MOTT MACDONALD

WelTAG Stage 2 Report

A483 Wrexham Key Stage 2

25 November 2020

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	23.12.19	J Evans	M Henderson	C Currie	Provisional draft
B	06.03.20	J Evans	M Henderson	C Currie	Draft
C	20.05.20	J Evans	M Henderson	C Currie	Final
D	14.08.20	J Evans	M Henderson	C Currie	Final with client comment updates
E	25.11.20	J Evans	M Henderson	C Currie	Final with client comment updates

Document reference: 402166-0013 |

Information class: Standard

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Introduction

This report documents the WelTAG Stage 2 appraisal of the A483 Wrexham Key Stage 2 Scheme from Junction 3 to 6 (known as the 'Scheme' in this report). The appraisal follows the Welsh Government's WelTAG 2017 Guidance which is based on the Five Business Case Model (Strategic, Transport, Management, Financial and Commercial Cases) and is aligned with the Wellbeing of Future Generations Act.

The need for the Scheme

This WelTAG Stage 2 appraisal has reviewed the need for the Scheme and considered potential material changes since the WelTAG Stage 1 report. The key drivers for the Scheme are identified as:

- **Lack of capacity at Junctions 4 and 5 -** Junction 4 operates over capacity in both peak periods, while Junction 5 operates over capacity in the PM peak period, affecting traffic flow along and across the corridor.
- **A483 related delay and operational safety issues due to tailing back onto the A483 at peak periods is hindering the viability of new development in Wrexham –** With the knock-on impact that the town will take longer to achieve its economic potential.
- **Potential for trips to reassign between A483 junctions due to congestion -** With increased 'junction hopping' it will reduce the ability of the A483 to cater for longer distance movements.
- **Needs to support the Wrexham County Borough Council Local Development Plan and associated economic growth.**

Recommendation of a preferred option

This WelTAG Stage 2 assessment recommends a phased approach to construction. The first phase will be construction of **Junction 4 with a gyratory roundabout and retaining the A525 open to all traffic,** which includes enhancement of Active Travel routes in the environs of the junction.

This option comprises:

- Replacing the existing Junction 4 arrangement with a new gyratory roundabout to the immediate south of the existing junction
- Retention of the existing A525 bridge over the A483 for all traffic
- Improvements to pedestrian and cyclist provision along the A525 and across the A483

After Junction 4 has been implemented, the following improvements to Junction 3, 5 and 6, which will all include enhancement of Active Travel routes in the environs of the junctions, are to be considered over a phased construction period:

Junction 3	– Additional flare lane on B5605 approach to roundabout
Junction 5	– Signals proposed for Mold Road entry to Junction 5. – Improved signalisation of the Plas Coch circulatory

Junction 6	– Additional lane on Chester Road southbound approach and the Blue Bell Lane approach – Extension to A483 southbound off-slip right turn lane – Additional circulatory lane between the A483 northbound off-slip and the industrial estate access road

On the basis that this phased construction process option:

- Would provide better future proofing at Junction 4
- Can be constructed and delivered with minimal impact on existing traffic
- Will enable the economic development of Wrexham to occur
- Will be more affordable
- Will be able to be delivered in phases

The WelTAG process and the design process

WelTAG is the Welsh Government's transport appraisal guidance. WelTAG sets out a process and broad framework for identifying, appraising and evaluating solutions to address transport-related issues. The WelTAG process comprises five stages which are intended to cover the lifecycle of a proposed transport intervention, from conception to post-implementation evaluation. The WelTAG process is evidenced based, proportionate to the impacts being investigated, collaborative (which includes stakeholder and public engagement) and provides the necessary information that decision-makers require.

WelTAG has aligned the process with the HM Treasury Green Book five case model for public investment. This means that the relationship between the WelTAG stages and transport business cases is clear.

The purpose of WelTAG Stage 2 is to '*examine in greater detail the short list of options for tackling the problem under consideration'*. The emphasis is on '*how the proposed solution will lead to the desired outcomes, maximising contribution to the objectives and Wellbeing goals and use this understanding to refine the design of the options and identify any key dependencies and constraints*.'

Strategic Case

This section sets out the case for change. The evidence review confirmed that there has been no substantive alteration to the case for change as identified at WelTAG Stage 1 and the key drivers remain more or less the same. The need is further driven by both national strategies and a ministerial commitment that have identified intervention along the A483 around Wrexham as a priority.

Given the redefined scope for the WelTAG Stage 2 appraisal, the objectives have been refreshed. These are largely carried over from WelTAG Stage 1, but additional scheme specific objectives around minimising potential construction impacts and improving safety have been added.

A long list of options was developed around a number of themes and assessed against the objectives. Given the complexity of the potential interventions at different locations and to understand the longer-term impacts, a representative sample of options were modelled and tested using the A483 Wrexham Strategic Transport Model. The outcomes of this assessment indicated:

- At Junction 4, a number of new layout permutations would work, but some would be more effective, with longer-term future proofing
- The options for Junction 4 should be packaged with the better-performing options for Junctions 3, 5 and 6

Based on this a short-list of 4 'packaged' options (Options A to D - outlined in Table 10) have been identified for further assessment against the 5-case model. An assessment of the short-list options against the objectives indicates no major differences, other than that the closure of the A525 at Junction 4 to general traffic would allow for a physically segregated route. This would benefit pedestrian and cyclist movements across the A483.

Transport Case

The Transport Case examined whether the Scheme offered value for money. From a traffic and economic modelling standpoint, there was similarity in journey times for Options A to D. Therefore, only Option A was assessed and found that:

- It would provide £12.8 million of economic benefits over a 60-year period resulting in a BCR of 0.315. This would provide 'poor' value for money (as defined by Box 5.1 of the Department for Transport Value for Money Framework 2015), but it is important to stress there would be wider economic benefits arising from the Scheme.
- Improvements, particularly to Junction 4, could support three employment sites within a 2 km distance of the A483. This has the potential to create 1,454 net jobs and approximately £64.4 million of GVA per annum.
- A phased construction of Option A with Junction 4 improvements as the first major construction phase would provide £14.5 million of economic benefits over a 60-year period resulting in a BCR of 0.482 for this phased approach combined with minor Active Travel Improvements only.

The level of environmental impacts is estimated to be low for both the quantitative and qualitative elements. There is a slight benefit arising from noise reduction, but marginal disbenefits from air quality, greenhouse gases, historic environment and biodiversity.

With social impacts, there are travel time benefits for commuters and other users coupled with a marginal improvement in vehicle operating costs. Option A is likely to lead to a reduction of 39 accidents over the 60-year period. With other social impacts, there are likely to be slight to moderate benefits to physical activity, journey quality, access to services, personal affordability, severance and option values. It is estimated there will be a slight disbenefit to pedestrians and cyclists around personal security as Option A may lead to a reduction in the level of surveillance as physical segregation would be possible.

Management Case

The assessment against the Management Case indicates that the frameworks for the delivery of the Scheme are in place. These include:

- An appropriate project team governance structure for KS2 that will evolve to meet the requirements necessary for KS3 and KS4
- A stakeholder engagement strategy that is tailored around the importance of different groups to the delivery of the Scheme
- A risk management strategy that includes an ongoing and updated risk register

At this stage of Scheme development, the main risks that have been identified are:

- Challenges at Public Inquiry
- Economic or political uncertainties
- Challenges to traffic modelling forecasting assumptions (Base year model meets all validation requirements)
- Scheme design shall aim to meet all standards
- Environmental conditions that are not yet understood
- Effective coordination with stakeholders including Welsh Government, Wrexham County Borough Council, landowners and the public
- Post COVID19 financial position and the associated potential for modal shift

Financial Case

At this stage of Scheme development, high level costs were estimated. To aid comparison and to keep the assessment as straightforward as possible, the costs from the economic modelling have been utilised. A number of assumptions have been used including discounting costs to a 2010 base level and the application of an optimism bias of 44%. The costs also exclude the enhancements associated with the Moneypenny link at Junction 4 and any Active Travel Improvements.

At this stage, the differences in costs between Option A and the other options are unlikely to be that significant.

- Junction 4, on its own, would form the largest element of cost and would be estimated at £33.9 million at 2020 prices.
- The additional minor highway improvements to Junction 3, 5 and 6 would increase the estimated costs to £34.7 million at 2020 prices.

A high-level funding profile has been put together and this indicated that the bulk of the funding would be required in the first three years.

An initial assessment of the affordability risks has been undertaken, but at this stage of Scheme development, these have not been monetised. The main affordability risks are:

- Land requirements and objections
- Public inquiry
- Variations to yearly spend
- Unknown environmental risks

Commercial Case

In line with guidance, consideration of the options against the Commercial Case is at a high level and will be assessed in greater detail at WelTAG Stage 3.

Nevertheless, there are a number of possible approaches to procurement. Principally there are four potential methods that sit under the Welsh Government's preferred NEC4 Engineering Construction Contract (ECC) framework.

One further consideration with the preferred method of procurement is the level of design maturity, with methods reflecting the level of design definition and risk. The procurement process will also need to consider risks around time, quality, cost and risk transfer.

1 Introduction

1.1 Background

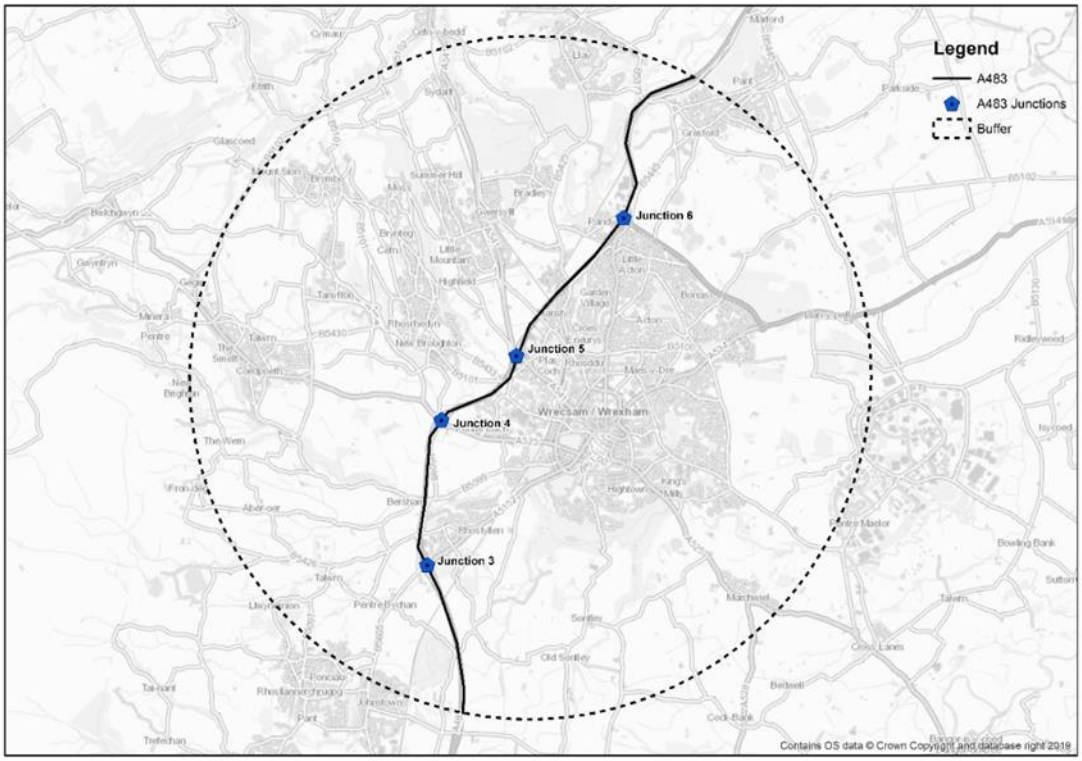
1.1.1 The North & Mid Wales Trunk Road Agent (NMWTRA) has appointed Mott MacDonald and Richards Moorehead and Laing (RML) as their technical and environmental advisors, to develop a Scheme for the A483 around Wrexham. This involves taking the Scheme through the Welsh Government's Key Stage 2 (KS2) approval process. The commission includes the completion of a WelTAG Stage 2 appraisal which should confirm the preferred option, and the design and analysis that will be required for Key Stage 3 (KS3).

1.1.2 The A483/A5 forms part of the trunk road network in Wales and is managed by NMWTRA on behalf of Welsh Government. The A483/A5 provides one of the connecting routes between North and South Wales, as well as providing access into North Wales from the Midlands. It also has an important role for trips within England, connecting Hereford, Shrewsbury and Chester.

1.1.3 Wrexham is one of the key towns in Wales, located in the north east corner of the country and serves as a key driver of economic, social and cultural activity. Wrexham's main connection to the national road network is the A483. The trunk road runs just to the west of the town, generally in a north/south direction. For the majority of its length the A483 is a single carriageway road. The section between the A5 at Ruabon, south of Wrexham, (Junction 1) and Junction 38 of the A55 to the south of Chester is an all-purpose dual carriageway containing seven junctions, all of which are grade separated. Figure 1 shows the A483 in relation to Wrexham, the locations of Junctions 3 to 6 which provide access to Wrexham and the extent of the study area for this WelTAG appraisal.

1.1.4 The A483 also serves the urban conurbation of Wrexham, existing employment areas to the east of the A483 and existing housing to the west of the A483. The A483 also allows access, at its junctions, to villages that are amongst the most deprived areas in Wales enabling connectivity to be maintained with the rest of Wales and the UK.

Figure 1: Location and study scope of the A483 Wrexham KS2



Source: Mott MacDonald

1.1.5 The A483 around Wrexham was constructed in the late 1980s and is known to experience junction related congestion and delay. The following statements demonstrate the level of concern and are included in the Wrexham Local Development Plan 2013-2028 Examination in Public Statement of Common Ground (SOCG004) between Wrexham County Borough Council and the Minister for Economy, Transport and North Wales, issued on 19 August 2019, highlighting the level of concern with traffic movements in the area:

- *Welsh Government is committed to delivering an integrated transport system in North Wales that connects people, communities and businesses to jobs, facilities and services and maximises economic opportunities of connectivity. Welsh Government and Wrexham County Borough Council are concerned by the current and future predicted levels of road based congestion at points on the A483/A5 corridor and its impact on the local environment.* https://wrexham-consult.objective.co.uk/portal/examination_agendas_and_statements
- *Junction 3 to 6 is a pinch point scheme included in the Welsh Government's National Transport Finance Plan was published in July 2015. The 2018 update includes a commitment to major infrastructure improvements to upgrade A483 Junctions 3-6 and for improvements to A483/A5 south of Wrexham to the English border.*

1.1.6 As a result, the Welsh Government are seeking to maintain the operational capacity and robustness of the A483 and its junctions at Wrexham, while maximising the economic development potential of Wrexham.

1.2 Policy and strategy context

1.2.1 Under the overarching statutory framework in the Wales Transport Strategy (2008), the National Transport Finance Plan (2017) outlined the process of delivering solutions to transport issues along the main movement corridors in Wales. This envisaged the development of the most appropriate modal solutions in ways that are linked to the Local Development Plans (LDPs) and delivering transport at a local and regional level.

1.2.2 The improvement of the A483 around Wrexham, between Junctions 3 and 6, has been identified as a priority in the Welsh Government's 'Moving North Wales Forward' which was published in 2017. This targeted improvement aims to tackle the pinch point around Wrexham and improve mainline capacity along the A483 between Junctions 3 and 6.

1.2.3 The priority to improve the capacity of the A483 around Wrexham and help unlock Wrexham's potential economic potential has been reinforced by a commitment in 2019 by the Minister for Economy, Transport and North Wales to progress works.

1.3 WelTAG

1.3.1 WelTAG is the Welsh Government's transport appraisal guidance. WelTAG 2017 sets out a process and broad framework for identifying, appraising and evaluating solutions to address transport-related issues. The WelTAG process comprises five stages which are intended to cover the lifecycle of a proposed transport intervention, from conception to post-implementation evaluation. The WelTAG process is evidenced based, proportionate to the impacts being investigated, collaborative (which includes stakeholder and public engagement) and should provide the necessary information that decision-makers require.

1.3.2 WelTAG 2017 has aligned the process with the HM Treasury Green Book five case model for public investment. This means that the relationship between the WelTAG stages and transport business cases is clear as follows:

- WelTAG Stage 1 is aligned with the Strategic Outline Case (SOC)
- WelTAG Stage 2 with the Outline Business Case (OBC)
- WelTAG Stage 3 with the Full Business Case (FBC)
- WelTAG Stage 4 with implementation
- WelTAG Stage 5 with post implementation

1.3.3 The purpose of WelTAG Stage 2 (OBC) is to '*examine in greater detail the short list of options for tackling the problem under consideration'*. The emphasis is on '*how the proposed solution will lead to the desired outcomes, maximising contribution to the objectives and Wellbeing goals and use this understanding to refine the design of the options and identify any key dependencies and constraints*.'

1.3.4 Supporting evidence included in other stand-alone project Reports are referenced as appropriate in this document using the ☞ symbol.

1.3.5 The WelTAG guidance identifies the following requirements at stage 2:

- A five cases assessment is presented for each of the short-listed options
- For each short-listed option, an assessment of the contribution to all four aspects of Wellbeing, as laid out in the Wellbeing of Future Generations Act (social, cultural, environmental and economic), included in the Multi Criteria Assessment in in the ☞**WelTAG Impacts Assessment Report** (IAR)

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- The transport case should summarise these impacts of each solution
- Supporting evidence and detail used to examine the impacts must be provided in the ☞**WelTAG Impacts Assessment Report** (IAR)

1.3.6 This A483 Wrexham WelTAG Stage 2 Report is based on the previous ☞**A483/A5 Transport Corridor Chirk to Rossett WelTAG Stage 1 Report**, which was published in October 2017. It is important to note this WelTAG Stage 2 Report has a more defined scope compared to the previous WelTAG Stage 1 Report. The key differences in scope being:

- A narrower geographical focus between Junctions 3 and Junction 6 around Wrexham
- An examination of improving capacity on the mainline A483 between these junctions
- Assessment of potential solutions around congestion on approaches to the A483 between these junctions

1.3.7 The previous WelTAG Stage 1 Report also identified other options which are outside the scope of this WelTAG Stage 2 appraisal. These included wider A483 improvements north and south of Junctions 3 to 6, a wider signing review for Wrexham, a West Wrexham sustainable transport package and a rail frequency enhancement package. Nevertheless, as required by legislation such as the Active Travel (Wales) Act 2013, measures to improve sustainable modes between J3 and J6 as part of other potential interventions will be considered.

