A494 River Dee Bridge Replacement – WelTAG Stage 2 – Outline Business Case

April 2025

1. Introduction

1.1. This document sets out the WelTAG Stage 2 – Outline Business Case – for the replacement of the A494 River Dee Bridge (referred onwards as the 'Scheme'). The Scheme is a part of Welsh Government's Major Asset Renewal (MAR) Programme for the trunk road network and its delivery is identified as the second highest priority.

1.2. This document follows the WelTAG Review Panel that was held on 26 September 2024. This confirmed the WelTAG Stage 1 was sufficiently presented, appraised and sifted options that addressed the identified problems and objectives. The Panel agreed with the conclusions and recommendations to proceed to WelTAG Stage 2.

1.3. The WelTAG Stage 1 Report recommended a short list of five packaged options, known as Packages B to F, should be assessed in more detail to the point where a preferred Option can be determined. These Packages comprise different combinations of:

- A new twin structure bridge **or** a single offline structure bridge across the River Dee

With:

- A new westbound carriageway rail bridge with an active travel link, **or** a separate active travel link through a new portal beneath the railway line, **or** an active travel link through the existing rail underbridge.

1.4. The WelTAG Stage 2 has reviewed the existing evidence base to demonstrate the option which is aligned with the priorities for transport and wellbeing within Wales. It includes an Integrated Well Being Assessment as well as incorporating the outcomes of the public consultation that was undertaken between December 2024 and March 2025.

2. Recommendation

2.1. The WelTAG Stage 2 has indicated that the Preferred Option should comprise a new single structure bridge across the River Dee, to be constructed off-line. An active travel link will also be provided adjacent to the westbound carriageway, over the river and through the existing railway underbridge which carries the North Wales Main Line across the A494. In addition, following the public consultation a future proofing element of 0.7m will be added to the width of the River Dee bridge structure.

2.2. This option, referred to as '**Package E**' throughout this document, performs strongly against the transport and wellbeing criteria outlined in both WelTAG and Welsh Government policy and legislation, including the Wales Transport Strategy and Well-being of Future Generations (Wales) Act 2015.

2.3. Package E is more affordable than the other short-listed options, has a lower environmental footprint and is the most practical to deliver. This report will present a summary of the appraisal undertaken and will support a progression of the Preferred Option to WelTAG Stage 3.

Table 1: Rationale for the Preferred Option (Package E): New off-line single structure River Dee Bridge plus active travel link within existing rail underbridge

Strategic Fit	Integrated Well-being	Affordability	Deliverability	Management
Contribution towards transport and wellbeing priorities.	Relatively low level of air quality and noise disbenefits.	Lower outturn cost.	Lower number of consents required.	Ease of construction (relative to the other options).
Supports Scheme and MAR objectives to maintain the SRN.	Lower levels of construction related carbon and waste.	£138.3m (Excluding inflation and tax).		Shorter construction programme and lower disruption to network and third-party infrastructure.

3. Context and Background

3.1. The need for intervention is driven by the poor quality of the existing A494 bridge across the River Dee – which is fundamental to maintaining connectivity into North Wales. As a result, the bridge has been identified as the **second highest priority** for the Welsh Government's MAR programme.

3.2. The A494 – together with the A55 and A550 – form a primary east-west link between North Wales and the Northwest of England. The existing River Dee bridge crossing of the A494, constructed in 1960, remains a critical part of this corridor and is the busiest part of the trunk road network in North Wales.

3.3. It runs mostly as a two-lane dual carriageway between Queensferry, Flintshire and around the north of Chester, before carrying traffic onwards as the M56 towards Manchester (**Figures 1 & 2**). It is maintained on the Welsh side by NWMTRA, including the River Dee bridge, and in England by National Highways.

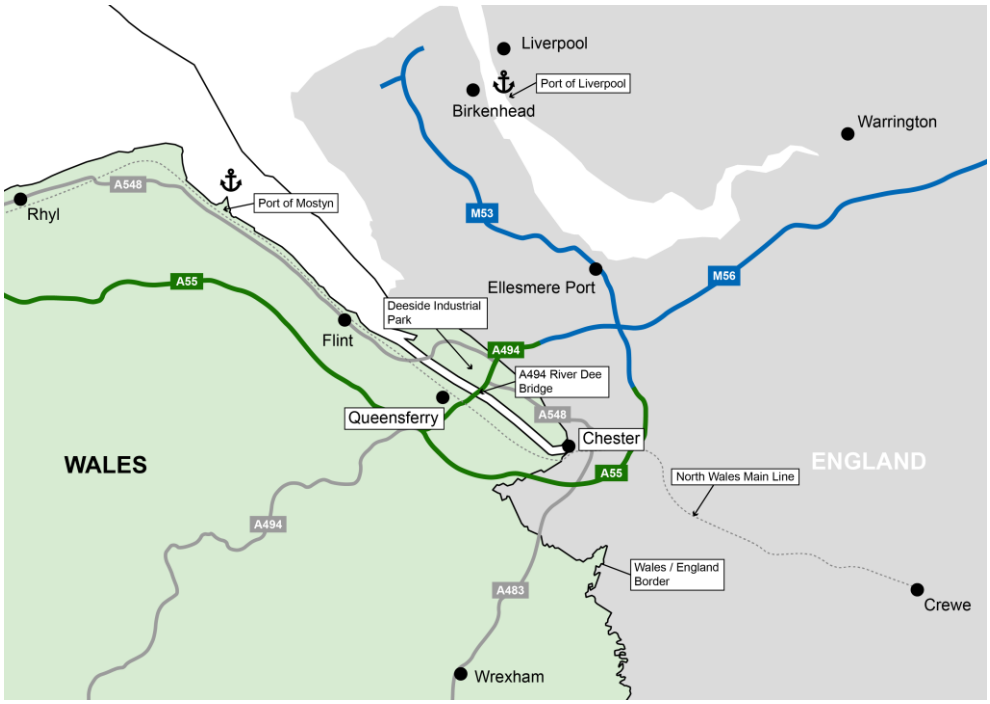
3.4. The bridge lies at the heart of an economic sub-region of the Mersey Dee – the immediate population of the area totalling close to one million people. Deeside Industrial Park (DIP) forms part of the Deeside Enterprise Zone to the west of the A494 corridor. The Zone consists of a cluster of automotive, construction,

electronics, food and sustainable energy sectors. It is home to several international companies such as Airbus, Toyota, James Fisher, Tata and Ifor Williams Trailers. It also includes Eren's new £1bn Shotton Mill paper plant.

Figure 1: General view of the A494 River Dee Bridge (foreground) and its surroundings, viewed from the east

Source: Mott MacDonald

Figure 2: Location plan



Source: Mott MacDonald

4. Strategic Fit

Evidence Update

4.1. The **Strategic Fit** consists of a review of the evidence base that has informed the Scheme. This evidence is used to assess how the Scheme will contribute to transport and wellbeing policy and legislation as outlined by the Welsh Government – principally, Llywbr Newydd – the Wales Transport Strategy and the Well-being of Future Generations (Wales) Act 2015 (WBFGA).

4.2. The Transport, Highway and Economic context for the Scheme remains **largely unchanged** since the completion of WelTAG Stage 1. Additional evidence has been used to inform this WelTAG Stage 2 appraisal including updated traffic and collision data taken from the **Initial Traffic and Collision Report**. In parallel, the traffic model has been updated and has taken account of the latest DfT guidance (post-COVID).

4.3. In terms of economic change, proposals for the Flintshire and Wrexham Investment Zone have solidified. Through targeted funding as well as tax breaks, three strategic sites (Deeside Gateway, Warren Hill and Wrexham Industrial Estate) have been identified and are forecasted to generate over 6,000 new jobs across the manufacturing sector and attract £1bn of investment.

4.4. In addition, an interim contingency plan is in place to ensure that this section of the Strategic Road Network (SRN) remains operational – in any event where it would be required. This would involve the construction of a thin over-slab of concrete to stabilise the existing bridge deck – the implementation of which may require partial or full closures of the A494, with significant disruption to local and strategic traffic[1]. This could extend the life of the bridge from 5 to 10 years but would not remove the need to replace the bridge.

4.5. Maintenance works on the adjacent A549 Flintshire Bridge are also scheduled for Summer 2028. Full closures of this route for maintenance could see an increase in demand on the A494 to carry cross-border movements. This will be considered when planning any closures of the A494 to avoid the risk of both roads being closed concurrently.

Sustainable Transport Hierarchy and Interfacing Schemes

4.6. Whilst the Scheme is largely a renewal of an existing trunk road asset, consideration has been given to the Sustainable Transport Hierarchy defined within the Wales Transport Strategy. This has ensured that options which would have resulted in the generation of additional traffic were not progressed to the Stage 2 appraisal.

4.7. Focus has largely been on replacing the existing bridge and to minimise traffic disruption. This has ensured that options which would have resulted in the generation of additional traffic were not progressed to the Stage 2 appraisal.

[1] Strategic traffic can be defined as: ‘road users who primarily utilise the Strategic Road Network), carrying a significant proportion of overall traffic and freight, particularly long-distance journeys and heavy goods vehicles, crucial for the national economy.’ https://nationalhighways.co.uk/our-roads/roads-we-manage/

Opportunities to maximise provision for alternative modes within the confines of the Scheme have also been pursued.

4.8. Engagement with bodies such as Transport for Wales (TfW) and Flintshire County Council (FCC) has focussed on alignment with the strategic planning that is currently being undertaken including the **Regional Transport Plan** for North Wales (RTP) and the **Strategic Development Plan** (SDP).

4.9. The RTP for North Wales is being formulated by the Corporate Joint Committee (CJC) of Ambition North Wales which is comprised of six Local Authorities and the Eyri National Park. As of Spring 2025, the RTP is out to public consultation. The RTP contains several interfacing schemes, including opportunities for sustainable modes including active travel and public transport.

4.10. A number of interfacing schemes are being progressed (as of Spring 2025). Relevant schemes have been summarised in **Table 2**.

4.11. It is important to note that these schemes are currently at different stages of development, however if implemented, will help to address the key headings of carbon reduction, modal shift and delivering economic growth within the region.

Table 2: Interfacing Schemes

Scheme	Description	Scheme	Description
A494 Aston Hill iRAP Route Study	Early stage optioneering to improve resilience, safety and sustainable transport options.	**Seasonal and visitor bus services**	To improve seasonal and visitor bus services. Delivery to be confirmed through North Wales RTP.
Deeside Park Active Travel and Bus Enhancement	Improve access by active travel and bus priority. Taken forward by FCC.	**North Wales Coast Mainline Enhancements**	Increase in speeds and service frequency. Being progressed by DfT and TfW.
Deeside Park Railway Station and Shotton Interchange	New station to serve Deeside Park. Better linkages between the North Wales Main Line and the Borderlands Line.	**Borderlands Railway Line Enhancements**	Increase in the number of trains per hour and better linkages with Merseyrail into Liverpool.

Source: Mott MacDonald

Highway, Transport and Economic Context

4.12. The contextual information used to inform the appraisal remains **largely unchanged** since WelTAG Stage 1.

4.13. Headline traffic figures estimate an annual average daily flow on the A494 to be around 69,200 vehicles when considering a 7 day week, and 73,200 vehicles per day when considering weekdays only.

4.14. Analysis of the data collected from the study area suggests a mix of both strategic and commuter traffic, with regular cross-border movements. The A494 and adjacent routes (such as the A55, A550 and M53) serve both a strategic function and perform a wider role by being principal roads connecting major settlements in the region.

