



WeITAG Stage 1 Report

A483/A5 Transport Corridor Chirk to Rossett

6 October 2017

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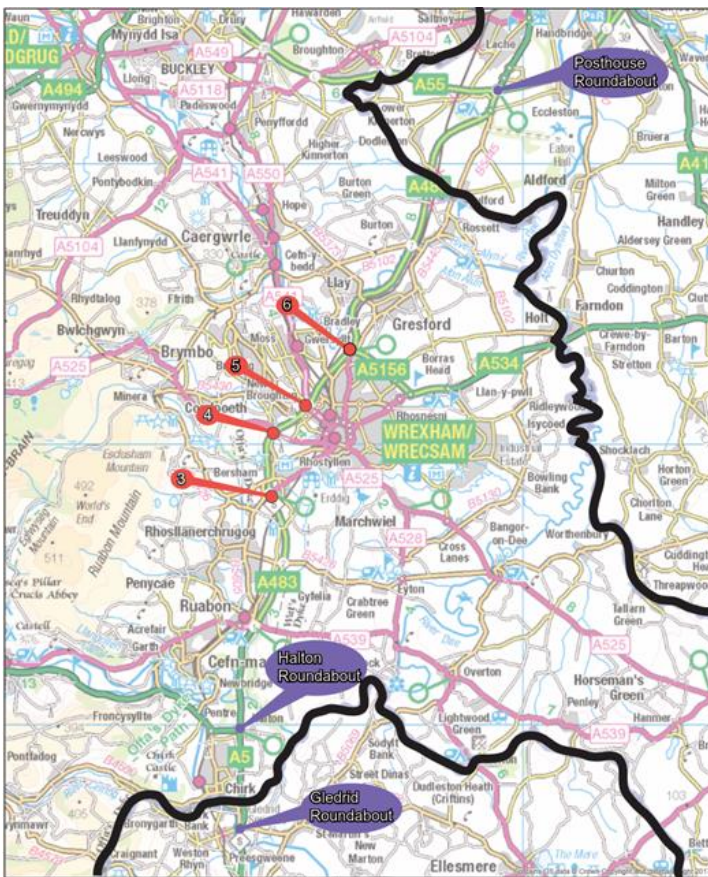
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Executive summary

Introduction

Welsh Government and Wrexham CBC are concerned by the level of road based congestion on the A483/A5 corridor and the impact on growth aspirations for Wrexham and the wider North Wales region. Mott MacDonald has therefore been commissioned to undertake a WelTAG Stage 1 (2017 consultation draft) appraisal for the A483/A5 transport corridor, between Chirk (Gledrid Roundabout) and the Rossett Interchange. The relevant section of the A483/A5 corridor is shown below.

A483/A5 Corridor



Source: Mott MacDonald. Contains OS data © Crown copyright and database right 2017

The purpose of a WelTAG Stage 1 appraisal (Strategic Outline Case) is to understand the issues, establish objectives, propose possible solutions and select a short list of options for more detailed consideration. For this study, the short-listed solutions should help to reduce road based congestion, such that congestion does not become a constraint to wider economic development across North Wales and to allow the Wrexham area to accommodate growth at the levels proposed in the emerging Local Development Plan (LDP).

Two stakeholder workshops were held to review identified issues, prioritise objectives, generate a solutions long list, and comment on the initial short list assessments.

WeITAG 2017 (consultation draft) appraisals are structured around the five case model for business cases, comprising Strategic, Transport (Economic), Delivery, Financial, and Commercial cases.

Strategic Case

The Strategic Case sets out the 'case for change' on the A483/A5 corridor, including the key issues and their main contributory factors, objectives for solutions, and a long list of potential solutions.

Key Issues

Key issues have largely been identified from existing planning documents, economic development and transport strategies, and plans, produced at a variety of spatial scales, supplemented with additional publicly available data sources.

Many of the issues identified are interrelated and can be grouped into a smaller number of contributory factors – local and regional growth aspirations which will rely on the A483 being able to accommodate additional demand, a high car mode share, capacity constraints that exist on the A483 and local road network, and severance caused by the A483.

Highway and congestion-related issues are a high priority for stakeholders, with specific highway capacity issues at A483 Junction 4 and Junction 5 seen as the most important. Traffic flows on the A483/A5 corridor already exceed design standards, which means that future traffic growth associated with housing and employment growth will be difficult to accommodate safely unless improvements are made to the road. For Wrexham CBC, the A483/A5 transport corridor is critical to the emerging LDP 2013-2028 and the need to accommodate 7,750 new homes over the next 10 years, along with growth in employment land.

Objectives

Taking into account stakeholder feedback, two top tier (higher priority) objectives for solutions to issues on the A483/A5 transport corridor have been defined:

- Support and enable the LDP growth aspirations of Wrexham; and
- Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability

Three second tier objectives have also been defined:

- Reduce 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; and
- Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor.

Option Long List

A long list of 81 potential solutions / transport packages to address the issues has been generated, with significant stakeholder input. Solutions cover a range of scheme types including highway capacity improvements, new road construction, road safety, active travel, park and ride, bus and rail infrastructure and service improvements, and travel demand management. Each solution has been assessed (scored) against the five objectives. Scores were reviewed and solutions not scoring well in their own right were packaged with other solutions where possible and rescored. Following the Strategic Case assessment, 24 solutions have been removed from the long list and 57 solutions carried through for wider assessment in the Transport Case.

Transport Case

The Transport Case at WeITAG Stage 1 provides an initial assessment of the socio-cultural, environmental, and economic impacts of the solutions long list. All 57 solutions (including packages) that scored positively in the Strategic Case have been carried through for assessment against the full range of WeITAG impact criteria, as well as criteria associated with the Delivery, Financial, and Commercial cases.

The following points have been noted with regard to the Transport Case:

- The five highest scoring solutions under the Social and Cultural impact category are solutions that provide alternatives to the private car.
- The highest scoring solution under the Environmental category aims to deter car commuter trips and would be expected to reduce traffic noise and improve local air quality due to reduced traffic queues within Wrexham.
- High scoring solutions in the Environmental category also provide additional highway capacity largely within the highway boundary, or provide smart technology solutions to optimise road space use, therefore reducing traffic queuing and improving local air quality. Other solutions, such as sustainable transport packages, are expected to help reduce greenhouse gas emissions by encouraging mode shift from the private car to public transport and active modes.
- Solutions that score highest under the Economic category are those that would be likely to deliver the greatest improvements in journey times and journey time reliability on the highway network, while also potentially having the ability to unlock development land and benefit the local economy.
- Solutions that scored the highest across the Delivery, Financial, and Commercial impact areas are primarily those that involve infrastructure improvements to deal with localised issues. These are generally conventional construction schemes that are unlikely to be controversial and which do not substantially increase future revenue liabilities.

Following the full multi-criteria assessment, a total of 37 solutions have been removed from the revised long list either because of a low overall weighted score or because the solutions perform better as part of a wider package of measures. The remaining 20 solutions have been placed into the initial short list.

Option Short List

Based on the multi-criteria assessment, the following six solutions are suitable for the final short list:

- CAP1a - Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5;
- JNC3 - 3rd lane on A483 to serve Wrexham, J3-J6;
- CAP8 - A483 wider corridor hotspot package, beyond J3-6 - Gledrid, Halton, Posthouse;
- TRR1 - A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3 in order to reduce pressure on J4;
- TDM1a - West Wrexham town sustainable transport package - new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site; and
- RAL4a - Rail frequency enhancement package - service frequency, increased parking, all mode access to Wrexham General.

Eleven other solutions can be considered as component parts of one of the above short listed solutions. These component parts might be considered as stand-alone schemes, if the wider package is not progressed, or as a short term solution with the wider package representing the longer term solution:

- JNC7 (comprehensive Junction 4 improvement) and JNC4 (Improve capacity at Junction 5), as component parts of package CAP1a;
- ACT6 (Junction 5 active travel improvements), ACT7 (Junction 4 active travel improvements), ACT10 (Cross-A483 active travel package), BUS6 (A483 corridor bus priority measures on B5605), BUS8 (Junction 5 bus priority), BUS10 and BUS11 (bus improvement packages), as component parts of package TDM1a;
- CAP2 as a short term capacity solution for CAP8; and
- TRS3 (rerouteing strategy) as a component part of TRR1.

Short list solutions for the A483/A5 transport corridor are not mutually exclusive. It would be possible to deliver them all or to deliver a smaller number as part of a corridor strategy.

Delivery Case

The Delivery Case at WeITAG Stage 1 identifies the key delivery (timescale, feasibility, legal) risks associated with progressing the short-listed options, and the additional evidence and assessments that would be required to assess the short list at WeITAG Stage 2.

A risk register for carrying forward to WeITAG Stage 2 is included in the separate WeITAG Impacts Assessment Report. Key programme level risks relate to uncertainty over funding and in relation to improvements proposed by Highways England on the continuation of the A483/A5 corridor in England. Any solution delivered in Wales will need to be complementary to solutions delivered in England.

Before commencing WeITAG Stage 2, work will be needed to understand the extent to which travel demand management solutions and direction signing reviews might free up capacity on the A483/A5. This has an impact on the extent of highway improvements required.

At WeITAG Stage 2 (Outline Business Case) further, more detailed, assessments will need to be undertaken for the shortlisted solutions, including cost estimates, transport modelling, and environmental surveys. Option assessment work will be needed at Stage 2 to define the exact extent of improvements required and the component measures that are to be included in the packages.

A draft delivery programme will need to be prepared at WeITAG Stage 2, setting out the short, medium, and long term solutions proposed.

Financial Case

The Financial Case at WeITAG Stage 1 provides an initial commentary on the lifetime cost implications of the short-listed solutions. The proposed highway capacity improvement schemes generally have the highest implementation cost, particularly where the Dee and Ceiriog viaducts are affected. The travel demand management and public transport solutions, while generally have lower implementation costs, are likely to require ongoing subsidy.

Commercial Case

The Commercial Case, when complete, should address all aspects of scheme procurement, including the level of private sector involvement, risk allocation, third party funding potential and ongoing liabilities facing scheme promoters. At WeITAG Stage 1 the Commercial Case sets out the high level procurement considerations associated with the short list:

- Potential funding sources, particularly in situations where funding and procurement are interlinked.
- Risk allocation and transfer, applying the general principal that risks should be passed to the party best able to manage them.

The principal commercial risks relate to national policy changes and funding pressures. This type of risk is strategic and the impact on procurement is usually accepted. The remaining commercial risks are connected with financial consequences to the Welsh Government and/or Wrexham CBC:

- Procurement of any additional services, unforeseen at present;
- Sufficiency of scheme funding (accuracy of cost estimation / inflation); and
- Schedule-based risks.

The procurement strategy will need to consider the contractual framework and contract management approach.

Next Steps

The outcomes from this WelTAG Stage 1 study can now be used to justify solution shortlisting, devise an overall strategy for the A483/A5 corridor, liaise further with stakeholders, and commission more detailed work on short-listed solutions.

The next steps for Welsh Government and Wrexham CBC are to agree that the short list can be progressed to WelTAG Stage 2, undertake more detailed option assessment including costing and transport modelling, liaise with Highways England on cross-border solutions, prepare Outline Business Cases for short-listed solutions, and identify suitable funding sources.

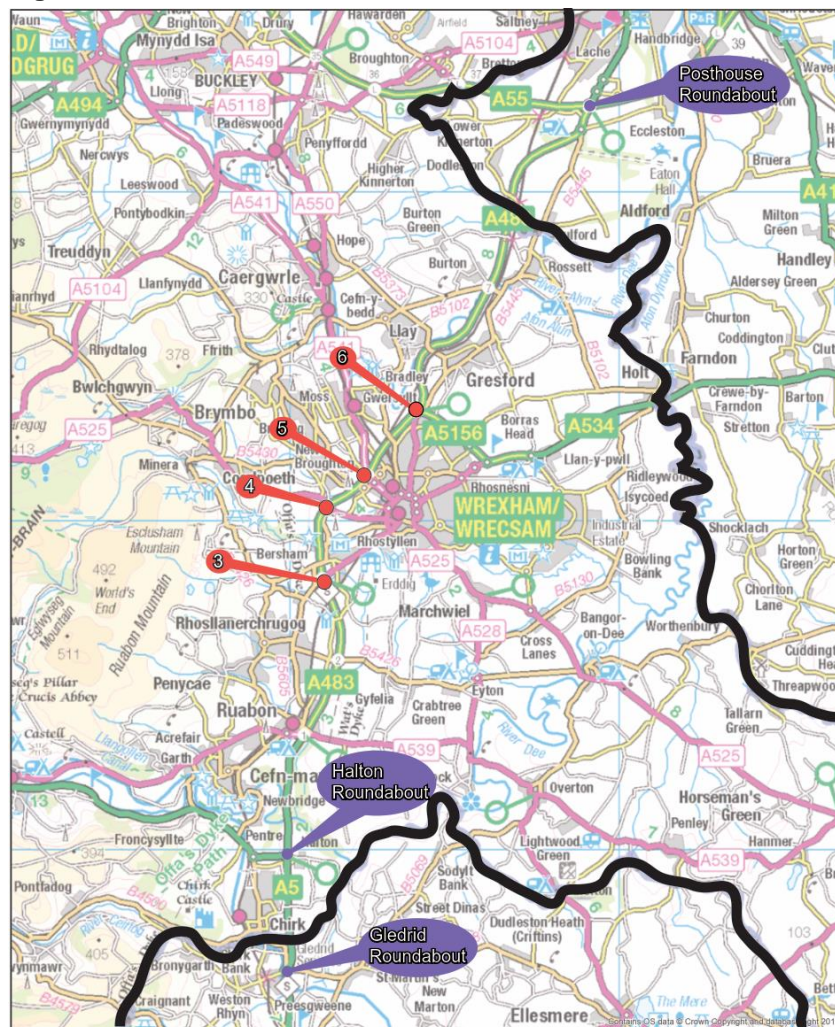
1 Introduction

1.1 Background

1.1.1 Welsh Government and Wrexham County Borough Council (Wrexham CBC) have commissioned Mott MacDonald to undertake a WelTAG Stage 1 appraisal for the A483/A5 transport corridor, between Chirk (Gledrid Roundabout) and the Rossett Interchange, a distance of approximately 14.5 miles.