1.4 Document status and parallel KS2 deliverables

1.4.1 It is important to stress that the WelTAG Stage 2 Report is one of a number of deliverables required as part of the KS2 process. The other reports are separate to the WelTAG Report itself but there are strong linkages and interdependencies, and these are referenced as appropriate in this document using the ☞ symbol. The key documents being (this list is not exhaustive):

- Initial Traffic and Accident Report
- Walking, Cycling and Horse-Riding Assessment Report
- Environmental Scoping Report
- Local Model Validation Report
- Forecasting Report
- Economic Assessment Report
- Stakeholder and public engagement/workshop reports
- Risk register

1.5 Report Purpose and Structure

1.5.1 This report is structured as follows:

- **Section 2 Strategic Case –** This section outlines the Case for Change. For this WelTAG Stage 2 assessment, the evidence presented at WelTAG Stage 1 has been reviewed together with any material changes that may amend the case for the change.
- **Section 3 Transport Case –** This case considers whether the Scheme will provide value for money and warrants public investment. It also assesses whether the Scheme will provide sufficient economic, environmental and social benefits.
- **Section 4 Management Case** – This section examines whether the Scheme is deliverable. The case outlines the proposed governance structure, stakeholder engagement, strategies for managing risk and the proposed evaluation of the Scheme to ensure its full benefits are realised.

- **Section 5 Financial Case** – This case assesses whether the Scheme is affordable. At WelTAG Stage 2, the assessment is largely high level with an indication of potential capital and lifetime costs. The case also considers some of the potential financial risks associated with the Scheme.
- **Section 6 Commercial Case** –The final case sets out whether the Scheme can be procured and the procurement risks managed.
- **Section 7 Conclusions and Recommendations** – This final section brings together the assessment and identifies the preferred option together with the reasons for that option.

1.5.2 Throughout this Report, supporting evidence and assessment that underpins the WelTAG analysis is contained within the ☞**WelTAG Impacts Assessment Report** (IAR).

2 Strategic Case

2.1 Overview

The aim of the Strategic Case is to demonstrate the case for change. For this WelTAG Stage 2 appraisal, the evidence presented at WelTAG Stage 1 has been reviewed together with any material changes that may amend the case for change. At the same time, there is a need to reassess the Scheme objectives, and refine any option development and assessment that has been previously undertaken.

2.2 Evidence base

2.2.1 The Strategic Case to date has been put together from a wide range of evidence sources which have included:

- Wrexham's Local Development Plan 2013-2028 Preferred Strategy Consultation document
- Economic development strategies, such as the 'Moving Wales Forward' vision for North Wales prepared by Welsh Government in 2017, and the Dee Region Cross-Border Economy (including Mersey Dee Alliance) next steps review
- Transport strategies and plans, including Wrexham Connected, the North Wales Local Transport Plan 2015, and the Growth Track 360 rail strategy
- Studies that have been undertaken into specific transport issues and schemes, including the Wrexham Strategic Road Network Capacity and Improvement Study (March 2016) and the Wrexham Transport Accessibility Study (2009)
- Census 2011 journey to workflow and mode share data
- Road accident data for the A483 between 2013 and 2017
- Traffic count data held by NMWTRA and the Department for Transport
- Online journey planning and traffic congestion data

2.2.2 In addition to the above, other sources have been examined including:

- 2018 Count data collected for the A483 Wrexham Strategic Transport Model
- Evidence that formed part of the Walking, Cycling and Horse-Riding Assessment Report

2.3 The Case for Change

2.3.1 At WelTAG Stage 1, the following main issues around the A483 Wrexham were identified:

- **Lack of capacity at Junctions 4 and 5 –** Junction 4 operates over capacity in both peak periods, while Junction 5 operates over capacity in the PM peak period, with operational issues associated with traffic tailing back onto the A483 from the junction off slips
- **Employment and housing developments will be reliant on the A483 –** congestion on the A483 and at the A483 junctions could hinder the viability of new housing and employment developments and further reduce connectivity to the east and west for the villages that are amongst the most deprived areas in Wales
- **Potential for trips to reassign between A483 junctions due to congestion -** with increased ‘junction hopping’ which will reduce the ability of the A483 to cater for longer distance movements

2.3.2 Also, as part of WelTAG Stage 1, other pertinent issues were identified:

- **Economic and social –** It was noted that there were high levels of deprivation and the relatively poor level of access to/from the A483 were a concern
- **Strategic traffic –** In addition to its role within Wrexham itself, the A483 has a wider function as a strategic route for long distance journeys
- **Local traffic –** Impacts on the operation of the local highway network with bottlenecks leading to the A483 within congested peak periods
- **Public transport –** Public transport alternatives are relatively poor with infrequent bus services with long journey times for short distances
- **Active modes –** The immediate area around the corridor has a fragmented cycling network with poor pedestrian crossings particularly across the A483

2.4 Material changes to the Case for Change

2.4.1 As part of this WelTAG Stage 2 Report, a review of the issues and the case for change has been undertaken. The full detail of this assessment is provided in the ☞**Review of the Case for Change Technical Note** and the ☞**Baseline Review Technical Note** in the **Impacts Assessment Report**.

2.4.2 This analysis indicated there have been several changes to the baseline situation since the WelTAG Stage 1 Report which was produced in 2017. However, the assessment concluded that the changes **do not** represent a material change and that **the need for the intervention remains.** The changes are summarised in Table 1.

Table 1: Material change to the Case for Change

Change	Description	Assessment of impact
North Wales Growth Deal	Announced in 2018, this Deal received £120 million from the UK government matched by a further £120 million from the Welsh Government. The investment is expected to bring in over £500 million of private sector investment into the region.	The Growth Deal supports the ambitions for economic growth in Wrexham and the rest of North Wales. It heightens the need for access to development areas in Wrexham and for an effective strategic road network serving the wider region.
Enhancements to local rail services	Under the new Wales and Borders Operator and Developer Partner (ODP) which commenced services from October 2018, a series of improvements to local rail services are planned. These include: • Increase in frequency of services on the Wrexham to Bidston line to 2 trains per hour • Increase of Marches line services to 1 train per hour, including a direct link to Liverpool every two hours	While the new rail services will have a beneficial impact on improving accessibility to and from Wrexham, the improvements are unlikely to substantially change the need for the Scheme. It is likely that there will be an increase in the use of sustainable modes. This is unlikely to offset the general growth in trip generation.
New railway stations at Wrexham North and Wrexham South	As part of plans to expand the Welsh rail network, new stations north and south of the town have been proposed. Both stations are still in development with neither at approval stage.	No significant impact. No indication, as of December 2019, if the stations are to be progressed.
Air quality	In June 2018, the Welsh Government temporarily reduced the speed limit on the A843 between Junction 5 and Junction	Since the WelTAG Stage 1 Report, concerns around air quality have become stronger and this was reflected in the

	6 from 70mph to 50mph in order to reduce nitrogen dioxide (NO_2) emissions which had exceeded limits set out in an EU Directive. This speed reduction was made permanent in August 2019	speed limit traffic orders. Given these measures, the need for air quality improvement has strengthened the need for the Scheme.
Chester Western Relief Road	Although outside the immediate study area, the Chester Western Relief Scheme aims to improve access in and around Chester, including north / south links. The Scheme is at an early stage of development as of December 2019	Given the location is outside the Scheme area and is designed to address some of the transport issues in and around Chester, it is unlikely to materially affect the need for the A483 Scheme.
Expansion of Moneypenny call centre, Western Gateway Wrexham	Proposed 5,591 sq. m expansion of existing office complex which is likely to create an additional 700 jobs as well as new access arrangements	Trips generated by this development and other developments have been modelled as part of the Scheme development

Source: Mott MacDonald

2.4.3 In addition to these material changes to the case for change, there has been an increased emphasis to the need to support the Wrexham County Borough Council Local Development Plan and associated economic growth.

2.5 Baseline contexts

Highway context

2.5.1 The geographical extent of this WelTAG Stage 2 assessment was presented in Figure 1.

2.5.2 The A483 trunk road links Swansea to Chester, forming one of the connecting routes between North and South Wales. It also provides access into North Wales from the Midlands and has an important role for trips within England, connecting Hereford/Shrewsbury to Chester. It is managed by NMWTRA on behalf of Welsh Government. Between Ruabon and Chester Business Park, just north of the junction with the A5, the A483 is a two-lane dual carriageway with grade separated junctions.

2.5.3 The A483 passes to the west of Wrexham town, serving as a bypass. Junctions 3, 4, 5 and 6 each connect the A483 to one of the radial routes into Wrexham. Junction 6 also connects to the A5156, towards Wrexham Industrial Estate.

2.5.4 Junction 3 is a four-arm grade separated roundabout at the southern extent of Wrexham. No arms are signalised. The A483 slip roads form the major arms. To the south-west the B5605 Wrexham Road connects to Pentre Bychan and onto other villages. The A5152 to the north-east serves the village of Rhostyllen and continues into the centre of Wrexham.

2.5.5 Junction 4 is a four-arm grade separated signal-controlled junction connecting the A483 and the A525 Ruthin Road. The A525 is a major route into Wrexham.

2.5.6 Junction 5 is a grade separated five-arm roundabout which is partially signalised. The signalised arms are the A483 northbound and southbound off-slips and the A541 Mold Road southbound approach. The A541 Mold Road eastbound is a major route into Wrexham towards the town centre. Immediately to the east of Junction 5 on the A541 is the four-arm Berse Road (Plas Coch) roundabout. The A541 Mold Road to the north west, the first kilometre of which is dualled, leads to the village of Gwersyllt. The final arm is Summerhill Road, a minor road that serves several villages.

2.5.7 Junction 6 is a seven-arm, graded separated roundabout. It is partially signalised with signals on the A483 off-slips, the A5156 and A5152 Chester Road. Junction 6 is at the northern extent of Wrexham, joining the A483 to the eastbound A5156, which carries traffic towards the Wrexham Industrial Estate. The minor arms on the eastern side include the A5152 Chester Road, which travels south through Wrexham to the town centre and the B5445 to Gresford. Minor arms on the west are Blue Bell Lane, to the village of Pandy, and access to an industrial estate.

2.5.8 Within the vicinity of the A483, there are a number of important links that form part of the local highway network. Some of these highways perform a wider strategic function in addition to being principal local roads connecting major settlements. These include:

- A5156: Towards Wrexham Industrial Estate. Meets the A483 at Junction 6.
- A5152: The main radial route into Wrexham from the north. Meets the A483 at Junction 6.
- A451: A main radial route into Wrexham. To the west the A451 is dualled as far as Gwersyllt. Crosses the A463 at Junction 5.
- A525: A main east-west link and radial route into Wrexham. Crosses the A483 at Junction 4.
- A5152: A main radial route into Wrexham from the southwest.

2.5.9 The ☛**Initial Traffic and Accident Report** provides an assessment of existing traffic flows and collision data. The main features being:

- An increase in Annual Average Daily Traffic (AADT) flows by 15% between 2013 and 2017, with a steady annual increase of approximately 2%-3%.
- Higher flows during the summer months and lower flows during the winter months.
- Distinct AM and PM commuting peaks in both the northbound and southbound direction along the A483, at 07:00-08:00 and 17:00-18:00.
- There were 111 personal injury collisions within the area of interest along the A483 between 2013 and 2017. The number of collisions increased from 2013 to 2014, before a notable decline to 2017, which mirrors the general trend across the county.

Public Transport context

2.5.10 Bus and rail service provision and use in the Scheme area are discussed in detail in the ☛**WelTAG Baseline Review Technical Note** in the **Impacts Assessment Report.**

2.5.11 Wrexham is served by two rail lines. The Marches line between Shrewsbury and Chester follows a similar route to the A483, with stations at Chirk, Ruabon and Wrexham General. Wrexham General station sees an hourly train service operating between Chester and Shrewsbury, extending every other hour to Holyhead in the North and Birmingham, or Llanelli via Newport and Cardiff to the South. There are 19 services in each direction on weekdays.

2.5.12 North from Wrexham, the Borderlands Line runs through the valleys of North East Wales, passes over the River Dee and then continues north towards Bidston where commuters can change to join the Merseyrail service to Liverpool. Stations at Wrexham Central, Gwersyllt, and Wrexham General lie on this line.

2.5.13 The main bus operator in Wrexham is Arriva, with some services operated by other companies. On weekdays there are approximately six services per hour to Chester. Twenty buses per weekday were identified as travelling on the A483. Several others cross the A483 at Junctions 3, 5 and 6. Bus services currently do not use Junction 4. Bus use is higher in Wrexham than rail.

Active travel context

2.5.14 A detailed review of walking and cycling is provided in the ☞**WelTAG Baseline Review Technical Note** in the **Impacts Assessment Report.** The key findings of cycle travel in Wrexham are:

- There are no national cycle network routes in Wrexham town or the A483 corridor
- Cycling accounts for a very small proportion of travel to work journeys (1.4% in 2011)
- In Wrexham in 2017-2018, 10% of people cycled more often than once a month, slightly above the Wales national average of 9%
- Of those who cycle to work, the largest flows occur within, to and from, east of Wrexham town centre
- Under the governments cycle strategy growth scenario, cycling could grow considerably on Wrexham's radial corridors, some of which extend beyond the A483 Junctions 3, 4 and 6
- A483 Junction 6 has a shared use path allowing cyclists to cross it. Junctions 3, 4 and 5 currently have no provision for cyclists.

2.5.15 For walking, the key findings are:

- 9.2% of people in Wrexham travel to work on foot. This is lower than the Wales average (11.3%) and Chester and Cheshire West (10.7%)
- There are no pedestrian facilities on the A483 mainline
- A483 Junctions 3, 4 and 5 have basic footways allowing pedestrians to cross the junction. Junction 6 has a shared use path with signalised crossing points where appropriate.

National and local policies and strategies

2.5.16 The Transport (Wales) Act 2006 placed a statutory obligation to prepare a Wales wide Transport Strategy. The **Wales Transport Strategy 2008** sets out the overarching ambition to improve connectivity within Wales and internationally, enable access to employment and services, improve the efficiency and reliability of freight movements and ensure the reliability and safety of travel. It also aims to reduce the environmental impact of transport. As a major north-south A road the A483 is an important contributor to all of these outcomes as part of the Strategic Trunk Road Network in Wales.

2.5.17 The **North Wales Joint Local Transport Plan 2015** (NWJLTP) provides a vision for the six North Wales Local Authority areas "to remove barriers to economic growth, prosperity and Wellbeing by delivering safe, sustainable, affordable and effective transport networks". It applies the national transport policies in addressing five key local needs:

- The strategic trunk road and rail corridors to provide good connectivity, for people and freight, within North Wales, to the ports and to the rest of the UK
- Resilience of road and rail networks
- Good access to and between the three Enterprise Zones in North Wales
- Good road links to / from the trunk road network into the rural areas
- Viable and affordable alternatives to the car to access key employment sites and other services

The NWJLTP identifies the following as regional priority projects:

- Improving the A55/A483 Trunk Road Highway Network
- A483/A525 Junction Capacity Improvements.

2.5.18 Under the overarching Wales Transport Strategy (2008) the National Transport Finance Plan (2017) outlined the process of delivering solutions to transport issues along the main movement corridors in Wales. This envisaged the development of the most appropriate modal solutions in ways that are linked to Local Development Plans (LDPs) and delivering transport at a local and regional level.

2.5.19 The improvement of the A483 around Wrexham, between Junctions 4 and 5, has been identified as a priority in the Welsh Government's 'Moving North Wales Forward' which was published in 2017. This targeted improvement aims to tackle the pinch points around Wrexham and improve capacity at Junctions 3 to 6.

2.5.20 The priority to improve the capacity of the A483 junctions around Wrexham and help unlock Wrexham's economic potential has been reinforced by a commitment by the Minister for Economy and Transport to progress works.

Emerging policy and strategy

2.5.21 The **Draft National Development Framework 2020-2040** (NDF) sets the direction for development in Wales from 2020 to 2040, providing a foundation for the development of regional and local plans. Proposals for the Wrexham area, in conjunction with neighbouring Deeside, include the focus for strategic housing and economic growth, essential services and facilities, advanced manufacturing, transport and digital infrastructure.

2.5.22 In line with the Transport (Wales) Act 2006, the **Wales Transport Strategy**, as of December 2019, is in the process of being updated. The Strategy is likely to embed the Principles for Public Transport Connectivity which were published in September 2019. These include:

- Classification of Wrexham General as a principal Interchange station
- Minimum of two trains per hour to Liverpool and Manchester (airport) from Wrexham
- Minimum of two trains per hour to HS2 hubs and Birmingham Airport
- Journey times between the North Wales principal Interchange stations of Wrexham General and Llandudno Junction to be less than 60 minutes

2.5.23 The **Wrexham County Borough Council Local Development Plan 2 (LDP2) 2013-2028** was produced in 2016, but has not yet been adopted. The deposit plan identifies the key social, economic, cultural and environmental issues within the local authority area, including capacity constraints along the A483 and a desire for significant residential and employment development in Wrexham Town.

2.6 Problems, constraints and dependencies

The problems identified at WelTAG Stage 1 have been reviewed and brought forward to WelTAG Stage 2. The ☞**WelTAG Stage 2: Changes to the Case for Change evidence base Technical Note** in the **Impacts Assessment Report** outlines this process. The problems presented are summarised in Table 2.

Table 2: Problems Identified

Theme	Issue
Economic	High levels of deprivation and lack of access throughout the corridor
	Employment and housing developments reliant upon road improvements
	LDP plans for 7,750 homes over the next 10 years
	New and proposed employment developments will put pressure on the A483 / A5 corridor
	Congestion constraining economic performance

	Key freight and tourist route into North Wales and Chester
Local Traffic	A451/Mold Road - congestion near junction 5
	Plas Coch/Berse Road - congestion near junction 5
	A525 Ruthin Road – congestion
	'Junction hopping'
	Condensed peak periods
	Accident cluster sites
	Bottlenecks and severance caused by A483
	Congestion on A5152 to the west of Wrexham town centre
Strategic Traffic	A483 as a key regional route for commuters and businesses
	A483 as a strategic route for long distance journeys
	Observed and predicted traffic flow increases on A483
Active Modes	Fragmented cycling network
	Limited pedestrian and cycling crossing facilities over the A483, rail line and A5152
	Unsafe and inhospitable pedestrian environments surrounding major roadways. Accident clusters
Public Transport	Infrequent bus service and unserved areas
	Limited bus service routes
	Limited market options for bus service tenders
	High car mode share
	Slow and indirect longer-distance bus journeys
	Infrequent train services and limited number of stations
	Limited operational period for station facilities

Source: Mott MacDonald

2.7 Scheme objectives

2.7.1 Although Scheme objectives had been developed (and confirmed following appropriate stakeholder consultation) for the WelTAG Stage 1 Appraisal, there was a need to review and update these in light of the revised scope for WelTAG Stage 2. The major changes in scope revolved around a smaller geographical area between junction 3 and junction 6 on the A483 and the stronger highway focus of the Scheme.

