorities</i> and would welcome a further update following that work</p>
C3	<p>That the Membership of the Economic Ambition Board be revised to include senior representatives from the six Local authorities, three from North Wales Business Council, one from Higher Education, one from Further Education, the three Chairs of the Enterprise Zones and one representative from the Mersey Dee Alliance</p>	<p>Accept in Principle</p> <p>The Welsh Government considers that ensuring the appropriate public and private sector expertise is key in delivering from both and would welcome further information on the role of the representatives on the Programme Board</p>
C4	<p>That a core programme office is established to manage the implementation of the agreed work streams and to deliver identified outcomes as set by the Economic Ambition Board.</p>	<p>Accept in Principle</p> <p>The Welsh Government note the intention of the Economic Ambition Board to develop a core programme office to manage the implementation of the agreed work streams and to deliver identified outcomes as set by the EAB.</p>
C5	<p>That Welsh Government should consider nominating</p>	<p>Accept in Principle</p> <p>The Welsh Government is keen to engage with</p>

	<p>representatives to sit on the Economic Ambition Board and on the Programme Group.</p>	<p>partners to move forward strategic transport improvements for the region. The Minister for Economy Science and Transport welcomes the opportunity to nominate a Welsh Government representative to the Board to ensure that appropriate alignment is achieved and is content for officials to work with officers to co-ordinate the delivery of transformational projects.</p>
<p>C6</p>	<p>The current Memorandum of Understanding of the Economic Ambition Board is revised to take account of the revised roles and responsibilities proposed by the Task Force and the review undertaken to date. The review and revised constitutional arrangements to be completed by 31 March 2015.</p>	<p>Accept in Principle</p> <p>The Welsh Government would welcome further information in relation to the review once the review of the current EAB constitution is completed.</p>

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