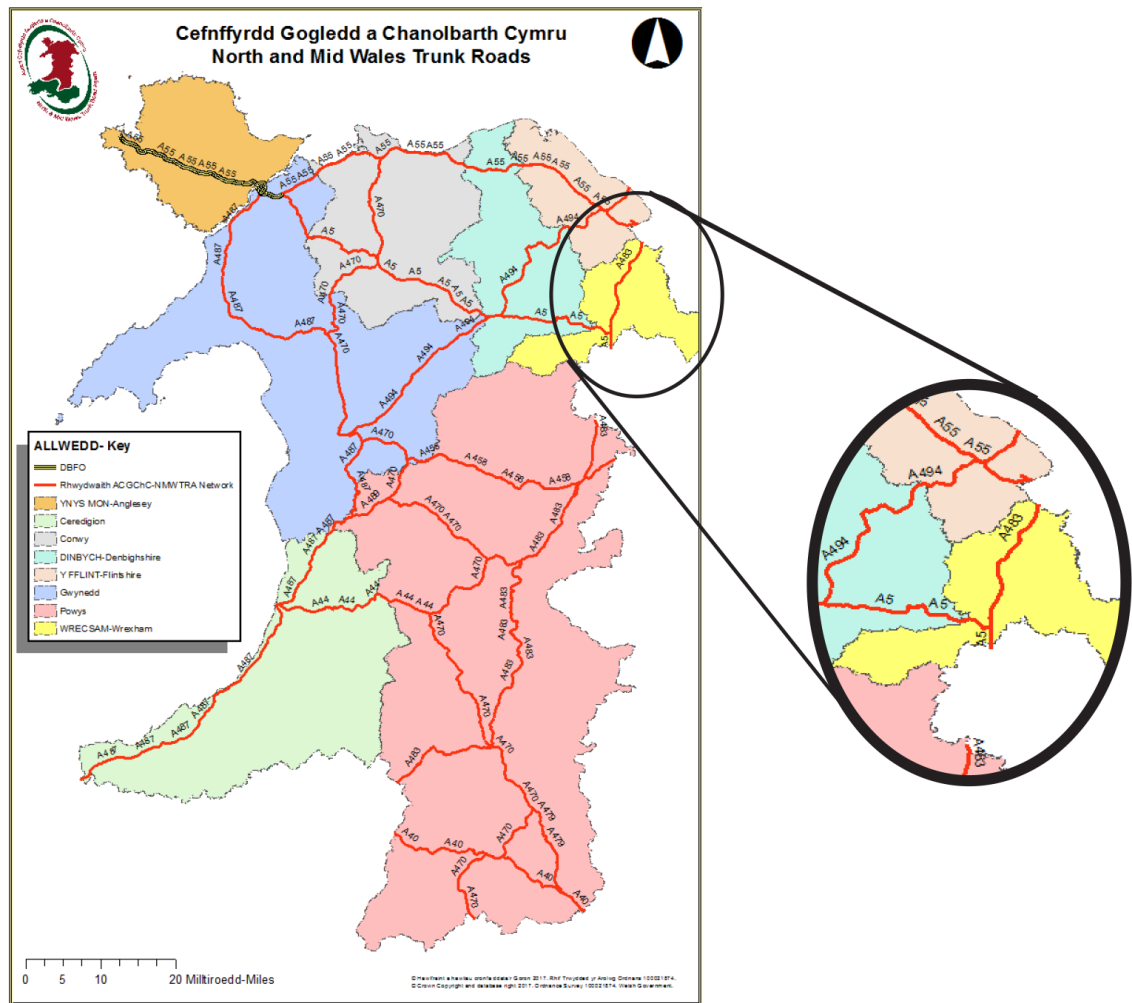
1.1.2 The A483/A5 forms part of the trunk road network in Wales, managed by the North and Mid Wales Trunk Road Agent (NMWTRA) on behalf of Welsh Government. The A483/A5 provides one of the connecting routes between North and South Wales, as well as providing access into North Wales from the Midlands. It also has an important role for trips within England, connecting Hereford/Shrewsbury to Chester. The A483/A5 corridor between Chirk and Rossett is shown in **Figure 1** and the location on the Wales trunk road network in **Figure 2**.

Figure 1: A483/A5 Corridor



Source: Mott MacDonald. Contains OS data © Crown copyright and database right 2017

Figure 2: North Wales Trunk Road Network



Source: Adapted from <http://www.nmwtra.org.uk/home/>

1.1.3 Welsh Government and Wrexham CBC are concerned by the level of road based congestion on the A483/A5 corridor and the impact this is having on the growth aspirations for both Wrexham and the wider North Wales region. Recent studies, such as the Wrexham A483 Junctions Economic Impact Report (April 2016), have confirmed that traffic congestion is a constraint to business development potential in Wrexham.

1.1.4 There are several other issues along A483/A5 transport corridor, affecting local and strategic (longer distance) traffic movements, active modes (walking and cycling), and public transport (bus and rail). Further details are provided within this report.

1.2 WeITAG Stage 1

1.2.1 WeITAG is the transport appraisal guidance produced by Welsh Government, setting out a process and broad framework for identifying, appraising and evaluating solutions to address transport-related issues. The WeITAG process comprises five stages which are intended to cover the lifecycle of a proposed transport intervention, from conception to post-implementation evaluation. Welsh Government intends the WeITAG process to be evidenced-based,

proportionate to the impacts being investigated, collaborative (involving stakeholder consultation), and to provide decision-makers with information required to make decisions.

- 1.2.2 Recent revisions to WelTAG, as set out in the 2017 consultation draft, have aligned the process with the HM Treasury five case model for transport business cases. This means that the relationship between the WelTAG stages and transport business case stages is now clear. WelTAG Stage 1 is aligned to the first of three business case stages, the Strategic Outline Case (SOC).
- 1.2.3 The purpose of WelTAG Stage 1 (Strategic Outline Case) is to ‘understand the issue of concern, explore its context and to present a wide list of possible solutions...and to select a short list of options for more detailed consideration’¹. Short listed solutions should be those that are most likely to solve the issues of concern, align with the stated objectives for solutions, leading to the most favourable impacts.
- 1.2.4 The WelTAG guidance² summarises the steps to be taken when developing the SOC at Stage 1:
- Identify issues that need addressing;
 - Establish objectives;
 - Develop a long list of possible solutions; and
 - Assess the long list of options against objectives.
- 1.2.5 At the end of Stage 1, the Strategic Case (one of the cases in the five case model) should be fully developed, setting out the need for change. The Transport Case (the second of the five cases) then provides an initial assessment of the expected impacts of a long list of solutions. The remaining cases (Delivery, Financial, Commercial) will be preliminary, identifying key issues that will affect the options being taken forward to Stage 2.
- 1.2.6 Alongside a Stage 1 Report, Welsh Government requires a WelTAG Impacts Assessment Report, documenting the evidence used in identifying issues and assessing the long list. A separate WelTAG Impacts Assessment Report for the A483/A5 transport corridor has been produced.

1.3 Study Aims

- 1.3.1 The expectation for Welsh Government and Wrexham CBC is that the measures short listed at the end of Stage 1 would help to reduce road based congestion, such that congestion does not become a constraint to wider economic development across North Wales and so that Wrexham area is able to accommodate growth at the levels proposed in the emerging Local Development Plan (LDP). Several potential employment and housing development sites are located in close proximity to the A483/A5 corridor. Solutions to the issues identified therefore need to consider both the strategic and local demands on the A483/A5.
- 1.3.2 The option identification and short-listing process also needs to take account of the Well-being of Future Generations (Wales) Act 2015, which aims to improve the social, economic, environmental, and cultural well-being of Wales. Objectives for solutions to improve the A483/A5 corridor must therefore pay attention to the overall well-being goals of prosperity, resilience, health, equality, and cohesiveness. Options will also need to be assessed against the full set of WelTAG impact assessment criteria, which are linked to the well-being goals.

¹ WelTAG 2017 Welsh Transport Appraisal Guidance, page 10

² WelTAG 2017 Welsh Transport Appraisal Guidance, page 20

- 1.3.3 With the Well-being of Future Generations (Wales) Act 2015 in mind, the long list needs to include a range of options across different modes of transport and any relevant non-transport solutions to the issues.

1.4 Stakeholder Consultation

- 1.4.1 Stakeholder involvement is an important aspect of the WeITAG process. At study inception, Welsh Government, Wrexham CBC and Mott MacDonald agreed that two stakeholder workshops would be held to:
- Review and rank the identified issues, to ensure that objectives and solutions that would deal with the most critical problems are proposed (part of Workshop 1);
 - Review, refine, and prioritise the objectives (part of Workshop 1);
 - Generate a long list of potential solutions (part of Workshop 1); and
 - Inform and comment on the initial multi-criteria assessment of potential solutions (part of Workshop 2).
- 1.4.2 Stakeholder workshops were organised in conjunction with a separate parallel study which is being undertaken by Mott MacDonald for Wrexham CBC in relation to capacity enhancement options for A483 junctions 4 and 5. Invitations were sent to Welsh Government, Wrexham CBC, NMWTRA, Highways England, Cheshire West and Chester Council (neighbouring local authority), Shropshire Council (neighbouring local authority), and Sustrans, all of whom have a direct interest in the performance of the A483/A5 and its junctions. Highways England is responsible for managing the A5 trunk road immediately south of the study area and the A483/A55 immediately to the north.
- 1.4.3 Summary reports on the two stakeholder workshops, including key outcomes and the long list generated, are provided in the **WeITAG Impacts Assessment Report**.

1.5 Report Purpose and Structure

- 1.5.1 This report forms the WeITAG Stage 1 Report (Strategic Outline Case) for the A483/A5 Transport Corridor. In line with the WeITAG 2017 consultation draft, this report sets out the issues of concern and their main contributory factors, states the objectives for proposed solutions, presents a long list of solutions, and describes the method by which the long list has been assessed to arrive at a short list. Recommendations for Stage 2 are also provided.
- 1.5.2 This remainder of this report is structured as follows:
- Section 2 (**Strategic Case**) outlines the issues affecting the A483/A5 transport corridor and their contributory factors. It also sets out the objectives for solutions, with an explanation of how these have been derived through stakeholder consultation. The Strategic Case includes the long list of options, with an initial assessment of each option against the objectives.
 - Section 3 (**Transport Case**) presents the outcomes of the long list sifting process, based on a multi-criteria assessment of each option, aligned to the objectives and the full range of WeITAG impact criteria. A short list of potential solutions and the expected impacts is provided. Further detail on the sifting process is provided in the WeITAG Impacts Assessment Report.
 - Section 4 (**Delivery Case**) identifies the key delivery (timescale, feasibility, legal) risks associated with progressing the short-listed options, and the additional evidence and assessments that would be required to assess the short list at Stage 2.
 - Section 5 (**Financial Case**) provides an initial commentary on the lifetime costs of the short-listed options.

- Section 6 (**Commercial Case**) sets out the high-level procurement considerations associated with the short list.
- Section 7 (**Recommendations**) provides a summary of the options that should be progressed to Stage 2 and the steps to be taken between completing Stage 1 and commencing Stage 2.

2 Strategic Case

The Strategic Case sets out the 'case for change', outlining the issues affecting the A483/A5 transport corridor and their main contributory factors. It also sets out the objectives for solutions, with an explanation of how these have been derived through stakeholder consultation, and identifies how proposed solutions can complement the objectives.

2.1 Issues Identification

- 2.1.1 The first WeITAG Stage 1 task is to identify the key transport issues that need to be addressed. For the A483/A5 transport corridor study the key issues have largely been identified from existing evidence contained within relevant planning documents, economic development and transport strategies, and plans, produced at a variety of scales from national to sub-regional and local.
- 2.1.2 The document review was supplemented with an examination of current congestion levels and travel-time predictions using online mapping tools, as well as a review of travel to work flows from the 2011 census data.
- 2.1.3 A full list of information sources is provided in the **WeITAG Impacts Assessment Report**. Information sources include:
- 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 work flow and mode share data;
 - Road accident data for the A483 between 2010 and 2015;
 - Traffic count data held by NMWTRA and the Department for Transport; and
 - Online journey planning and traffic congestion data.
- 2.1.4 The full range of issues was presented at the first stakeholder workshop. Attendees were asked to add any relevant additional issues and identify what they consider to be the top five issues.

2.2 Current Issues

- 2.2.1 An Issues Log has been prepared, outlining 33 issues associated with the A483/A5 transport corridor. The issues include problems that need to be addressed, constraints which are expected to limit positive outcomes in the future, and aspirations that will rely on the transport corridor.
- 2.2.2 For initial collation purposes, the issues were categorised under five headings:
- Economic Development – relating to constraints on and aspirations for employment and housing development;

- Local Traffic – associated with the local road network and vehicle trips that start and end their journeys within the Wrexham CBC area;
- Strategic Traffic – associated with vehicle trips that start or end their journeys outside the Wrexham CBC area;
- Active Modes – relating to walking and cycling (non-motorised users); and
- Public Transport – issues linked to bus and rail services.

2.2.3 The complete Issues Log, with detailed references to the information source for each issue, is provided in the **WeITAG Impacts Assessment Report**. Examples of issues within the five categories are shown in **Figure 3**.

Figure 3: Examples of Issues Identified

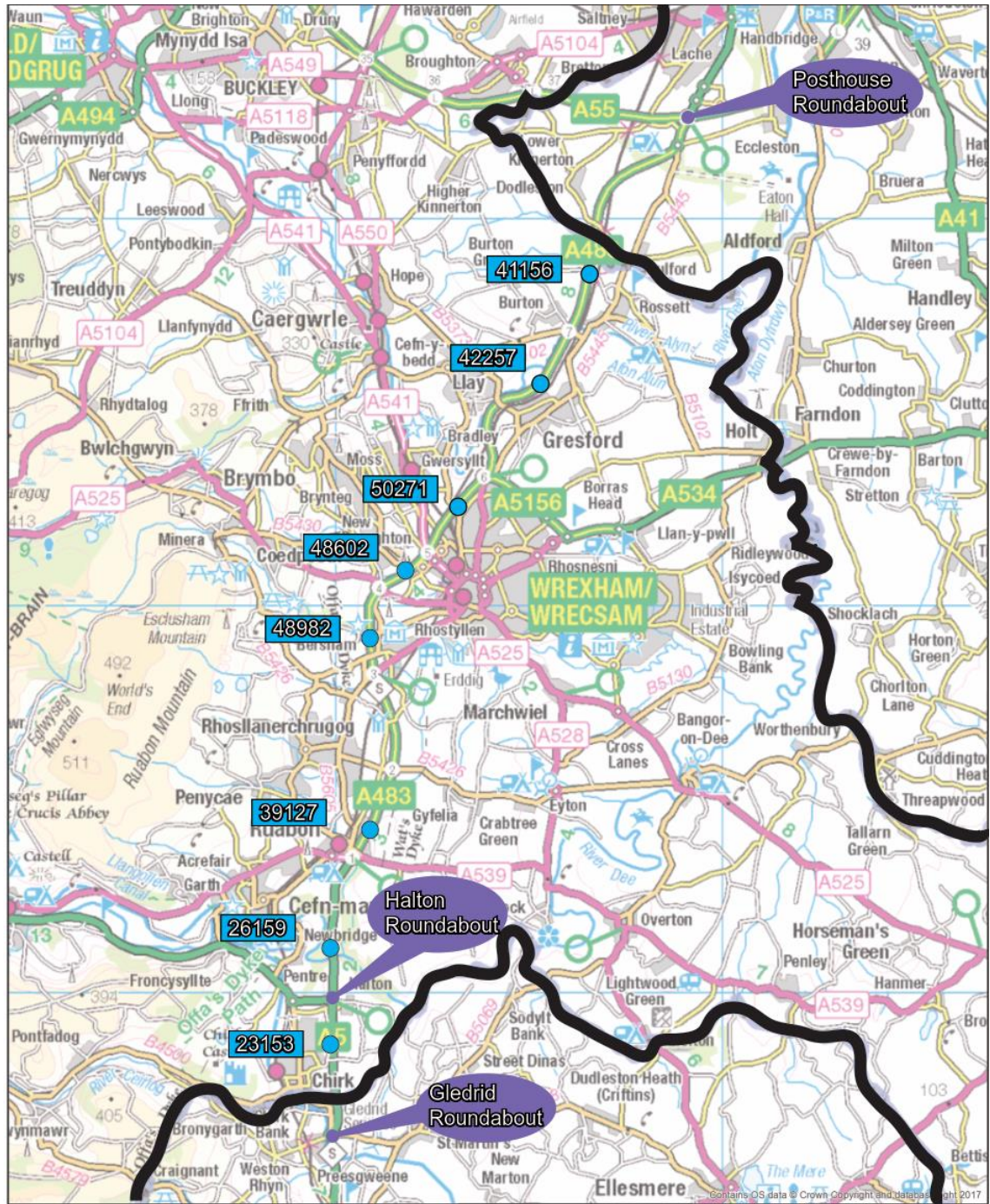
Economic Development	Local Traffic	Strategic Traffic	Active Modes	Public Transport
High levels of deprivation and lack of access throughout the corridor	A541/Mold Road Congestion near J5	A483 Congestion between Ruabon and Chirk	Fragmented Cycling Network	Infrequent bus service and unserved areas
Employment and housing developments reliant upon road improvements	Plas Coch/Berse Road congestion near J5	A483 as a key regional route for commuters and businesses	Poor pedestrian and cycling crossing facilities over the A483, rail line and A5152	Poor quality bus service
LDP plans for 7,750 homes over the next 10 years with 1,200 planned for the south of Wrexham	A525 Ruthin Road Congestion	A483 as a strategic route for long distance journeys	Unsafe and inhospitable pedestrian environments surrounding major roadways and accident clusters	Poor market for bus service tenders
New and proposed employment developments will put pressure on the A483/A5 corridor	'Junction Hopping'	Observed and predicted traffic flow increase on A483		High car mode share
Congestion constraining economic performance	Condensed peak periods			Slow and indirect longer-distance bus journeys
Key freight and tourist route into North Wales and Chester	Accident cluster sites			Infrequent train services and limited number of stations
	Bottlenecks and severance caused by A483			Poor station facilities
	Congestion on A5152 to the west of Wrexham town centre			

Source: Prepared by Mott MacDonald based on various sources as indicated in the Issues Log in the WeITAG Impacts Assessment Report.