4.15. The region has three main urban areas in Chester, Birkenhead and Wrexham. Industrial centres in Deeside, Ellesmere Port and Wrexham represent the wide spread of economic development across the area.

4.16. As a result, Light Goods Vehicles (LGVs) and Other Goods Vehicles (OGVs) combined make up 15% of all traffic.

4.17. The public transport network in the region is fragmented. Public Service Vehicle (PSV) figures are relatively low for the A494, owing to the limited number of public transport services using the strategic road network. These are much more defined on principal roads leading into Chester with a number of bus routes running along the A56 and A51.

4.18. Rail services operate on both the North Wales Main Line (Chester to Holyhead) and the Borderlands Line (Wrexham to Bidston), which see a mix of both passenger and freight services.

4.19. There are limited active travel routes in the area and existing routes can be discontinuous in places. These are largely confined to settlements in the study area with few direct links between adjacent towns and villages. The principal crossing point for pedestrians across the River Dee is at the B5441 Jubilee Bridge, and at Hawarden Bridge for cyclists.

Public Consultation

4.20. Public consultation was undertaken between 9 December 2024 and 4 March 2025, with the aim to capture stakeholder views on the options for the A494 River Dee Bridge. The consultation was advertised through a letter drop, posters, and press releases. The public was engaged via an online consultation document and response form, email, freepost, and an in-person public exhibition event.

4.21. Stakeholders, including local elected members, transport bodies, environmental groups, community organisations, and businesses, were invited to respond to a dedicated email address. In addition, local elected members were invited to an in-person briefing session and online session.

4.22. Stakeholders demonstrated strong support for replacing the A494 River Dee Bridge as soon as possible. There was support for Option E as a solution which

would minimise impacts during construction, provide noise screening for residents through new green spaces, and provide active travel connections across the River Dee. However, participants identified concerns about congestion on the A494 and supported further measures that could alleviate this. Further information regarding the consultation outcomes is provided in the **A494 River Dee: Public Exhibition & Consultation WelTAG Stage 2 Summary of Responses report**.

4.23. While the primary driver for the Scheme is to replace the A494 River Dee Bridge and to maintain the critical link between North Wales and the Northwest of England, there is a need to acknowledge the consultation concerns relating to congestion. In response, future proofing to potential future demand has been explicitly considered as part of the Scheme's objectives, logic map (see **Appendix 1**) and short list of options.

Transport Planning Objectives

4.24. The Scheme's SMART objectives have been reviewed and updated to reflect the latest policy ambitions and priorities and are to:

- Maintain connectivity of the A494 strategic corridor by addressing the life expired River Dee bridge.
- Maximise opportunities for modal shift through better provision for alternative modes.
- Minimise scheme whole life carbon emissions through applying carbon reduction measures to design, construction and operation.
- Maintain and enhance the local environment by securing long term net benefit for biodiversity.
- Improve the resilience on the A494 corridor by minimising the impacts of incidents and accidents and enhancing safety for road users and maintenance personnel.
- Maintain connectivity along the A494 strategic corridor during construction to minimise impacts on residents, businesses, strategic and local traffic.

4.25. In terms of the future proofing aspect, the first objective relating to maintaining connectivity was assessed in that it could meet this requirement. Nevertheless, the underpinning logic map was refreshed with outcomes and impacts updated to demonstrate how future proofing could be achieved.

Option Definition

4.26. A long list of 44 identified options were identified at WelTAG Stage 1. These were sifted to a total of 5 option packages, based on deliverability, potential for adverse impacts (such as induced traffic), capacity and operational requirements. The options were also tested in terms of their fit with the objectives and contribution to Welsh Government's priorities as shown in **Appendix 2.**

4.27. Options from previous studies have also been considered alongside new options for WelTAG Stage 1. At WelTAG Stage 1, the long list was comprised of 44 options, including:

- 'Do Minimum'.
- Options for a single lane, or multiple lanes, in either direction.
- Varying configurations for the rail bridge.
- Active travel and public transport options.

4.28. At WelTAG Stage 2, a short list of options has been prepared. These are comprised of options that successfully meet the criteria of the WelTAG Stage 1 appraisal. Five options (referred to as 'Packages', as they are formed of several elements) have been identified and consist of:

- A twin or an off-line River Dee bridge structure.
- Varying configurations for the rail bridge.
- Different options for active travel provision.

4.29. Further refinement of this short list has been undertaken and includes making **provision for future proofing** following feedback from the public consultation. The final short-listed options are defined in **Table 3** and the latest Scheme drawings are included within **Appendix 3**.

4.30. In terms of future proofing, the focus has centred on that any replacement for the River Dee Bridge is likely to last up to 100 years. Following an internal workshop, it was felt widening could provide additional flexibility for future operational use of the bridge. Increasing the widths by 0.7m could allow an additional lane or lane earmarked for public transport without the need for further major works to the bridge itself.

Table 3: Short listed options

Package Ref	Definition
B	New twin structure bridge across the River Dee. Active travel link through the existing rail underbridge on westbound carriageway. Includes new road layout through the Network Rail bridge. Provision for 0.7m additional width for future proofing.
C	New twin structure bridge across the River Dee. Separate active travel link through a portal beneath the North Wales Main Line, southbound of the westbound carriageway. Provision for 0.7m additional width for future proofing.

Package Ref	Definition
D	New off-line single structure bridge across the River Dee. New rail underbridge for the westbound carriageway with an active travel link adjacent to the carriageway. Provision for 0.7m additional width for future proofing.
E (Preferred Option)	New off-line single structure bridge across the River Dee. Active travel link through the existing rail underbridge on westbound carriageway. Includes new road layout through the Network Rail bridge. Provision for 0.7m additional width for future proofing
F	New off-line single structure bridge across the River Dee. Separate active travel link through a portal beneath the North Wales Main Line, southbound of the westbound carriageway. Provision for 0.7m additional width for future proofing.

Source: Mott MacDonald

5. Integrated Well-being Appraisal

5.1. The Integrated Well-being Appraisal (IWBA) considers the contribution of the short-listed options towards well-being. It provides both a quantitative and qualitative assessment of benefits towards communities, the environment, the economy and culture.

5.2. The IWBA methodology is a test of the Scheme's contribution towards the five core headings defined in the WelTAG guidance. These are:

- Good for People and Communities
- Good for the Environment
- Good for Places and the Economy
- Good for Culture and the Welsh Language

5.3. Whilst WelTAG does not provide detailed guidance on how these elements should be tested, the Department for Transport's Transport Analysis Guidance (TAG) units and other evidence sources have been applied where applicable.

5.4. These elements are assessed either qualitatively (a written, evidence-based assessment) or quantitatively (using monetised or numerical values) against the following seven-point scale:

- Major benefit
- Moderate benefit

- Slight benefit
- Negligible or no impact
- Slight disbenefit
- Moderate disbenefit
- Major disbenefit

5.5. The results of the well-being appraisal are used to further assess the Scheme against the Wales Transport Strategy Monitoring Measures and are also used to inform the Value for Money criteria.

5.6. **Appendix 4** provides in greater detail the methodology that has been deployed. In addition, a summary of the appraisal is outlined in **Appendix 5**. The main conclusions of the assessment are:

Good for People and Communities

5.7. The main changes to **air quality** relate to changes to the alignment of the bridge rather than additional traffic. It is important to note the speed limit is being retained at 50mph. Most of the options, including Package E, are expected to result in a negligible change in air quality.

5.8. With **noise**, no significant beneficial or adverse noise impacts are anticipated from the five options. There may be localised changes such as demolition of commercial buildings near the traveller's site which may provide some existing screening.

5.9. In terms of **physical activity**, there are no major differences between the options. There is expected to be a minor uplift in physical activity arising from active travel improvements proposed as part of all the options.

5.10. At WelTAG Stage 2, the **collision** assessment has been qualitative. This indicated that all options would result in collision related benefits, principally arising from the change to the highway layout especially along the bridge.

5.11. With the **confidence** category, all options will result in an improvement. Confidence can be defined as reducing driver frustration, improving the quality of the transport links as well as personal security. The new highway layout as well as improved active provision will bring positive benefits.

Good for the Environment

5.12. **Whole life carbon** emissions have been divided into two main areas: One relating to construction and the other to operation. Estimates have been made of the construction carbon. This shows Option E resulting in the lowest carbon, essentially arising from less work associated with new structures. Conversely, Option D with major works to the railway as well as the River Dee Bridge replacement suggest higher levels of carbon during construction.

5.13. In terms of operation, no calculations have made to date and will be detailed at WelTAG Stage 3. Apart from the construction related traffic management, all the option packages are expected to have a similar carbon profile when open as there is no fundamental change to highway capacity or speed.

5.14. All packages offer a positive contribution towards **modal shift** as they all include the potential for an enhancement to active travel provision. This includes reducing the severance at the railway bridge and improving connection to the coastal cycleway. These works will support other complementary schemes in maximising opportunities for modal shift.

5.15. The **biodiversity and ecosystem resilience** assessment is largely based on the additional land take as well as the reuse of redundant land. There are differences in terms of biodiversity improvement between the options, with Package E assessed having the greatest benefit. This is based on the reuse of redundant land as well as minimal works required at the railway bridge.

5.16. As part of the carbon assessment, an analysis has been made of the **waste** associated with each of the Packages. The assessment points to Package E producing the lowest level of waste, followed by Package F. This reflects the lower level of works required to new and existing structures.

Good for Places and the Economy

5.17. All packages perform equally in terms of improved cohesive communities and **placemaking** through improved active travel connectivity and general improvements to a largely industrial environment. This includes improvements to the biodiversity surrounding the corridor and possible potential for improved screening for neighbouring properties.

5.18. In terms of the contribution towards the **economy**, there is likely to be a modest positive contribution from the off-line packages (D, E and F) in terms of improved resilience. This is reinforced by minimising the adverse impacts associated with construction. The twin-structure options overall perform negligibly due to the construction related disbenefits to the economy.

5.19. It is important to note WelTAG Stage 3 will include traffic and economic modelling analysis which would provide further evidence of the potential benefit to the economy.

5.20. In terms of **sustainable transport innovation**, all packages have the potential to be combined with a complementary intelligent transport system option. However, all the options have been scored neutral at this stage of scheme development.

5.21. The assessment of **sustainable distribution of goods** for all options largely reflects and replicates the economic assessment. As the Scheme does not change capacity, the contribution towards sustainable goods distribution is likely from improved resilience of the route.

5.22. In terms of **socio-economic disadvantage**, there will be a modest benefit associated from renewing the link, and how it supports the wider economy and access to services. The differences between the options are likely to be minor but principally relate to the construction related impacts.

Good for Culture and the Welsh Language

5.23. All packages are expected to have negligible contributions towards **culture and the Welsh Language** directly. Nevertheless, replacing the existing link will

support tourism and access to culture-based assets – particularly in the North Wales leisure sectors.

5.24. There is an anticipated disbenefit arising from all packages towards the **historic environment** (and heritage) due to potential conflicts with archaeological remains within the River Dee itself, particularly at former river piers.

Contribution and Monitoring towards the Wales Transport Strategy

5.25. The monitoring framework sets out the contribution of the Scheme towards the Wales Transport Strategy. It has six key measures and 27 subsidiary measures which are comprised of social, environmental and economic metrics.

5.26. An assessment identified seven subsidiary measures which are not applicable to the project – therefore, these have not been assessed. As the Scheme is a replacement scheme, many of the impacts on the WTS measures are neutral or only show a minor beneficial impact.

5.27. A summary of the assessment is included as **Appendix 6**. The largest beneficial impact of the Scheme is against monitoring measure **S21 'Percentage of transport infrastructure in good condition'**. This is as the replacement of the River Dee bridge will result in a major renewal of a key transport asset.