2.7.2 As outlined in the ☞**WelTAG Stage 2 – Setting Objectives Technical Note** in the **Impacts Assessment Report**, the following approach was undertaken:

- Review of WelTAG Stage 1 objectives to check continued relevance for WelTAG Stage 2
- Mapping of the Highway Objectives (see below) to the WelTAG Stage 1 objectives to identify whether additional objectives are required for Stage 2.
- Development of WelTAG Stage 2 objectives

As part of KS2, objectives have been identified for the highway improvement. These were established in conjunction with Welsh Government, NMWTRA and Wrexham CBC. One key difference is that the highway objectives were set around 'themes' as detailed in Table 3.

Table 3: KS2 Highway Objectives

Theme	Issue
Communication	Improve real time information to drivers
	Coherent routing to manage traffic demand
Buildability & Maintenance	Effectively manage assets to reduce maintenance cost (whole life cost) and disruption
	Minimise disruption to existing traffic during construction

Transport Conditions | Reliability & Resilience	Reduce delays on all trunk road approaches to junctions
	Reduce delays on all county road approaches to junctions
	Improve resilience and journey time reliability
	Improve east-west connectivity across A483 corridor
Safety	No adverse impact on safety (personal injury collisions)
	Reduce level of incidents and associated delays
Environment	No adverse impacts on sensitive receptors during operation
	Contribute towards improving air quality between Junctions 5 and 6 in accordance with the air quality directive requirements (NO_2)
Sustainable Travel (& Future Proofing)	Support public transport and Active Travel provision to reduce high car modal use
Planning | Economy (Future Proofing)	Address pinch points to accommodate existing and forecast growth
	Meet the LDP and economic development aspirations of Wrexham

Source: Mott MacDonald

Table 4: Mapping of Highway Objectives to WelTAG Stage 2 Objectives

WelTAG Stage 1 Objective	Highway Theme and Objective	Conclusion	WelTAG Stage 2 Objective
Tier 1: Support and enable the LDP growth aspirations of Wrexham	Planning / Economy: Address pinch points to accommodate existing and forecast growth	Retain as WelTAG Stage 2 Objective	Tier 1: Support and enable the LDP growth aspirations of Wrexham
	Planning / Economy: Meet the LDP and economic development aspirations of Wrexham		
Tier 1: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	Communication: Improve real time information to drivers	Retain as WelTAG Stage 2 Objective	Tier 1: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability
	Communication: Coherent routing to manage traffic demand		
	Transport conditions: Reduce delays on all trunk road approaches to junctions		
	Transport conditions: Improve resilience and journey time reliability		
Tier 2: Reduce the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	Sustainable Travel: Support public transport and Active Travel provision to reduce high car modal use	Retain as WelTAG Stage 2 Objective	Tier 2: Contribute to the reduction of the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions
Tier 2: Ensure that the A483 is effective in serving local movements	Transport conditions: Reduce delays on all county road approaches to junctions	Retain as WelTAG Stage 2 Objective	Tier 2: Ensure that the A483 is effective in serving local movements
Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	Transport conditions: Improve east-west connectivity across A483 corridor	Retain as WelTAG Stage 2 Objective	Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor
Design objective: Provide safe and convenient access for active modes at all new developments along the corridor		Covered by the Option long list	
Design objective: Future proof the transport network for increased demand		Retain as a Design Objective	Design objective: Future proof the transport network for increased demand
Design objective: Future proof the transport network with regard to maintenance liabilities	Buildability & maintenance: Effectively manage assets to reduce maintenance cost (whole life cost) and disruption	Develop as a Design Objective on Future proofing for maintenance	Design objective: Future proofing of design to minimise whole life cost and disruption of future maintenance

-	Buildability & maintenance: Minimise disruption to existing traffic during construction	Develop objective on minimising disruption during construction	Tier 2: Minimise disruption during construction.
-	Safety: No adverse impact on safety (personal injury collisions)	Develop objective on Safety	Tier 2: Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents
	Safety: Reduce level of incidents and associated delays	Resilience covered by Tier 1 Objective	
	Environment: No adverse impacts on sensitive receptors during construction	Develop an objective covering air quality and noise impact	Tier 1: Improve air quality and noise impact along A483 between Junctions 5 and 6.
	Environment: Contribute towards improving air quality between Jnc 5 and 6 in accordance with the air quality directive requirements (NO2)		

Source: Mott MacDonald

2.7.3 From this process, three sets of Scheme objectives have been set as follows:

- **Tier 1 –** these are the regional objectives which represent the fundamental reason for the Scheme. Any option that does not contribute towards these objectives will either be refined or rejected. Objectives originally set in WelTAG Stage 1 study.
- **Tier 2 –** these cover other important considerations that options ideally need to contribute to. Options that don't contribute to these objectives will be refined if possible. The poorest performing options will be rejected. Objectives originally set in WelTAG Stage 1 study.
- **Design objectives –** these objectives specifically cover design considerations that options will need to address

Table 5: WelTAG Stage 2 Objectives

WelTAG Stage 2 Objective	Additional detail
Tier 1: Support and enable the LDP growth aspirations of Wrexham	Planning / Economy: Address pinch points to accommodate existing and forecast growth
	Planning / Economy: Meet the LDP and economic development aspirations of Wrexham
	Future proof the transport network for increased demand
Tier 1: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	Communication: Improve real time information to drivers
	Communication: Coherent routing to manage traffic demand
	Transport conditions: Reduce delays on all trunk road approaches to junctions
	Transport conditions: Improve resilience and journey time reliability
Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	Environment: No adverse impacts on sensitive receptors during construction
	Environment: Contribute towards improving air quality between junction 5 and junction 6 in accordance with the air quality directive requirements (NO_2)
Tier 2: Contribute to the reduction of the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	Sustainable Travel: Support public transport and Active Travel provision to reduce high car modal use
Tier 2: Ensure that the A483 is effective in serving local movements	Transport conditions: Reduce delays on all county road approaches to junctions
Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	Transport conditions: Improve east-west connectivity across A483 corridor
Tier 2: Minimise disruption during construction.	
Tier 2: Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents	Safety: No adverse impact on safety (personal injury collisions)
	Safety: Reduce level of incidents and associated delays
Design objective: Future proof the transport network for increased demand	
Design objective: Future proofing of design to minimise whole life cost and disruption of future maintenance	

Source: Mott MacDonald

2.7.4 The LDP growth aspirations of Wrexham have been determined through the Community Involvement Scheme (CIS) as directed by the Welsh Government's Planning Directorate and through which an agreed Delivery Agreement (DA) has been entered into by WG and Wrexham. These aspirations are determined though the LDP process and are rigorously tested under Public Examination using defined 'Soundness' Tests, including delivery of associated

developments. The Public Examination of the Deposit LDP has been ongoing since September 2019 and is scheduled for Adoption in 2020.

2.8 Wellbeing and sustainable development principle

2.8.1 In addition to the above, there is a statutory requirement to show that new schemes take account of the Wellbeing of Future Generations Act (2015) and demonstrate the application of the sustainable development principle. As part of this an assessment, which is detailed in the ☞**Sustainable Development Report** in the **Impacts Assessment Report,** these have been assessed utilising a bespoke spreadsheet tool called WELLIE (Wellbeing Impact Evaluation). The assessment included an analysis of the objectives against the Wellbeing Goals and these are summarised in Table 6. This indicated that the Scheme is likely to have the greatest positive impact against the Prosperous and Cohesive goals, with lower impacts against Equal, Cultural and Language and Global.

Table 6: Assessment of the objectives against the Wellbeing goals

Wellbeing Goal	Relevant Scheme Objectives	Contribution towards the goal	Commentary
Prosperous *A productive and low carbon society, which generates wealth and employment opportunities*	Tier 1: Support and enable the LDP growth aspirations of Wrexham	✓✓	Improves prosperity through creation of new jobs and housing
	Tier 2: Minimise disruption during construction.	✓	Ensures existing economic activity is not adversely impacted by construction works
Resilient *Maintains and enhances natural environment that supports social, economic and ecological resilience*	Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	✓	Improve air quality through the increased free flow of traffic
	Tier 2: Minimise disruption during construction.	✓	Reduce the adverse environmental impacts associated with construction works
Healthier *People's physical and mental Wellbeing is maximised*	Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	✓	Improve air quality through the increased free flow of traffic
	Tier 2: Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents	✓	Better layout designs for all types of users should reduce the risks around accidents
More Equal *Society that enables people to fulfil their potential no matter what their background or*	Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	✓	Beneficial improvements arising from improved connectivity and accessibility

Wellbeing Goal	Relevant Scheme Objectives	Contribution towards the goal	Commentary
circumstances			
Cohesive Communities *Attractive, viable, safe and well-connected communities*	Tier 1: Support and enable the LDP growth aspirations of Wrexham	✓	Improved levels of economic activity should underpin viable communities
	Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	✓	Benefits to attractive and safe communities arising from improved air quality
	Tier 2: Contribute to the reduction of the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	✓	Improvements to communities from better connectivity
	Tier 2: Ensure that the A483 is effective in serving local movements	✓	Improvements to communities from better accessibility and connectivity
	Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	✓	Improvements to communities from better accessibility and connectivity
	Tier 2: Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents	✓	Better layout designs for all types of users should reduce the risks around accidents
Culture and language *Promotes and protects culture, heritage and the Welsh Language*	Tier 1: Support and enable the LDP growth aspirations of Wrexham	✓	Marginal improvements in that the LDP also include aspirations around strengthening cultural and heritage provision
Global *The contribution Wales can make to global Wellbeing*	Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	✓	Marginal improvements arising from improved free flow of traffic

Source: Mott MacDonald

2.8.2 In applying the Sustainable Development principle, there is also a need to demonstrate the Five Ways of Working: Long term, prevention, integration, collaboration and involvement. This can be applied in many ways including by the demonstration of the project team in the delivery of the Scheme. The ☛ **Sustainable Development Report** in the **Impacts Assessment Report** provides an overview of the likely approach.

2.9 Measures for success

2.9.1 Building upon the above, a number of impact areas have been identified and are outlined in the ☛ **Sustainable Development Report** in the **Impacts Assessment Report.** The impact areas provide the basis for the measure of the success of the Scheme and form the basis for the

Benefits Realisation Plan which is normally developed at WelTAG Stage 3 as the preferred option is refined and confirmed.

2.9.2 Nevertheless, at WelTAG Stage 2 there is a need to identify what the objectives seek to achieve**.** Table 7 provides an outline of the potential measures for success. The measures themselves fall into two main categories:

- Direct measures which can be directly attributed to the scheme's potential impact
- Indirect, where the scheme is likely to make a positive contribution, but other factors may be more significant (e.g. state of the macro economy)

Table 7: Measures for success

WelTAG Stage 2 Objective	What are we trying to achieve?	Direct and/or indirect measure
Tier 1: Support and enable the LDP growth aspirations of Wrexham	Help unlock economic development aspirations	Indirect: Uplift in land values, employment levels and housing completions
Tier 1: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	Reduce recurring congestion and incidents	Direct: Reduction in the variation in peak journey times
Tier 1: Improve air quality and noise impact along A483 between Junctions 3 and 6.	Reduce adverse air quality and noise impacts from the A483	Direct: Nitrogen Oxides and Particulate emission reporting Direct: Change in dBA and identified receptors
Tier 2: Contribute to the reduction of the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	Reduce the number of short distance trips within Wrexham that use the A483	Indirect: Change in modal split for short distance journeys
Tier 2: Ensure that the A483 is effective in serving local movements	Ensure the Scheme brings benefits to the operation and efficiency of local transport networks	Direct: Journey times on the local highway network Indirect: Modal split of journeys to work
Tier 2: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	Reduce the severance impacts of the A483 corridor	Direct: Journey times across the A483 corridor (all modes)
Tier 2: Minimise disruption during construction.	Reduce the extent of delays and diversions during construction works	Direct: Journey times during construction works (all modes)
Tier 2: Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents	Reduce the level of collisions	Direct: Collision data and severity

Source: Mott MacDonald

2.10 Identification of Scheme environmental objectives

As part of the Scheme development, environmental objectives have been set, as presented in Table 8. The process and detail of these objectives are outlined in the ☞**Environmental Scoping Report**.

Table 8: Environmental objectives

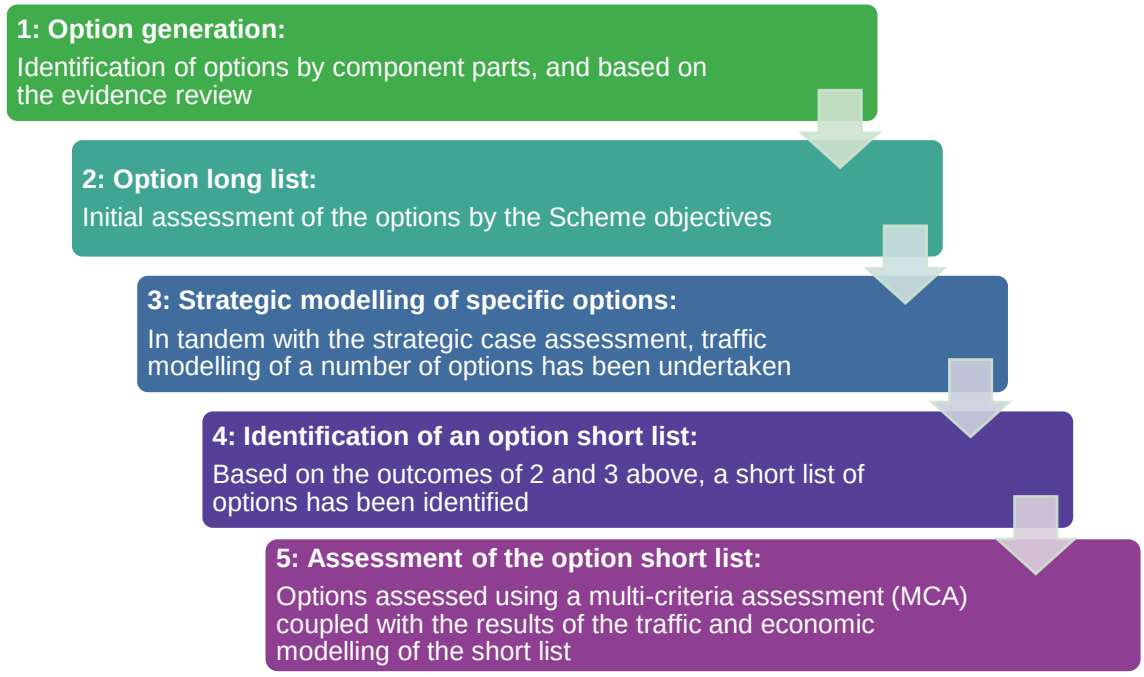
Environmental objectives
Contribute to reduction in greenhouse gas emissions from transport
Improve attenuation of peak run-off discharges to watercourses
Minimise exposure to traffic noise and air pollutants
Minimise loss and enhance potential for biodiversity
Enhance the highway corridor landscape for residents and highway users
Protect heritage and cultural assets
No adverse impacts on sensitive receptors during construction / operation

Source: RML

2.11 Option development and assessment process

2.11.1 In identifying and appraising the options, the following process in Figure 2 has been used. This process is aligned with the WelTAG guidance, but for this particular WelTAG Stage 2 Report the option development has been further informed by traffic modelling using the A483 Wrexham Strategic Model. The rationale for this approach is that an individual assessment of the impacts at representative locations would be more efficient, and less cumbersome and lengthy to assess. Details of this model, and its scope, can be found in the parallel ☞**A483 Wrexham Local Model Validation Report (LMVR).**

Figure 2: Option development and assessment process



Source: Mott MacDonald

2.12 Option generation

2.12.1 For both clarity and the ease of assessment, the options were broken down into component parts rather than packaged up at this stage. A total of 56 options were initially identified. It was apparent early on in the process that the long list of options could be 'themed' into broad groups as shown in Figure 3.

2.12.2 The main themes revolved around improvements to each of the junctions, upgrades to the 'mainline' A483, other changes (which are generally more modest such as improved signage) and other options that principally revolve around reducing the level of traffic on the A483.

2.12.3 Further detail of each option including the description and the elements that are incorporated into each are outlined in the ☞**A483 Wrexham Multi-Criteria Assessment** document in the **Impacts Assessment Report.**

Figure 3: Long list of option 'Themes'

Theme/group	• Main elements of the options
Junction 4 (17 options)	• Full/partial conversion to a roundabout • A new link road • Creation of a segregated gyratory • Partial closure of slip roads
Junction 5 (13 options)	• Signalisation • Reduction in arms • Additional lanes • Partial closure of slip roads
Junction 6 (8 options)	• Reduction of arms • Additional lanes • New segregated arrangement
Junction 3 (3 options)	• Minor capacity enhancement
Mainline (6 options)	• Additional lanes • Offline replacement
Other (5 options)	• Improved signing • Speed limits • Additional provision for active modes
Reduce traffic on the A483 (4 options)	• Improvements to radial routes • Improvements to inner by-pass • New local link roads

Source: Mott MacDonald

2.13 Option sifting

2.13.1 The first part of the sifting exercise was to assess the long list of options against the objectives. The scoring system as set out in WelTAG 2017 was used to assess the options against the objectives. The scoring is summarised in Table 9.