2.3 A483 Capacity

- 2.3.1 The A483/A5 corridor between Chirk (Gledrid Roundabout) and the Rossett Interchange is approximately 14.5 miles in length, of which the 10 miles north of Ruabon is a dual carriageway with two lanes in either direction (D2AP) and the 4.5 miles south of Ruabon is a wide single carriageway (WS2 standard).
- 2.3.2 The dual carriageway at the Rossett Interchange joins with the remaining section of the A483 dual-carriageway, continuing a further 4.25 miles north across the Wales-England border to the Posthouse Roundabout (A483/A55), Chester. The single carriageway at Gledrid Roundabout joins with the single carriageway A483/A5 route south to Oswestry and Shrewsbury/Welshpool.
- 2.3.3 The single carriageway section includes a 0.5 mile stretch to the east of Chirk with two lanes northbound and one lane southbound (S2+1 standard), allowing for safe overtaking on the uphill section.
- 2.3.4 Annual Average Daily Traffic flow (AADTs) for the A483/A5 corridor are shown in **Figure 4**.

Figure 4: AADTs on A483/A5 corridor



Source: AADTs obtained from Department for Transport, based on counted datasets only. Estimated datasets excluded. Data from 2014, 2015 or 2016. Count at Rossett is from 2012.

- 2.3.5 While traffic flows on the single carriageway section to the south of Ruabon are lower than the traffic flows experienced on the dualled section, they are still higher than the maximum end of the design standard flow range for a wide single carriageway (WS2). The Design Manual for Roads and Bridges (DMRB)³ sets out the flow range for WS2 as a minimum of 6,000 vehicles AADT and a maximum of 21,000. The AADT exceeds 23,000 to the east of Chirk and exceeds 26,000 between Ruabon and Chirk, approximately 10-25% higher than the design standard flow range. If a new road was to be designed based on these AADTs then a dual carriageway with either two or three lanes in each direction could be justified (D2AP or D3AP).
- 2.3.6 The traffic flows on the 10 miles of dual-carriageway between Ruabon and Rossett Interchange (Junction 1 to 7) are higher than the maximum end of the design standard flow range for a dual-carriageway with two lanes in each direction (D2AP). The DMRB sets out the flow range for D2AP as a minimum of 11,000 vehicles AADT and a maximum of 39,000. The AADT exceeds 39,000 on all dualled sections of the A483, particularly between Junction 5 and Junction 6 where the AADT exceeds 50,000 vehicles, 29% higher than the design standard flow range. If a new road was to be designed based on these AADTs then a dual carriageway with three lanes in each direction could be justified (D3AP).
- 2.3.7 Additional capacity related issues on the A483/A5 are:
- Junctions to the west of Wrexham town are closely spaced. The shortest distance between junctions is 1,100 metres between Junction 4 (A525 Ruthin Road) and Junction 5 (A541 Mold Road). Traffic moving to the left to leave at Junction 5 northbound, or Junction 4 southbound, is therefore in conflict with traffic merging from the Junction 4 northbound on-slip or the Junction 5 southbound on-slip.
 - Sub-standard merge arrangements exist at several A483 grade-separated junctions. Inadequate merge and diverge lengths can mean that traffic joins the A483 at too low a speed, or must slow down before leaving the mainline. These manoeuvres will cause other traffic on the A483 mainline to slow, reducing overall capacity.
- 2.3.8 With traffic flows on the A483/A5 corridor already exceeding design standards, future traffic growth associated with housing and employment growth will be difficult to accommodate safely unless improvements are made to the road.

2.4 Future Situation

- 2.4.1 The majority of issues listed in the Issues Log, the majority of the examples shown in Figure 3, and the additional capacity issues associated with the A483 mainline are problems and constraints that exist now. For Welsh Government and Wrexham CBC the concern is that these issues will either worsen as housing and employment growth is delivered, or indeed act as constraints on future growth such that growth aspirations cannot be realised. For Wrexham CBC, the A483/A5 transport corridor is critical to the emerging LDP 2013-2028 and the need to accommodate 7,750 new homes over the next 10 years, along with growth in employment land.
- 2.4.2 The expected location of future housing and employment is shown in **Figure 5**, **Figure 6** and **Figure 7**. While a largest area for employment growth is expected to be at the Wrexham Industrial Estate to the east of the town (Figure 5), there are 11 further employment development sites located to the west of the town in close proximity to the A483/A5 corridor. The three largest sites along the corridor, at Bluebell Estate (near Gresford Industrial Park),

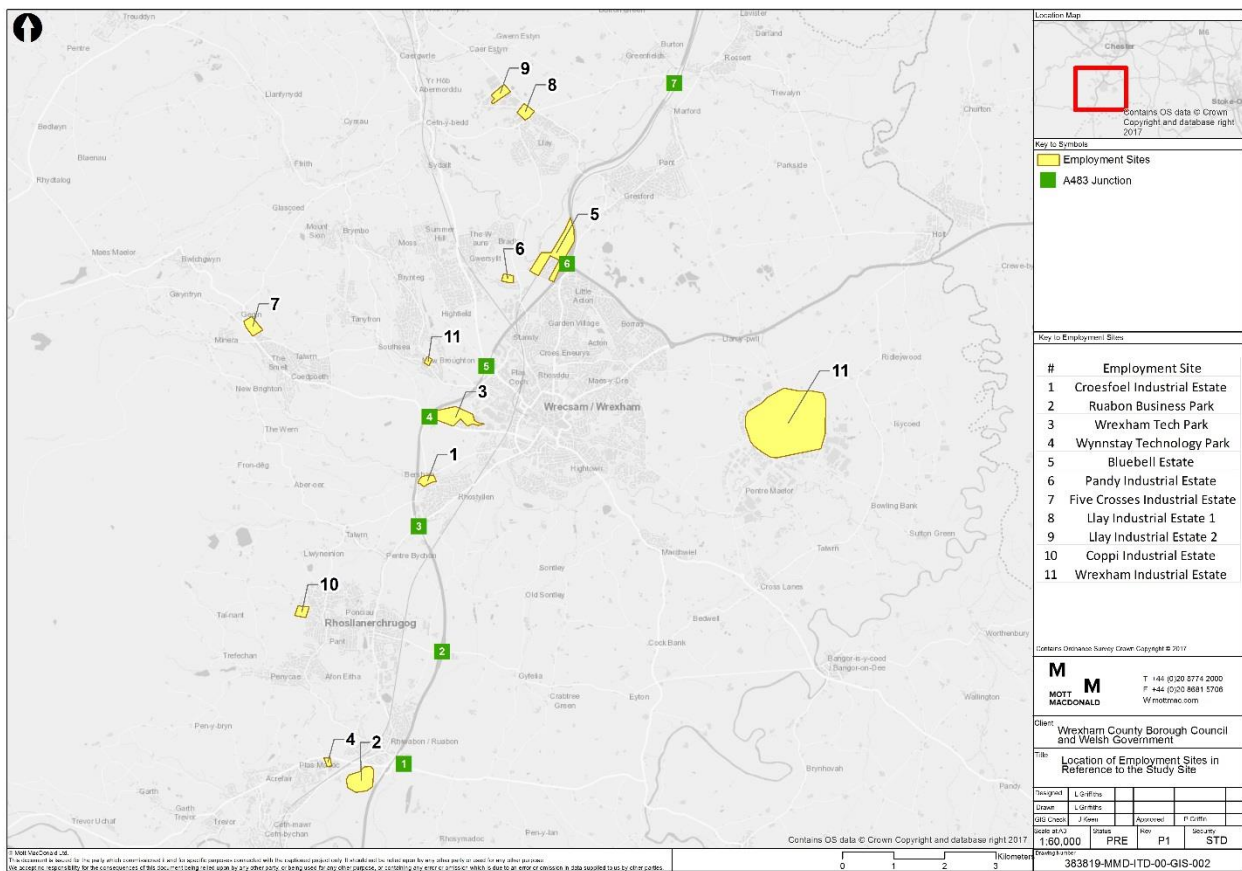
³ DMRB Volume 5 Section 1 Part 3, TA46/97 Traffic flow ranges for use in the assessment of new rural roads.

Wrexham Technology Park, and Ruabon Business Park, are located immediately adjacent to one of the A483 junctions.

2.4.3 Housing development sites are also spread along the A483/A5 corridor (Figure 6 and Figure 7). However, a large proportion of housing development is expected to rely on delivering key strategic sites, each capable of accommodating more than 500 new homes. While the location of these is subject to confirmation through the planning process one of the largest potential sites exists at Lower Berse Farm, adjacent to the A525 Ruthin Road and Junction 4 of the A483.

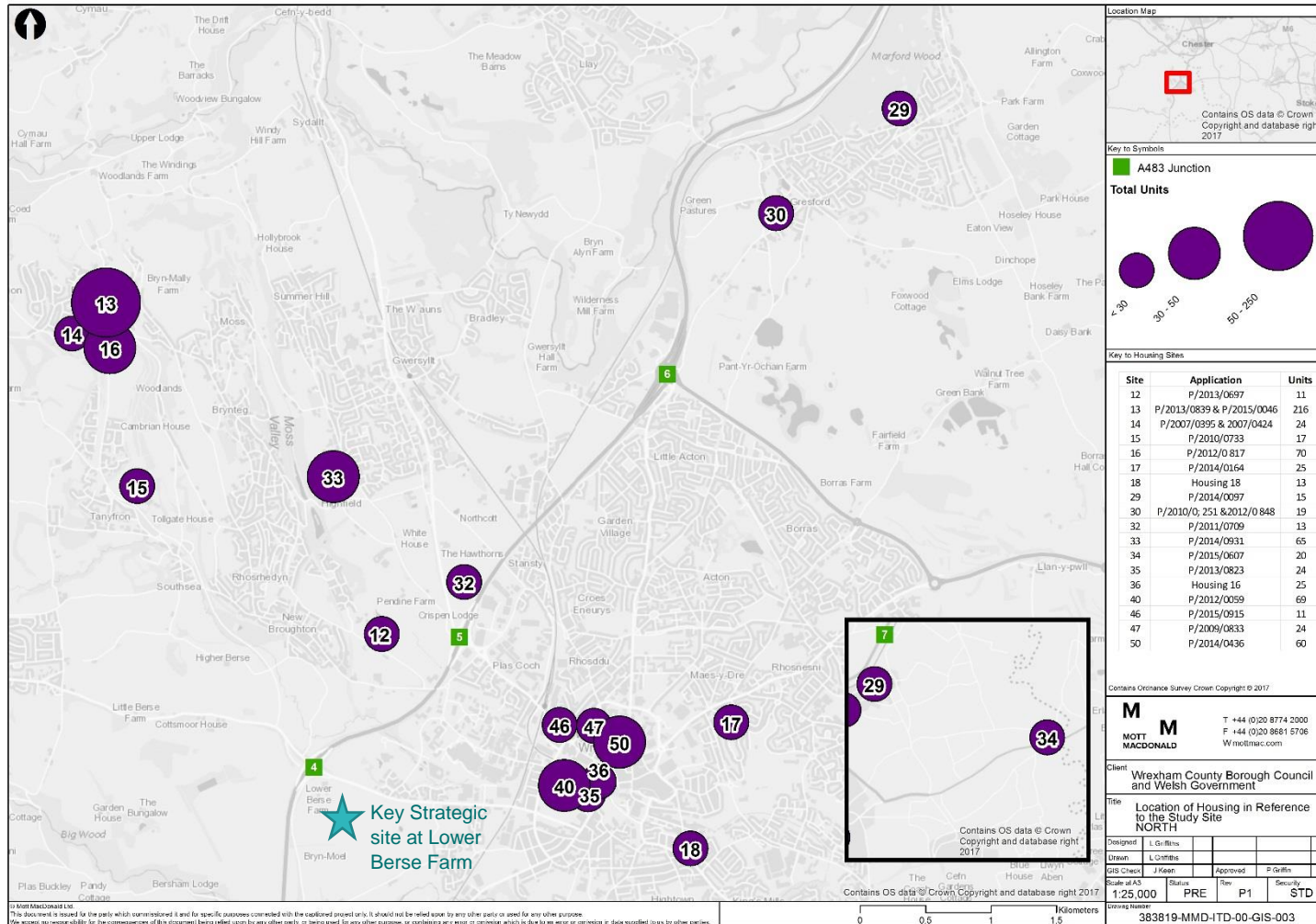
2.4.4 The performance of the A483/A5 corridor and its junctions will therefore be of critical importance to unlocking future employment and housing growth potential in Wrexham and across the wider region.