5.28. There is likely to be a positive impact on measure **S26 'Percentage of waste produced by the transport sector that is reused or recycled'**. This is a result of opportunities to reuse material from the existing bridge.

Value for Money

5.29. Value for Money (VfM) assessments typically include a monetisation of the benefits of the Scheme, alongside a non-monetised qualitative analysis. The WelTAG guidance (February 2024) does not specifically prescribe a method for undertaking a Value for Money comparison of options. **Appendix 4** provides an outline of the methodology that has been used in its place.

5.30. **Table 4** summarises the relevant benefits for each of the Scheme options. Traffic modelling will be undertaken at WelTAG Stage 3 to further inform economic outputs and the VfM assessment as a whole.

5.31. **Package E** performs the strongest in this assessment. There is a lower environmental disbenefit which results in greater value for public investment – in addition to the improved economic resilience of replacing the bridge and maintaining the strategic link in a highly productive economic region.

5.32. In terms of the environment, the assessment mainly reflects the amount of carbon produced particularly at construction stage. The operation of the options are likely to have minimal level of impact (whether positive or negative) compared to the existing baseline.

Table 4: Value for Money assessment

Package Ref	People and Communities	Environment	Places and Economy	Culture and Welsh Language
B	Negligible	Minor disbenefit	Minor benefit	Negligible
C	Minor benefit	Minor disbenefit	Minor benefit	Negligible
D	Moderate benefit	Moderate disbenefit	Moderate benefit	Negligible
E (Preferred Option)	Minor benefit	Negligible	Moderate benefit	Negligible
F	Minor benefit	Minor disbenefit	Moderate benefit	Negligible

Source: Mott MacDonald, using the 7-point Likert scale from major benefit (+++) to major disbenefit (---)

6. Deliverability

6.1. An assessment has been made of the deliverability of the Scheme. In particular, the consents required as well as developing a procurement strategy. In line with WelTAG Stage 2 reporting requirements, the assessment to date is at a high level, and will be developed and confirmed at the next WelTAG stage.

Consenting Strategy

6.2. The main planning consent for the Scheme is through the Highways Act (1980), however a number of related permits and consents are required. The bridge element itself requires numerous environmental consents and licences. These are outlined in the **Permits and Consents Tracker**.

6.3. Of the known required consents, most relate to environmental consents issued by Natural Resources Wales and Flintshire County Council. Consents include specific permits for water and drainage works (particularly in relation to culvert diversions) and the protected species licences. This covers activities which may affect protected species – such as demolition of existing structures and new construction works.

Procurement Strategy

6.4. A draft Procurement Strategy has been prepared and builds upon the Outline Procurement Strategy (OPS) that was developed for the MAR programme in 2022/23. The Strategy has been developed using best practice and guidance tools (such as the Cabinet Office's Construction Playbook) with a strong focus on the Wales Transport Strategy.

6.5. Market engagement was undertaken in early 2025 of the delivery and contracting model and responses from 16 organisations were received. This confirmed support for the following key elements of the recommended Procurement Strategy:

- Implementation of an Early Contractor Involvement (ECI) 2 stage model
- Utilisation of the NEC4 suite of contracts, Option C and PSC Option E
- A two-stage tender process that involves shortlisting and a tender stage covering technical and commercial evaluation
- Incentivisation and carbon reduction to be built into the delivery model

6.6. Further detail relating to the procurement options that were evaluated are outlined in the **Procurement Strategy** document.

Risk Allocation and Transfer

6.7. The general approach to the allocation of risk is defined in the **Risk Management Plan**, which delegates risk to the appropriate risk and action owners. These are informed by risk reviews, held on a continual basis to delegate risk.

6.8. The Welsh Government and NMWTRA, as their trunk road agent, will take ownership of the risks associated with the operation of the trunk road network. This includes management of the scope of the Scheme.

6.9. The Welsh Government will assume responsibility over land related risks, in relation to any impacts on current landowners and subsequent compensation. Welsh Government will also provide contingency funding to the Scheme, should a cost overrun occur.

7. Affordability

7.1. The affordability of the packages has been tested and an indicative funding profile has been developed for the Scheme. Several assumptions have been applied to the reporting of costs, including general and specific inclusions and exclusions. The full list of assumptions is reported in the **Cost Plan**.

Inclusions and Exclusions

7.2. The aim of the cost exercise at WelTAG Stage 2 is to provide a comparator of capital costs between each of the Scheme options. The current estimate base date for costs is Q3 2024.

7.3. Several key assumptions have been considered:

- An anticipated start of works in July 2027 and construction completed by December 2029.
- Inflation has been excluded.
- An optimism bias of 23%.
- Preliminaries at 24% with overheads and profits at 10%
- Exclusion of VAT and other taxes and levies, including statutory and planning fees.

- An allowance of £4.2 million for land purchase and compensation.

7.4. The rate of optimum bias has been applied equally against each of the options. This will be superseded by a Quantitative Risk Assessment (QRA) once risks have been quantified at WelTAG Stage 3.

Capital Costs

7.5. **Table 5** provides a high-level overview of capital costs for each short listed option.

7.6. Whilst direct construction works per option are not particularly high (in comparison to previous estimates), the main change of the Scheme costs comes in the form of indirect works, risk and inflation.

7.7. **Package E** is the cheapest option with an anticipated final cost of **£138.30 million.** This is down to the reduced construction works required for a single structure option and routing the active travel link through the existing rail underbridge.

7.8. Conversely, Package D is the most expensive option at **£208.56 million**. This would require a greater amount of work with the provision of the new westbound rail underbridge.

7.9. A full breakdown of outturn costs are included in the **Appendix 7**. This includes an itemised cost breakdown and lower and upper cost estimates (-30% and +50%) for each option.

Table 5: Scheme capital costs (£m)

Item	B	C	D	E (Preferred Option)	F
Direct Construction	£89.95	£91.69	£95.43	£66.71	£69.86
Indirect Construction	£45.61	£46.49	£46.39	£30.89	£32.34
Design, PM and Other	£18.85	£22.98	£25.74	£14.84	£18.26
Risk	£35.51	£37.07	£38.99	£25.86	£27.21
Anticipated Final Cost	**£189.92**	**£198.22**	**£208.56**	**£138.30**	**£148.17**

Source: Mott MacDonald

Funding Profile and Sources

7.10. Funding for the Scheme is expected to be delivered through direct Welsh Government capital funding, as the Scheme is part of the MAR programme for the trunk road network.

7.11. **Table 6** presents the provisional indicative funding profile at this stage. These do not represent a precise allocation of Scheme costs, and instead, serve to provide a view of when funding is likely to be required. These figures have been rounded to the nearest whole-million pounds (£m) for each funding year.

Table 6: Indicative funding profile (£m)

Package Ref	2024	2025	2026	2027	2028	2029
B	£4	£24	£47	£36	£46	£33
C	£4	£26	£50	£37	£47	34
D	£4	£28	£53	£39	£49	£35
E (Preferred Option)	£2	£17	£34	£27	£34	£24
F	£2	£20	£37	£28	£36	£26

Source: Mott MacDonald

7.12. The funding profile indicates that most funding would be required **through 2026 to 2029**. This is in line with the anticipated preliminary works and construction period. Remaining costs for the Scheme include the initial design and project management work prior to 2026 and the inclusion of risk from 2025 onwards.

Financial Risks

7.13. Specific financial related risks have been identified which may influence overall Scheme cost. These are yet to be quantified and will be further identified through the QRA at WelTAG Stage 3. These risks are:

- The Scheme not having access, or running out of funding, resulting in a pause or termination of the Scheme, contractual changes or changes in scope, programme or cost.
- Tender returns being higher than pre-tender estimates, resulting in insufficient funding to deliver the Scheme.

7.14. Both financial risks are monitored through the Risk Management Plan with responsibility falling on Welsh Government to allocate contingency funds to the project should any cost overruns be identified. Cost and risk plans are continually reviewed to monitor the Scheme's sensitivity to funding constraints.

8. Management Dimension

8.1. An assessment of the mechanisms used to deliver the Scheme, including project governance, risk management and delivery programme has been undertaken. The aim of this dimension is to demonstrate that the Preferred Option can be successfully delivered and that these mechanisms are robust enough for the Scheme to deliver benefits upon completion.

Governance, Roles and Responsibilities

8.2. The project team is comprised of four levels: the Project Board, the core management team, expert witnesses and the support team.

8.3. The Project Board provides the overarching direction and oversight for the Scheme and is comprised of Welsh Government and NMWTRA representatives.

8.4. The Project Board is supported by the core management and support teams which encompasses various project management leads and technical experts which inform the Scheme – formed of NWMTRA representatives and external consultants appointed to deliver the Scheme.

8.5. Expert witnesses may be utilised for public inquiry if required. The extent of the involvement will vary according to the need of the specialism to aspects of the Scheme.

Programme

8.6. The key events for the duration of the Scheme occur across two periods:

- Between the first quarter of 2024, to the first quarter of 2027. During this period, the planning and preliminary stages of Scheme development occur.
- Construction of the Scheme between the second quarter of 2027 and the final quarter of 2029.
- The opening of the Scheme for traffic in the final quarter of 2029.

8.7. Whilst there is some variation associated with each of the options, the programme assumes a **start of works in the 2027** and a completion of works in the **Autumn of 2029**.

8.8. Certain constraints to Scheme delivery have also been factored in, including the need for works on the adjacent Flintshire Bridge in the summer of 2028. This may see an increase in demand on the A494 as a result.

8.9. Works within the River Dee itself also need to consider fish migration periods. Activities such as percussive piling should not take place between March to August (inclusive) and other working hours are restricted between November and February.

Risk

8.10. A full, detailed breakdown of Scheme risks is included within the **Appendix 8** as the **Risk Register**. This applies a scale of severity to each risk and details the potential impact on the Scheme and the proposed methods of risk mitigation.

8.11. Risks are monitored on an ongoing basis in accordance with the **Risk Management Plan**. This captures threats, opportunities, issues and assumptions of risk in relation to the Scheme.

8.12. The major risks for the Scheme cover both the funding elements and the potential for bridge failure prior to construction. Contingency plans in place to mitigate these, effectively providing additional funding for the Scheme which will further increase overall cost.

Monitoring, Evaluation and Benefits Realisation

8.13. In line with Welsh Government requirements, monitoring and evaluation will be undertaken. A **Benefits Realisation Plan** will also be produced as a part of WelTAG Stage 3 to demonstrate that the benefits of the Scheme, including passive provision for futureproofing, will be delivered and secured.

Data Compliance

8.14. The Scheme is not anticipated to handle any information or data which would require a specific plan for the management of data – beyond the use of the General Data Protection Regulation (GDPR) when handling and storing personal information.

8.15. It is expected that all relevant parties (NWMTRA, Welsh Government and external contractors/consultants) will adhere to their internal data compliance policies to ensure data is securely managed.