Table 9: WelTAG Stage 2 Objectives

Score	
+3	Large beneficial impact
+2	Moderate beneficial impact
+1	Slight beneficial impact
0	Neutral/no impact
-1	Slight adverse impact
-2	Moderate adverse impact
-3	Large adverse impact

Source: Mott MacDonald

2.13.2 The ☞**A483 Wrexham Multi-Criteria Assessment** document in the **Impacts Assessment Report** outlines the assessment of the long list of options against the objectives. The main outcomes of the assessment are:

- Options that **improve capacity at Junctions 4, 5 and 6** perform better
- Unsurprisingly those that involve a **significant change / reconfiguration to the layout** perform more strongly
- Changes to **Junction 3 have little impact**
- Changes to the **A483 mainline have limited impact**
- Reducing traffic on the A483 has disbenefits, **reassigning traffic onto local roads**
- **Other options also have limitations** in that they need to be packaged up with other options to be truly effective

2.13.3 As part of the initial long list option sifting exercise, some testing of options using the A483 Wrexham Strategic Model was undertaken. The rationale behind this approach was to further understand the potential impacts arising from the complexity of different options at different locations. The options that were tested in the traffic model included:

Junction 4

All the traffic modelling options were off-line and included variations of keeping the A525 open to all traffic or closed to some modes:

- Option J4-2: Offline roundabout with A525 open (Known as Test 1)
- Option J4-14: Offline roundabout with A525 closed (Test 2)
- Option J4-15: Offline dumbbell roundabout with A525 open (Test 3)
- Option J4-16: Offline dumbbell roundabout with A525 closed (Test 4)
- Option J4-17: Minor improvements with some dedicated left slips (Test 5)

Junction 5

The traffic modelling options tested for Junction 5 all had online improvements:

- Option J5-11: Improved Junction 5 with Summerhill Road realigned (Test 6)
- Option J5-13: Improved Junction 5 with Summerhill Road open (Test 7)
- Option J5-12: Plas Coch roundabout replaced by a traffic signal-controlled crossroads with Summerhill Road realigned (Test 8)

Junction 6

The traffic modelling options tested at Junction 6 were one involving on-line improvements and two others consisted of an offline improvement:

- J6-3: Online improvements with some dedicated left-slips (Test 9)
- J6-7: Offline improvement (flyover) (Test 10)
- J6-8: Offline improvement (through-about) (Test 11)

Junction 3

The traffic modelling option tested at Junction 3 was involved minor on-line improvements J3-3 and was included in Tests 9 to 11.

Other traffic modelling route options

Other traffic modelling route options tested included:

- Speed limit adjustments between Junctions 3 and 6 (Tests 12 to 14)
- Three lanes on the A483 mainline between Junctions 3 and (Test 15)
- Lane gain/lane drop between each junction on the A483 mainline between Junctions 3 and 6. Two lanes running through each of the junctions (Test 16)

2.13.4 Full details of the options tested, including relevant option drawings, are outlined in the ☛**Modelling Option Test Order and Decision Points Technical Note** in the **Impacts Assessment Report.**

2.14 Identification of the short list of options

2.14.1 The combination of the assessment against the objectives and the traffic modelling has identified the following options as better performing:

2.14.2 **Junction 3:**

- Option J3-3: Additional flare lane on B5605 approach to roundabout.
- There is scope for some further option refinement for enhancements to be made to Active Travel Routes.

Rationale:

- No major changes required to Junction 3 although an additional flared lane would improve the operation of the junction in the longer term

Junction 4:

- Options J4-2, J4-14, J4-15, J4-16: J4-2 is the better performing of these four options, however the other options also work.
- There is scope for some further option refinement for enhancements to be made to Active Travel Routes.

Rationale:

- Keeping the existing A525 open to all vehicles provides capacity relief at Junctions 3 and 5 (plus Berse Road)
- The offline proposals will provide better junction capacity future proofing in 2037
- The offline proposals will cause the least impact on the mainline during construction
- There are no environmental show-stoppers
- Road safety benefits will be realised with the offline proposals
- Non-Motorised Users will be better served with A525 remaining open to local traffic (personal security)
- Public Transport options are able to be delivered with the A525 remaining open to local traffic

Junction 5:

- Option J5-11: Improved Junction 5 will Summerhill Road realigned (Test 6)
- There is a need for some further option refinement particularly around Non-Motorised User provision which have been identified as a separate option J5-1.
- There is also scope for some further additional option refinement to enable enhancements to be made to Active Travel Routes adjacent to Junction 5.

Rationale:

- Improvements with Summerhill Road realigned will provide better junction capacity future proofing in 2037
- Realignment of Summerhill Road provides for a development junction on Mold Road at Stansty Fields
- No environmental show-stoppers
- Road Safety is slightly enhanced as some vehicular conflicts are removed
- Non-Motorised Users better served with Summerhill Road realigned and would be considered remotely from the junction to better replicate desire lines
- Public Transport provision is not specifically enhanced

Junction 6:

- J6-3: Online improvements with some dedicated left-slips (Test 9)
- There is scope for some further option refinement for enhancements to be made to Active Travel Routes.

Rationale:

- In 2037 the at-grade improvements operate sufficiently well without queueing back onto the A483
- In 2037 small queues on the A5156 (accommodated within the local highway network)
- No environmental show-stoppers
- Road Safety slightly enhanced as some vehicular conflicts are removed. Those remaining will be improved by the provision of additional carriageway space for weaving
- Non-Motorised User measures would be considered remotely from the junctions to better replicate desire lines
- Public Transport provision is not specifically enhanced

2.14.3 Based on the above, the following short-list of options have been identified:

- **Option A:** Junction 3, 5 and 6 enhancements with J4 gyratory roundabout and A525 open to all traffic
- **Option B:** Junction 3, 5 and 6 enhancements with J4 gyratory roundabout and A525 open to buses and pedestrians/cyclists only
- **Option C:** Junction 3, 5 and 6 enhancements with J4 dumbbell and A525 open to all traffic
- **Option D:** Junction 3, 5 and 6 enhancements with J4 dumbbell and A525 open to buses and pedestrians/cyclists only

All these options can be constructed in phases and will include, where possible, enhancements to Active Travel Routes.

2.14.4 Table 10 provides a summary of the component parts of the options. For greater definition including drawings of the shortlisted options, please refer to the ☛**A483 Wrexham Short List of Options Definition Technical Note** in the **Impacts Assessment Report.** The definitions also include an outline of the enhancement in provision for Active Travel modes.

Table 10: Short list of options (all options include Active Travel enhancements)

	Option A	Option B	Option C	Option D
J3-3 Additional flare lane on B5605 approach	✓	✓	✓	✓
J4-2 Gyratory roundabout to south, A525 open to all traffic	✓			
J4-14 Gyratory roundabout to south, A525 open to buses, pedestrians and cyclists only		✓		
J4-15 Dumbbell to south, A525 open to all traffic			✓	
J4-16 Dumbbell to south, A525 open to buses, pedestrians and cyclists only				✓
J5-11 Closure of Summerhill Road arm, dedicated filter lanes on J5, additional signalisation on J5 and Plas Coch	✓	✓	✓	✓
J6-3 Additional lane on Chester Road southbound approach and Bell Lane approach, extension to A483 southbound off-slip right turn lane	✓	✓	✓	✓

Source: Mott MacDonald

2.15 Assessment of the short list of options

2.15.1 Table 11 shows the assessment of the short list of options against the main Scheme objectives. For the assessment against the design and environmental objectives, together with the explanation for the scoring, refer to the ☞**A483 Wrexham Multi-Criteria Assessment** document in the **Impacts Assessment Report.**

2.15.2 The main conclusion of the short list assessment is that there is very little difference between the options, other than keeping the A525 open to all traffic at Junction 4 which is likely to have a positive impact on the shift towards sustainable modes.

2.16 Summary of the Strategic Case

2.16.1 This Section set out the Case for Change. The evidence review confirmed that there is no substantive change to the Case for Change as identified at WelTAG Stage 1 and the key drivers remain more or less the same. These being:

- **Lack of capacity at Junctions 4 and 5 -** Junction 4 operates over capacity in both peak periods, while Junction 5 operates over capacity in the PM peak period, affecting traffic flow along and across the corridor
- **A483 related delay and operational safety issues due to tailing back onto the A483 at peak periods is hindering the viability of new development in Wrexham –** With the knock-on impact that the town will take longer to achieve its economic potential
- **Potential for trips to reassign between A483 junctions due to congestion -** with increased 'junction hopping' it will reduce the ability of the A483 to cater for longer distance movements

In addition, there has been an increased emphasis on the **need to support** the Wrexham County Borough Council Local Development Plan and associated economic growth.

2.16.2 The need is further driven by both national strategies and a Ministerial Commitment that have identified intervention along the A483 around Wrexham as a priority.

2.16.3 Given the redefined scope for the WelTAG Stage 2, the objectives have been refreshed. These are largely carried over from WelTAG Stage 1, but additional objectives around minimising potential construction impacts and improving safety have been added.

2.16.4 A long list of options around a number of themes was developed and these were assessed against the objectives. Given the complexity of the potential interventions at different locations and understanding the longer-term impacts, a representative sample of options were modelled and tested using the A483 Wrexham Strategic Transport Model. The outcomes of this assessment indicated:

- At Junction 4, a number of new layout permutations would work, but some would be more effective, with longer-term future proofing
- The options for Junction 4 should be packaged with the better-performing options for Junctions 3, 5 and 6

Based on this a short-list of 4 ‘packaged’ options (Options A to D - outlined in Table 10) have been identified for further assessment against the 5-case model. An assessment of the short-list options against the objectives indicates no major differences, other than that the closure of the A525 at Junction 4 to general traffic which would allow for a physically segregated route. This would benefit pedestrian and cyclist movements across the A483.

Table 11: Assessment of the short list of options against objectives

Ref	Description	Support and enable the LDP growth aspirations of Wrexham	Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	Improve air quality and noise impact along A483 between Junctions 3 and 6.	Contribute to the reduction of the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	Ensure that the A483 is effective in serving local movements	Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor	Minimise disruption during construction.	Have no adverse impact on safety (personal injury accidents) and reduce the level of incidents
A	Junction enhancements with J4 gyratory roundabout and A525 open to all traffic	2	2	1	-2	2	2	-2	1
B	Junction enhancements with J4 gyratory roundabout and A525 open to buses and pedestrians/cyclists only	2	2	1	-1	2	2	-2	1
C	Junction enhancements with J4 dumbbell and A525 open to all traffic	2	2	1	-2	2	2	-2	1
D	Junction enhancements with J4 dumbbell and A525 open to buses and pedestrians/cyclists only	2	2	1	-1	2	2	-2	1

Source: Mott MacDonald

3 Transport Case

3.1 Overview

The aim of the Transport Case is to consider whether the Scheme offers value for money and warrants public investment. The Case also assesses and considers whether the Scheme will provide sufficient economic, environmental and social benefits.

3.2 Overall approach

3.2.1 Given WelTAG does not outline a prescriptive approach, the Department for Transport (DfT)'s TAG (Transport Analysis Guidance) has been followed. The value for money assessment and option comparison has considered a range of costs and benefits. These have been quantified, or 'monetised', wherever possible; Otherwise, they are assessed qualitatively.

3.2.2 The monetised impacts that feed into the Transport Case have been derived from outputs produced from the A483 Wrexham Strategic Transport Model. Full details of the development, forecasting and economic assessment undertaken using this model are contained in the following reports:

- ☞**Local Model Validation Report**
- ☞**Traffic Forecasting Report**
- ☞**Economic Assessment Report**

3.2.3 The Value for Money (VfM) assessment includes the following impacts:

- **Transport user impacts during construction and post Scheme opening (TAG A1)** - The transport user impacts appraisal has been undertaken using the TUBA and QUADRO programs, which carry out appraisal in accordance with published DfT guidance
- **Safety (TAG A4-1)** - An analysis of the impacts of accidents and their costs as part of the economic appraisal has been undertaken. COBALT (COst and Benefit to Accidents – Light Touch), which was developed by the DfT in 2013 (version 2013.02), has been used to undertake the economic appraisal of accidents by assessing the safety aspects of the Scheme using detailed inputs. The assessment is based on a comparison of accidents by severity and associated costs across the network in the with and without Scheme forecasts, using details of link and junction characteristics, relevant accident data, and forecast traffic volumes
- **Air Quality (TAG Unit A3)** - The air quality appraisal has been undertaken in accordance with TAG Unit A3 Chapter 3. Net Present Values (NPVs) have been calculated for both local and regional changes in air quality. The NPV of these changes have been calculated using the 'Local Air Quality Workbook' and 'Air Quality Valuation Workbook' provided as part of TAG Unit A3
- **Noise (TAG Unit A3)** - An appraisal of the noise impact of the Scheme has been undertaken in accordance with TAG Unit A3 (December 2015), which considers impacts from road, rail and air traffic in terms of annoyance, sleep disturbance and health impacts, which are in turn based upon Defra guidance, for which there are dose-response relationships

- **Greenhouse gases (TAG Unit A3)** - An appraisal of the change in greenhouse gas emissions has been carried out in accordance with TAG Unit A3 Chapter 4 using the 'Greenhouse Gases Workbook' to calculate NPVs

3.3 Economic assessment

Overview

3.3.1 There are two main headings that underpin the economic assessment of the Scheme:

- **Business users and transport providers –** This assesses the impact on business users' journey times and vehicle operating costs as well as the costs to business users during construction and maintenance
- **Wider impacts –** This assesses the impact of the Scheme on the wider local economy including investment, productivity and employment

3.3.2 A main requirement of this WelTAG study was to have a robust transport model that can be used to facilitate optioneering and steer the appraisal towards a preferred option. This model should be capable of giving traffic forecasts to reinforce the economic appraisal and environmental appraisal as well as the operational design. In addition, both the foundation of data and the model should withstand scrutiny and have a geographical coverage representative of the strategic alternative routes.

3.3.3 The ☞**A483 Wrexham Local Model Validation Report** outlines the scope of the model that has been used as the basis of this economic assessment. The key features of the model are:

- The use of June 2018 traffic data as the base year. The model covers three time periods for an average weekday:
  - AM Peak Hour (08:00-09:00)
  - Inter Peak Average Hour (10:00-16:00)
  - PM Peak Hour (17:00-18:00)
- Origin-destination trip information, which serves the trip matrix construction, was derived from three principal sources of data:
  - Roadside interview surveys
  - Mobile phone data
  - Census and land use data – synthetic gravity model

3.3.4 Traffic count data commissioned for the modelled time periods was utilised in multiple ways. This included the production of factors, both for expansion and time period adjustment for the construction of the trip matrices.

3.3.5 The economic assessment is based primarily on calculations of user benefits in terms of journey time savings, and changes in fuel and vehicle operating costs (VOCs). Forecast trip and cost information have been extracted from model for:

- An expected opening year (2022)
- A design year 15 years after opening (2037)

3.3.6 One major aspect from a traffic and economic modelling standpoint is the similarity between the options. This means that the total journey times for vehicles using Junction 4 are not likely to have significant differences between Options A, B, C and D. Based on this premise, Option A was tested against a 'do minimum' scenario which comprised the existing network and the 50mph speed limit on A483 between Junctions 5 and 6 (Air Quality Intervention).

3.4 Business users and transport providers

3.4.1 Journey time benefits will result from the proposed junction capacity enhancements from all the options. Table 12 summarises the benefits to business users (values in 2010 prices discounted to 2010).

Table 12: Transport Economic Efficiency (TEE) - Business impacts (£000s at 2010 discounted prices)

Heading	Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic
Travel Time	5,820
Vehicle operating costs	-567
User changes	0
During construction and maintenance	0
Net business impact	5,253

Source: Mott MacDonald

3.4.2 The largest benefits will be to travel time although there will be a marginal disbenefit around vehicle operating costs.

3.5 Wider economic benefits

3.5.1 The land use and economic development potential of key residential and employment sites around the A483 were assessed using Mott MacDonald's Transparent Economic Assessment Model (TEAM). Two different scenarios were assessed:

- Study 1: all residential and commercial development in proximity to the A483. This is the development that would benefit from the full A483 improvement scheme
- Study 2: all residential and commercial development within 2 km of junction 4 and 5 of the A483

3.5.2 The studies calculated the economic benefits associated with the expected commercial development on sites with strong links to the A483 scheme. At this stage it was not possible to assess the construction benefits of the employment sites. The construction benefits of the residential development were calculated.

3.5.3 A full discussion of the wider economic benefits including details of the assumptions made and methodology used are provided in the ☞**Wider Economic Benefits Technical Note**.

3.5.4 For study 1, once fully operational, the 12 identified employment sites could support a total of approximately 6,300 net jobs and approximately £282.9 million of net GVA per annum. This includes an estimated 1,421 jobs (£63.6 million net GVA) at Wrexham Technology Park and 3,795 jobs (£169.9 million net GVA) at Wrexham Industrial Estate. In addition, employment will be generated by an extra-care residential facility at Ruabon Business Park. This could not be included in the model as such facilities do not have standard employment densities and the exact nature of the facility is not known at this stage.

3.5.5 For study 1, the development of the residential land identified will generate temporary construction effects, equivalent to 130 full time jobs.

3.5.6 Study 2 assumes that investment in the A483 is limited to Junctions 4 and 5 and only considers development sites within 2 km of either of these junctions. This encompasses 14 residential developments, totalling 2,151 dwellings, and three employment sites, including Moneypenny,

which have the potential to support 1,454 net jobs and approximately £64.4million of GVA per annum.

3.5.7 For study 2, the full potential benefits that the development of key employment and residential sites could bring to Wrexham and the surrounding area has been quantified, but it does not define the extent to which the benefits can be attributed directly to the A483 improvements.

3.6 Environmental assessment

3.6.1 Quantitative noise and air quality assessments were informed by the traffic forecasts. The greenhouse gases assessment was informed by the TUBA outputs. All other environmental headings are based on a qualitative assessment as shown in Table 13.

Table 13: Approach for assessing environmental impact

WelTAG component	Assessment	Description	Qualitative high scoring options:	Qualitative low scoring options:
Air quality	Quantitative and monetised	Measurement of likely change in Nitrogen Oxide (NOx) and local particulate (PM10) concentrations	--	--
Noise	Quantitative and monetised	Assessment based on changes in noise during construction and operation on identified noise receptors	--	--
Greenhouse gases	Quantitative and monetised	Assessment includes transport impacts as well as use of materials during construction	--	--
Landscape	Qualitative	Assessment based on the 20 identified local landscape areas near the Scheme	Provide improvement to the existing landscape	Have an adverse impact on the existing landscape
Townscape	Qualitative	Assessment includes consideration impact on visual receptors	Provide improvement to the existing townscape	Have an adverse impact on the existing townscape
Historic environment	Qualitative	Assessment based on several heritage assets identified in the vicinity of the Scheme	Provide a major improvement to the protection of existing historic assets and environment	Result in a major adverse impact to existing historic assets and environment
Biodiversity	Qualitative	Assessment based on changes to	Protect and enhance biodiversity	Result in adverse

		identified habitats and species		impacts on biodiversity
Water environment	Qualitative	Includes impacts on water habitats and species	Protect and enhance the water environment	Result in adverse impacts on the water environment

Source: Mott MacDonald/RML

3.6.2 Table 14 summarises the environmental assessment for the short-list of options and all figures quoted below cover the net benefit/disbenefit for the whole of the model study area covering the mainline of the A483, the associated junctions and the wider Wrexham area. Further detail about the rationale behind the assessment can be located in the ☞**A483 Wrexham Multi-Criteria Assessment** document in the **Impacts Assessment Report**.