Figure 5: Employment Development Sites in Wrexham



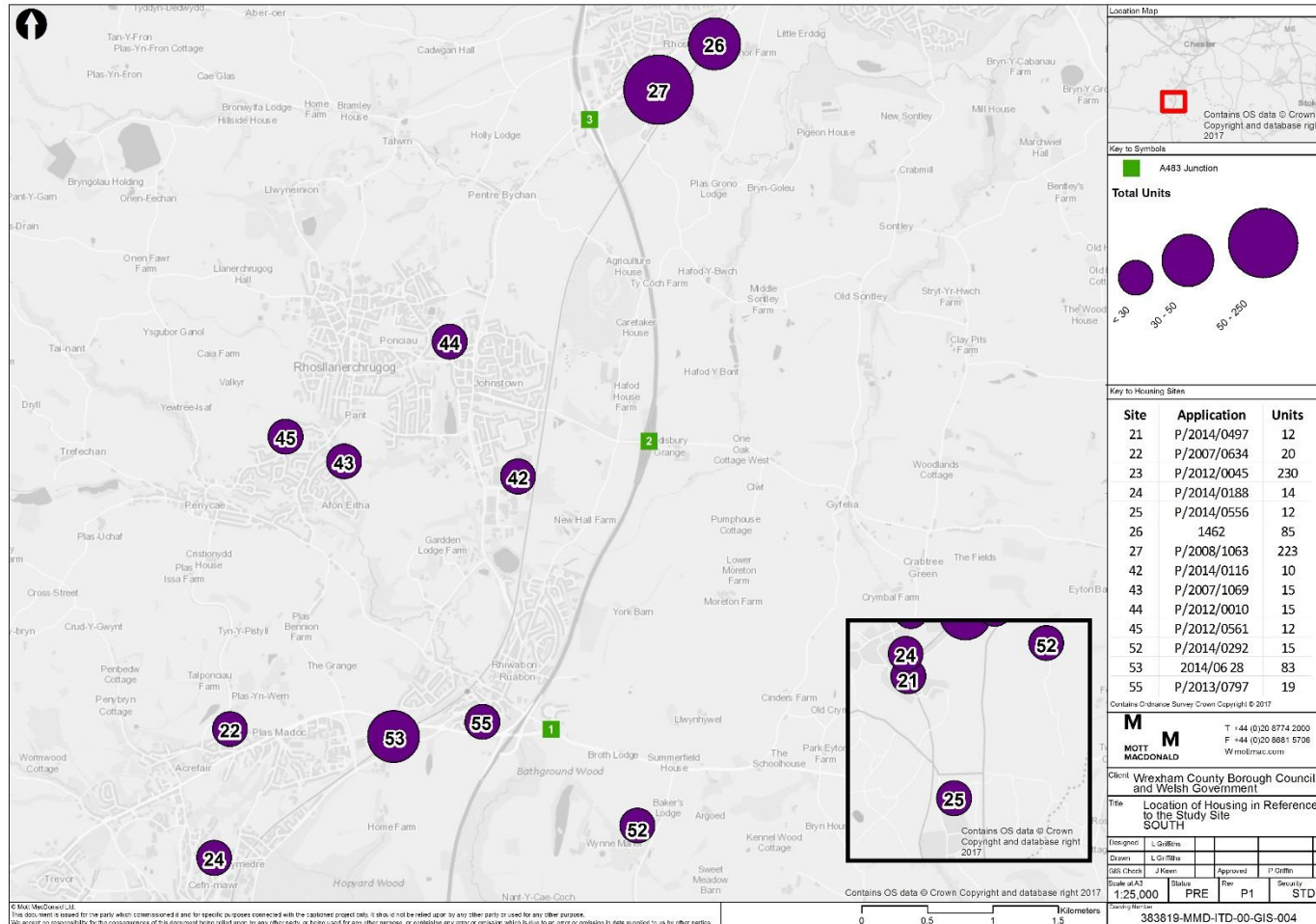
Source: Produced by Mott MacDonald based on information provided by Wrexham County Borough Council

Figure 6: Housing Development Sites in Wrexham (North)



Source: Produced by Mott MacDonald based on information provided by Wrexham County Borough Council

Figure 7: Housing Development Sites in Wrexham (South)



Source: Produced by Mott MacDonald based on information provided by Wrexham County Borough Council

2.5 Issue Prioritisation

2.5.1 At the first stakeholder workshop, attendees were asked to select what they considered to be the top five issues affecting the A483/A5 transport corridor. Combining the feedback from all attendees, the highest priority issues for the corridor are:

- 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 [Issues Log #5];
- A483 congestion between the lane drop at Ruabon and the Gledrid Roundabout near Chirk, particularly southbound during the PM peak [Issues Log #4];
- 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 [Issues Log #22];
- Physical constraints exist on the A483 between Ruabon and Chirk, with two significant viaduct structures potentially limiting the scope of improvement works that could be proposed [Issues Log #32]; and
- Potential for trips to reassign between A483 junctions due to congestion, and for increased ‘junction hopping’ which will reduce the ability of the A483 to cater for longer distance movements [Issues Log #6].

2.5.2 Highway and congestion-related issues are a high priority for stakeholders, with the specific highway capacity issues at Junction 4 and Junction 5 seen as the most important issue for the A483/A5 corridor. The need for the A483 to function effectively in order to cater for housing and employment development is also clear.

2.6 Key Contributory Factors

2.6.1 Many of the 33 issues identified are interrelated and can be grouped into a smaller number of contributory factors. At the centre of this study is the concern that the A483/A5 transport corridor will not adequately cope with the additional demands arising from LDP and other growth aspirations without intervention. **Growth aspirations** are therefore a contributory factor to the issues identified. Other key contributory factors are a **high car mode share**, which leads to increased traffic levels and congestion along the corridor, **capacity constraints** that exist on the A483 and on the local road network which mean that greater pressure is placed on the A483, and **severance** caused by the A483 which make journeys by active modes more difficult to complete (and also increases the high car mode share).

2.6.2 The key contributory factors provide a link in this study between the wide range of identified issues and the objectives for solutions (section 2.7). **Table 1** to **Table 4** summarise the issues under the contributory factor headings. The issues that were prioritised by stakeholders at the first workshop are also highlighted.

Growth Aspirations

2.6.3 The emerging Local Development Plan for Wrexham expresses specific aspirations for housing and employment development along the A483 corridor, with 7,750 new homes planned for the next ten years. The road network will need to operate effectively if these and other aspirations across the wider region are to be realised. Table 1 summarises the issues that relate to growth aspirations.

Table 1: Issues relating to Growth Aspirations

Issue (** denotes issue prioritised by stakeholders)	Evidence	Relevance to A483 Corridor
High deprivation present at settlements along the corridor [Issues Log #21]	<ul style="list-style-type: none"> Wrexham LDP Preferred Strategy Wales Spatial Plan West Cheshire North East Wales Sub Regional Spatial Strategy 	Strategies to address economic deprivation rely upon easy and affordable access to employment in Wrexham and surrounding Industrial Estates.
** Employment and housing developments reliant upon road improvements [Issues Log #22]	<ul style="list-style-type: none"> Wrexham A483 Junctions Economic Impact Assessment Report West Cheshire North East Wales Sub Regional Spatial Strategy 	Congestion on the A483 could hinder the viability of proposed housing and employment developments.
Congestion constraining economic performance [Issues Log #23]	<ul style="list-style-type: none"> Wrexham A483 Junctions Economic Impact Report West Cheshire North East Wales Sub Regional Spatial Strategy 	Slow and unreliable journey times for journeys to work in Wrexham caused by congestion on the A483 hinders the economic performance potential of employment sites.
LDP plans for 7,750 homes over the next 10 years with 1,200 planned for the south of Wrexham [Issues Log #26]	<ul style="list-style-type: none"> Revised dwelling numbers provided by Wrexham CBC 	Inefficient transport infrastructure and poor accessibility have the potential to hinder housing targets in the study area due to restricting the viability of new developments.
New and proposed employment developments will place additional pressure on A483/A5 corridor [Issues Log #27]	<ul style="list-style-type: none"> Mersey Dee Alliance Sector Report 	New development sites will introduce more vehicles onto the local and trunk road network, including the A483, potentially exacerbating current congestion.
A483 serves as a key UK and European road freight route [Issues Log #29]	<ul style="list-style-type: none"> Inception Meeting 	Inefficient freight movements caused by congestion could limit the economic and development potential of Wrexham and the wider region.

High car mode share

2.6.4 The Wrexham CBC area experiences an above average car mode share for journeys to work (70% of Wrexham residents travel to work by car, while more than 80% of people commuting into or out of the Wrexham CBC area do so by car), which exacerbates the problems of congestion. The high car mode share is both a cause and an effect of a range of public transport issues, including uneven bus service provision and infrequent rail services. Car dominance also reinforces the perceived unsuitability of active travel and public transport. Table 2 summarises the issues relating to a high car mode share.

Table 2: Issues relating to High Car Mode Share

Issue	Evidence	Relevance to A483 Corridor
High Car Mode Share [Issues Log #14]	<ul style="list-style-type: none"> Wrexham Transport Accessibility Study Wrexham Connected SUMP Wrexham General Transport Hub Study Moving North Wales Forward Growth Track 360 Census 2011 	High rates of car use exacerbate issues of congestion on the road network. Reliance on car access does not support use of alternative modes such as public transport or active travel along the A483 corridor. The quality of the alternatives also hinders people's ability to move around the area if they do not have access to a car.
Infrequent and poor quality bus services leave many areas unserved, exacerbating a poor market for local bus tenders [Issues Log #11,12]	<ul style="list-style-type: none"> Wrexham Transport Accessibility Study Wrexham Connected SUMP Moving North Wales Forward Inception Meeting 	Poor bus provision in the study area both encourages use of private cars and occurs as a side effect of car-dominated travel behaviour.
Slow and indirect bus journeys [Issues Log #15]	<ul style="list-style-type: none"> West Cheshire North East Wales Regional Spatial Strategy Online journey planners 	Journeys from one side of Wrexham town to the other usually require passengers to change services in the town centre, meaning that journeys are nearly always faster by car.
Infrequent train services and limited number of stations [Issues Log #16]	<ul style="list-style-type: none"> National Rail Timetable Moving North Wales Forward Growth Track West Cheshire North East Wales Regional Spatial Strategy 	Poor rail provision hinders long-distance and local movement along the A483 transport corridor which negatively impacts the practicability of public transport as a viable alternative mode to the private car.
Poor train and bus station facilities [Issues Log #17]	<ul style="list-style-type: none"> Wrexham General Transport Hub Study Growth Track 360 West Cheshire North East Wales Regional Spatial Strategy 	Poor station facilities discourage use of public transport throughout the A483 corridor area due to perceptions of a lack of safety or unattractive/insufficient facilities for public use. This discourages use of public transport as an alternative to the private car.

Road Capacity Constraints

2.6.5 The limited capacity of the strategic and local road network in the Wrexham area is a contributory factor which further exacerbates the issues caused by the inefficient operation of A483 Junctions 4 and 5. Queues form along local roads, especially the A525 and A541 near junctions 4 and 5, at peak times as traffic struggles to effectively join and exit the A483. Congestion on the A483 may also encourage drivers to seek alternative routes on local roads along the corridor which have insufficient capacity to meet this increased demand. Table 3 summarises the issues relating to capacity constraints on the road network.

Table 3: Issues relating to Road Capacity Constraints

Issue (* denotes issue prioritised by stakeholders)	Evidence	Relevance to A483 Corridor
Plas Coch and Berse Road area congestion near J5 A541 Mold Road Congestion near J5 A525 Ruthin Road Congestion near J4 [Issues Log #1,2,3]	<ul style="list-style-type: none"> ● Wrexham Transport Accessibility Study ● Wrexham General Transport Hub Study ● Wrexham A483 Junctions Economic Impact Report ● Online journey planners ● Observed 	Congestion on local roads caused by A483 junctions operating over capacity, hindering movement along and across the A483 corridor. This congestion places pressure on local roads and has a negative knock-on impact on local roads in Wrexham.
** A483 congestion Ruabon-Chirk [Issues Log #4]	<ul style="list-style-type: none"> ● West Cheshire North East Wales Regional Spatial Strategy ● Online journey planners 	Congestion occurs on the A483, particularly southbound in the PM peak between Ruabon and the Halton and Gledrid roundabouts.
** Lack of capacity at Junctions 4 and 5 [Issues Log #5]	<ul style="list-style-type: none"> ● Wrexham A483 Junctions Economic Impact Report ● Wrexham Strategic Road Network Capacity and Improvement Study 	Capacity constraints at J4 and J5 lead to peak period delays and knock-on congestion to the west of Wrexham town centre.
** Potential for trips to reassign between A483 junctions due to congestion [Issues Log #6]	<ul style="list-style-type: none"> ● Inception Meeting ● Online journey planners 	Reassignment between junctions may lead to congestion on the local road network. 'Junction hopping' may also occur if drivers are re-routeing to avoid congestion on the western side of Wrexham.
Short but intense peak periods overwhelm local road networks to the west of Wrexham [Issues Log #7]	<ul style="list-style-type: none"> ● Inception Meeting ● Online journey planners 	Condensed peak periods results in sudden and intense increases in traffic flow which overwhelm local road networks and the A483 Junctions 4 and 5.
Constrained site context at A483 J4 and J5 [Issues Log #10]	<ul style="list-style-type: none"> ● Inception Meeting ● Observed 	Available space may limit the extent of solutions that can be proposed for either junction.
Destination signing from the A483 encourages greater use of J5 [Issues Log #31]	<ul style="list-style-type: none"> ● Inception Meeting ● Observed 	Signing is encouraging use of a junction (J5) that is operating at capacity during peak periods, while other junctions (such as J3) operate well within capacity.
** Physical constraint issues associated with the two viaducts on the A483/A5 Ruabon-Chirk [Issues Log #32]	<ul style="list-style-type: none"> ● Observed 	Viaduct structures may limit the scope of improvements that can be proposed for the A483, on cost effectiveness grounds.
Observed traffic flow increase on A483 [Issues Log #30]	<ul style="list-style-type: none"> ● Department for Transport AADF Records of A483 between 2010 and 2016 	Increasing levels of traffic on the A483 threaten to push the road further over operational capacity over time, hindering movement throughout the study area.

Issue (** denotes issue prioritised by stakeholders)	Evidence	Relevance to A483 Corridor
Traffic congestion and road safety issues on the A5152 around the west side of Wrexham [Issues Log #33]	<ul style="list-style-type: none"> Online journey planners Observed 	Potentially affects traffic route choice approaching from the A483 direction, as drivers will use the A483 junction which allows them to avoid this congestion.

Severance

- 2.6.6 Severance for motorised and non-motorised users caused by the presence of the A483 is a contributing factor to a variety of problems along the corridor, as it prevents easy access between residential areas and key employment sites located on opposite sides of the A483. Motorised traffic must pass through traffic bottleneck locations, most notably at Junction 4 and Junction 5, while non-motorised users have limited safe locations to cross the A483 corridor.
- 2.6.7 Severance related issues (Table 4) have the potential to constrain development aspirations by hindering connections between identified housing and employment sites on opposite sides of the A483.

Table 4: Issues relating to Severance

Issue	Evidence	Relevance to A483 Corridor
Traffic bottlenecks and severance caused by A483 [Issues Log #9]	<ul style="list-style-type: none"> Wrexham A483 Junctions Economic Impact Report 	Congestion occurs in locations where the county road network intersects with the A483. This creates bottleneck locations along the corridor.
Poor cycling and pedestrian crossings of A483, the rail line and the A5152 [Issues Log #18]	<ul style="list-style-type: none"> Wrexham Transport Accessibility Study Report Wrexham Connected SUMP 	Poor and non-existent active travel infrastructure crossing the A483 severely limits the practicability of using active modes throughout the corridor and reinforces the severance caused by the A483.
Fragmented cycling network [Issues Log #19]	<ul style="list-style-type: none"> Wrexham Transport Accessibility Study Report Sustrans 	The A483 acts as a barrier to cycling throughout the study area by fragmenting the cycling network and providing insufficient crossing infrastructure for cyclists.