9. Ways of Working and Engagement Plan

9.1. Throughout the development of the Scheme to date, the Five Ways of Working have been actively utilised. This is demonstrated in **Table 7.**

Table 7: Demonstration of the Ways of Working

Way of Working	Demonstration to Date
Long Term	The Scheme objectives have sought to balance the impacts and benefits associated with replacing the River Dee Bridge with a **long-term** asset, whilst ensuring short term disbenefits are minimised.
Integration	It is recognised that the Scheme **sits within** a wider range of other schemes and interventions that seek to improve opportunities for sustainable travel and achieve Well-Being objectives. The Scheme is directly referenced within the Regional Transport Plan and includes active travel provision that will integrate with other parts of the transport network.
Involvement	The importance of the existing bridge to the local area as well as North Wales, has ensured active **engagement** with stakeholders and the public. Given the reset of the Scheme, further public

Way of Working	Demonstration to Date
	consultation was undertaken from December 2024 to March 2025 to reflect this.
Collaboration	The Scheme interfaces a number of elements such as the River Dee, the North Wales Coast Main Line and the wastewater treatment works. Active **collaboration** (and formalised through liaison and technical working groups) has been undertaken with organisations such as Natural Resources Wales.
Prevention	One of the challenges associated with the Scheme is the need to **improve the resilience** of the network, in line with Wales Transport Strategy, whilst not substantially increasing whole life carbon and creating induced traffic. The application of the Sustainable Transport Hierarchy has led to options that could lead to these disbenefits not being progressed.

9.2. To deliver the Scheme effectively, it is important to achieve stakeholder buy-in from the onset when considering the selection of the Preferred Option. The **Engagement Plan** outlines in full who will be engaged with and for what purposes. This includes directly affected parties, statutory stakeholders and other parties who should be consulted with. This is used to inform the design and delivery of the Scheme to meet stakeholder needs and statutory requirements.

10. Next Steps

10.1. The overall recommendation of this WelTAG Stage 2 appraisal is **to progress Package E as the Preferred Option**. This would comprise a new off-line single structure River Dee bridge, plus an active travel link within the existing rail underbridge on the westbound carriageway. This option includes additional width provision of 0.7m for future proofing.

10.2. This package performs the best against the five dimensions of WelTAG on the basis of:

- A lower construction footprint, resulting in an improved IWBA assessment, particularly against environmental factors (air quality, noise, carbon, biodiversity and waste).
- Minimal levels of induced traffic and a number of resilience benefits in terms of operational performance and modal shift opportunities.
- Affordability, being the most affordable Scheme option.
- Less consents required for construction.

- Overall ease of construction and a reduced level of risk.

10.3. The focus for the WelTAG Stage 3 (Full Business Case / FBC) will provide a detailed assessment of the Preferred Option – including environmental, financial and technical analysis. This will include:

- **Strategic Fit –** A review of the evidence base to confirm the need for the Scheme remains unchanged.
- **Wellbeing –** Traffic modelling outputs will underpin safety and environmental analysis such as operational carbon, noise and air quality. Economic modelling outputs will further underpin value for money elements such as delays during the construction period.
- **Affordability –** Further costings will be provided and will include quantified risk analysis and inclusion of VAT.
- **Deliverability –** Will detail the commercial delivery method for the Scheme including the output specification. It will further detail the consents required and supporting programme that is needed.
- **Management –** Focus will be on the risks and mitigation, assurance, resourcing requirements as well as refinement to the programme. It will also highlight the benefits that need to be captured by identifying the monitoring that will be required especially at Key Stages 5 and 6. (WelTAG Stages 4 and 5).

A494 River Dee Bridge Replacement – WelTAG Stage 2 – Appendices

Appendix 1 – Logic Map

Appendix 2 – Objective Analysis

Appendix 3 – Drawings

Appendix 4 – Integrated Well Being Appraisal Methodology

Appendix 5 – Integrated Well Being Appraisal

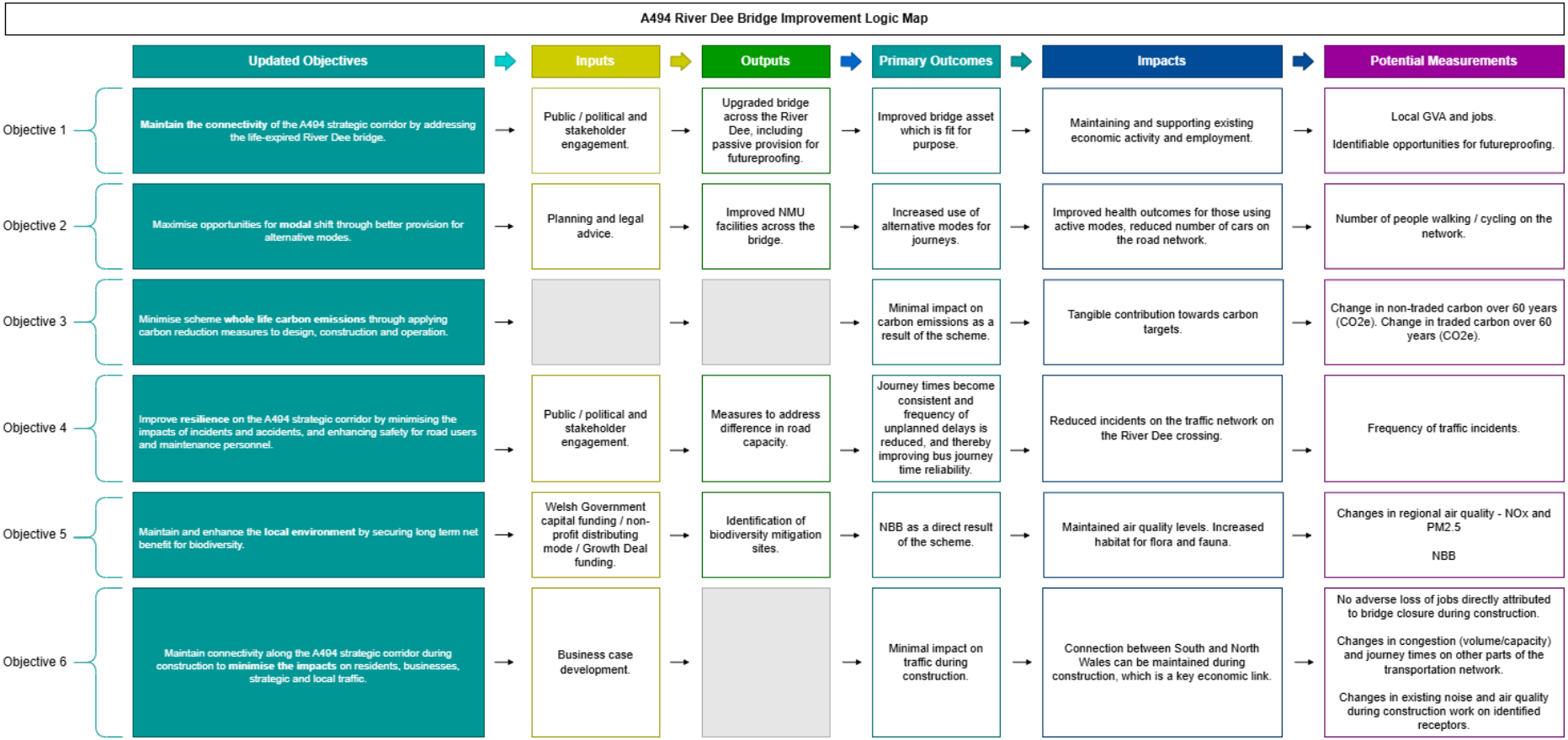
Appendix 6 – Contribution to Wales Transport Monitoring Framework