Table 14: Summary of expected environmental impacts

Heading	Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic	Option B: Junction enhancements with J4 gyratory roundabout and A525 open to buses and pedestrians/cyclists only	Option C: Junction enhancements with J4 dumbbell and A525 open to all traffic	Option D: Junction enhancements with J4 dumbbell and A525 open to buses and pedestrians/cyclists only
Noise	£114,794 net benefit for Option A			
Air quality	-£1,114,226 net disbenefit for Option A			
Greenhouse gases	-£1,439,450 net disbenefit for Option A			
Landscape	Neutral/negligible	Neutral/negligible	Neutral/negligible	Neutral/negligible
Historic environment	Slight disbenefit	Neutral/negligible	Neutral/negligible	Neutral/negligible
Biodiversity	Slight disbenefit	Neutral/negligible	Slight disbenefit	Slight disbenefit
Water environment	Neutral/negligible	Neutral/negligible	Neutral/negligible	Neutral/negligible

Source: Mott MacDonald/RML

Noise

3.6.3 There will be a marginal improvement to noise levels arising from Option A. The calculations indicate the benefits largely relate to improved sleep patterns (with enhancements to population health) and amenity.

Air quality

3.6.4 It is important to note that baseline air quality conditions in the vicinity of the Scheme are generally good, following the WG intervention in 2019 of a permanent 50mph speed restriction to cover the Air Quality Zone between junctions 5 and 6. Nevertheless, there are some sensitive receptors in the Wrexham area which will be affected by the redistribution and increase in traffic arising from the Scheme. The assessment indicates, for the whole study area, a small increase in mass emissions which equates to a net disbenefit (air quality deterioration) assuming that there is no major change in the vehicle mix and vehicle engine technology enhancements in vehicle emission controls are not fully realised.

Greenhouse gases

3.6.5 Option A increases the length of road by 1 km which increases the total traded and non-traded emissions by 6%. However, by 2037, the difference in emission increases is just 1%. This is accompanied by a greater proportion of non-traded emissions (electric vehicles) than would be apparent in 2022. The increase in emissions coincides with the vehicle kilometres travelled per year. In 2022 and 2037, the Option leads to an expected 7% and 2% increase in vehicle kilometres consecutively. The overall increase in emissions is from higher traffic flows on less congested traffic routes.

Landscape impacts

3.6.6 The overall assessment for the four options is that there is likely to be a negligible impact on landscape. Each of the options will involve vegetation loss, but this is likely to be replaced over time.

3.6.7 With Junction 4, it is felt that the proposed developments on the KSS1 residential allocation will have a more significant bearing on the landscape than any junction improvement.

Historic environment

3.6.8 Three of the options (B, C and D) are likely to have a negligible impact on the historic environment. Proposed works to Junctions 3, 4 and 6 are likely to have a neutral impact where there is a minor adverse impact on the boundary wall of Stansty Park at Junction 5.

3.6.9 With Option A, there is likely to be a slight adverse impact overall. In addition to the impacts at Stansty Park at Junction 5, there will be a moderate adverse impact on the land and setting at Berse Farm.

Biodiversity

3.6.10 For three of the options (A, C, D) there is likely to be a slight impact on existing habitats at Junctions 3 and 4. This will involve some loss of existing habitats, although replacement will make up for some of that loss.

3.6.11 Option B is deemed as negligible impact on the basis of a slight impact at Junction 3 only where some loss should be partially mitigated through replacement.

Water environment

3.6.12 Overall, all four options are deemed to have a negligible impact on the water environment. There is expected to be a neutral impact from the works at Junctions 3, 5 and 6. At Junction 4 there is potential for a minor improvement, but only if attenuation is provided.

3.7 Social and cultural impacts

3.7.1 For social and cultural related impacts, these are considered under a number of headings as shown in Table 15.

Table 15: Approach for assessing social and cultural impact

Heading	Assessment	Description	Qualitative high scoring options:	Qualitative low scoring options:
Non-business users	Quantitative and monetised	Assesses the impact on journey times and vehicle operating costs to non-business	--	--

		and includes the period during construction and maintenance, and reliability		
Physical activity	Qualitative	Analyses potential changes to walking and cycling levels that could impact on physical activity levels	Will improve the extent and quality of walking and cycling infrastructure which will be conducive to encouraging more people to walk and cycle	Will reduce the extent and extent of walking and cycling infrastructure will encourage greater use of motorised forms of transport and reduce the levels of walking and cycling
Journey quality	Qualitative	Considers the impacts of the Scheme on the end to end journey experience of transport users and includes traveller care, views and stress	Will improve journey quality, reduce stress and improve the level of traveller information	Will reduce journey quality, increase stress and improve the level of traveller information
Accidents	Quantitative and monetised	Assesses the change in number and monetary value of fatal, serious and slight accidents and casualties	--	--
Security	Qualitative	Analyses impacts on crime or the fear of crime within the transport context	Will improve personal security for all categories of travellers	Will reduce personal security for all categories of all travellers
Access to services	Qualitative	Assesses how the Scheme affects the range of opportunities and choices people have in connecting with jobs, services, friends and family	Will provide improved access to healthcare, education, leisure and retail facilities by reducing some of the transport barriers and constraints for all modes	Will reduce access to healthcare, education, leisure and retail facilities by increasing the transport barriers and constraints for all modes
Affordability	Qualitative	Provides an assessment of how the Scheme affects people as a result of changes in the transport costs.	Will noticeably reduce the cost of travelling to individuals	Will noticeably increase the cost of travelling to individuals
Severance	Qualitative	Involves analysis of the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows.	Will assist pedestrians and cyclists in crossing the A483 which currently creates severance	Will make conditions for pedestrians and cyclists crossing the A483 worse
Option values	Qualitative	Assesses the value of preserving transport options for their potential use or	Will improve value attached arising from infrastructure	Will reduce the value from infrastructure and

	the value of the existence of services to individuals when they are not used	and journey times/reliability	journey times/reliability

Source: Mott MacDonald

Non-business users: Commuting and other users

3.7.2 Table 16 presents the monetised impacts of the Scheme forecast to accrue to commuters and other users for Option A.

Table 16: Transport Economic Efficiency (TEE) – Commuting and other users (£000s at 2010 discounted prices)

Item	Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic
Consumer – Commuting User Benefits	
Travel Time	1,473
Vehicle operating costs	90
User changes	0
During construction and maintenance	0
Net – Commuting User Benefits	1,563
Consumer – Other User Benefits	
Travel Time	5,414
Vehicle operating costs	521
User changes	0
During construction and maintenance	0
Net – Commuting User Benefits	5,935

Source: Mott MacDonald

3.7.3 The greatest benefits relate to the reduction in travel time for commuting and other users, coupled with a lower level of benefit from reduced vehicle costs.

Accidents

3.7.4 The ☞**Economic Assessment Report** outlines the methodology and rationale that was used to calculate the potential change in accidents arising from the Scheme. For brevity, only Option A was modelled given there was unlikely to be a significant difference in collisions between the four options. The results of the accident savings are summarised in Table 17.

Table 17: Accident savings (£000s in 2010 prices discounted to 2010)

Scenario		Cost
Existing		
Casualties (Number)	Fatal	63.4
	Serious	707.4
	Slight	7082.4
Accident Costs (£000s)	Total	£249,389.0
Option A Junction enhancements with J4 gyratory roundabout and A525 open to all traffic		
Casualties (Number)	Fatal	61.6

	Serious	701.5
	Slight	7051.1
Accident Costs (£000s)	Total	£246,741.2
Economic saving in accidents arising from Option A		
Casualties (Number)	Fatal	1.8
	Serious	5.9
	Slight	31.3
Accident Cost Benefits (£000s)	Total	£3,352.2

Source: Mott MacDonald

3.7.5 Overall, Option A is likely to result in a modest accident saving over the 60-year appraisal period. The assessment indicated that a saving of £3,352,000 based on a reduction of 39 injuries at 2010 discounted prices.

Other social/cultural impacts

3.7.6 Table 18 provides an assessment of the other social/cultural impacts for the short-list of options. Further detail about the rationale behind the assessment can be located in the ☞**A483 Wrexham Multi-Criteria Assessment** document in the **Impacts Assessment Report**.

Table 18: Summary of expected social and cultural impacts

Heading	Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic	Option B: Junction enhancements with J4 gyratory roundabout and A525 open to buses and pedestrians/cyclists only	Option C: Junction enhancements with J4 dumbbell and A525 open to all traffic	Option D: Junction enhancements with J4 dumbbell and A525 open to buses and pedestrians/cyclists only
Physical activity	Moderate benefit	Large benefit	Moderate benefit	Large benefit
Journey quality	Moderate benefit	Moderate benefit	Moderate benefit	Moderate benefit
Security	Slight disbenefit to pedestrians and cyclists	Slight disbenefit to pedestrians and cyclists	Slight disbenefit to pedestrians and cyclists	Slight disbenefit to pedestrians and cyclists
Access to services	Moderate benefit	Moderate benefit	Moderate benefit	Moderate benefit
Personal affordability	Slight benefit	Slight benefit	Slight benefit	Slight benefit
Severance	Moderate benefit	Moderate benefit	Moderate benefit	Moderate benefit
Option values	Slight benefit	Slight benefit	Slight benefit	Slight benefit

Source: Mott MacDonald

Physical activity

3.7.7 Options B and D keep the A525 open for pedestrian and cyclist only use across Junction 4 and so have a greater benefit for physical activity than options A and C. The proposed change at Junctions 3 and 6 will have no impact on physical activity. At Junction 5, if Summerhill Road remains open for Active Travel enhancements, Summerhill Road could become an attractive walking and cycling route with very little traffic interaction.

3.7.8 All four packages enhance the development of new bus and cycle routes crossing the A483 west to east at Junction 4 and Junction 5. As well as directly encouraging cycling, by improving

provision for buses, people will be encouraged to make public transport journeys that include an element of walking at either end, instead of driving from door to door.

3.7.9 All packages have expected benefits that contribute to maintaining an attractive and healthy environment for physical activity. These include a slight positive impact on air quality and noise levels on this section of the A483. All packages have a slight positive impact on road safety, through improved junction standards. This safer environment will contribute to encouraging Active Travel and keeping people healthy in order to participate in physical activity.

Journey quality

3.7.10 All four shortlisted packages would be expected to improve traffic flow on this section of the A483, it's junctions and connecting local roads. By reducing congestion and improving journey time reliability, this will reduce stress levels for travellers, particular those using Junction 4 or Junction 5. Journey quality will be enhanced for travellers on the A483 and those crossing the A483 on local east-west routes.

3.7.11 The provision of cycle routes will substantially improve the journey quality for cyclists crossing Junction 4 and Junction 5. Active travellers will benefit from a slight improvement in air quality and noise levels. The proposed improvements would improve journey time reliability across the A483, enabling existing bus services to reroute and new services to be provided in the future.

3.7.12 All four packages require an equal level of temporary disruption during the construction phase, which may cause stress and frustration for travellers.

3.7.13 The realignment of Summerhill Road at Junction 5 is expected to have a positive impact on journey quality for most users by improving traffic flow. Journey quality for pedestrians and cyclists will be substantially improved on Summerhill Road. There may be a negative effect on a small number of travellers who will be forced to change their usual route and may face increased journey times.

Personal security

3.7.14 Where segregated routes are provided for pedestrians and cyclists; across Junction 4 and Junction 5 and on the A525 or on Summerhill Road if closed to other vehicles, there is likely to be a reduced sense of personal security as the routes are quieter and loose the surveillance from passing vehicles. In turn this may discourage people from walking and cycling, particularly after dark. This effect can be minimised by ensuring the routes are adequately lit.

Access to services

3.7.15 The Scheme is expected to improve traffic flow on the Wrexham section of the A483, junctions and connecting roads. Any of the four short listed options will have a positive effect on journey times along the A483 and across it.

3.7.16 Improving conditions for walking, cycling and buses will increase the range of transport options available for local trips.

Personal affordability

3.7.17 The impact of the Scheme on the affordability of transport costs is likely to be small, but positive. There is little difference between the four shortlisted options. Improved traffic flows will produce savings in fuel costs for drivers. By improving conditions for walking, cycling and buses, cheaper transport options may become more practical and attractive.

Severance

3.7.18 One of the Scheme objectives is to enhance connectivity for journeys that cross the A483 corridor, reducing the existing severance. All four option packages have a moderate beneficial impact on this.

3.7.19 The expected improvement in traffic flow across the A483 junctions as well as the provision of new bus and cycle links at Junctions 4 and 5 will reduce severance for all modes.

Option values

3.7.20 The Scheme is expected to improve journey times and reliability mostly for private vehicles but will also improve buses time reliability and improve the conditions for walking and cycling for journeys crossing the A483. The option value of each of these modes will be improved by any of the four shortlisted options. The four package options have equal benefit for private vehicles. As options B and D have a greater benefit for pedestrians and cyclists their overall benefit to option values is slightly greater.

3.8 Value for money

Analysis of Monetised Costs and Benefits (AMCB)

3.8.1 Table 19 presents an Analysis of Monetised Costs and Benefits (AMCB) for Option A.

Table 19: Analysis of monetised costs and benefits (£000s at 2010 discounted prices)

Item	Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic
Economic Efficiency: Consumer Users (Commuting)	1,563
Economic Efficiency: Consumer Users (Other)	5,935
Economic Efficiency: Business Users and Providers	5,253
Wider Public Finances (Indirect Taxation Revenues)	88
Present Value of Benefits (PVB)	12,813
Present Value of Costs (PVC)	40,765
Net Present Value (NPV)	-29,592
Benefit to Cost Ratio (BCR)	0.315

Source: Mott MacDonald

3.8.2 The AMCB for Option A shows the largest monetised benefits arising from improved journey times to other users and business users, with commuting benefits being lower. This would contribute towards £12.8 million of benefits over the 60-year appraisal period. This is offset by £40.8 million of costs which results in a Benefit Cost Ratio (BCR) of 0.315. This would provide '**poor' value for money as defined by the Department for Transport Value for Money Framework 2015,** but this needs to be seen in the context that the wider economic benefits, which are a key driver for this Scheme, are not factored into the BCR.

3.8.3 Nevertheless, given the relative costs for the Scheme, two sensitivity tests around Option A were undertaken. These were:

- Option A without the Junction 3 and 6 components
- Option A without the Junction 3, 5 and 6 components (effectively Junction 4 improvement only)

3.8.4 Table 20 outlines the identified economic benefits for the sensitivity tests. Compared to Table 12 and Table 16, given both tests are smaller schemes, the level of benefits are lower. Nevertheless, the assessment indicated that removing all the Junction 3, 5 and 6 elements from the scheme proposal would perform better than just excluding the Junction 6 proposal on its own (which is the provision of an additional Stop line and Give Way Lanes on 4 of the 7 arms at the junction).

Table 20: Transport Economic Efficiency (TEE) – Sensitivity Tests (£000s at 2010 prices)

Heading	Sensitivity test – Option A without Junction 3 and 6 components	Sensitivity test – Option A without Junction 3, 5 and 6 components
Business impacts		
Travel Time	5,193	5,386
Vehicle operating costs	254	33
User changes	0	0
During construction and maintenance	0	0
Net business impact	5,447	5,419
Commuting user benefits		
Travel Time	1,344	1,520
Vehicle operating costs	104	61
User changes	0	0
During construction and maintenance	0	0
Net commuting benefits	1,448	1,581
Other user benefits		
Travel Time	4,952	7,199
Vehicle operating costs	608	33
User changes	0	0
During construction and maintenance	0	0
Net other user benefits	5.561	7,543

Source: Mott MacDonald

3.8.5 Taking the sensitivity tests further, the AMCB also indicates that focussing on the Junction 4 improvements alone would improve the level of economic benefits. Contrasting with Table 19, this would increase the PVB to £14.5 million (compared to £12.8 million for the full Option A) and would improve the BCR to 0.482 (As shown in Table 21).

3.8.6 Whilst this would still provide '**poor' value for money as defined by the Department for Transport Value for Money Framework 2015**, it should be noted that the assessment indicates that focussing upon Junction 4 improvements at this stage would maximise the benefits, whilst reducing the level of costs as much as possible.

Table 21: Analysis of monetised costs and benefits (£000s at 2010 prices) for sensitivity tests

Item	Sensitivity test – Option A without Junction 3 and 6 components	Sensitivity test – Option A without Junction 3, 5 and 6 components
Economic Efficiency: Consumer Users (Commuting)	1,448	1,581
Economic Efficiency: Consumer Users (Other)	5,561	7,543
Economic Efficiency: Business Users and Providers	5,447	5,419
Wider Public Finances (Indirect Taxation Revenues)	-250	-61
Present Value of Benefits (PVB)	12,266	14,490
Present Value of Costs (PVC)	42,557	30,047
Net Present Value (NPV)	-37,909	-15,557
Benefit to Cost Ratio (BCR)	0.305	0.482

Source: Mott MacDonald

3.8.7 Given the issues around the BCR value, two further tests were undertaken around background traffic growth rates for Option A with all four Junctions improved. High and low growth scenarios were developed to test the impact of uncertainty in the projections of demographic data (population, households and employment), GDP growth and fuel price trends. This would result in:

- A BCR of 0.511 for high growth (against a BCR of 0.315 for central growth)
- A BCR of 0.057 for low growth

3.9 Summary of the Transport Case

3.9.1 The Transport Case examined whether the Scheme offers value for money. The assessment found for Option A:

- It would provide £12.8 million of economic benefits over a 60-year period resulting in a BCR of 0.315. This would provide 'poor' value for money as defined by the Department for Transport Value for Money Framework 2015, but it is important to note that there would be additional wider economic benefits arising from the Scheme.
- Improvements particularly to Junction 4 could support three employment sites within a 2 km distance of the A483. This has the potential to create 1,454 net jobs and approximately £64.4 million of GVA per annum.
- A phased construction of Option A with Junction 4 improvements as the first major construction phase would provide £14.5 million of economic benefits over a 60-year period resulting in a BCR of 0.482 combined with minor Active Travel Improvements only at Junction 3, 5 and 6.

3.9.2 The level of environmental impacts are estimated to be low for both the quantitative and qualitative assessment. There is a slight benefit arising from noise, but marginal disbenefits from air quality, greenhouse gases, historic environment and biodiversity.