2.7 Objectives for Solutions

- 2.7.1 A clear set of objectives is critical for decision-making purposes, particularly in situations where there are many potential options. In this study, the objectives are central to the process of sifting the long-list, leading to options being rejected because they are not expected to perform well against the objectives.
- 2.7.2 The priority order for objectives is also important as options have to perform particularly well against the highest priority objectives, while some flexibility will exist for how interventions perform against the lower priority objectives.
- 2.7.3 A draft set of objectives was presented at the first stakeholder workshop. The draft objectives were devised to cover all of the identified issues and to nest within the Well-being of Future Generations (Wales) Act 2015 goals that have been established by Welsh Government at a national level.
- 2.7.4 The opinions of each attendee on the objectives and their priority order were obtained using a written feedback form and reviewed by Mott MacDonald after the event. **Table 5** sets out the

draft objectives and the influence that stakeholder involvement has had on the redrafting and prioritisation of these objectives.

Table 5: Draft Objectives and Stakeholder Input

Draft Objective	Stakeholder Input and Related Amendments	Revised Objective
Reduce the high car mode share by enhancing public transport and active mode provision along the corridor	<ul style="list-style-type: none"> Make reference to the A483 corridor and remove reference to specific modes to allow other solutions to be considered. 	Reduce the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions.
Allow the A483/A5 to continue to function as a strategic corridor by improving journey time reliability between Chirk and Rossett	<ul style="list-style-type: none"> Use the word 'resilience' to allow interventions to deal with a wider range of issues on the A483. Make the objective more active - 'maintain the strategic function' rather than 'allow'. Remove specific reference to geographic locations, to avoid an arbitrary end to where interventions can be proposed. High priority objective. 	Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability.
Serve the development aspirations of Wrexham	<ul style="list-style-type: none"> Revise wording so that solutions 'support and enable' rather than simply 'serve' developments. High priority objective. 	Support and enable the LDP growth aspirations of Wrexham.
Reduce personal injury accidents on the road network	<ul style="list-style-type: none"> This should be tied into 'resilience' issues associated with the A483 corridor. Accident impacts of solutions will be assessed as part of standard WeITAG impact assessment. 	<i>Removed</i>
Enhance public transport accessibility from residential areas to employment sites across the A483 corridor	<ul style="list-style-type: none"> Remove specific reference to employment sites, so that all journey purposes are covered. Remove mode specific references. Refer to transport network coherence, to avoid localised solutions that are disconnected from wider networks. 	Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor
Improve east-west connectivity across the A483 corridor for pedestrians, cyclists and drivers	<ul style="list-style-type: none"> Combine with objective above and remove mode specific references. 	<i>Combined with objective above.</i>
Allow the A483 to have a local function for any trips that have to be made by car	<ul style="list-style-type: none"> Objective should be more active – the A483 is a trunk road by design but has a dual strategic and local purpose. 	Ensure that the A483 is effective in serving local movements.
Minimise knock-on impact of congestion on Wrexham's local network by reducing delays on all approaches to J4 and J5	<ul style="list-style-type: none"> If the A483 caters for both strategic and local trips, as required by other objectives, then this objective is not required. 	<i>Removed</i>

2.7.5 Taking into account the feedback received from the stakeholder workshop, including direct comments relating to the draft objectives and the outcomes of the issues prioritisation exercise, a revised set of objectives has been prepared. Revised objectives are shown in **Table 6**.

2.7.6 The objectives have been divided into two tiers, based on the prioritisation exercise undertaken at the first stakeholder workshop. The top tier focuses on the development and economic growth concerns of Welsh Government and Wrexham CBC.

2.7.7 A matrix which sets out the relationship between identified issues and the final objectives is available in the **WeITAG Impacts Assessment Report**.

Table 6: Revised Objectives

Objectives	Further Explanation
TOP TIER (<i>objectives in this tier have equal highest weighting</i>)	
1: Support and enable the LDP growth aspirations of Wrexham	<ul style="list-style-type: none"> Designed to align with the specific needs of Wrexham CBC and their LDP preparation.
2: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	<ul style="list-style-type: none"> Allows for wider regional economic growth needs to be considered – North Wales, Merseyside and Deeside, Cheshire and Shropshire. 'Strategic function' refers to trips that start and/or end outside the Wrexham CBC area.
SECOND TIER (<i>objectives in this tier have equal weighting</i>)	
3: Reduce the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	<ul style="list-style-type: none"> It is more realistic to set a geographical boundary for interventions that address mode share. This avoids unrealistic solutions being proposed.
4: Ensure that the A483 is effective in serving local movements	<ul style="list-style-type: none"> Local movements are those that start and end within the Wrexham CBC area and which therefore join and leave the A483 between Gledrid and Rossett.
5: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor.	<ul style="list-style-type: none"> Journeys crossing the A483 corridor are those that pass east-west (or vice versa) through one of the Wrexham junctions (J3 to J6), but which do not join the A483. Also includes journeys that pass under or over the A483.

2.7.8 The relationship between the national Well-being of Future Generations (Wales) Act 2015 goals and the revised objectives for the A483/A5 transport corridor is summarised in **Table 7**.

Table 7: Relationship between Objectives and Well-being of Future Generations (Wales) Act

A Prosperous Wales	A Resilient Wales	A Healthier Wales	A more Equal Wales	A Wales of Cohesive Communities	A Wales of Vibrant Culture and Thriving Welsh Language	A Globally Responsible Wales
Objective 1: LDP Growth Aspirations	Objective 3: Reduce Car Mode Share	Objective 3: Reduce car mode share	Objective 1: LDP growth aspirations	Objective 4: Serve local movements	Objective 1: LDP Growth Aspirations	Objective 2: Strategic Function of A483
Objective 2: Strategic function of A483		Objective 5: Enhance connectivity across A483	Objective 3: Reduce car mode share	Objective 5: Enhance connectivity across A483		Objective 3: Reduce car mode share
			Objective 5: Enhance connectivity across A483			

2.8 Design Objectives

2.8.1 A set of three design objectives have also been established based on stakeholder workshop feedback. The design objectives are intended to guide the way in which short listed options are developed and will therefore need to be carried through to subsequent WeITAG stages.

Wherever possible interventions should:

1. Provide safe and convenient access for active modes at all new developments along the corridor;
2. Future-proof the transport network for increased demand; and
3. Future-proof the transport network with regard to maintenance liabilities.

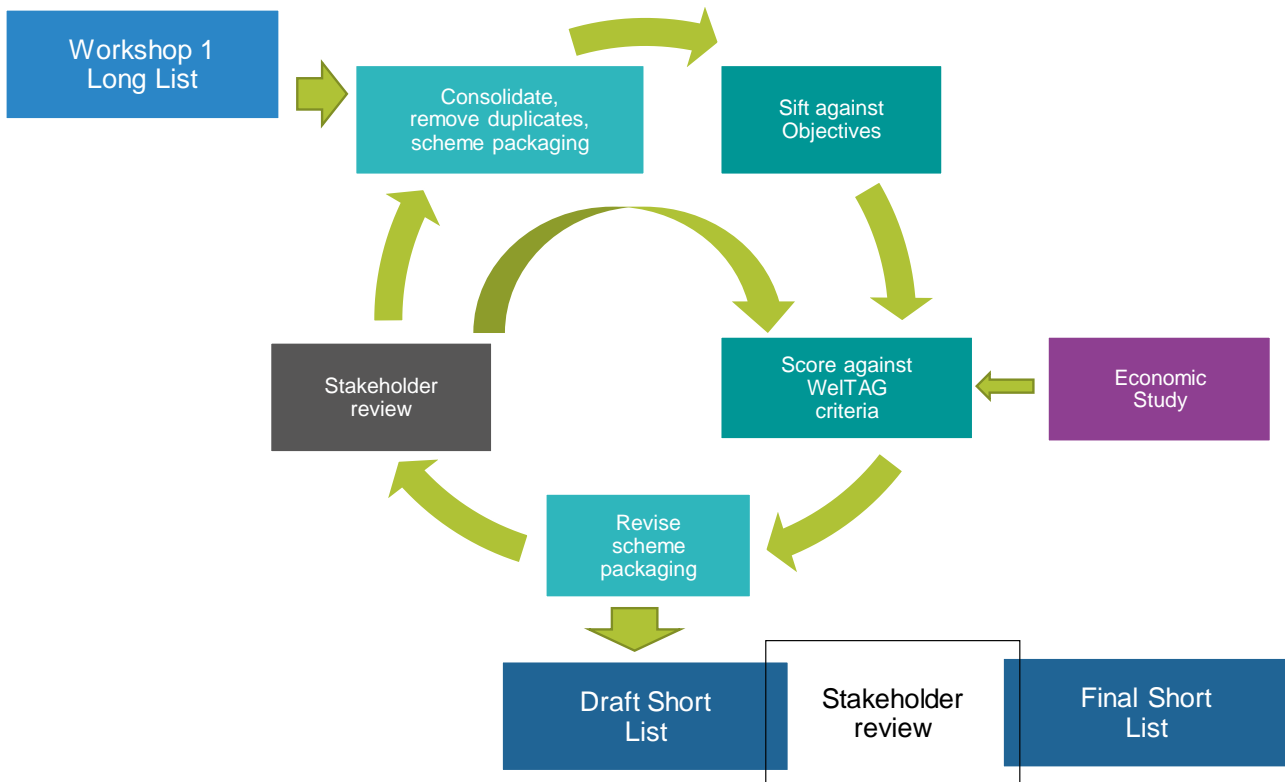
2.9 Option Generation and Sifting Methodology

2.9.1 Following issue identification and objective setting, the next stage of the WeITAG process is to generate a long list of potential solutions and assess those solutions against the objectives and wider WeITAG impact assessment criteria.

2.9.2 For this study, the process of formulating and sifting the long list of potential solutions to reach a short list of options involved an iterative process comprising several stages, as shown in **Figure 8**. In summary, the process involved:

- Generating a long list of potential solutions, with ideas provided by stakeholders included in the long list.
- Consolidating the initial long list by removing duplicates, combining solutions where they are directly related, and packaging solutions where as stand-alone measures they would be unlikely to perform well against the objectives.
- Initial scoring of solutions against the objectives (using a seven-point scale from -3 to +3, in line with WeITAG recommendations), followed by additional packaging and re-scoring for any options that do not perform well in their own right. This part of the process is reported within the **Strategic Case**.
- Removing solutions from the long-list where they are considered not to align well with the objectives. This part of the process is reported within the **Strategic Case**.
- Scoring of remaining long list solutions against the full set of WeITAG impact assessment criteria, followed by further packaging and rescoreing to identify a short list. This part of the process is reported under the **Transport Case** section of this document.

Figure 8: Long List Sorting and Sifting Process



Source: Mott MacDonald

2.10 Option Long List

- 2.10.1 The initial long list was devised from a review of available documents and through stakeholder input at the first workshop. **Figure 9** sets out the breakdown of these proposed solutions into 15 categories following long list consolidation.
- 2.10.2 The solutions generated at, and immediately following, the workshop are listed in the Stakeholder Workshop 1 notes, provided in the **WeITAG Impacts Assessment Report**. For ease of reference each solution has been given a unique reference code.
- 2.10.3 **Appendix A** contains a full list of solutions (including packages) developed throughout the long list sorting and sifting process.

Figure 9: Long List Measures Categories



2.11 Scoring against Objectives

- 2.11.1 The initial scoring of solutions against the five objectives was undertaken by a panel of five transport planners and used a seven-point scale (-3 to +3) to indicate whether the solution would be expected to have a large / moderate / slight adverse or beneficial impact on the objective. A weighted score for the five objectives was then calculated, with the two top tier objectives having double the weight of the second tier objectives.
- 2.11.2 Solutions have been awarded scores of 0 where no impact is expected. Scores of +1 have been awarded where a beneficial impact is possible (even if the extent of this benefit is uncertain) – solutions have therefore been given the ‘benefit of the doubt’ in the scoring process.
- 2.11.3 Scores of +3 or -3 have been reserved for where the impact is expected to be significant and where the number of people affected would be large.
- 2.11.4 Scores were reviewed and solutions not scoring well in their own right were packaged with other solutions where possible and rescored. **A total of 81 solutions, including packages, have been considered in the Strategic Case.** Examples of high and low-scoring solutions are shown in **Table 8**.
- 2.11.5 The ten highest scoring solutions for the Strategic Case assessment against objectives are listed in **Table 9**.

Table 8: Strategic Case Assessment

Objectives	High-Scoring Solutions – Examples / Reason	Low-Scoring Solutions – Examples / Reason
Support and Enable the LDP Growth Aspirations of Wrexham	<p>CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 J4 / J5 [+3]</p> <p>NRA1 – New southern link road, A483 to Wrexham Industrial Estate [+3]</p> <p><i>These solutions would provide additional capacity and improved access to Wrexham’s key strategic sites and other LDP sites.</i></p>	<p>TRR4 – Local traffic must pay to use A483 at peak times [-2]</p> <p>SIG3 – Ramp metering on A483 on-slips [-1]</p> <p><i>These solutions would reduce the ability of trips associated with LDP sites to use the A483 and are likely to increase congestion on the local road network.</i></p>
Maintain the Strategic function of the A483/A5 corridor by improving resilience and journey time reliability	<p>JNC3 – 3rd lane on A483 to serve Wrexham J3-J6 [+3]</p> <p>CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 J4 / J5 [+3]</p> <p><i>These solutions would increase the capacity of the A483. JNC3 would reduce the interaction between local and strategic traffic.</i></p>	<p>SIG1 – Change signals at key junctions to release more traffic from local network on to A483 [-1]</p> <p><i>As a stand-alone solution, this would actively encourage local trips to use the A483, potentially causing conflict with strategic traffic.</i></p>
Reduce the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	<p>ACT10 – Cross-A483 active travel package, including cycle improvements on Mold Rd / Ruthin Rd & west Wrexham town centre link [+2]</p> <p>TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning, active travel package, major bus improvement package, and Park & Share site [+2]</p> <p><i>These packages would provide improved alternatives to the private car for journeys within Wrexham CBC.</i></p>	<p>JNC5 – New local link road(s) parallel to A483 J3-J5 [-2]</p> <p><i>This solution would unlock capacity for local journeys to be made by private car.</i></p>
Ensure that the A483 is effective in serving local movements	<p>JNC3 – 3rd lane on A483 to serve Wrexham J3-J6 [+2]</p> <p>JNC7 – Comprehensive J4 improvement [+2]</p> <p><i>These solutions would provide increased capacity to allow local journeys to use the A483 if required.</i></p>	<p>TRR4 – Local traffic must pay to use A483 at peak times [-3]</p> <p>SIG3 – Ramp metering on A483 on-slips [-2]</p> <p><i>These solutions would actively discourage local trips from using the A483.</i></p>
Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 Corridor	<p>JNC7 – Comprehensive J4 improvement [+2]</p> <p>ACT10 – Cross-A483 active travel package, including cycle improvements on Mold Rd / Ruthin Rd & west Wrexham town centre link [+2]</p> <p><i>These solutions would provide improved highway and active travel connectivity east-west across the A483 corridor, reducing the current severance effect.</i></p>	<p><i>No solutions scored negatively against this objective.</i></p>

Scores awarded for the Strategic Case assessment are shown in square brackets.