Appendix 7 – Costs

Appendix 8 – Risks

Appendix 9 - Glossary

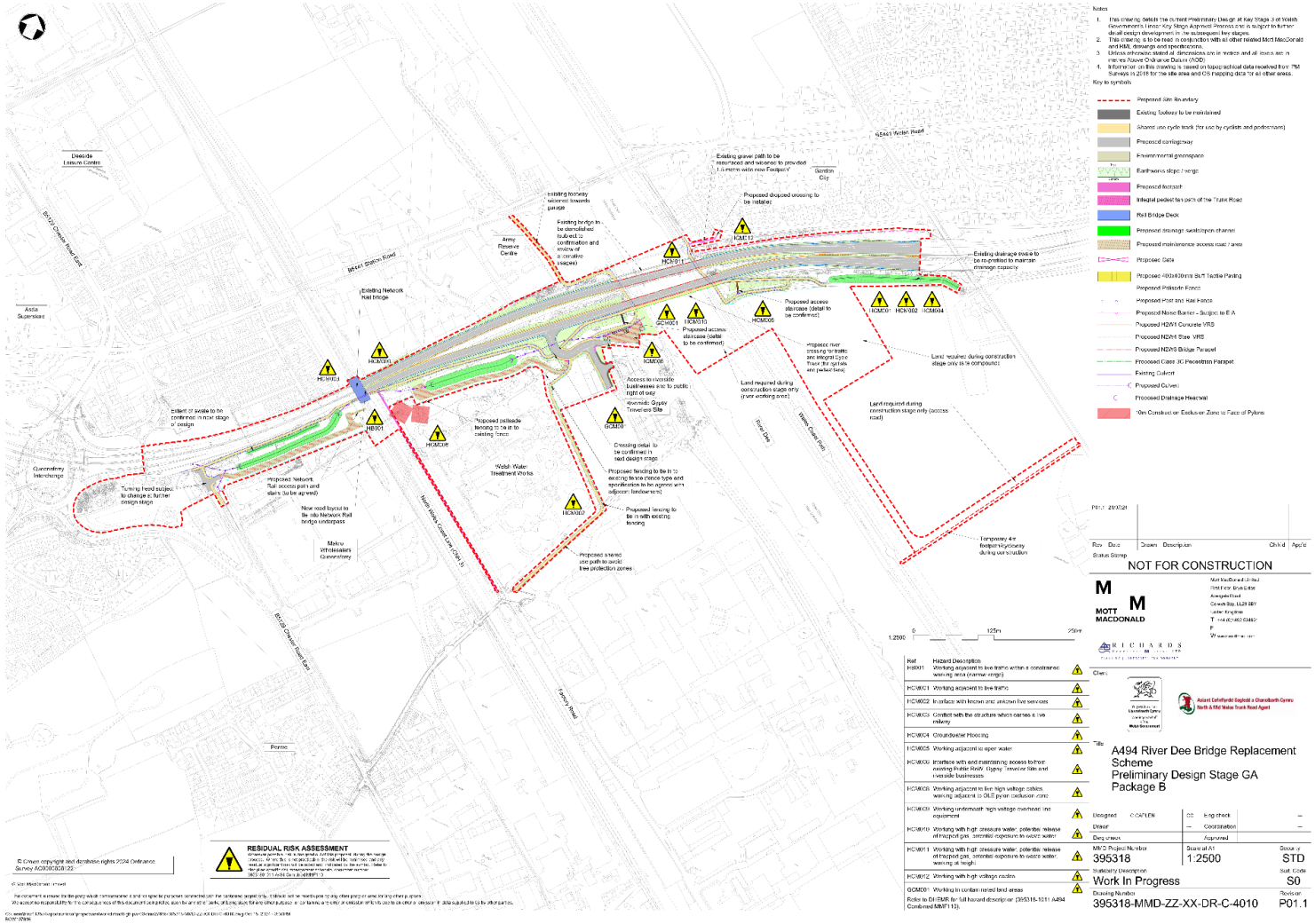
Appendix 1 – Logic Map

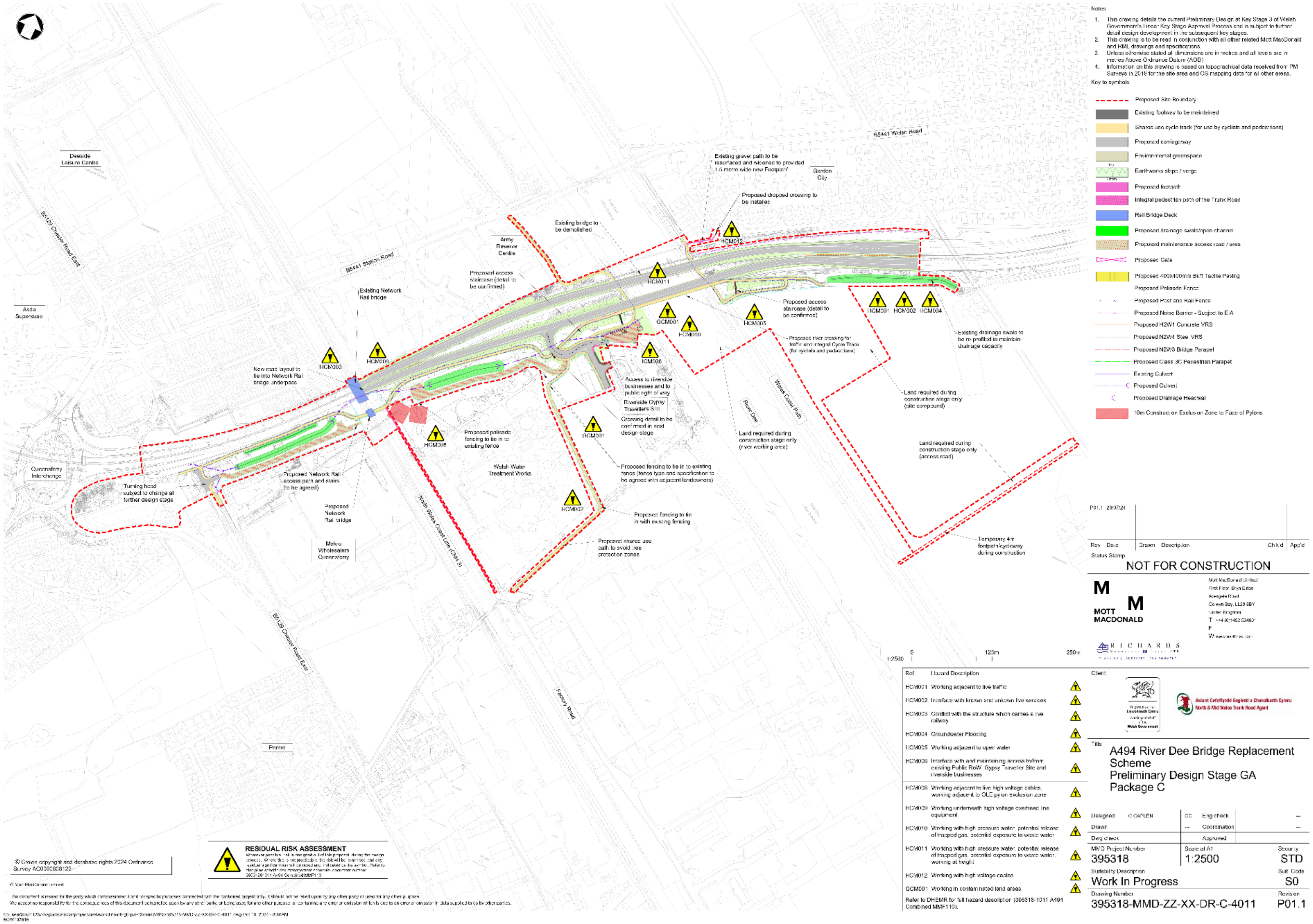


Appendix 2 – Objective Analysis

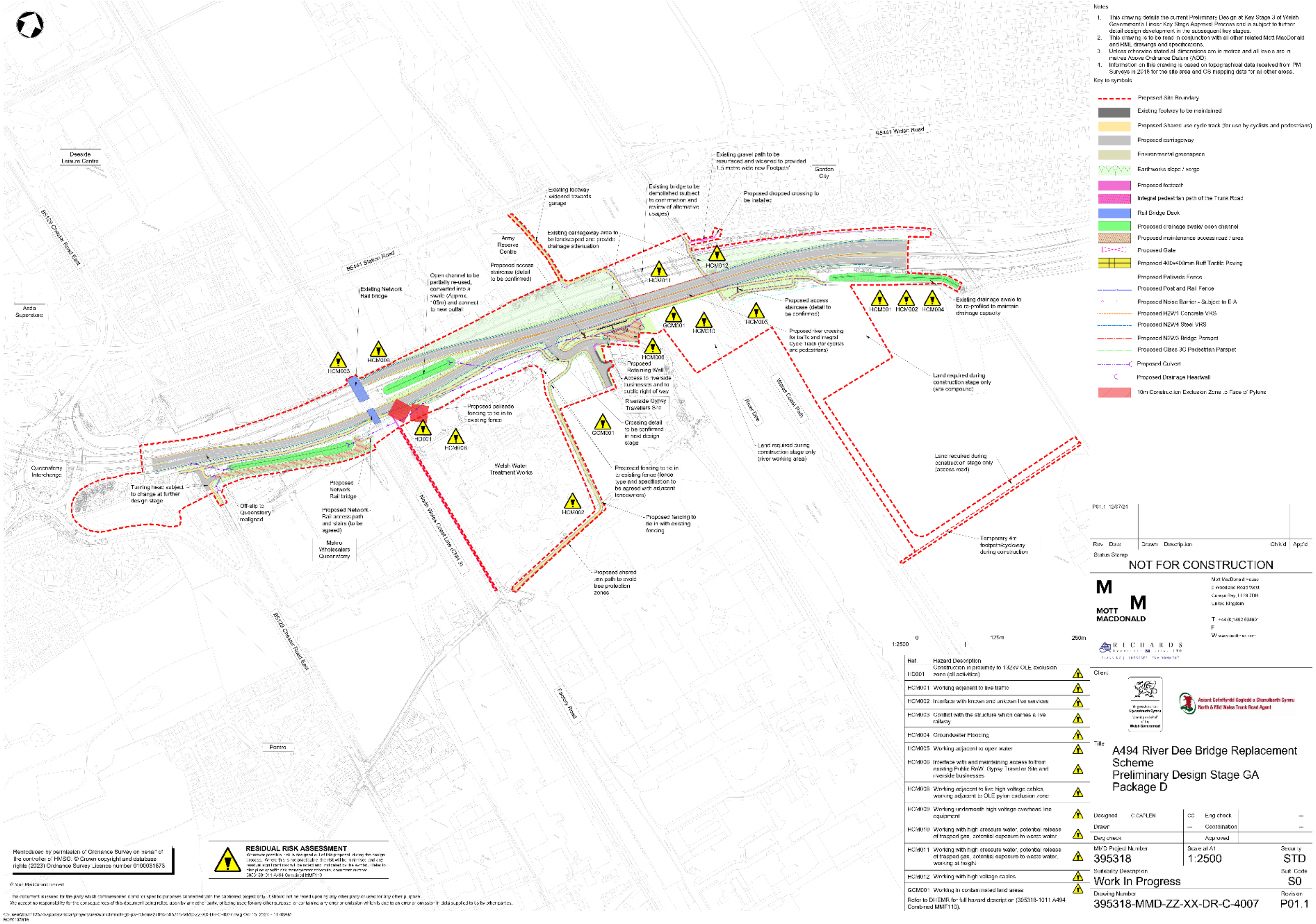
Package	Objective 1: Function	Objective 2: Modal Shift	Objective 3: Carbon	Objective 4: Resilience	Objective 5: Local Environment	Objective 6: Construction	Supporting Commentary
Package B: New twin structure River Dee plus active travel link within existing rail underbridge.	Major Benefit	Slight Benefit	Slight Disbenefit	Moderate Benefit	Neutral / Negligible	Moderate Disbenefit	**Progressed -** Whilst this option does perform less well in terms of the carbon and construction objectives, it performs well in terms of the function and resilience of the route.
Package C: New twin structure River Dee Bridge plus separate rail underbridge for active travel.	Major Benefit	Moderate Benefit	Slight Disbenefit	Moderate Benefit	Neutral / Negligible	Moderate Disbenefit	**Progressed -** Whilst this option does perform less well in terms of the carbon and construction objectives, it performs well in terms of the function and resilience of the route. There is a greater performance towards the modal shift objective in comparison to Package B.
Package D: New off-line single structure River Dee Bridge plus new westbound rail underbridge.	Major Benefit	Moderate Benefit	Moderate Disbenefit	Major Benefit	Slight Disbenefit	Slight Disbenefit	**Progressed -** Whilst this option performs less well in terms of the local environment objective due to the construction for the westbound rail underbridge (and similarly, the performance against carbon and construction objectives), it performs well against the function and resilience of the route.
Package E: New off-line single structure River Dee Bridge plus active travel link within existing rail underbridge.	Major Benefit	Slight Benefit	Slight Disbenefit	Moderate Benefit	Slight Benefit	Slight Disbenefit	**Progressed -** Whilst this option does perform less well in terms of the carbon and construction objectives, it performs well in terms of the function and resilience of the route.
Package F: New off-line single structure River Dee Bridge plus separate rail underbridge for active travel.	Major Benefit	Slight Benefit	Slight Disbenefit	Moderate Benefit	Neutral / Negligible	Slight Disbenefit	**Progressed -** Whilst this option does perform less well in terms of the carbon and construction objectives, it performs well in terms of the function and resilience of the route. There is a greater performance towards the modal shift objective in comparison to Package E.

Appendix 3 – Option Drawings





Notes
1. This drawing details the current Preliminary Design at Key Stage 3 of Welsh Government's Linear Key Stage Approval Process and is subject to further detail design development in the subsequent key stages.
2. This drawing is to be read in conjunction with all other related Mott MacDonald and RML drawings and specifications.
3. Unless otherwise stated all dimensions are in metres and all levels are in metres Above Ordnance Datum (AOD).
4. Information on this drawing is based on topographical data received from PM Surveys in 2018 for the site area and OS mapping data for all other areas.
Key to symbols
Proposed Site Boundary
Existing footway to be maintained
Shared use cycle track (for use by cyclists and pedestrians)
Proposed carriageway
Environmental greenspace
Earthworks slope / verge
Proposed footpath
Integral pedestrian path of the Trunk Road
Rail Bridge Deck
Proposed drainage swale/open channel
Proposed maintenance access road / area
Proposed Gate
Proposed 400x400mm Buff Tactile Paving
Proposed Palisade Fence
Proposed Post and Rail Fence
Proposed Noise Barrier - Subject to EIA
Proposed H2W1 Concrete VRS
Proposed N2W4 Steel VRS
Proposed N2WS Bridge Parapet
Proposed Class 3C Pedestrian Parapet
Existing Culvert
Proposed Culvert
Proposed Drainage Headwall
10m Construction Exclusion Zone to Face of Pylons
NOT FOR CONSTRUCTION
MOTT MACDONALD
RESIDUAL RISK ASSESSMENT
Ref Hazard Description
HCM001 Working adjacent to live traffic
HCM002 Interface with known and unkown live services
HCM003 Conflict with the structure which carries a live railway
HCM004 Groundwater Flooding
HCM005 Working adjacent to open water
HCM006 Interface with and maintaining access to/from existing Public RoW, Gypsy Traveller Site and riverside businesses
HCM008 Working adjacent to live high voltage cables, working adjacent to OLE pylon exclusion zone
HCM009 Working underneath high voltage overhead line equipment
HCM010 Working with high pressure water, potential release of trapped gas, potential exposure to waste water
HCM011 Working with high pressure water, potential release of trapped gas, potential exposure to waste water, working at height
HCM012 Working with high voltage cables
GCM001 Working in contaminated land areas
Refer to DHEMR for full hazard description (395318-1011 A494 Combined MMF110).
Client
Asiant Cefnffyrdd Gogledd a Chanolbarth Cymru
North & Mid Wales Trunk Road Agent
Title
A494 River Dee Bridge Replacement Scheme
Preliminary Design Stage GA
Package C
Designed C CAPLEN
Drawn
Dwg check
Eng check
Coordination
Approved
MMD Project Number 395318
Scale at A1 1:2500
Security STD
Suitability Description Work In Progress
Suit. Code S0
Drawing Number 395318-MMD-ZZ-XX-DR-C-4011
Revision P01.1