3.9.3 With social impacts, there are travel time benefits for commuters and other users coupled with a marginal improvement in vehicle operating costs. Option A is likely to lead to a reduction of 39 accidents over the 60-year period.

3.9.4 With other social impacts, there are likely to be slight to moderate benefits to physical activity improvement, journey quality, access to services, personal affordability, severance and option values. It is estimated there will be a slight disbenefit to pedestrians and cyclists around personal security as Option A may lead to a reduction in the level of surveillance as physical segregation would be possible.

4 Management Case

4.1 Overview

The purpose of the Management Case is to assess whether the Scheme is deliverable. The case outlines the proposed governance structure, stakeholder engagement, strategies for managing risk and proposed evaluation of the Scheme to ensure its full benefits are realised.

4.2 Options and deliverability

4.2.1 At this stage of Scheme development, detail around how the short list of options would be constructed, delivered and maintained has not been explored in detail. On this basis, the assessment against the Management Case has been generally applied irrespective of option as there are only likely to be modest differences around construction and mitigation.

4.3 Scheme governance and programme

4.3.1 The project team for the KS2 stage will evolve to meet the requirements necessary for KS3 and KS4. The current structure of the project team is as follows:

- A483 Wrexham Project Board
- Core Management Team
- Team/Task Leaders with support teams

4.3.2 The Project Board provides the overarching direction and oversight of the delivery of the Scheme. The Board at KS2 comprises representatives from the Welsh Government, NMWTRA, Wrexham County Borough Council as well as Mott MacDonald.

4.3.3 The core management team comprises the various project and technical leads. This includes NMWTRA, and Mott MacDonald and RML Project Managers.

4.3.4 The Team Leaders are responsible for the work undertaken by their respective teams. Team Leaders are backed by support teams with appropriate resourcing as required.

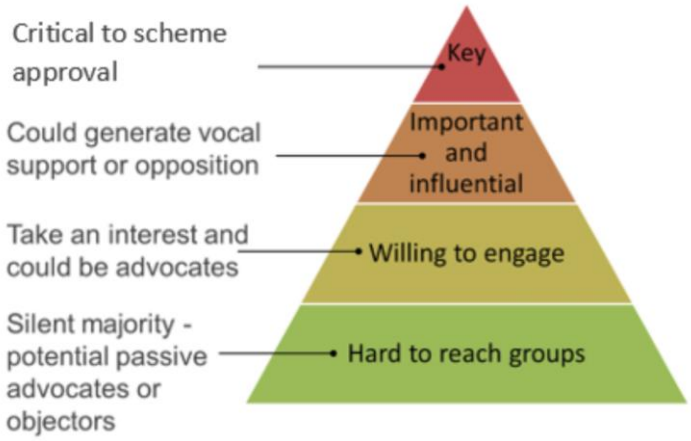
4.3.5 The overall programme for the Scheme is still at an early stage of development. The key milestones envisaged as of December 2019 are:

- Identification of Preferred Scheme: Spring 2020
- Public Consultation: Summer 2020 (Subject to Covid-19 restrictions)
- Public Inquiry (if needed) Spring 2021
- Estimated construction start date (subject to Welsh Minister's approval) Spring 2022

4.4 Stakeholder engagement and management

4.4.1 The focus of the engagement with stakeholders and the public is to raise awareness of the Scheme and to build support. As part of this process, stakeholders have been categorised into four distinct categories as shown in Figure 4. The aim is to tailor the level of engagement as appropriate and also mitigate against risks that could impact on the approval and delivery of the Scheme.

Figure 4: Categories of Stakeholders



Source: Mott MacDonald

4.4.2 The first tier of stakeholders that have been identified are **key stakeholders**. These are essential to the Scheme progressing to delivery. These include:

- Welsh Government
- NMWTRA
- Wrexham County Borough Council
- Local Community Councils

4.4.3 The second tier are deemed as **important and influential**. These could impact on public and political opinion by generating support or organised opposition to the Scheme. These include:

- Flintshire and Wrexham Joint Local Access Forum
- Ramblers
- Sustrans
- Cycling UK
- Natural Resources Wales
- Cadw
- Wrexham Museum

4.4.4 The third tier of stakeholders are defined as **willing to be engaged**. This includes landowners, interested members of the public, public transport operators and the Freight Transport Association. The final tier of stakeholders is the **hard to reach** groups. These include people who would not normally engage during the development of schemes.

4.4.5 As part of the Scheme development process to date, a series of workshops and events have been held with different groups. This included a Public Information Event (PIE) to inform the public of the Scheme options. No formal Public Consultation has been held to date, but this is scheduled for Summer 2020.

4.4.6 Regular workshops are being held with a panel of key stakeholders to identify their requirements and keep them updated with the progress on the Scheme. The workshops held to date are summarised in Table 22.

Table 22: Key Stakeholder Workshops

Date	Workshop Focus
January 2019	Option identification and selection
February 2019	Objectives
March 2019	Junction 4 Programme
July 2019	Option sifting and packages
November 2019	WelTAG and option testing update

Source: Mott MacDonald

4.4.7 Separate workshops were held to discuss the environmental aspects of the Scheme, using an environmental liaison group. The workshops held are summarised in Table 23.

Table 23: Environmental Liaison Group Workshops and updates

Date	Workshop Focus
February 2019	Introduce project, request data and information and draft Environmental Objectives
June 2019	Explain project progress and initial design ideas, review findings of environmental surveys and update on initial option sifting
September 2019	Updating note circulated in place of meeting: presenting progress on actions from ELG 2
November 2019	Explain the outcome of option sifting and describe refined options, present further survey findings and proposed content of EIA / HRA screening and WelTAG Stage 2 Impact Appraisal / EIA Scoping report
February 2020	ELG 5 to coincide with identifying preferred option

Source: Mott MacDonald

4.4.8 Two walking, cycling and horse-riding consultation workshops have been held, with the aim of capturing the needs of pedestrians, cyclists and equestrians. Attendance included access groups such as the Flintshire and Wrexham Joint Local Access Forum.

4.4.9 A PIE was held in June 2019 to inform the public of the need for the Scheme, set out how the Scheme will be developed and introduce the project team. As this was a public information event rather than a consultation exercise, official feedback was not collected. 109 people attended over the two exhibition days. Communication methods to inform the public of the PIE included:

- Press release and posters
- Promotion of events by Wrexham County Borough Council, Traffic Wales, Wrexham Leader and Wrexham.com
- Leaflets distributed to 1,805 households within the study area
- Drop in session for Wrexham Councillors prior to PIE
- Leaflets sent to 34 Community Council contacts for advertising locally

4.5 Risk and issues management

4.5.1 Ongoing risk management is key to the successful delivery of the Scheme and an integral part of the programme and project management processes. The approach to managing risk is to establish an iterative and on-going cycle of risk management activity, covering the identification, assessment, mitigation, reporting (including escalation) and reviewing of risk.

4.5.2 Three risk management workshops have been held to date to discuss and update the risk/opportunity register. The aim has been to identify all risks to the project, at all levels. At this

stage a qualitative scoring system has been used to speed up the process and allow comparison of risks.

4.5.3 At this stage of scheme development, the Scheme has not yet reached the point where Quantitative Risk Analysis (QRA) is required. When it does, a suitable risk register will be assessed using Monte Carlo analysis for input to the economic appraisal.

4.5.4 Going forward, the common principles of risk management will be followed for this Scheme are as follows:

- Risks are identified and recorded
- Responsibility for risk management is assigned to the relevant party
- Risks are analysed and evaluated in terms of their likelihood and impact estimates. This assessment covers – cost, schedule, reputation, and magnitude
- Relevant action is taken to mitigate, treat or accept the risks
- Risks are monitored and updated through project development

4.5.5 An important principle that will be applied is that the risk owner should be the person best able to manage the risk. This is often the person, with the appropriate accountability, that is closest to the risk. Where an individual does not have accountability, the risk will need to be escalated and managed at a higher level. Risk escalation levels are shown below.

4.5.6 Risks flow upwards from 1-4:

1. Project team
2. Project Management Co-ordination
3. Senior Responsible Owner
4. Project Board

4.5.7 A series of risks have been identified and set out in the risk register. For each risk potential mitigation measures have been considered and implemented. Following mitigation, 16 out of the 42 risks remain at least medium likelihood and the remaining 26 have a low or very low likelihood.

4.5.8 For more detail on the information summarised in Table 24 refer to the ☞**Risk Register**.

Table 24: Risk register

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
Ambition to accelerate Junction 4 works ahead of other locations.	WG ambition to accelerate Junction 4 could impact overall delivery of proposed improvements at J3-6 and A483 mainline.	High	Low	Active
Assuming outcome of preferred options at early stages of WelTAG process (E.g. Improvements to Junction 4).	Public inquiry challenging project team on not providing enough justification for preferred option or eliminating options.	High	Low	Active
Land requirements at junctions and A483 mainline	Suitable stakeholder engagement not completed which can delay/prevent land purchase	High	Medium	Active
Cabinet reshuffle due in December 2018 affecting	Cabinet reshuffle affecting funding/programme/prioritisation of the scheme.	Very High	Medium	Active

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
funding/programme/prioritisation of the scheme.				
Topographic Survey on A483 mainline and junctions not available	Topographic Survey not progressed to enable option design. This may be delayed due to cost of survey and Land access required.	Medium	Very Low	Closed
Delayed access to land	Stakeholder risk with landowners denying access for surveys which will slow down programme	High	Medium	Active
Scope differences between traffic modelling teams (WG/NMWTRA/MM) and the overall project team (WG/NMWTRA/MM)	Traffic modelling team delivering scope above/below expectations of project team	Medium	Low	Closed
Requirement for Public transport model.	Still awaiting comment from Welsh Government if public transport model is required, leading to uncertainty on modelling requirements.	Medium	Very Low	Closed
Definition of scope of Strategic model.	Not clear on extent of strategic model requirements. Currently focusing on A483 mainline between J3-6 to solve local congestion. Noted Debbie Hudd (WG modelling) is co-ordinating the completion of a North Wales strategic model.	Medium	Very Low	Closed
Definition of Wrexham extents to be modelled and variable demand model requirements	Over-resourcing modelling for the requirements of the scheme slowing down the overall programme and overspending.	Medium	Very Low	Closed
Internal and external communication between modelling teams.	Possible breakdown in co-ordination between internal and external modelling teams leading to overspend and programme delays.	High	Low	Closed
Information on key stakeholders from Wrexham	Information on key stakeholders from Wrexham not being received and slowing down programme.	Medium	Low	Active
Support from Wrexham in programme tasks (e.g. option selection, land ownership discussion).	Tasks associated with Wrexham input delayed leading to programme delay	High	Medium	Active
Land developers objecting to proposed schemes.	Objections to proposed schemes due to reasons such as poor stakeholder engagement, extent of land take and/or linking new infrastructure to new developments.	High	Medium	Active
Public Inquiry in relation to preferred option.	Public inquiry delaying/stopping further development of the preferred option. (Likely a Key Stage 3 risk).	High	Medium	Active
Compatibility of preferred options with committed schemes	Conflict between modelling and design of preferred options and other committed schemes.	Medium	Low	Active
'Minimum Expressway Standards' implementation on preferred options	'Redesign required due to 'Minimum Expressway Standards' not implemented on preferred options.	Medium	Low	Active

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
Requirements for Highway option design	Highway options developed and not including specific NMWTRA requirements. (e.g. ITS infrastructure and ramp metering)	Medium	Low	Active
Application of DMRB standards to highway options	Risk of options developed which are fully compliant with large land take and non-compliant with safety issues.	Medium	Low	Closed
Variations to year spend profile	Additional tasks and change of scope altering year spend profile and creating funding risk	High	Medium	Active
Unknown environmental risks along the A483	Unknown environmental risks affecting delivery of overall scheme.	High	Medium	Active
Active Travel stakeholder engagement	Options not including suitable active travel implementations.	Medium	Low	Active
Programme of Surfacing works and A483 scheme in construction stage.	Conflict between surfacing works on A483 and construction stage.	Medium	Low	Active
Process for Public Consultation events.	Delay of Public Consultation materials and events, causing confusion with public and other stakeholders	High	Medium	Active
Process for translation of consultation material from English to Welsh.	Incorrect translation causing frustration with public and other stakeholders	High	Low	Closed
Environmental mitigation demands from NRW exceeding reasonable requirements. Based on past experience, agreeing mitigation measures with NRW can be difficult in the Wrexham area due to substantial demands by the NRW representative	Increased mitigation from NRW increasing budget and time required in design and construction	High	Medium	Active
Potential rat-running of vehicles from Junction 1 to avoid the A483.	Vehicle rat-running outside of the strategic model area affecting the accuracy of the strategic model.	Medium	Very Low	Closed
The assessed capacities of existing over and under bridges between J3-6 on A483 are unknown and assessments are out of date	Existing structures may require strengthening within the scheme area, even if improvement works are not proposed.	Medium	Medium	Active
Uncertainty on exact acceleration of Junction 4 within Project team.	Confusion over exact acceleration of Junction 4 leading to potential errors and delay to overall programme	Very High	Low	Closed
Gaps in Trafficmaster (Journeytime) data received from WG.	Unable to validate strategic model and microsim models due to missing journey time data	Very High	Low	Closed
Unexploded Ordnance (UXO) risk identified around Junction 4	Increased costs to GI and time required to reduce the risk	High	Medium	Active
Unforeseen strategic model and option testing tasks	Increased time and cost to scheme for completing traffic modelling tasks	High	Medium	Closed
Historic Opencast mining at proposed site for Junction 4	Difficult ground conditions for highway construction which could lead to significant earthworks costs	High	Medium	Active

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
Brexit impact on economy	Inaccurate future forecasting due to economic downturn or upturn	Medium	Low	Active
Modelling Year used in Option Testing	Using 2022 opening year may not be realistic and provide inaccurate outputs	Low	Very Low	Closed
Consultation Period Length	Too long or too short consultation period in relation to options being consulted	Medium	Low	Closed
Inaccurate traffic information at Moneypenny	Inaccurate assessment of options in traffic modelling due to uncertain trip patterns at Moneypenny	Medium	Very Low	Closed
WelTAG compliance and junction option testing	'Assumptions on likely preferred junction improvements have been used to limit the strategic modelling such that a fully incremental testing regime has not been used. It may be found that the WelTAG sifting and modelling could require additional tests to be run at a later date. A Technical Note (402166-0071) to cover the option testing approach was issued 07/10/19.	Medium	Low	Closed
Validation of Journey Time Data	'In review of the LMVR, raised that the Traffic master data provided by WG has gaps in information which had to be addressed with professional judgement to validate the strategic model. It is noted the model is functioning as expected.	Medium	Low	Closed
Covid-19 Impact on Programme Delivery	'With reference to EW77, resourcing, meetings and events required for remaining project deliverables are likely to be significantly impacted by the spread and restrictions of Covid-19. This relates to specific deliverables of Public Consultation events, external stakeholder meetings and bridge assessments	Very High	High	Active
Traffic speeds in the strategic model is not matching actual journey times on the network	'Potential traffic speed and journey time conflict may impact base year model validation and subsequent option testing.	Low	Low	Closed
Post-COVID financial position impacting scheme delivery and the associated potential in modal shift	'Due to possible future budget changes due to COVID-19, predominately the change in traffic demand, this may impact budget available for the scheme	High	Medium	Active

Source: Mott MacDonald

4.5.9 The main areas where risks have been identified are:

- Challenges at public inquiry
- Economic or political uncertainties
- Challenges to traffic modelling forecasting assumptions (Base year model meets all validation requirements)
- Scheme design shall aim to meet all standards

- Environmental conditions that are not yet understood
- Effective coordination with stakeholders including the Welsh Government, Wrexham County Borough Council, landowners and the public
- Post COVID19 financial position and the associated potential for modal shift

4.6 Monitoring and benefits realisation

4.6.1 As part of the implementation of the Scheme, a monitoring and evaluation plan as well as a Benefits Realisation Plan will be prepared to capture the following:

- Delivery of the Scheme
- Technical performance
- Wellbeing performance

4.6.2 The monitoring and evaluation of the delivery of the Scheme will largely focus on:

- Any changes in scope
- Adherence to programme
- Outturn costs
- Public and stakeholder issues raised

4.6.3 Technical performance will focus on operational performance (for example, changes in journey times and the frequency of recurring congestion) and public satisfaction (for example, public reception around maintenance and need for temporary closures).

4.6.4 The final part relates to realising the proposed benefits of the Scheme. This includes meeting the requirements of the Wellbeing of Future Generations Act and how the public investment scheme can ultimately be traced to the wider wellbeing of the community.

4.7 Summary of the Management Case

4.7.1 The assessment against the Management Case indicates that the framework for the delivery of the Scheme are in place. These include:

- An appropriate project team governance structure for KS2 that will evolve to meet the requirements necessary for KS3 and KS4
- A stakeholder engagement strategy that is tailored around the importance of different groups to the delivery of the Scheme
- A risk management strategy that includes an ongoing and updated risk register

4.7.2 At this stage of Scheme development, the main risks that have been identified:

- Challenges at public inquiry
- Economic or political uncertainties
- Challenges to traffic modelling forecasting assumptions (Base year model meets all validation requirements)
- Scheme design shall aim to meet all standards
- Environmental conditions that are not yet understood
- Effective coordination with stakeholders including the Welsh Government, Wrexham County Borough Council, landowners and the public
- Post COVID19 financial position and the associated potential for modal shift

5 Financial Case

5.1 Overview

The aim of the Financial Case is to assess whether the Scheme is affordable. At WelTAG Stage 2, the assessment is largely high level with an indication of potential capital and lifetime costs. The Case also considers some of the potential financial risks associated with the Scheme.

5.2 Summary of costs

5.2.1 Cost estimates have been calculated and are outlined in the ☞**Cost Profile**. These are high level costs and represent a provisional assessment as at February 2020.

5.2.2 For the economic modelling, a number of assumptions were made. To aid comparison particularly at this stage of Scheme development, the costs that were used in the economic modelling are presented in this WelTAG Stage 2 document. The key assumptions were:

- The costs presented are based on Option A – Junction enhancements with Junction 4 gyratory roundabout and A525 open to all traffic
- The estimates are based on a construction start date in 2021 and to complete in 2022 (Assumed Opening Year)
- Costs exclude all recoverable VAT
- The costs also include optimism bias of 44%
- The costs exclude the costs associated with the Moneypenny development link.

5.2.3 Table 25 provides a breakdown for Option A together with the sensitivity tests as outlined in the Transport Case. The potential differences in the costs between Options A, B, C and D are unlikely to be significant.