Table 9: Strategic Case – Highest Scoring Solutions

Solution	Strategic Case Assessment				
	1: Support and enable the LDP growth aspirations of Wrexham	2: Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability	3: Reduce the high car mode share for journeys starting or ending within the Wrexham CBC area that use the A483 and its junctions	4: Ensure that the A483 is effective in serving local movements	5: Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor.
CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 J4 / J5	+3	+3	-1	+2	+2
JNC3 – 3 rd lane on A483 to serve Wrexham J3-J6	+3	+3	-1	+2	0
TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning, active travel package, major bus improvement package, and Park & Share site	+2	+1	+2	+1	+2
CAP1 – Improve capacity (dualling) of A483/A5 south of Ruabon	+1	+3	-1	+1	0
CAP8 – A483 wider corridor hotspot package, beyond J3-6 (Gledrid, Halton, Posthouse)	+1	+3	-1	+1	0
RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General	+2	+1	+2	0	0
JNC4 – Improve capacity at J5 - slip road widening, dedicated lanes, widening structures, new signing	+2	0	-1	+2	+2
JNC7 – Comprehensive J4 improvement	+2	0	-1	+2	+2
NRA1 – New southern link road, A483 to Wrexham Industrial Estate	+3	+1	-1	0	0
TDM4 – Behaviour change - shift patterns for key employers i.e. hospital and university (peak spreading)	+2	+1	+1	0	0

2.11.6 On completion of the Strategic Case assessment of solutions against objectives, a total of 24 solutions were removed from the long list. Removed or packaged solutions are listed in **Table 10**. Removal of solutions from the A483/A5 transport corridor long list should not lead to their automatic preclusion from future studies as viable business cases for them may be capable of development in their own right.

Table 10: Solutions Removed or Packaged following Scoring against Objectives

Solution Removed or Packaged	Rationale			Included in package – package has higher score
	Negative score for at least one top tier objective	Very low weighted score (negative or 0)	Low weighted score	
SIG1 – Change signals at key junctions to release more traffic from local network to A483	✓ (Obj 2)	✓	✓	
SIG3 – Ramp metering on A483 on-slips	✓ (Obj 1)	✓	✓	
PAR2 – Parking controls at new developments (more restrictive than current standards)	✓ (Obj 1)	✓	✓	
TRR5 – No car zones in Wrexham Town Centre	✓ (Obj 1)	✓	✓	
TRR4 – Local traffic pay to use A483 peak times	✓ (Obj 1)	✓	✓	
SAF2 – Tackle accident cluster sites (non-A483)		✓	✓	<i>Review for any highway solution</i>
SAF3 – Carriageway relining		✓	✓	
PAR1 - Segregate hospital car parks by direction of travel		✓	✓	
TRS1 – Commission wider Wrexham Transport Strategy		✓	✓	
TRR6 -HGV/freight (consolidation) system at corridors leading into Wrexham		✓	✓	
POL1 – Preserve potential active travel routes in planning policy		✓	✓	
SAF1 – Improve safety of traffic flow on Chirk bypass (retain two lanes)			✓	
CAP6 – Convert wide single carriageway to three lanes south of Ruabon			✓	
SMA3 – Variable message signing on A483 corridor / variable speed limits on A483			✓	✓ (SMA4)
BUS4 – Improved bus service quality on services across Wrexham area			✓	✓ (BUS10)
BUS7 – Integrated bus/rail ticketing			✓	✓ (BUS10)
BUS9 – Bus priority measures at A483 J4			✓	✓ (JNC7)
RAL3 – Increased parking capacity at Wrexham General station			✓	✓ (RAL4a)
RAL4 – Increased parking capacity at Ruabon and Chirk stations			✓	✓ (RAL4a)
TDM3 – Residential travel planning for existing residential areas			✓	
JNC1 – Additional lanes on J4 offslips				✓ (JNC7)
JNC2 – Increased capacity at J4				✓ (JNC7)
SMA2 – Better real time information on the road network				✓ (SMA4)
SMA1 – Smart corridor technology for route choice leaving the town				✓ (SMA4)

2.11.7 The 57 solutions remaining in the revised long list have then been scored against the full set of WelTAG impact assessment criteria as part of the Transport Case (Section 3).

2.12 Strategic Case Summary

2.12.1 The Strategic Case sets out the 'case for change' on the A483/A5 transport corridor, including the key issues and their main contributory factors, objectives for solutions, and a long list of potential solutions.

2.12.2 Key issues have largely been identified from existing planning documents, economic development and transport strategies, and plans, produced at a variety of spatial scales, supplemented with additional publicly available data sources.

2.12.3 Many of the issues identified are interrelated and can be grouped into a smaller number of contributory factors – local and regional growth aspirations which will rely on the A483 being able to accommodate additional demand, a high car mode share, capacity constraints that exist on the A483 and local road network, and severance caused by the A483.

2.12.4 Highway and congestion-related issues are a high priority for stakeholders, with specific highway capacity issues at Junction 4 and Junction 5 seen as the most important.

2.12.5 Taking into account stakeholder feedback, the following two top tier (higher priority) objectives for solutions to issues on the A483/A5 transport corridor have been defined:

- Support and enable the LDP growth aspirations of Wrexham; and
- Maintain the strategic function of the A483/A5 corridor by improving resilience and journey time reliability

2.12.6 Three second tier objectives have also been defined:

- Reduce 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; and
- Enhance connectivity, accessibility and transport network coherence for journeys that cross the A483 corridor.

2.12.7 A long list of 81 potential solutions / transport packages to address the issues has been generated, with significant stakeholder input. Each solution has been assessed against the five objectives. Following the Strategic Case assessment, 24 solutions have been removed from the long list and 57 solutions carried through for wider assessment in the Transport Case.

3 Transport Case

The Transport Case considers the socio-cultural, environmental, and economic impacts of the long list solutions. It presents the outcomes of the long list sifting process, based on a multi-criteria assessment which is aligned to the objectives and the full range of WelTAG impact criteria.

3.1 Assessment Methodology

- 3.1.1 All 57 solutions (including packages) that scored positively in the Strategic Case have been carried through to the Transport Case for assessment against the full range of WelTAG impact criteria. The WelTAG criteria cover social, cultural, environmental, and economic impacts and are designed to ensure that every transport scheme is assessed as objectively as possible against a full range of impacts.
- 3.1.2 The Transport Case at WelTAG Stage 1 should make an initial assessment of the impacts of a long list of solutions, to help decide on a short list for further assessment. The Transport Case is then developed further at WelTAG Stage 2.
- 3.1.3 Each solution has been scored against 23 of the 26 WelTAG impact criteria⁴, using the seven-point scale (-3 to +3) as recommended in WelTAG, to indicate whether the solution would be expected to have a large / moderate / slight adverse or beneficial (or neutral) impact on each criterion. A weighted score has then been calculated, to include the scores previously awarded for the Strategic Case and scores for the Delivery, Financial, and Commercial cases, based on the following weightings:
- 40% Strategic Case (assessment against five specific objectives);
 - 40% Transport Case, with equal weighting to the socio-cultural, environmental, and economic categories;
 - 5% Delivery Case (feasibility, legal requirements, and acceptability assessment);
 - 10% Financial Case (lifetime costs assessment); and
 - 5% Commercial Case (procurement risk assessment).
- 3.1.4 Sensitivity testing on the weightings has also been undertaken to evaluate how the shortlisting conclusions change if:
- Greater emphasis is placed on the Transport Case, given that solutions being assessed at this stage have passed an initial Strategic Case sift (30% Strategic Case, 50% Transport Case);
 - Adding to the above, greater emphasis is placed on the economic category within the Transport Case, as this fits with the overall objectives for Welsh Government and Wrexham CBC (30% to economy, 10% to socio-cultural, 10% to environment within the 50% Transport Case weighting); and
 - Scoring for the Delivery, Financial and Commercial cases is removed, with a 50/50 split remaining for the Strategic Case and Transport Case.

⁴ The criteria are listed in WelTAG 2017 Welsh Transport Appraisal Guidance, pages 32-33. Insufficient information is available at Stage 1 to score townscape impacts and to score changes in productivity. Accident impacts are scored once only (under the Social category) and not also under the Economic category.

3.2 Social and Cultural Impacts

3.2.1 Impact assessments for the socio-cultural criteria have been made based on the descriptions set out in **Table 11**, with high-scoring solutions receiving scores of +2 or +3, using existing evidence and readily available information.

Table 11: Social and Cultural Impact Assessment

Socio-Cultural WeITAG Impact	High-scoring solutions will...	Low-scoring solutions will...
Physical Activity	Actively encourage more walking/cycling and/or provide new high quality infrastructure for active modes.	Encourage greater use of motorised forms of transport, risk poor health and/or remove infrastructure for active modes.
Journey Quality	Improve journey comfort, reduce stress, or improve traveller information.	Reduce journey comfort, increase stress, or reduce traveller information.
Accidents	Reduce vehicle conflict on the faster routes (reducing the risk of accidents) and/or provide significantly safer active travel infrastructure. Solutions might also address accident cluster sites.	Increase vehicle conflict on the faster routes (increasing the accident risk) and/or increase the risks associated with active travel.
Security	Improve personal security for travellers	Reduce personal security for travellers
Access to Employment	Provide improved access to job opportunities for those without access to a car, or make commuting journeys by car more realistic where journeys are currently difficult to make.	Reduce access to job opportunities for those without access to a car, or make commuting journeys by car significantly harder without providing a realistic alternative.
Access to Services	Provide improved access to healthcare, education, leisure, and retail facilities for those without access to a car, or make journeys by car more realistic where journeys are currently difficult to make.	Reduce access to healthcare, education, leisure, and retail facilities for those without access to a car, or make journeys by car significantly harder without providing a realistic alternative.
Affordability	Noticeably reduce the cost of travelling to individuals.	Noticeably increase the cost of travelling to individuals.
Severance	Assist pedestrians and cyclists in crossing current lines of severance - the A483, A5152, and/or rail line.	Reduce the ability or opportunity for pedestrians and cyclists to cross roads or rail lines.
Option Values	Introduce a new mode of transport and therefore increase travel choices.	Remove a mode of transport and therefore reduce travel choices.

3.2.2 The five highest scoring solutions under the Social and Cultural category are solutions that provide alternatives to the private car. The top three are packages combining a range of sustainable transport measures:

- TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning, active travel package (ACT10), major bus improvement package (BUS10), and Park & Share site;
- ACT10 – Cross-A483 active travel package – cycle routes on Mold Rd & Ruthin Road and west Wrexham town centre link;
- BUS10 – Major bus improvement package – service quality, service frequencies, express services, targeted bus priority measures, integrated bus/rail ticketing;
- RAL5 – New rail station with Park & Ride close to J7 at Wrexham North (Rossett); and
- RAL6 – New rail station with Park & Ride close to J2 at Wrexham South (Johnstown).

3.3 Environmental Impacts

- 3.3.1 Impact assessments for the environmental criteria have been made based on the descriptions set out in **Table 12**, using existing evidence and readily available information. No solutions have scored greater than +1 (slight beneficial) for any of the environmental criteria.
- 3.3.2 High level environmental searches have been undertaken using the MAGIC database, to identify statutory and non-statutory designations.

Table 12: Environmental Impact Assessment

Environmental WeITAG Impact	High-scoring solutions will...	Low-scoring solutions will...
Noise	Reduce transport movements overall, leading to an overall decrease in the number of people affected by noise.	Create new route alignments or significantly increase movements on existing transport routes, leading to an overall increase in the number of people affected by noise.
Air Quality	Reduce queueing traffic to the extent that local/regional air quality is improved.	Increase traffic queues or create new areas of congestion to the extent that local/regional air quality worsens.
Greenhouse Gases	Reduce motorised traffic levels overall, leading to reduced greenhouse gas emissions.	Increase motorised traffic levels overall, leading to increased greenhouse gas emissions.
Landscape	Enhance the natural landscape or improve the visual character of an area.	Build on greenfield sites and/or adversely affect the visual character of an area.
Townscape	<i>Insufficient information available - not scored at Stage 1</i>	<i>Insufficient information available - not scored at Stage 1</i>
Historic Environment	Enhance significant historical sites.	Have a negative impact on a significant historical site.
Biodiversity	Enhance provision for flora and fauna and avoid building on greenfield sites.	Build on greenfield sites or in ecologically sensitive areas.
Water Environment	Reduce surface run-off or the risk of flooding.	Increase surface run-off, increase the risk of flooding, or lead to an increased risk of water pollution.

- 3.3.3 The highest scoring solution under the Environmental category is TRS2 – Town centre strategy to deter car commuter trips, as this solution would be expected to reduce traffic noise within Wrexham and to improve local air quality due to reduced traffic queues.
- 3.3.4 A further 13 solutions would be expected to have a slight beneficial impact on one of the environmental impact criteria and no impact on the remaining criteria. These include solutions that provide additional highway capacity largely within the highway boundary or provide smart technology solutions to optimise road space use, therefore reducing traffic queuing and improving local air quality. Other solutions, such as sustainable transport packages, are expected to help reduce greenhouse gas emissions by encouraging mode shift from the private car to public transport and active modes.

3.4 Economic Impacts

3.4.1 Impact assessments for the environmental criteria have been made based on the descriptions set out in **Table 13**, with high-scoring solutions receiving scores of +3, using existing evidence and readily available information.

3.4.2 Scores for the Local Economy and Land criteria have been assessed in part using information contained in the Wider Economic Benefits technical note (included in the **WelTAG Impacts Assessment Report**).

Table 13: Economic Impact Assessment

Economic WelTAG Impact	High-scoring solutions will...	Low-scoring solutions will...
Journey Time Changes	Increase public transport service frequencies and/or reduce journey times by any mode.	Reduce public transport service frequencies and/or increase journey times by any mode.
Journey Time Reliability Changes	Actively address uncertainty, unpredictability, or inconsistency in journey times.	Lead to reduced certainty, increased unpredictability, or further inconsistency in journey times.
Transport Cost Changes	Reduce travel distances and/or delays so that business trip fuel costs and transport provider costs are reduced.	Increase travel distances and/or delays so that business trip fuel costs and transport provider costs increase.
Cost of accidents	<i>Scored under Social category</i>	<i>Scored under Social category</i>
Changes in Productivity	<i>Insufficient information available - not scored at Stage 1</i>	<i>Insufficient information available - not scored at Stage 1</i>
Local Economy	Support local economic regeneration and increase local employment	Tend not to have a noticeable regeneration effect on employment or business formation and development
Land	Unlock development land without sacrificing other available land.	Build on agricultural land and/or fail to unlock development land.
Capital Costs	Scores awarded based on a high level implementation cost band estimate: -1: <£5 million -2: £5 million - £25 million -3: > £25 million	
Revenue Costs	<i>Scored under Financial Case heading (Lifetime costs)</i>	<i>Scored under Financial Case heading (Lifetime costs)</i>

3.4.3 Solutions that score well under the Economic category are primarily those that are expected to deliver the greatest improvements in journey times and journey time reliability on the highway network. Given their potential ability to also unlock development land and benefit the local economy, the two solutions that scored the highest under the Economic Category are:

- CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 J4 / J5; and
- JNC7 – Comprehensive J4 improvement.