Deeside Leisure Centre
B5129 Chester Road East
Asda Superstore
B5441 Station Road
Existing Network Rail bridge
Army Reserve Centre
Welsh Water Treatment Works
Queensferry Interchange
Turning head subject to change at further design stage
North Wales Coast Line (Chester)
Factory Road
Garden City
B5441 Welsh Road
River Dee
Wales Coast Path
HCM001
HCM002
HCM003
HCM004
HCM005
HCM006
HCM008
HCM009
HCM010
HCM011
HCM012
GCM001
HD001
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Proposed carriageway
Environmental greenspace
Earthworks slope / verge
Proposed footpath
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Rail Bridge Deck
Proposed drainage swale/ open channel
Proposed maintenance access road / area
Proposed Gate
Proposed 400x400mm Buff Tactile Paving
Proposed Palisade Fence
Proposed Post and Rail Fence
Proposed Noise Barrier - Subject to EIA
Proposed H2W1 Concrete VRS
Proposed N2W4 Steel VRS
Proposed N2W3 Bridge Parapet
Proposed Class 3C Pedestrian Parapet
Proposed Culvert
Proposed Drainage Headwall
10m Construction Exclusion Zone to Face of Pylons
NOT FOR CONSTRUCTION
MOTT MACDONALD
1:2500
0
125m
250m
Ref Hazard Description
HD001 Construction in proximity to 132kV OLE exclusion zone (all activities)
HCM001 Working adjacent to live traffic
HCM002 Interface with known and unkown live services
HCM003 Conflict with the structure which carries a live railway
HCM004 Groundwater Flooding
HCM005 Working adjacent to open water
HCM006 Interface with and maintaining access to/from existing Public RoW, Gypsy Traveller Site and riverside businesses
HCM008 Working adjacent to live high voltage cables, working adjacent to OLE pylon exclusion zone
HCM009 Working underneath high voltage overhead line equipment
HCM010 Working with high pressure water, potential release of trapped gas, potential exposure to waste water
HCM011 Working with high pressure water, potential release of trapped gas, potential exposure to waste water, working at height
HCM012 Working with high voltage cables
GCM001 Working in contaminated land areas
Refer to DHEMR for full hazard description (395318-1011 A494 Combined MMF110).
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Asiant Cefnffyrdd Gogledd a Chanolbarth Cymru
North & Mid Wales Trunk Road Agent
Title
A494 River Dee Bridge Replacement Scheme
Preliminary Design Stage GA
Package D
Designed C CAPLEN
Eng check
Drawn
Coordination
Dwg check
Approved
MMD Project Number
395318
Scale at A1
1:2500
Security
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Suitability Description
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Drawing Number
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Revision
P01.1
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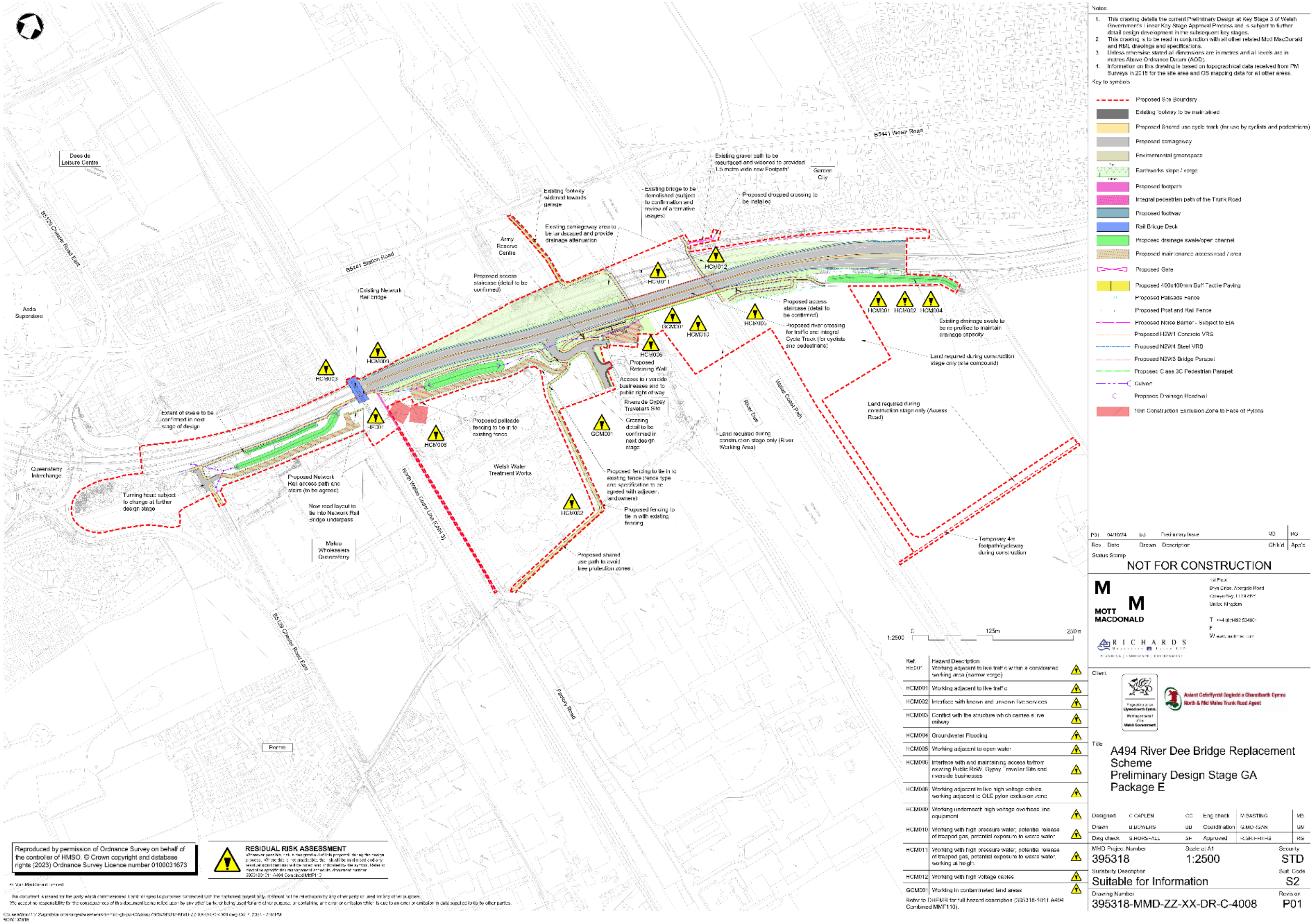

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Proposed footway
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Proposed N2W4 Steel VRS
Proposed N2W5 Bridge Parapet
Proposed Class 3C Pedestrian Parapet
Culvert
Proposed Drainage Headwall
10m Construction Exclusion Zone to Face of Pylons
B5441 Station Road
B5129 Chester Road East
Welsh Water Treatment Works
North Wales Coast Line (CNH3)
Queensferry Interchange
1:2500 0 125m 250m
Ref. Hazard Description
HE001 Working adjacent to live traffic within a constrained working area (narrow verge)
HCM001 Working adjacent to live traffic
HCM002 Interface with known and unkown live services
HCM003 Conflict with the structure which carries a live railway
HCM004 Groundwater Flooding
HCM005 Working adjacent to open water
HCM006 Interface with and maintaining access to/from existing Public RoW, Gypsy Traveller Site and riverside businesses
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GCM001 Working in contaminated land areas
Refer to DHEMR for full hazard description (395318-1011 A494 Combined MMF110).
RESIDUAL RISK ASSESSMENT
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P01 04/10/24 BB Preliminary Issue MB RG
Rev Date Drawn Description Chk'd App'd
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Bryn Eirias, Abergele Road
Colwyn Bay, LL29 8BY
United Kingdom
RICHARDS
Client
Asiant Cefnffyrdd Gogledd a Chanolbarth Cymru
North & Mid Wales Trunk Road Agent
Title
A494 River Dee Bridge Replacement Scheme
Preliminary Design Stage GA
Package E
Designed C.CAPLEN CC Eng check M.BASTING MB
Drawn B.BOWERS BB Coordination G.MORGAN GM
Dwg check S.HORSFALL SH Approved R.GRIFFITHS RG
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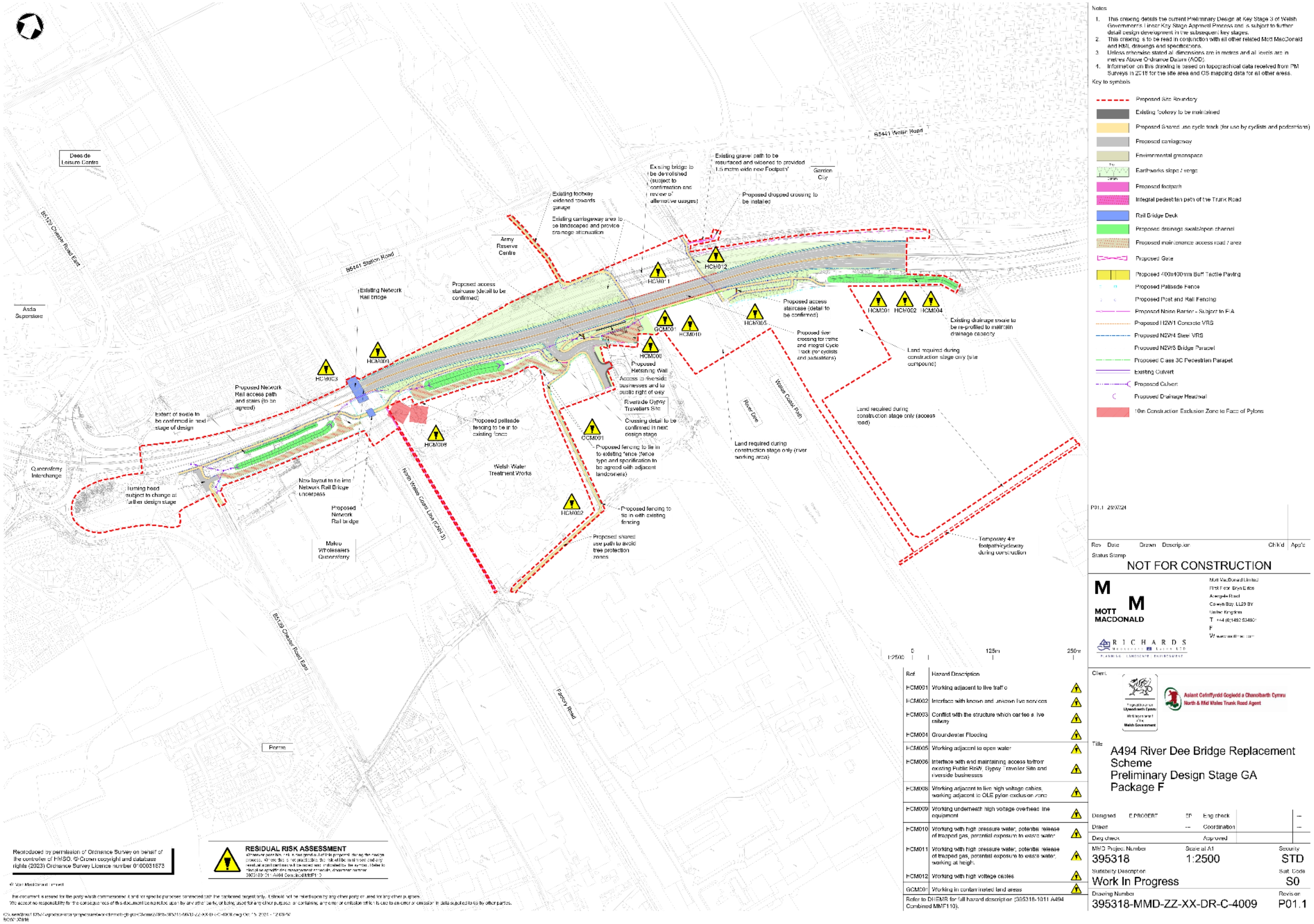
Revision P01