Table 25: Scheme Cost Summary (£, 2020 Prices)

Cost Type	Option A	Option A without Junction 3 and 6 components	Option A Junction 4 only
Preparation	£2,892,000	£2,850,000	£2,037,000
Supervision	£1,928,000	£1,900,000	£1,358,000
Works	£48,197,000	£47,493,000	£33,948,000
Land	£188,000	£188,000	£185,000
TOTAL	**£53,203,000**	**£52,430,000**	**£37,527,000**

Source: Mott MacDonald

5.2.4 The summary indicates that construction works to Junction 4 would form the largest element of cost and is estimated at £33.9 million at 2020 prices. Other elements such as preparation, supervision would be proportionally lower.

5.3 Funding profile

5.3.1 Based on the above costings, an indicative funding profile is shown in Table 26. This suggests that the bulk of the costs associated with the Junction 4 improvement would occur within the next three years, with other junction enhancements taking place after this period.

Table 26: Funding profile (£, 2020 prices in millions)

Item	2020-1	2021-2	2022-3	2023 +	Total
Option A: Junction enhancements with J4 gyratory roundabout and A525 open to all traffic	£5.0 m	£17.0 m	£16.9 m	£14.3 m	£53.2 m
Option A: Without J3 and J6 enhancements	£5.1 m	£17.0 m	£16.9 m	£13.5 m	£52.5 m
Option A: Junction 4 only	£3.6 m	£17.0 m	£16.9 m	--	£37.5 m

Source: Mott MacDonald

5.4 Affordability risks and opportunities

5.4.1 Linked with the risks identified in the Management Case, Table 27 identifies the main financial risks and opportunities. At this stage of Scheme development, these have not been monetised.

Table 27: Affordability risks and opportunities

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
Land requirements at junctions and A483 mainline	Suitable stakeholder engagement not completed which can delay/prevent land purchase	High	Medium	Active
Land developers objecting to proposed schemes.	Objections to proposed schemes due to reasons such as poor stakeholder engagement, extent of land take and/or linking new infrastructure to new developments.	High	Medium	Active
Public Inquiry in relation to preferred option.	Public inquiry delaying/stopping further development of the preferred option. (Likely a Key Stage 3 risk).	High	Medium	Active
Variations to year spend profile	Additional tasks and change of scope altering year spend profile and creating funding risk	High	Medium	Active
Unknown environmental risks along the A483	Unknown environmental risks affecting delivery of overall scheme.	High	Medium	Active
Environmental mitigation demands from NRW exceeding reasonable requirements. Based on past experience, agreeing mitigation measures with NRW can be difficult in the Wrexham area due to substantial demands by the NRW representative	Increased mitigation from NRW increasing budget and time required in design and construction	High	Medium	Active
The assessed capacities of existing over and under bridges between J3-6 on A483 are unknown and assessments are out of date.	Existing structures may require strengthening within the scheme area, even if improvement works are not proposed.	Medium	Medium	Active
Unexploded Ordnance (UXO) risk identified around Junction 4	Increased costs to GI and time required to reduce the risk	High	Medium	Active
Historic Opencast mining at proposed site for Junction 4	Difficult ground conditions for highway construction which could lead to significant earthworks costs	High	Medium	Active
Post-COVID financial position impacting scheme delivery and the associated potential in modal shift	'Due to possible future budget changes due to COVID-19, predominately the	High	Medium	Active

Risk identified	Impact	Impact	Likelihood Post mitigation	Status
	change in traffic demand, this may impact budget available for the scheme			

Source: Mott MacDonald

5.5 Budget Constraints

5.5.1 As of December 2019, funding levels have yet to be formally confirmed and there is a need to consider the preferred scheme of packaged measures against other schemes across Wales as there are likely to be other competing projects challenging for a limited monetary fund availability. Therefore, the value for money considerations for the preferred interventions have been considered independently of each other as they could each be constructed in isolation.

5.5.2 The incremental economics developed to support the transport case (as shown in Table 25) indicates that the cost of the **major highway intervention at Junction 5 is unlikely to provide any significant value for money in its own right**. This would also be very disruptive to construct as it is an online carriageway widening improvement. Therefore, a less disruptive option is proposed with no online carriageway widening improvements, but enhancements to traffic signals and the Active Travel routes in the environs of the Junction 5. The final proposed improvements for each junction are shown in Appendix 1 and include Active Travel route enhancements, a major highway intervention at Junction 4 and minor online improvements for junctions 3 and 6.

5.6 Sources of funding

5.6.1 As of December 2019, funding sources have yet to be formally confirmed. There are a range of funding sources available including:

- Welsh Government capital funding – Direct capital funding dependent whether funding rounds are available
- Welsh Government Non-Profit Distributing Model (NPD) – A form of public-private partnership funding but the NPD involves a fixed rate of return for private investors
- Growth Deal funding – Funds may be available from the North Wales Growth Deal, but usually committed to other infrastructure and economic improvements
- European structure funding – Certain areas of Wales have benefitted from EU structure funding with key transport corridors outside these immediate areas also receiving monies. The status of the funding and replacement streams as part of the UK withdrawal from the EU is not known as of December 2019

5.7 Summary of the Financial Case

5.7.1 At this stage of Scheme development, high level costs were estimated. To aid comparison and to keep the assessment as straightforward as possible, the costs presented in the ☞**Economic Assessment Report** have been utilised. A number of assumptions have been used including discounting costs to a 2010 base level and the application of an optimism bias of 44%. The costs also exclude the enhancements associated with the Moneypenny development link at Junction 4.

5.7.2 At this stage, the differences in costs between Option A and the other options are not likely to be significantly different. However, estimated costs have been calculated for the sensitivity tests as outlined in the Transport Case. These indicate:

- Junction 4, on its own, would form the largest element of cost and estimated at £33.9 million at 2020 prices. Costs such as preparation, supervision and land would increase that total to £37.5 million, also at 2020 prices
- Adding the other Junction enhancements at 3, 5 and 6 would increase the overall total to £53.2 million also at 2020 prices.

5.7.3 A high-level funding profile has been put together and this indicated that the bulk of funding would be required in the first three years.

5.7.4 An initial assessment of the affordability risks has been undertaken, but at this stage of Scheme development, these have not been monetised. The main affordability risks are:

- Land requirements and objections
- Potential of a public inquiry
- Variations to yearly spend
- Unknown environmental risks

6 Commercial Case

6.1 Overview

The Commercial Case assesses whether the Scheme can be procured and the procurement risks can be managed. Given this is a WelTAG Stage 2, the approach to the Commercial Case is at a high level and will be developed into greater detail at WelTAG Stage 3, as outlined in the WelTAG Guidance.

6.2 Options and commercial delivery

6.2.1 At this stage of Scheme development, detail around how the short list of options would be procured has not been fleshed out. On this basis, the assessment against the Commercial Case has been generally applied irrespective of option even where there may be modest differences.

6.3 Output based specification

6.3.1 The main aim is to ensure the Scheme can be delivered within budget and in good time to maximise the objectives. In particular:

- Ensure the Scheme is affordable, demonstrates best value and provides good value for money for the investment
- Deliver a scheme that meets the needs of all stakeholders
- Minimise environmental impacts of the Scheme

6.3.2 The level of budget available for this scheme has yet to be fully finalised, but the value for money considerations for the preferred interventions indicate a phased approach to construction would be possible, the least disruptive and therefore the most beneficial to the wider Wrexham area. However, when each junction intervention is then considered in isolation of the other component parts of the package, the cost of the major improvement at junction 5 is outweighed by its lesser need for improvement and the consequently lower associated benefits.

6.3.3 Having adopted a plan for a phased approach to construction to ensure adequate budget can be secured, the major highway improvement at junction 5 has been removed from the preferred option. The final proposed improvements for each junction are shown in Appendix 1 and include:

Initial Phase – construction of new Junction 4 starting in 2021

- Replacing the existing Junction 4 arrangement with a new gyratory roundabout to the immediate south of the existing junction
- Retention of the existing A525 bridge over the A483 for all traffic
- Improvements to pedestrian and cyclist provision along the A525 and across the A483

Future Phases – construction to start after completion of Junction 4 improvements in 2022

Improvements to Junction 3, 5 and 6 to be phased, in any order, and all include Active Travel enhancements in the environs of the junctions.

Junction 3	– Additional flare lane on B5605 approach to roundabout
Junction 5	– Signals proposed for Mold Road entry to Junction 5. – Improved signalisation of the Plas Coch circulatory
Junction 6	– Additional lane on Chester Road southbound approach and the Blue Bell Lane approach – Extension to A483 southbound off-slip right turn lane – Additional circulatory lane between the A483 northbound off-slip and the industrial estate access road

6.3.4 The method of procurement will need to consider:

- Price certainty
- Secure optimised whole-life cost
- Meeting funding timescales for delivery
- To optimise the apportionment of risk
- Meeting stakeholders' requirements

6.3.5 Another element of the procurement approach is to ensure it is aligned with the Welsh Government's project processes. This should spell out elements such as the standard project lifecycle, standard project deliverables, project control processes and governance arrangements.

6.4 Procurement strategy

6.4.1 As part of KS3, a preferred procurement strategy will be prepared, and this will be outlined in WelTAG Stage 3. As of December 2019, the Welsh Government's preferred form of procurement for a Scheme of this type is the NEC4 Engineering Construction Contract (ECC).

6.4.2 ECC comprises four methods (ECC A to D) and the advantages and disadvantages of each are summarised in Table 28. In addition to this is also the impact of the level of design maturity. Essentially, ECC methods A and B are usually used where designs that are well defined at tender or only requiring a low level of change. Conversely, ECC methods C and D are for designs adequately defined but will require more substantive design refinement.

Table 28: Procurement strategy

Method	Advantages	Disadvantages
Method A Lump sum with activity schedule	**Simplicity of payment assessment and forecasting of cashflow**. Clarity of passing of **financial risk to contractor**. **Simple to pass down financial risk to smaller subcontractors** familiar with priced contracts. Direct **link between activity schedule and programme**.	**Risk transfer costs.** **No direct commercial incentive for project manager (on behalf of employer) to collaborate** – any saving or overspend compared with total of the Prices is taken by the contractor only. **No commercial incentive for contractor to suggest changes** to employer's works information (this can be added). **No openness of contractor's costs** required. **Assessment of the cost of compensation events** uses a model of cost that is not in use for regular payment assessment and so is less familiar to those using it. In assessment of compensation events, **a subcontractor's fee is not included in the contractor's actual cost**. The tenderer therefore must make an allowance in his own fee percentage for possible subcontractor's fees for possible work under compensation events. (This can be modified).
Method B Lump sum with bill of quantities	Allows **employer, if appropriate, to take the risk of accuracy in tender quantities** e.g. where he has been responsible for the preparation of bills of quantities and the (outline) design leading to them. **Similar payment mechanism to consultant design/contractor build measure and value contracts** (e.g. ICE 5th, 6th, 7th) (although this is now much less of an advantage as use of the NEC ECC increases compared with that of consultant design/contractor build forms). **Allows use of bill rates to be used for rapid assessment of compensation events** but only when agreed by both project manager and contractor: the default, like all other ECC main options is to consider the effect of the compensation event on 'defined cost plus fee'	**Requires monthly 'measurement'** of progress of the works that is clearly not a 'value adding' activity. **Requires an 'activity schedule' of sorts linked with programme to generate a predicted cash flow**, even though the activity schedule is not required for payment. **Requires an appropriately detailed method of measurement** that can be a cause of misunderstanding and or disagreement. (The employer takes the risk of all errors in the BoQ) **Unlikely to be appropriate if contractor is responsible for the design** and so for the quantities required. **Assessment of the cost of compensation events** uses a model of cost (Defined Cost + Fee) that is not in use for regular payment assessment and so is less familiar to those using it. **Similar payment mechanism to** consultant design/contractor build **measure and value contracts** can lead to users not paying the required attention to the many features of the NEC ECC that are completely different
Method C Target cost with activity schedule	**Direct commercial incentive to collaborate** for project manager (on behalf of employer) and contractor – any saving or overspend compared with total of the prices – the project target - is shared and so all 'contractor risks' are really 'project risks' and the Project Manager has a direct commercial incentive to help manage them. **Visibility of defined cost** to all. **Complete flexibility in selection of share ranges and share percentages** to develop an appropriate commercial incentive structure. In the extreme this is from 0% share (effectively reimbursable) to 100% share (effectively lump sum). Requirement to present target cost **encourages openness** relating to resource planning and risk allocation and pricing. **Assessment of the cost of compensation events** uses a model of cost that is in use for regular payment assessment and so is familiar to those using it. **Can be adapted** to support a procurement strategy allowing target costs for successive sections of work to be developed through the contract. **Can be adapted to include employer's own costs** in overall project target.	**No direct linkage between activity schedule and programme** **Cashflow is less certain** than with e.g. Method A (although a modification can be made to pay according to a predetermined cashflow and correct according to actual costs). **Assessment and audit of 'defined cost' is time-consuming** (although it is possible to use the contractor's own 'model' of cost rather than the ECC's 'schedule of cost components'). Systems for monitoring **disallowed cost** must be set up from the start Drafting issues: The **definition of defined cost** requires a forecast of what will be due to paid (to subcontractors and directly by the contractor) at the next assessment date. **Definitions within 'disallowed cost'** are subject to interpretation and have caused disagreements. **Timing of payment of the contractor's share** is unacceptable to some employers.
Method D Target cost with bill of quantities	**Allows employer, if appropriate, to take the risk of accuracy in tender quantities** where he has been responsible for the preparation of bills of quantities and the (outline) design leading to them. **Visibility of defined cost** to all **Allows use of bill rates to be used for rapid assessment of compensation events** but only when agreed by both project manager and contractor: the default, like all other ECC main options is to consider the effect of the compensation event on 'Defined Cost plus fee). Direct commercial incentive to collaborate for project manager (on behalf of employer) and contractor– any saving or overspend compared with total of the prices – the project target - is shared. **Complete flexibility** in selection of share ranges and share percentages to develop an appropriate commercial incentive structure. In the extreme this is from 0% share (effectively reimbursable) to 100% share (effectively lump sum). Requirement to present (or collaboratively develop) target cost **encourages openness** relating to resource planning and risk allocation and pricing. (Particularly appropriate if contractor is part of integrated team developing design and target) **Assessment of the cost of compensation events** uses a model of cost that is in use for regular payment assessment and so is familiar to those using it. **Can be adapted to include employer's own costs** in overall project target.	**As for Method C** and **Requires remeasurement** of the works that is clearly not a 'value adding' activity – in addition to assessment of actual costs **Requires an appropriately detailed method of measurement** that can be a cause of misunderstanding and or disagreement. **Unlikely to be appropriate if contractor is responsible for the design** and so for the quantities required.

Source: Mott MacDonald

6.5 Procurement related risks

6.5.1 Given the procurement strategy has yet to be fully developed, it is not possible at this stage to identify the appropriate procurement related risks. The risks that are likely could include ensuring adequate procurement lead in times and taking account of potential construction phasing.

6.5.2 Nevertheless, the following guiding principles will be adhered to:

- Risk management is embedded as part of all project management activities and decision making
- Risk management will be proactively and consistently applied throughout the project lifecycle
- The management of risks is to ensure their reduction to a level as low as 'reasonably practical' or adopt an appropriate mitigation strategy
- A risk management plan will be initiated at the beginning of the project
- Risk communication will be open and transparent to all stakeholders

6.6 Summary of the Commercial Case

6.6.1 In line with guidance, consideration of the options against the Commercial Case is at a high level and will be assessed in greater detail at WelTAG Stage 3.

6.6.2 Nevertheless, there are a number of possible approaches to procurement. Principally there are four potential methods that sit under the Welsh Government's preferred NEC4 Engineering Construction Contract (ECC) framework.

6.6.3 One further consideration with the preferred method of procurement is the level of design maturity, with methods reflecting the level of design definition and risk. The procurement process will also need to consider risks around time, quality, cost and risk transfer.

7 Conclusions and Recommendations

7.1 Summary

7.1.1 This WelTAG Stage 2 Report has reviewed and refreshed the Case for Change. The key drivers for the Scheme are identified as:

- Lack of capacity at Junctions 4 and 5
- A483 related delay and operational safety issues due to tailing back onto the A483 at peak periods is hindering the viability of new development in Wrexham
- Potential for trips to reassign between A483 junctions due to congestion
- Support the Wrexham County Borough Council Local Development Plan and associated economic growth

7.1.2 A long list of options around a number of themes were developed and assessed. This indicated:

- At Junction 4, a number of new layout permutations would work, but some would be more effective, with longer-term future proofing
- The options for Junction 4 should be packaged with the better-performing options for Junctions 3, 5 and 6

7.1.3 Based on this a short-list of 4 ‘packaged’ options (Options A to D - outlined in Table 10) have been identified for further assessment against the 5-case model.

7.1.4 The economic assessment found:

- For Option A, it could provide £12.8 million of economic benefits over a 60-year period resulting in a BCR of 0.315. This would provide ‘poor’ value for money as defined by the Department for Transport Value for Money Framework 2015, but it is important to state there would be wider economic benefits arising from the Scheme.
- Improvements particularly to Junction 4 could support three employment sites within a 2 km distance of the A483. This has the potential to create 1,454 net jobs and approximately £64.4 million of GVA per annum.
- A phased construction of option A with junction 4 improvements as the first major construction phase would provide £14.5 million of economic benefits over a 60-year period resulting in a BCR of 0.482 for this phased approach combined with Active Travel improvements only.

7.1.5 The level of environmental impacts are estimated to be low for both the quantitative and qualitative assessment. With other social impacts, there are likely to be slight to moderate benefits for physical activity improvement, journey quality, access to services, personal affordability, severance and option values. There would also be travel time benefits to commuters and other users coupled with a marginal improvement in vehicle operating costs.

7.1.6 The assessment against the Management Case indicates that the framework for the delivery of the Scheme is in place. However, a number of main risks have been identified and will need to be mitigated as the Scheme is developed in more detail.

7.1.7 At this stage, the differences in costs between Option A and the other options are not likely to be significantly different. However, estimated costs have been calculated for the sensitivity tests as outlined in the Transport Case. These indicate:

- Junction 4, on its own, would form the largest element of cost and estimated at £33.9 million at 2010 discounted prices. Costs such as preparation, supervision and land would increase that total to £37.5 million, also at 2010 discounted prices

7.1.8 The initial assessment of the Scheme against the Commercial Case has been done at a high level, although it should be noted this is in line with WelTAG guidance. The initial assessment indicated the NEC4 Engineering Construction Contract (ECC) framework as the preferred approach.