3.4.4 Other high scoring solutions include a mix of traditional junction capacity upgrade schemes along the A483, new road building, and a potential behaviour change strategy to reduce the intensity of peak period demand on the road network surrounding A483 Junction 4 and Junction 5:

- TDM4 – Behaviour change - shift patterns for key employers i.e. hospital and university (peak spreading). This solution would not require capital infrastructure investment.
- NRA1 – New southern link road, A483 to Wrexham Industrial Estate.

- CAP3 – Further capacity improvements at Posthouse junction (A483/A55).
- CAP5 – A483 Gledrid Roundabout capacity improvements.

3.5 Additional Considerations

3.5.1 The multi-criteria assessment used for the solutions sifting process has also taken account of four further criteria across the Delivery, Financial, and Commercial cases, as summarised in **Table 14**. These considerations account for 20% of the overall weighted score.

Table 14: Delivery, Financial, Commercial Assessment

Additional Criteria	High-scoring solutions will...	Low-scoring solutions will...
Delivery: Technical feasibility and Technical Risks	Be easy to deliver/construct, using conventional techniques.	Be more difficult to deliver/construct than other solutions, using unproven methods of construction.
Delivery: Legal Requirements	Have no statutory planning requirements and will take place within the existing highway/rail boundary.	Take place outside the existing highway or rail boundary and have significant statutory requirements, potentially including a public inquiry.
Delivery: Stakeholder and Public Acceptability risks	Be acceptable to nearly all members of the public, leading to largely positive publicity.	Be highly controversial, potentially leading to significant amounts of negative publicity.
Financial: Lifetime Costs	Reduce ongoing maintenance and service operation financial liabilities for the public sector and/or lead to increased revenues.	Provide completely new infrastructure requiring ongoing maintenance and/or services requiring an ongoing public subsidy.
Commercial: Procurement Risks	Be relatively easy to procure, with stand technologies and standard forms of contract.	Be challenging to procure, potentially using technologies that are not widely available, or non-standard forms of contract.

3.5.2 The solutions that scored the highest across the Delivery, Financial, and Commercial cases are primarily those that involve infrastructure improvements to deal with localised issues. These are generally conventional construction schemes that are unlikely to be controversial and which do not substantially increase future revenue liabilities:

- JNC3 – 3rd lane on A483 to serve Wrexham J3-J6;
- JNC4 – Improve capacity at J5 - slip road widening, dedicated lanes, widening structures, new signing;
- JNC7 – Comprehensive J4 improvement;
- SAF4 – Improved merges onto A483 to meet design standards;
- ACT1 – Cycle lanes/provision through junctions 3,4,5 and 6;
- ACT6 – Junction 5, Plas Coch and Mold Road active travel improvements;
- ACT7 – Junction 4 and Ruthin Road active travel improvements;
- RAL1 – Better all mode access to Wrexham General station; and
- TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3.

3.6 Short List Development

3.6.1 Following the full multi-criteria assessment, a total of 37 solutions have been removed from the long list either because of a low overall weighted score or because the solutions perform better as part of a wider package of measures. Removed or packaged solutions are listed in **Table 15**. Removal of solutions from the A483/A5 transport corridor long list should not lead to their automatic preclusion from future studies, as they are likely to address other transport issues.

Table 15: Solutions Removed or Packaged following Scoring against all Five Cases

Solution Removed or Packaged	Rationale			Further Explanation
	Very low weighted score (negative or 0)	Low weighted score	Included in package – package has higher score	
BUS1 – Increased bus service frequency across Wrexham area	✓	✓	✓(BUS10)	Ongoing revenue implications likely to be high. Review service requirements as part of wider package.
BUS5 – More direct bus services to Wrexham from the south (express services via A483)	✓	✓	✓(BUS10)	
P&R1 – P&R to serve western area (hospital/university) – site located to the south		✓		Substantial land requirement.
P&R2 – P&R to serve western area (hospital/university) – site located to the north		✓		Ongoing revenue implications likely to be high – service subsidy.
P&R4 – Park and ride solutions for Wrexham Industrial Estate		✓		
ACT2 – Wrexham wide cycle network improvements		✓		Active travel improvements that are more closely targeted to the specific issues identified will be more suitable and cost effective – see package ACT10
ACT3 – Active travel 'ultra-investment' along A483 corridor to Wrexham and station		✓		
ACT4 – Cycle routes to Wrexham Industrial Estate		✓		
SIG2 – Wrexham-wide traffic signalling optimisation		✓		A more targeted solution is required
SIG4 – Tidal flow system with 3 rd lane on A483 south of Ruabon		✓		Unlikely to be a suitable or acceptable solution for an inter-urban corridor.
SMA4 – Smart technology package (real time information, dynamic routing, variable speed limits on A483)		✓		Solution suitable only as a last resort.
NRA1 – New southern link road A483 to Wrexham Industrial Estate		✓		High capital cost and large adverse environmental impacts.
BUS3 – Wrexham CBC to set up own community interest bus company to run services in areas not currently served		✓		Review service requirements as part of wider package. Too early to define procurement.
RAL5 – New rail station with Park & Ride close to J7 at Wrexham North (Rossett)		✓		Considerable land take and statutory requirements. Rail frequency upgrades to existing stations should be delivered first.
RAL6 – New rail station with Park & Ride close to J2 at Wrexham South (Johnstown)		✓		
TDM5 – Parish lift scheme to encourage community car sharing		✓		Limited economic benefits and impact against objectives.
TRS2 – Town centre strategy to deter car commuter trips		✓		Unlikely to have required impact on A483 corridor. Low public acceptability.
TRS4 – Area wide travel strategy for Wrexham Industrial Estate		✓		Unlikely to have required impact on A483 corridor.

Solution Removed or Packaged		Rationale
TRR3 – Signing strategy to direct through traffic HGVs to use M6 for north-south journeys	✓	Unlikely to be an effective or deliverable solution.
P&R3 – Park and Share site near J4 or J5	✓	✓(TDM1a)
SAF4 – Improved merges onto A483 to meet design standards	✓	✓(JNC3 / CAP1a) Dependent on junction improvements and/or 3 rd lane.
CAP1 – Improve capacity (dualling) of A483/A5 south of Ruabon		✓(CAP1a)
CAP3 – Further capacity improvements at Posthouse junction (A483/A55)		✓(CAP8)
CAP4 – A483/A5 Halton Roundabout capacity improvements		✓(CAP8) All included in package CAP8 - A483 wider corridor hotspot package
CAP5 – A483 Gledrid Roundabout capacity improvements		✓(CAP8)
CAP7 – Dualling wide single sections of A483		✓(CAP1a)
ACT1 – Cycle lanes/provision through junctions 3,4,5 and 6		✓(ACT10)
ACT5 – West Wrexham to town centre active travel link	✓	✓(ACT10) Solutions too specific for WelTAG stage 1. Exact requirements to be reviewed as part of wider package of active travel measures (ACT10).
ACT8 – B5101/Gatewen Rd active travel improvements (crossing A483) including Coedpoeth link		✓(ACT10)
ACT9 – Upgrade / increase access points for pedestrians & cyclists onto railway path west of Croesnewydd Rd		✓(ACT10)
BUS2 – Improved bus services to Wrexham Industrial Estate	✓	✓(BUS10)
RAL1 – Better all mode access to Wrexham General station		✓(RAL4a) Solutions included in package RAL4a – Rail frequency enhancement package
RAL2 – Increase rail service frequency Gobowen/Chirk/Ruabon to Wrexham/Chester		✓(RAL4a)
TDM1 – Comprehensive travel planning for all major new development sites		✓(TDM1a)
TDM2 – Workplace travel planning for A483 corridor employers		✓(TDM1a) All included in package TDM1a – West Wrexham town sustainable transport package
TDM4 – Behaviour change - shift patterns for key employers i.e. hospital and university (peak spreading)		✓(TDM1a)
TDM6 – Working with major employers to promote agile working		✓(TDM1a)

3.6.2 The remaining 20 solutions have been placed into the initial short list. The multi-criteria scores for each of these solutions are shown in **Table 16**.

3.6.3 The four highest scoring solutions are not part of a larger package and all have positive scores against both top tier objectives (Objectives 1 and 2). **These four solutions are therefore suitable for inclusion in the final short list:**

- CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5;
- JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6;
- TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site; and
- CAP8 – A483 wider corridor hotspot package, beyond J3-6 – Gledrid, Halton, Posthouse

- 3.6.4 The 10th and 12th ranked solutions are also not part of a larger package, both with positive scores against the two top tier objectives. **These two solutions are also suitable for inclusion in the final short list:**
- TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3 in order to reduce pressure on J4; and
 - RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General.
- 3.6.5 Eleven of the remaining solutions can be considered as component parts of one of the packages to be included in the short list. These component parts might be considered as stand-alone schemes if the wider package is not progressed, or as a short term solution with the wider package representing the longer term solution.
- JNC7 and JNC4, as component parts of package CAP1a;
 - ACT6, ACT7, ACT10, BUS6, BUS8, BUS10 and BUS11, as component parts of package TDM1a;
 - CAP2 as a short term solution for CAP8; and
 - TRS3 as a component part of TRR1.
- 3.6.6 The three remaining solutions are lower scoring solutions that are not part of any wider package. These should be considered for excluding from the final short list:
- TRR2 – Improve junctions west side of Wrexham (A5152). However minor junction improvements on the A5152 might need to be considered as complementary to short list solution TRR1.
 - JNC6 – A525 to Croesnewydd Link Road (avoids J4). The alignment could be considered as a cross-A483 active travel route as part of short list package TDM1a.
 - JNC5 – New local link road(s) parallel to A483 J3-J5.
- 3.6.7 Short list solutions for the A483/A5 transport corridor are not mutually exclusive. It would be possible to deliver them all or to deliver a smaller number as part of a corridor strategy.

Table 16: Short listing Multi-Criteria Assessment

Solution	Strategic Case					Transport Case: Socio-Cultural										Transport Case: Environmental							Transport Case: Economic					Delivery Case			Commercial Case	Financial Case	Weighted Score (min -3, max +3)			
	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5	Physical. Activity	Journey Quality	Accidents	Security	Access-Employment	Access-Services	Affordability	Severance	Option Values	Noise	Air Quality	Greenhouse Gases	Landscape	Townscape	Historic Envnt	Biodiversity	Water Envnt	Journey Times (JT)	JT Reliability	Transport Costs	Local Economy	Land	Capital Costs	Technical Risks	Legal Requirements				Acceptability		
CAP1a – Improve capacity A483/A5 S of Ruabon & J4/5	+3	+3	-1	+2	+2	0	+2	+1	0	0	0	0	0	0	0	0	+1	-1	0	0	0	-1	0	+3	+1	+1	+2	+1	-3	-1	-2	0	0	-1	0.81	
<i>**JNC7 – Comprehensive J4 improvement</i>	+2	0	-1	+2	+2	0	+2	0	0	0	0	0	0	0	0	0	+1	0	0	0	0	0	0	+2	+1	+1	+2	+1	-2	0	0	0	0	0	0	0.52
<i>**JNC4 – J5 capacity upgrade</i>	+2	0	-1	+2	+2	0	+1	0	0	0	0	0	0	0	0	0	+1	0	0	0	0	0	0	+1	+1	0	+1	0	-2	0	0	0	0	0	0	0.45
JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6	+3	+3	-1	+2	0	0	+1	0	0	0	0	0	0	0	0	0	+1	0	0	0	0	0	0	+1	+1	0	+1	0	-2	0	0	0	0	0	0.79	
TDM1a – West Wrexham town sustainable transport (TDM, active travel, bus)	+2	+1	+2	+1	+2	+3	+2	+1	0	+2	+2	+1	+2	+1	-1	0	+1	-1	0	0	-1	0	+1	0	+1	+1	+1	-2	-1	-2	+1	-1	-2	0.55		
<i>**ACT6 – J5 and Mold Road active travel (incl Plas Coch)</i>	+1	0	+1	0	+2	+2	+1	+1	0	0	0	0	+2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0.36	
<i>**ACT7 – J4 and Ruthin Road active travel improvements</i>	+1	0	+1	0	+2	+2	+1	+1	0	0	0	0	+2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	0.36	
<i>**ACT10 – Cross-A483 active travel package</i>	+1	0	+2	0	+2	+3	+2	+1	0	0	0	0	+2	0	0	0	0	+1	0	0	0	0	0	0	0	0	0	0	-2	0	-1	+1	0	-1	0.35	
<i>**BUS10 – Major bus improvement package – quality, frequencies, bus priority, ticketing</i>	+2	0	+1	0	+1	0	+1	0	0	+2	+2	+1	0	+1	0	0	+1	0	0	0	0	0	0	+1	+1	+1	0	0	-2	-1	-1	+1	-1	-2	0.21	
<i>**BUS8 – Bus priority J5</i>	+1	0	+1	0	+1	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	+1	+1	0	0	-1	0	-1	0	0	0	0.26	
<i>**BUS6 – A483 corridor bus priority measures (on B5605)</i>	+1	0	+1	0	+1	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	+1	+1	0	0	-2	0	-1	0	0	0	0.24	
<i>**BUS11 – Bus improvement package, capital measures</i>	+1	0	+1	0	+1	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	+1	+1	0	0	-2	0	-1	0	0	0	0.24	
CAP8 – A483 wider corridor hotspot package	+1	+3	-1	+1	0	0	+1	+1	0	0	0	0	0	0	0	0	+1	0	0	0	0	0	0	+2	+1	+1	+2	0	-3	0	-1	0	0	0	0.53	
<i>**CAP2 – Improve junction capacity A483/A5 S of Ruabon (short term version of CAP8)</i>	+1	+2	-1	+1	0	0	+1	+1	0	0	0	0	0	0	0	0	+1	0	0	0	0	0	0	+2	+1	0	0	0	-2	0	-1	0	0	0	0.39	
TRR1 – A483 signing review access to town centre	+1	+1	0	+1	+1	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0	0	0	-1	0	0	0	0	0	0.36	
<i>**TRS3 – Reroute strategy at key decision points</i>	0	+1	0	+2	+1	0	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	0	0	0	0	-1	0	0	0	0	0	0.30	
RAL4a – Rail frequency enhancement package & access to stations	+2	+1	+2	0	0	+1	+1	0	+1	+1	+1	0	0	+1	-1	0	+1	0	0	0	0	0	0	+1	0	0	+1	0	-2	0	-1	+1	0	-2	0.35	
<i>^TRR2 – Improve junctions west side of Wrexham (A5152)</i>	+1	+1	-1	+2	0	0	+1	+1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	+1	+1	0	0	+1	-2	0	0	-1	0	0	0.31	
<i>^JNC6 – A525 to Croesnewydd Road link (avoids J4)</i>	+2	+1	-2	0	+2	+1	+2	0	0	0	0	0	+1	0	-1	+1	0	-1	0	0	-1	0	+1	+1	0	+1	0	-3	0	-1	0	0	-1	0.25		
<i>^JNC5 – New local link road(s) parallel to A483 J3-J5</i>	+2	+2	-2	0	0	0	+1	0	0	0	0	0	0	0	-1	+1	0	0	0	0	-1	0	+1	+1	0	+1	0	-3	0	-1	0	0	-1	0.22		

Source: Mott MacDonald

3.7 Sensitivity Tests

3.7.1 Sensitivity testing on the weightings has also been undertaken to evaluate how the shortlisting conclusions change:

1. **Greater emphasis placed on the Transport Case** (30% Strategic Case, 50% Transport Case). With this test there is no overall change to the proposed short list. The scores for JNC5 and JNC6 (both involving new link road construction) are weakened, which further strengthens the argument for excluding these solutions from the short list.
2. **Greater emphasis placed on the Economic category within the Transport Case** (30% to economic, 10% to socio-cultural, 10% to environment within the 50% Transport Case weighting). With this test, the case for many sustainable transport measures, including active travel, bus, and rail is weakened, as these solutions are generally not expected to give rise to substantial journey time or journey time reliability improvements across the transport network. RAL4a (rail frequency enhancement package) and TDM1a (West Wrexham town sustainable transport package) would only remain in the short list, although the majority of the component parts score relatively poorly as standalone solutions. The scores for JNC5 and JNC6 (involving new link road construction) are also weak, suggesting that their proposed exclusion from the short list is appropriate.
3. **Scoring for the Delivery, Financial and Commercial cases removed**, with a 50/50 split remaining for the Strategic Case and Transport Case. With this test, scores for solutions which are expected to require ongoing revenues (such as Park and Ride sites), which are technically difficult to deliver, or which are likely to be controversial are strengthened. NRA1 (new southern link road to Wrexham Industrial Estate) would be an additional contender for the short list, and the case for including JNC5 and JNC6 is strengthened.