Dee-side Leisure Centre
B5129 Chester Road East
B5441 Station Road
B5441 Welsh Road
Asda Superstore
Queensferry Interchange
Army Reserve Centre
Welsh Water Treatment Works
North Wales Coast Line (CNH 3)
Wales Coast Path
River Dee
Factory Road
Makro Wholesalers Queensferry
NOT FOR CONSTRUCTION
MOTT MACDONALD
Mott MacDonald Limited
First Floor, Bryn Eirias
Abergele Road
Colwyn Bay, LL29 8Y
United Kingdom
RICHARDS MOORHEAD & LAING LTD
PLANNING | LANDSCAPE | ENVIRONMENT
Asiant Cefnffyrdd Gogledd a Chanolbarth Cymru
North & Mid Wales Trunk Road Agent
Ref. | Hazard Description
HCM001 | Working adjacent to live traffic
HCM002 | Interface with known and unkown live services
HCM003 | Conflict with the structure which carries a live railway
HCM004 | Groundwater Flooding
HCM005 | Working adjacent to open water
HCM006 | Interface with and maintaining access to/from existing Public RoW, Gypsy Traveller Site and riverside businesses
HCM008 | Working adjacent to live high voltage cables, working adjacent to OLE pylon exclusion zone
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HCM011 | Working with high pressure water, potential release of trapped gas, potential exposure to waste water, working at height.
HCM012 | Working with high voltage cables
GCM001 | Working in contaminated land areas
Refer to DHEMR for full hazard description (395318-1011 A494 Combined MMF110).
Title
A494 River Dee Bridge Replacement Scheme
Preliminary Design Stage GA
Package F
Designed E.PROBERT
MMD Project Number 395318
Scale at A1 1:2500
Security STD
Suitability Description Work In Progress
Suit. Code S0
Drawing Number 395318-MMD-ZZ-XX-DR-C-4009
Revision P01.1
RESIDUAL RISK ASSESSMENT

Appendix 4 – Integrated Well Being Appraisal Methodology

Heading	Subheading	Evidence and Data	Approach	Assessment Scale	WTS Monitoring Framework Measure
People and Communities	Air Quality	ES/ Number of receptors	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major Improvement in Air Quality (construction and operation) to --- Major Adverse Impact in Air Quality (construction and operation), measured on the number of receptors	M2 Percentage of vehicles that are ultra-low or zero emission M3 Total vehicle kilometres travelled M4 Average distance travelled per person S23 Level of air pollutants from the transport sector
	Noise	ES/ Number of receptors	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major Improvement in noise (construction and operation) to --- Major Adverse Impact in noise (construction and operation), measured on the number of receptors	M2 Percentage of vehicles that are ultra-low or zero emission M3 Total vehicle kilometres travelled M4 Average distance travelled per person S24 Percentage of people regularly bothered by noise from outside the home caused by transport
	Physical Activity	WCHAR / number of active travel journeys from survey data	Qualitative for WelTAG Stage 2 / TAG worksheets	+++ Major Improvement in physical activity to --- Major Adverse Impact in physical activity, measured on the number of active travel journeys	M1 Percentage of journeys by walking, cycling and public transport M3 Total vehicle kilometres travelled S1 Average travel time to education, health and leisure services S2 Percentage of people satisfied with their ability to access services in their local area S3 Percentage of people within walking distance of sustainable modes of transport S4 Percentage of people who walk or cycle at least once a week as a means of transport S5 Percentage of trips to a rail station by walking, cycling or bus in North Wales
	Equalities and Barriers to Sustainable Transport	Distributional Effects	Qualitative for WelTAG Stage 2 / TAG worksheets	+++ Major Improvement in equality opportunities --- Major Adverse Impact in equality opportunities, measured by impacts on specific socio-economic groups	Not applicable

Heading	Subheading	Evidence and Data	Approach	Assessment Scale	WTS Monitoring Framework Measure
	Safety - Collisions	ITCR	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major reduction in KSIs --- Major increase in KSIs	M3 Total vehicle kilometres travelled S19 Number of people killed or injured on the transport network
	Safety - Confidence	User surveys	Qualitative for WelTAG Stage 2 / TAG worksheets	+++ Major improvements in safety confidence --- Major adverse impacts in safety confidence	M3 Total vehicle kilometres travelled S20 Percentage of people who feel safe and welcome when travelling S11 Percentage of people satisfied with their journey
Environment	Whole Life Carbon Emissions	Carbon modelling – operational and construction	Qualitative for WelTAG Stage 2.for operational; Quantitative for WelTAG Stage 2 on construction. WelTAG Stage 3 Quantitative for both elements	+++ Major improvement in whole life carbon emissions --- Major adverse impacts in whole life carbon emissions	M2 Percentage of vehicles that are ultra-low or zero emission M3 Total vehicle kilometres travelled M6 Greenhouse gas emissions from the transport sector S16 Average delay per kilometre travelled
	Contribution to Modal Shift	ITCR	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major improvement to sustainable journeys --- Increased use of car use	M1 Percentage of journeys by walking, cycling and public transport M3 Total vehicle kilometres travelled S1 Average travel time to education, health and leisure services S17 Average cost per kilometre travelled by public transport
	Biodiversity and Ecosystems Resilience	ES	Qualitative for WelTAG Stage 2	+++ Major enhancement to biodiversity --- Major adverse impact on biodiversity	S22 Percentage of transport infrastructure at risk of flooding S25 Hectares of habitat on the transport estate maintained or improved for biodiversity benefit
	Waste	Carbon calculations based on the waste	Quantitative based on carbon estimates for construction	+++ Minimum level of waste and reuse --- Major waste created	S26 Percentage of waste produced by the transport sector that is reused or recycled
Places and the Economy	Placemaking	ES / Townscape	Qualitative for WelTAG Stage 2	+++ Major enhancement to placemaking --- Major adverse impact on place making	Not applicable
	Economy	ITCR / change in traffic flows / wider economic assessment	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major improvement to local economic performance (jobs, agglomeration, GVA)	M3 Total vehicle kilometres travelled

Heading	Subheading	Evidence and Data	Approach	Assessment Scale	WTS Monitoring Framework Measure
				--- Adverse impacts to local economic performance (jobs, agglomeration, GVA)	M5 Percentage of the workforce working remotely on a regular basis S9 Percentage of bus and rail services on time S16 Average delay per kilometre travelled
	Sustainable Transport Innovation	Technology, use of construction materials, VMS	Qualitative for WelTAG Stage 2	+++ Major improvement to sustainable transport innovation --- Adverse impacts to sustainable transport innovation	M2 Percentage of vehicles that are ultra-low or zero emission M5 Percentage of the workforce working remotely on a regular basis
	Sustainable Distribution of Goods	ITCR/ Freight statistics	Qualitative for WelTAG Stage 2. Quantitative based on traffic data being produced for WelTAG Stage 3	+++ Major improvement to sustainable distribution of goods --- Adverse impacts to sustainable distribution of goods	M2 Percentage of vehicles that are ultra-low or zero emission M3 Total vehicle kilometres travelled S8 Percentage of land-based freight moved by rail
	Affordability and Socio-economic Disadvantage	Socio Economic Statistics	Qualitative for WelTAG Stage 2 / TAG worksheets	+++ Major improvement to socio economic conditions --- Adverse impacts on socio economic conditions	S1 Average travel time to education, health and leisure services S2 Percentage of people satisfied with their ability to access services in their local area S17 Average cost per kilometre travelled by public transport
Culture and Welsh Language	Welsh Language	Welsh Language Statistics	Qualitative for WelTAG Stage 2	+++ Major improvement to boosting Welsh language use and promotion --- Adverse impacts on Welsh Language use and promotion	S1 Average travel time to education, health and leisure services S2 Percentage of people satisfied with their ability to access services in their local area
	Arts, Sports and Culture	Number of Arts and Sports facilities and events	Qualitative for WelTAG Stage 2	+++ Major improvement to arts, sports facilities and events --- Adverse impacts to arts, facilities and events	S1 Average travel time to education, health and leisure services S2 Percentage of people satisfied with their ability to access services in their local area S6 Percentage of trips to visitor attractions by sustainable modes of transport
	Historic Environment and Heritage	ES / Historical Environment	Qualitative for WelTAG Stage 2 / TAG worksheets	+++ Major improvement to the historic environment	S27 Percentage of designated historical assets on the transport estate that are in a stable or improving condition

Heading	Subheading	Evidence and Data	Approach	Assessment Scale	WTS Monitoring Framework Measure
				--- Adverse impacts to the historic environment	

Appendix 5 – Integrated Well-being Appraisal

Heading	Subheading	Package B New twin structure River Dee Bridge plus active travel link within existing rail underbridge	Package C New twin structure River Dee Bridge plus separate rail underbridge for active travel	Package D New off-line single structure River Dee Bridge plus new westbound rail underbridge	Package E New off-line single structure River Dee Bridge plus active travel link within existing rail underbridge	Package F New off-line single structure River Dee Bridge plus separate rail underbridge for active travel	Summary
People and Communities	Air Quality	**Neutral / Negligible**	**Neutral / Negligible**	**Slight Benefit**	**Neutral / Negligible**	**Neutral / Negligible**	
	Noise	**Minor Disbenefit**	**Minor Disbenefit**	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	
	Physical Activity	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.
	Equalities and Barriers to Sustainable Transport	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.
	Safety – Collisions	**Neutral / Negligible**	**Slight Benefit**	**Moderate Disbenefit**	**Neutral / Negligible**	**Slight Benefit**	
	Safety - Confidence	**Slight Benefit**	**Slight Benefit**	**Moderate Disbenefit**	**Slight Benefit**	**Slight Benefit**	
Environment	Whole Life Carbon Emissions	**Moderate Disbenefit**	**Moderate Disbenefit**	**Moderate Disbenefit**	**Minor Disbenefit**	**Moderate Disbenefit**	
	Contribution to Modal Shift	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.
	Biodiversity and Ecosystems Resilience	**Slight Benefit**	**Neutral / Negligible**	**Moderate Disbenefit**	**Slight Benefit**	**Neutral / Negligible**	
	Waste	**Moderate Disbenefit**	**Moderate Disbenefit**	**Moderate Disbenefit**	**Minor Disbenefit**	**Moderate Disbenefit**	
Places and the Economy	Placemaking	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.
	Economy	**Neutral / Negligible**	**Neutral / Negligible**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	
	Sustainable Transport Innovation	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.