7.2 Recommendation

Based on the Five Case Model, this WelTAG Stage 2 assessment recommends a phased approach to construction. The first phase will be construction of **Junction 4 with a gyratory roundabout and retaining the A525 open to all traffic,** which includes enhancement of Active Travel routes in the environs of the junction.

This option comprises:

- Replacing the existing junction arrangement with a new gyratory roundabout to the immediate south of the existing junction
- Retention of the existing A525 bridge over the A483 for all traffic
- Improvements to pedestrian and cycling provision along the A525 across the A483

After Junction 4 has been implemented, the following improvements to Junction 3, 5 and 6, which will all include enhancement of Active Travel routes in the environs of the junctions, are to be considered over a phased construction period:

Junction 3	– Additional flare lane on B5605 approach to roundabout
Junction 5	– Signals proposed for Mold Road entry to Junction 5. – Improved signalisation of the Plas Coch circulatory
Junction 6	– Additional lane on Chester Road southbound approach and the Blue Bell Lane approach – Extension to A483 southbound off-slip right turn lane – Additional circulatory lane between the A483 northbound off-slip and the industrial estate access road

On the basis that this phased construction process option:

- Would provide better future proofing at Junction 4
- Can be constructed and delivered with minimal impact on existing traffic
- Will enable the economic development of Wrexham
- Will be more affordable
- Will be able to be delivered in phases

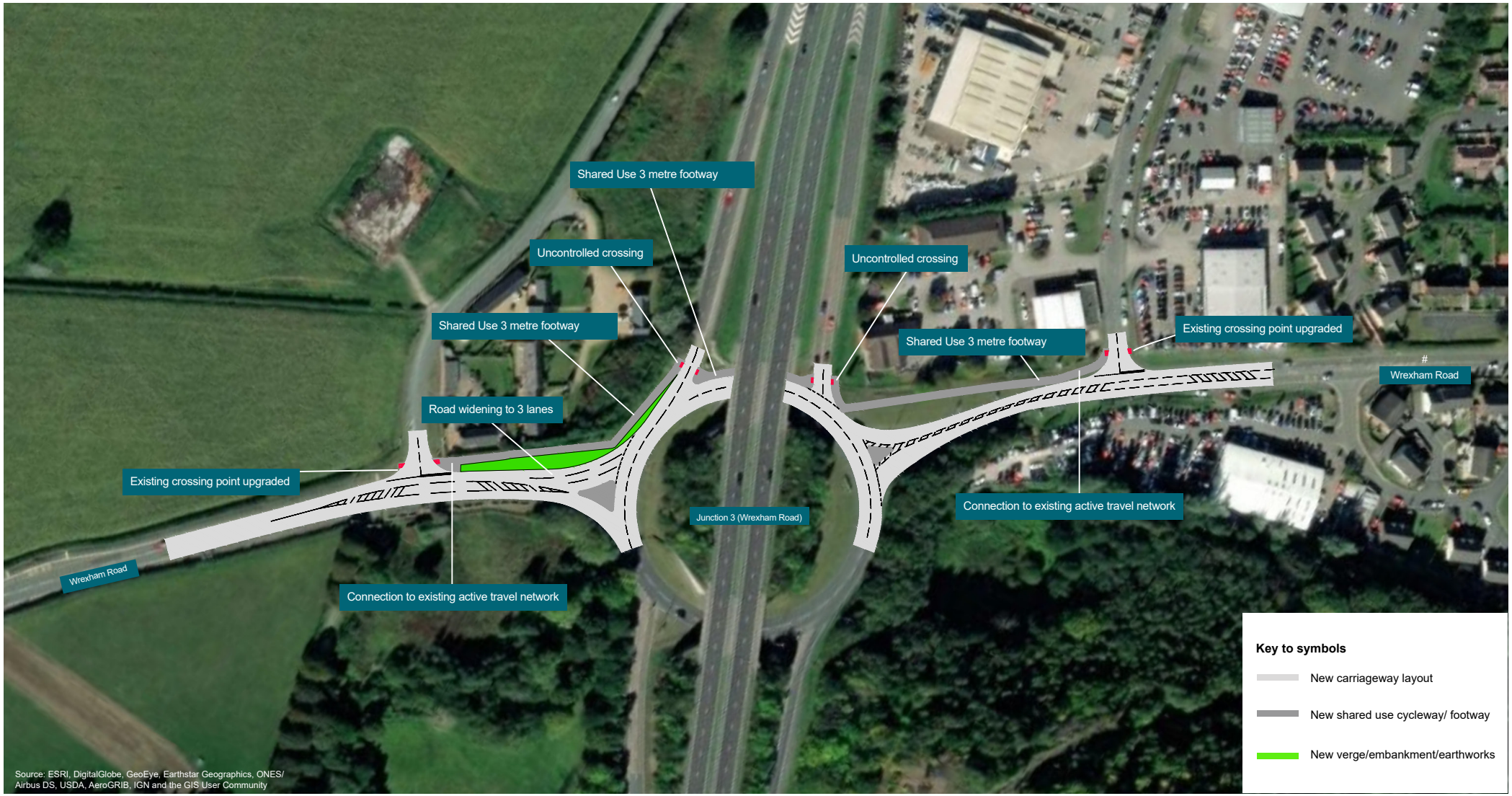
Glossary

AADT	Average Annual Daily Traffic
AMCB	Analysis of Monetised Costs and Benefits
BoQ	Bill of Quantities
CBC	County Borough Council
COBALT	Cost and Benefits to Accidents – Light Touch (software)
DfT	Department for Transport
EAR	Economic Assessment Report
ECC	Engineering Construction Contract Framework
IAR	Impacts Assessment Report
KS2/3/4	Key Stage 2/3/4
LDP	Local Development Plan
LMVR	Local Model Validation Report
LTP	Local Transport Plan
NDF	National Development Framework
NMU	Non-Motorised User
NMWTRA	North and Mid Wales Trunk Road Agent
NPV	Net Present Value
NO_2	Nitrogen Dioxide
NRW	Natural Resources Wales
NWJLTP	North Wales Joint Local Transport Plan
OBC	Outline Business Case
ODP	(Rail) Operator and Developer Partner
PIE	Public Information Event
QRM	Quantitative Risk Analysis
QUADRO	Queues and Delays at Roadworks (software)
RML	Richards Moorehead and Laing
SOC	Strategic Outline Case
TAG	Transport Analysis Guidance
TUBA	Transport Users Benefits Appraisal (software)
VOC	Vehicle Operating Costs
WELLIE	Well Being Impact Evaluation
WelTAG	Welsh Transport Planning and Appraisal Guidance

Appendix **1** – Public Consultation Junction Improvement Plans

Proposed Scheme for Junction 3 (Wrexham Road)

Llywodraeth Cymru
Welsh Government



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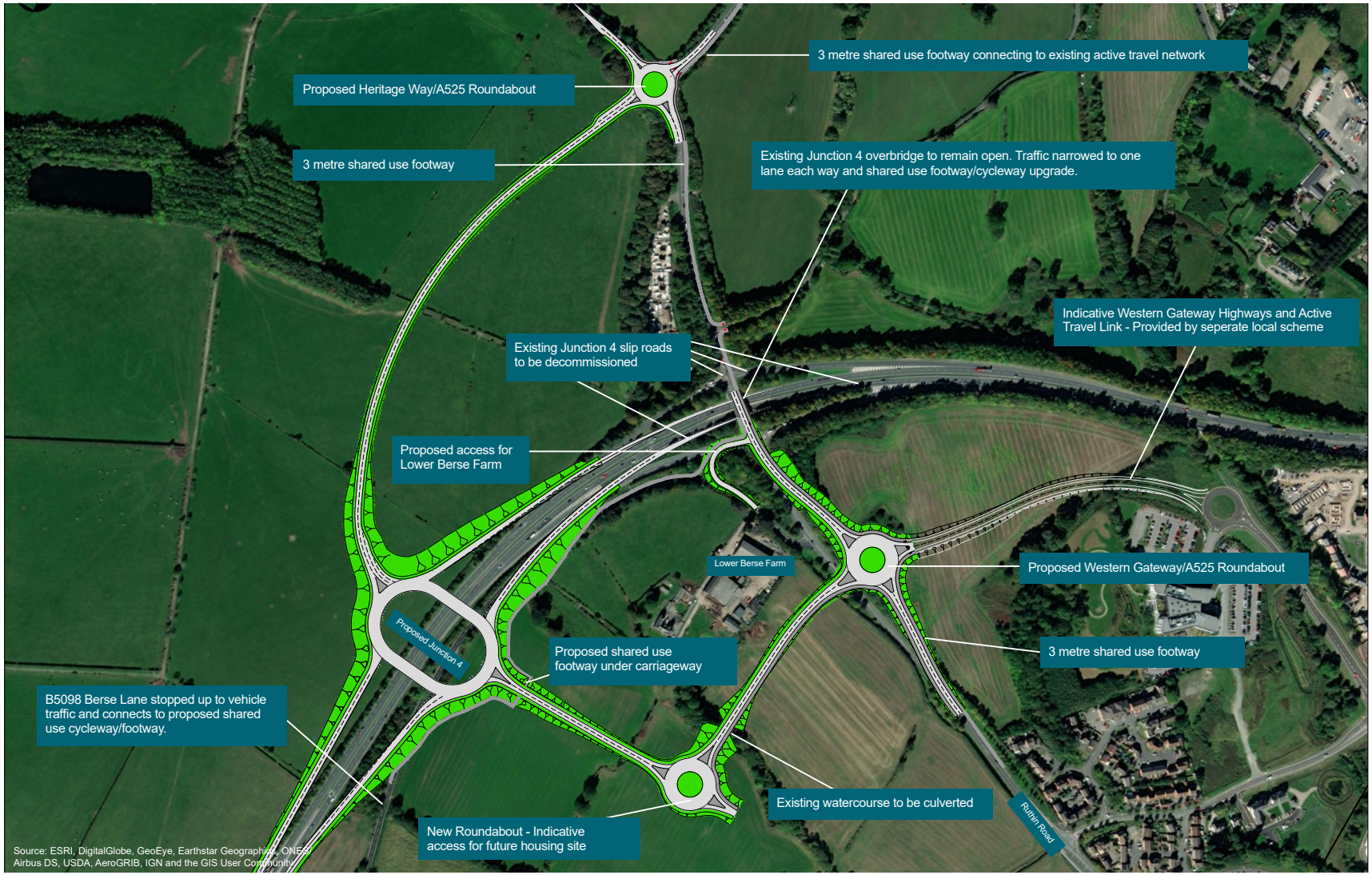
Proposed Scheme for Junction 4 (Ruthin Road)

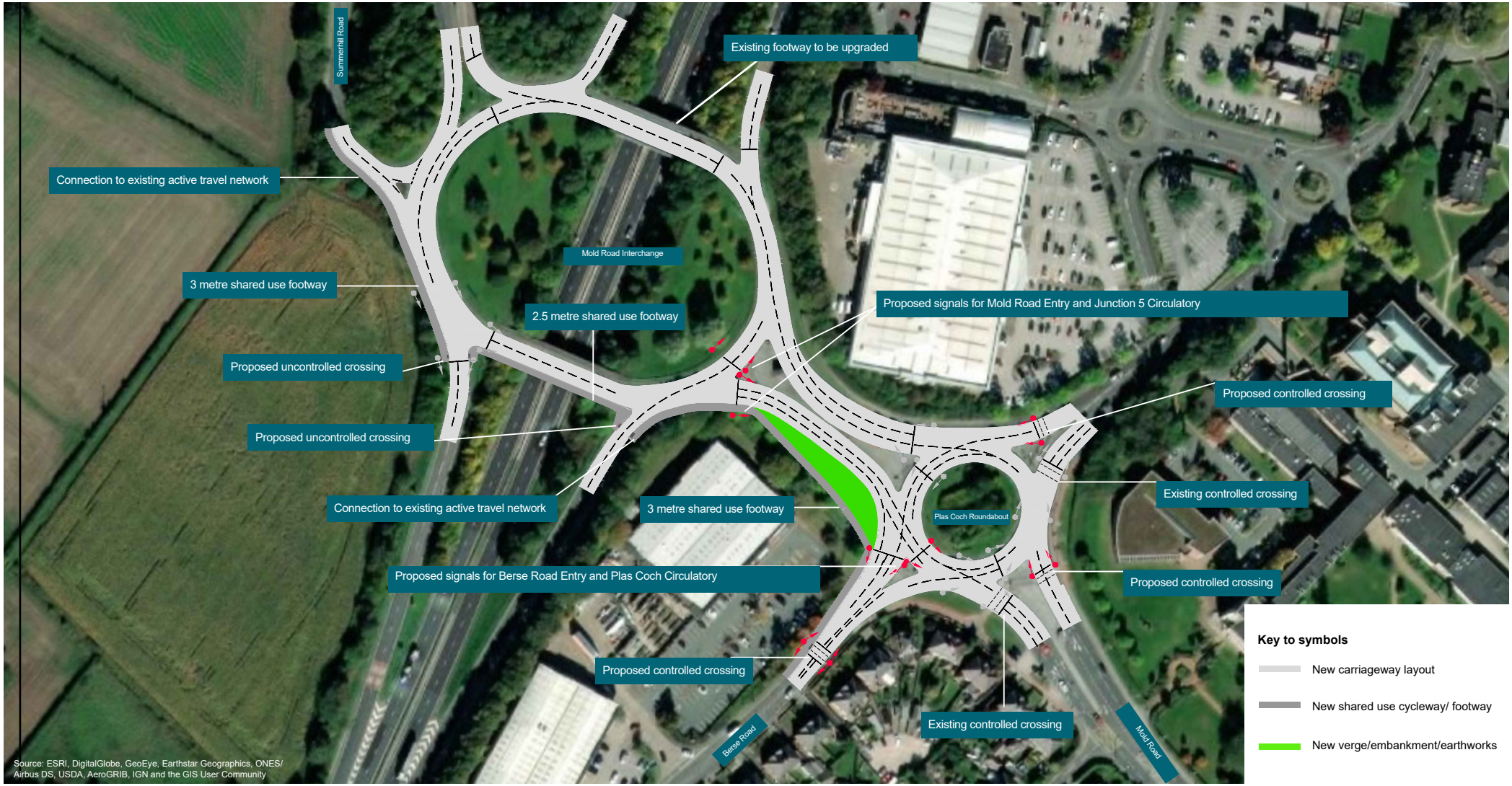


Key to symbols

- New carriageway layout
- New shared use cycleway/ footway
- New verge/embankment/earthworks

Proposed Scheme for Junction 5 (Plas Coch Roundabout / Mold Road)

Llywodraeth Cymru
Welsh Government



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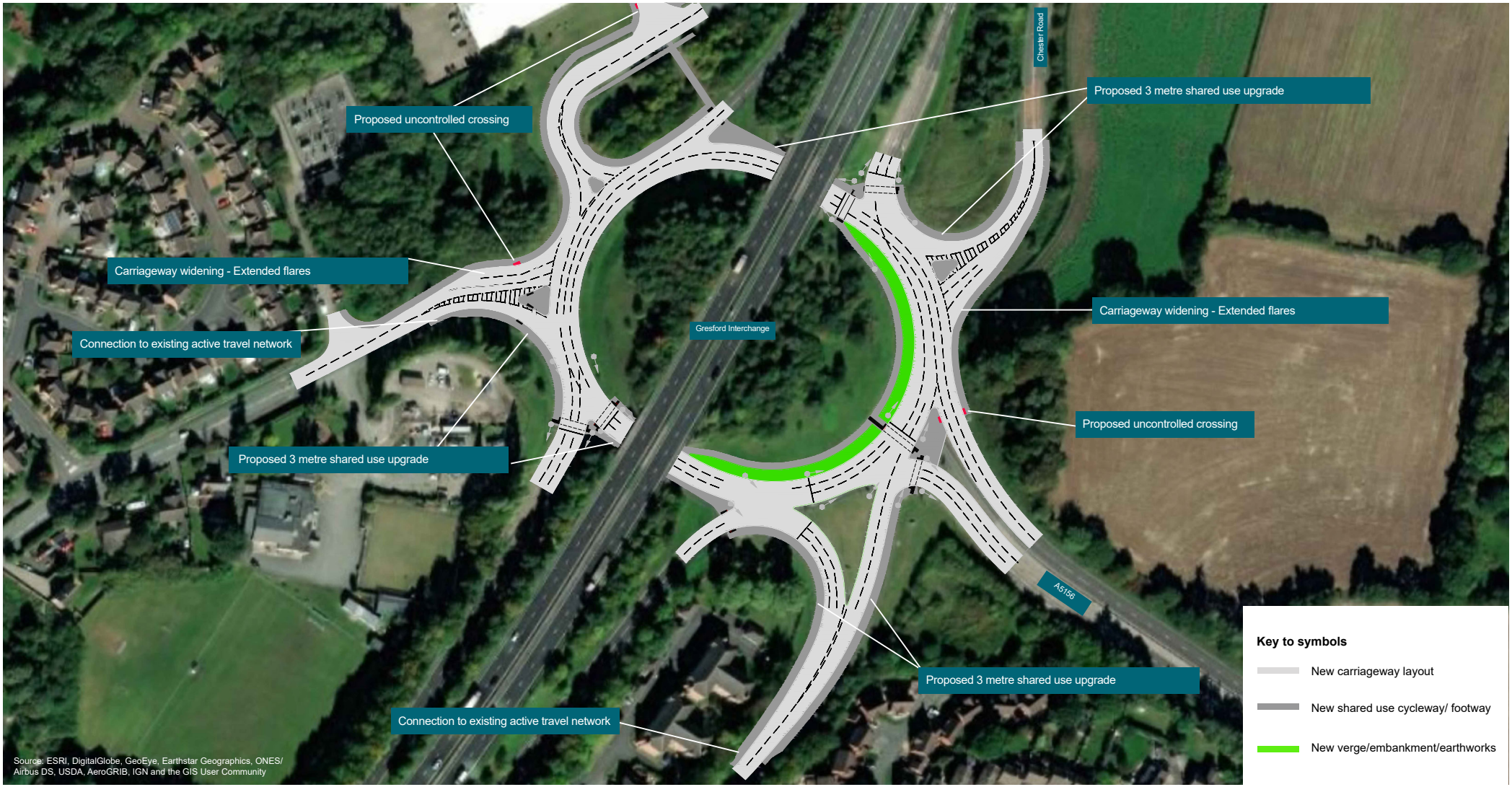
Proposed scheme for Junction 6 (A5156 / Gresford Interchange)

Llywodraeth Cymru
Welsh Government



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