Heading	Subheading	Package B New twin structure River Dee Bridge plus active travel link within existing rail underbridge	Package C New twin structure River Dee Bridge plus separate rail underbridge for active travel	Package D New off-line single structure River Dee Bridge plus new westbound rail underbridge	Package E New off-line single structure River Dee Bridge plus active travel link within existing rail underbridge	Package F New off-line single structure River Dee Bridge plus separate rail underbridge for active travel	Summary
	Sustainable Distribution of Goods	**Neutral / Negligible**	**Neutral / Negligible**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	
	Affordability and Socio-economic Disadvantage	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	**Slight Benefit**	No major differences between the options.
Culture and Welsh Language	Welsh Language	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	No major differences between the options.
	Arts, Sports and Culture	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	**Neutral / Negligible**	No major differences between the options.
	Historic Environment and Heritage	**Minor Disbenefit**	**Minor Disbenefit**	**Minor Disbenefit**	**Minor Disbenefit**	**Minor Disbenefit**	No major differences between the options.

Appendix 6A – Contribution and Monitoring towards the Wales Transport Strategy (Key Measures)

Measure	Indicator	National Score	Contribution of Scheme to Measure	Commentary
M1 Percentage of journeys by walking, cycling and public transport	Percentage of journeys by walking and public transport	28.1%	**Slight Benefit**	Improved active travel network and reduced impact of severance
M2 Percentage of vehicles that are ultra-low or zero emission	Percentage of vehicles in Wales that are ultra-low or zero emissions	1.10%	**Neutral / Negligible**	Scheme is unlikely to directly impact the percentage of vehicles
M3 Total vehicle kilometres travelled	Total vehicles travelled on the Welsh road network (billions)	29.4	**Neutral / Negligible**	Scheme does not generate induced traffic
M4 Average distance travelled per person	Average distance travelled per person (kilometres)	12,043	**Neutral / Negligible**	Scheme does not generate induced traffic
M5 Percentage of the workforce working remotely on a regular basis	Percentage of the workforce who usually work remotely	33.90%	**Neutral / Negligible**	Scheme unlikely to change established working patterns given manufacturing cluster and proximity to English border
M6 Greenhouse gas emissions from the transport sector	Greenhouse gases from domestic transport in Wales 2021 (KtCO2e)	5,421	**Slight Benefit**	Scheme is likely to improve the flow of traffic through improved operational resilience

Appendix 6B – Contribution and Monitoring towards the Wales Transport Strategy (Subsidiary Measures)

Measure	Indicator	National Score	Contribution of Scheme to Measure	Commentary
S1 Average travel time to education, health and leisure services	Average time to key services (GP Surgery, Primary School, Secondary School and Sports Facilities) (minutes)		**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee
	Walk	N/A	**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee
	Cycle	N/A	**Neutral / Negligible**	No major change anticipated to both bus and rail services
	Bus and Rail	N/A	**Slight Benefit**	Scheme is likely to improve the flow of traffic through improved operational resilience
	Motor Vehicles	N/A	**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee
S2 Percentage of people satisfied with their ability to access services in their local area	Percentage of people satisfied with their ability to access services available within a 15 to 20-minute walk of home	85.80%	**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee

Measure	Indicator	National Score	Contribution of Scheme to Measure	Commentary
S3 Percentage of people within walking distance of sustainable modes of transport	Percentage of people within walking distance of public transport	49.90%	**Slight Benefit**	Improved active travel networks will help boost walking and cycling
S4 Percentage of people who walk or cycle at least once a week as a means of transport	Percentage of people who walk or cycle at least once a week	51.80%	**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee
S5 Percentage of journeys to a rail station by walking, cycling or bus	Percentage of trips to a rail station by walking, cycling or bus in North Wales	34%	**Neutral / Negligible**	Although the Scheme is part of a major leisure route into North Wales, it is unlikely to increase sustainable trips to key attractors
S6 Percentage of trips to visitor attractions by sustainable modes of transport	Percentage of trips to visitor attractions by sustainable modes of transport	25.80%	**Slight Benefit**	By not increasing highway capacity, there may be an uplift in demand to haul freight by rail.
S8 Percentage of land-based freight moved by rail	Proportion of land-based freight moved by rail	5.90%	**Slight Benefit**	Improved operational resilience should have a positive improvement on bus and rail services
S9 Percentage of bus and rail services on time	Percentage of bus services on time	71.40%	**Neutral / Negligible**	Scheme unlikely to have a fundamental impact on bus satisfaction
S11 Percentage of people satisfied with their journey	Percentage of people satisfied with bus services	52.40%	**Moderate Benefit**	Scheme will improve operational resilience and given the volume of traffic using the existing bridge, this should translate into a reduction in strategic road delay
S16 Average delay per kilometre travelled	Average strategic road network delay (Seconds per kilometre)	3.1	**Neutral / Negligible**	No expected change in the cost of bus services.
S17 Average cost per kilometre travelled by public transport	Average cost per kilometre travelled by bus	£0.52	**Slight Benefit**	Mainline collisions on the A494 are relatively low given the traffic volumes but provision of better safety features should translate into a reduction
S19 Number of people killed or injured on the transport network	Number of people killed or injured on the road network	4447	**Slight Benefit**	Current active provision on the River Dee bridge is poor, and the Scheme should result in a better environment for users
S20 Percentage of people who feel safe and welcome when travelling	Percentage of people who feel safe using walking/using public transport/travelling by car after dark	N/A	**Major Benefit**	This is a life expired asset which has both strategic and local importance. Replacement of the River Dee Bridge will result in a major renewal of a key transport asset.
S21 Percentage of transport infrastructure in good condition	Percentage of structures on the strategic road network in good condition, by value	37%	**Slight Benefit**	Although the Scheme is located on a flood plain, the flooding risk especially to climate change events has yet to be tested. However, raised riverbank plus potential works to the existing culvert should minimise the negative impacts of flooding
S22 Percentage of transport infrastructure at risk of flooding	Percentage of strategic road network at high or medium risk of flooding	8%	**Slight Benefit**	Improved operational resilience should result in a slight benefit
S23 Level of air pollutants from the transport sector	Average NOx concentration from road in North Wales (µg/m3)	0.64	**Slight Benefit**	Improved operational resilience should result in a slight benefit

Measure	Indicator	National Score	Contribution of Scheme to Measure	Commentary
	Average PM10 concentration from road in North Wales (µg/m3)	0.03	**Slight Benefit**	Depending on the option, the new alignment together could result in a localised benefit
S24 Percentage of people regularly bothered by noise from outside the home caused by transport	Percentage of people dissatisfied with traffic noise in their local area	15.20%	**Slight Benefit**	Also depending on the option, there are good opportunities for net benefit in biodiversity including use of existing bridge approaches and use of a former brownfield council depot
S25 Hectares of habitat on the transport estate maintained or improved for biodiversity benefit	Hectares of habitat on the strategic road network maintained or improved	3,145	**Slight Benefit**	Scheme reduces the severance impact of the railway line and improves opportunities to cross the River Dee
S26 Percentage of waste produced by the transport sector that is reused or recycled	Percentage of waste produced by the transport sector that is reused or recycled	42.20%	**Slight Benefit**	There will be opportunities to recycle some of the waste produced by the Scheme. The extent will be determined at subsequent stages.

Appendix 7 – Outturn Costs

Element	Option Package Costs (£m)				
	B	C	D	E	F
DIRECT CONSTRUCTION WORKS					
Highways	48.92	49.45	42.77	36.76	36.72
Bridge structure	24.59	26.05	18.79	14.47	16.73
Utility diversion	15.21	15.21	32.85	14.21	14.21
Other construction costs	0.81	0.81	0.8	0.86	0.81
SUB-TOTAL	**89.53**	**91.52**	**95.21**	**66.29**	**68.47**
INDIRECT CONSTRUCTION WORKS					
Preliminaries	47.45	48.5	50.45	32.48	33.55
Overheads and profit	16.43	16.8	17.48	11.85	12.24
SUB-TOTAL	**63.88**	**65.3**	**67.93**	**44.33**	**45.79**
DESIGN, PM & OTHER PROJECT COSTS					
Design	7.67	7.84	8.16	5.53	5.71
Project management	8.29	8.65	9.09	6.04	6.37
Other project costs	4.72	8.39	10.46	4.60	7.35
SUB-TOTAL	**20.68**	**24.88**	**27.7**	**16.17**	**19.43**
BASE COST PLAN	**174.10**	**181.71**	**190.85**	**126.81**	**133.7**
RISK					
Risk	55.71	58.15	61.07	40.58	42.78
ANTICIPATED FINAL COST (EXCLUDING INFLATION)	**229.81**	**239.86**	**251.92**	**167.38**	**176.48**
INFLATION					
Inflation	33.75	35.22	36.99	24.58	25.92
ANTICIPATED FINAL COST (INCLUDING INFLATION)	**263.56**	**275.08**	**288.92**	**191.97**	**202.4**
ANTICIPATED FINAL COSTS					
Anticipated final costs (including inflation, taxes and grants)	**263.56**	**275.08**	**288.92**	**191.97**	**202.4**
AACE estimate Class 4 accuracy range – Lower (-30%)	**184.5**	**192.56**	**202.25**	**134.38**	**141.68**
AACE estimate Class 4 accuracy range – Higher (+50%)	**395.34**	**412.62**	**433.38**	**287.96**	**303.6**

Appendix 8 – Risk Register

Order	Risk Title	Impact
1	Airbus re-commence wing barge movements on the river Dee	5 - Catastrophic
2	Failure of existing bridge prior to construction completion	5 - Catastrophic
3	Scheme Funding	5 - Catastrophic
4	Objection - NRW Object to Drainage Outfall; Access Road	4 - Major
5	Objection - NRW; Pumping Station, Surface Water Attenuation, Storm Capacity, Saltmarsh.	4 - Major
6	Revised junction design from Riverside to the A494 is not accepted by stakeholders	4 - Major
7	Traffic Modelling - Local Authority Response to Request for Information	4 - Major
8	Cost overrun during construction	4 - Major
9	Rivers Piers impacting on environment and affect Special Areas of Conservation (SACs)	4 - Major
10	Objection - NRW Object to FCA	4 - Major
11	J&M Garner Haulage Ltd (affected business) object to the scheme	4 - Major
12	Contractor disagrees with river bridge method of construction	4 - Major
13	Availability of Construction Equipment	4 - Major
14	Approvals - Traffic Regulation Order (TRO)	4 - Major
15	Contractor disagrees with buildability assumptions at design stage	4 - Major
16	Approvals; Licence - Unable to obtain Marine Licence	4 - Major
17	The availability and duration of NR possessions not available.	4 - Major
18	Utility Diversions Delay	4 - Major
19	Vibration Damages Local Infrastructure and Properties	3 - Moderate
20	Unknown utilities are encountered	3 - Moderate

Appendix 9 – Glossary

AACE	Advancement of Cost Engineering
CJC	(North Wales) Corporate Joint Committee
DfT	Department for Transport
DIP	Deeside Industrial Park
FBC	Full Business Case
FCC	Flintshire County Council
ITCR	Initial Traffic and Collision Report
IWBA	Integrated Well-being Appraisal
LGV	Light Goods Vehicle
MAR	Major Asset Renewal
NMWTRA	North and Mid Wales Trunk Road Agent
OBC	Outline Business Case
OGV	Other Goods Vehicle
PCE	Public Consultation Event
PSV	Public Service Vehicle
QRA	Quantitative Risk Assessment
RTP	Regional Transport Plan
SRN	Strategic Road Network
TAG	Transport Analysis Guidance
TfW	Transport for Wales
VAT	Value Added Tax
VfM	Value for Money
WTS	Wales Transport Strategy / Llywbr Newydd – the Wales Transport Strategy
WBFGA	Well-being of Future Generations (Wales) Act
WelTAG	Welsh Transport Appraisal Guidance