3.8 Transport Case Summary

3.8.1 The Transport Case at WelTAG Stage 1 provides an initial assessment of the socio-cultural, environmental, and economic impacts of a long list of solutions. It presents the outcomes of the long list sifting process, based on a multi-criteria assessment which is aligned to the objectives and the full range of WelTAG impact criteria.

3.8.2 All 57 solutions (including packages) that scored positively in the Strategic Case have been carried through to the Transport Case for assessment against the full range of WelTAG impact criteria, as well as criteria associated with the Delivery, Financial, and Commercial cases.

3.8.3 The following points have been noted with regard to the Transport Case:

- The five highest scoring solutions under the Social and Cultural category are solutions that provide alternatives to the private car.
- The highest scoring solution under the Environmental category aims to deter car commuter trips and would be expected to reduce traffic noise and improve local air quality due to reduced traffic queues within Wrexham. High scoring solutions also provide additional highway capacity largely within the highway boundary or provide smart technology solutions to optimise road space use, therefore reducing traffic queuing and improving local air quality. Other solutions, such as sustainable transport packages, are expected to help reduce greenhouse gas emissions by encouraging mode shift from the private car to public transport and active modes.
- Solutions that score highest under the Economic category are those that are expected to deliver the greatest improvements in journey times and journey time reliability on the

highway network, while also potentially having the ability to unlock development land and benefit the local economy.

- Solutions that scored the highest across the Delivery, Financial, and Commercial cases are primarily those that involve infrastructure improvements to deal with localised issues. These are generally conventional construction schemes that are unlikely to be controversial and which do not substantially increase future revenue liabilities.

3.8.4 Following the full multi-criteria assessment, a total of 37 solutions have been removed from the revised long list either because of a low overall weighted score or because the solutions perform better as part of a wider package of measures. The remaining 20 solutions have been placed into the initial short list.

3.8.5 Based on the multi-criteria assessment, the following six solutions, which are not part of a wider package, are suitable for inclusion in the final short list:

- CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5;
- JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6;
- CAP8 – A483 wider corridor hotspot package, beyond J3-6 – Gledrid, Halton, Posthouse;
- TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3 in order to reduce pressure on J4;
- TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site; and
- RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General.

3.8.6 Eleven of the remaining solutions can be considered as component parts of one of the packages to be included in the short list. These component parts might be considered as stand-alone schemes if the wider package is not progressed, or as a short term solution with the wider package representing the longer term solution.

3.8.7 Short list solutions for the A483/A5 transport corridor are not mutually exclusive. It would be possible to deliver them all or to deliver a smaller number as part of a corridor strategy.

4 Delivery Case

The Delivery Case at WeITAG Stage 1 identifies the key delivery (timescale, feasibility, legal) risks associated with progressing the short-listed options, and the additional evidence and assessments that would be required to assess the short list at Stage 2.

4.1 Key Delivery Risks

4.1.1 As outlined in the Transport Case, six main solutions have been proposed for the A483/A5 transport corridor short list. **Table 17** sets out the key delivery risks for each of the shortlisted solutions.

Table 17: Delivery Risks for Short List Solutions

Solution	Key Delivery Risks
CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5	<ul style="list-style-type: none"> Assumption that journey time savings will be realised – more evidence needed. Potential need to overcome physical constraints at two viaducts (over the Dee and Ceiriog valleys). Requirements in these locations will have a large bearing on the capital cost. Lengthy development and delivery timescale – need to understand extent of capacity increase required.
JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6	<ul style="list-style-type: none"> Uncertainty over the extent to which this could be delivered within the highway boundary.
TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site	<ul style="list-style-type: none"> Environmental impacts thought to be minimal at this stage, although risk that further site based investigation highlights difficulties that make active travel, bus priority or park and share infrastructure more challenging to deliver. Bus service improvement components may not be commercially viable and could face ongoing funding challenge given constraints on public sector revenue budgets.
CAP8 – A483 wider corridor hotspot package, beyond J3-6 – Gledrid, Halton, Posthouse	<ul style="list-style-type: none"> One of the major congestion hotspots affecting the A483 corridor (at Posthouse) is located in England and work has recently been completed at this junction. Assumption that journey time savings / reliability will be realised – more evidence needed.
TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3	<ul style="list-style-type: none"> Possibility that the Wrexham town centre road network will constrain what is achievable, leading to more pressure to upgrade the A5152 junctions.
RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General	<ul style="list-style-type: none"> Level of service subsidy required to increase service frequency is unknown at this stage. Given available line capacity, there is a potential conflict between making paths available for faster longer distance services between North and South Wales and allocating paths for local services.

Source: Mott MacDonald

4.1.2 A risk register for carrying forward to WeITAG Stage 2 is included in the **WeITAG Impacts Assessment Report**. Key programme level risks are:

- Funding uncertainty, relating to both the source and amount likely to be available to support solutions for the A483/A5 transport corridor; and

- Uncertainty regarding improvements to be made by Highways England on the continuation of the A483/A5 transport corridor in England, both to the north and south. Any solution delivered in Wales will need to be complementary to solutions delivered in England.

4.2 Additional Evidence Required

4.2.1 At WeITAG Stage 2, Outline Business Case, further more detailed assessments will need to be undertaken for the shortlisted solutions. Additional evidence will need to be collated, targeted to the topic areas that will most likely affect the Outline Business Case conclusions:

- Cost estimates will be required for each short listed solution, covering implementation and ongoing operation / maintenance costs;
- Journey time savings, transport cost savings, and changes in road accidents will need to be forecast, potentially using a transport model covering the Wrexham CBC area; and
- Environmental site surveys to assess the likely landscape, biodiversity, and water environment impacts will need to be undertaken, as little information is currently available.

4.2.2 Work will be needed before commencing WeITAG Stage 2 to understand the mode shift that could be achieved from shortlisted solutions TDM1a and RAL4a and therefore the extent to which capacity will be freed up along the A483/A5 corridor.

4.2.3 Work will also be required to determine the extent to which solution TRR1 (A483 signing review) can remove pressure from Junction 4 and Junction 5, which in turn will impact on the exact improvement required for solutions CAP1a and JNC3.

4.2.4 Option assessment work will be needed at Stage 2 to define the exact extent of improvements required and the component measures that are to be included in the packages. For example, the standards required for the A483 corridor south of Ruabon, the extent of 3rd lane, and decisions on which cross-A483 active travel measures and bus measures should be retained within package TDM1a.

4.2.5 A greater understanding will be needed on Highways England's plans for the A5 Shrewsbury – Oswestry corridor and plans for further improvements at the Posthouse roundabout. and how these might complement the short list solutions in this WeITAG Stage 1 Report.

4.3 Delivery Programme

4.3.1 Once further development and assessment work has been undertaken at WeITAG Stage 2 then a draft delivery programme will need to be prepared. The delivery programme will set out the short, medium, and long term solutions proposed for the A483/A5 transport corridor.

5 Financial Case

The Financial Case at WelTAG Stage 1 provides an initial commentary on the lifetime cost implications of the short-listed solutions.

5.1 Lifetime Cost Implications

5.1.1 As set out in the Delivery Case (Section 4), cost estimates for implementation and ongoing operation / maintenance costs will be required for each shortlisted solution to inform WelTAG Stage 2, Outline Business Case.

5.1.2 **Table 18** sets out the expected cost implications for each of the six main solutions that have been proposed for the A483/A5 transport corridor short list. This is based on a high-level review only.

Table 18: Expected Lifetime Cost Implications for Short List Solutions

Solution	Cost Implications
CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5	<ul style="list-style-type: none"> Infrastructure requirements, particularly in relation to the Dee and Ceiriog viaducts, will have a large bearing on the capital cost. Solution could lead to a slight increase in ongoing maintenance costs, although if the solution involved renewing existing carriageway and bridge structures then the ongoing cost impact could be mitigated.
JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6	<ul style="list-style-type: none"> Moderate implementation cost expected, partly dependent on land take requirements. Unlikely to have a significant impact on ongoing maintenance costs for the A483.
TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site	<ul style="list-style-type: none"> More detailed option assessment work required to determine exact requirements, and therefore implementation costs, for active travel, bus and Park and Share components. Bus service improvement components may not be commercially viable and could require ongoing subsidy.
CAP8 – A483 wider corridor hotspot package, beyond J3-6 – Gledrid, Halton, Posthouse	<ul style="list-style-type: none"> Infrastructure and land take requirements are currently uncertain and will have a large bearing on the capital cost. Unlikely to have a significant impact on ongoing maintenance costs for the A483/A5 corridor.
TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3	<ul style="list-style-type: none"> Review and implementation costs expected to be relatively low. Net increase in ongoing maintenance costs expected to be minimal.
RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General	<ul style="list-style-type: none"> Implementation cost will primarily be associated with increased car parking, dependent on infrastructure and land take requirements. Service frequency enhancement likely to require additional subsidy for the train operating company, although this is largely dependent on the new Wales and Borders Rail Services Contract which is currently being procured. Additional operating costs for larger car parks expected to be recouped through additional parking revenues at Wrexham General and Ruabon.

Source: Mott MacDonald

6 Commercial Case

The Commercial Case at WelTAG Stage 1 sets out the high level procurement considerations associated with the short list.

6.1 Introduction

- 6.1.1 The Commercial Case, when complete, should address all aspects of scheme procurement, including the level of private sector involvement, risk allocation, third party funding potential and ongoing liabilities facing scheme promoters.
- 6.1.2 As this is a WelTAG Stage 1 study, it is not appropriate for a detailed commercial assessment to be carried out at this point. This is recognised in the WelTAG guidance.

6.2 Application to the Short List

- 6.2.1 The emerging short list of solutions comprises a series of complementary schemes of different scales, impacts and potential delivery mechanisms. A further critical factor to consider is the potential source of funding for elements included on the short list, particularly in situations where funding and procurement are interlinked.
- 6.2.2 Development of the Commercial Case is therefore informed by:
- An understanding of the likely outputs and the outcomes required for schemes;
 - Scheme complexity;
 - Procurement objectives, outcomes and constraints; and
 - As assessment of potential procurement and funding options.

6.3 Output Based Specification

- 6.3.1 The recommended procurement approach will aim to:
1. Deliver the schemes within the available funding;
 2. Deliver schemes to programme;
 3. Ensure full commitment to the project;
 4. Ensure Best Value is delivered;
 5. Offer an affordable 'whole life' cost solution;
 6. Reduce risks to a level that is as low as practicably possible; and
 7. Establish contractor and stakeholder engagement throughout the whole process from early planning to full scheme delivery.
- 6.3.2 In setting out this framework, there is no starting presumption on the level of private sector involvement or third party funding that may be factored into its development, so it is useful to next consider how such opportunities relate to the development and delivery of the scheme.

6.4 Potential Funding Mechanisms

- 6.4.1 Scheme funding traditionally has relied on local and national government capital funding routes supplemented by other mechanisms such as EU or UK bid-based approaches based plus additional flexibilities afforded in revenue spending, particularly "prudential borrowing".

6.4.2 The potential for extending the scope of funding and therefore the types of scheme that could be developed, has been thoroughly explored since private sector partnership approaches to delivery and funding austerity policies have applied at the UK level. The aim throughout is to seek ways of implementing schemes while also reducing the risk and long term cost exposure to the public sector.

6.4.3 There are several funding mechanisms which need to be considered for the A483/A5 transport corridor:

- Delivery risk transfer;
- Third party funding availability;
- Innovative funding routes; and
- Ongoing liability transfer.

6.4.4 In each case, the length of time it takes to develop a scheme is an important factor in determining the potential of these mechanisms. In short, the larger the scheme, the longer it is likely to take to deliver but also the greater the opportunity for securing additional resources and/or transferring risk. This is summarised in **Figure 10**.

Figure 10: Potential Delivery Mechanisms Potential

Development timescale →	Up to 5 years			5 - 10 years			Over 10 years		
	<£5m	£5-25m	>£25m	<£5m	£5-25m	>£25m	<£5m	£5-25m	>£25m
Development aspects									
Scheme delivery: < £5m	★								
Scheme delivery: £5m - £25m					★	★			
Scheme delivery: > £25m									★
Delivery risk sharing	★		★	★	★	★	★	★	★
Delivery risk transfer			★						
Third party funding potential	★	★							
Innovative funding (capex)						★		★	★
Private sector operation					★	★		★	★
Ongoing liability transfer						★			★
Community involvement	★			★			★		

Source: Mott MacDonald

6.4.5 Regarding risk transfer, various formal routes currently exist at procurement stage and are built into commonly used contract forms, e.g. ‘pain and gain’ sharing on delivery or manipulation of quality / price tendering to capture and transfer risks as required by the client.

6.4.6 Extending these approaches to longer term operational costs is dependent on some type of partnership approach between the clients and contractors, or a third-party operator being in place. The traditional PFI approach is no longer favoured on value for money grounds, but other forms of partnership may be explored to determine their application. In respect of trunk roads for instance, Highways England has used a variety of Managing Agent Contractors to ‘operate’ their network, with the scope covering revenue spending headings such as routine and winter maintenance, carriageway lighting and minor capital works delivery.

6.4.7 These contracts are arrangements for restructuring HE's establishment and therefore strictly may not save the client anything at the procurement level. However use of partnerships does open the door to closer strategic collaboration between large clients such as the Welsh Government and private sector highways businesses. This offers potential for securing economies of scale such as streamlined management, better procurement of materials and specialist services and reduction in programme risks.

6.4.8 A further area needing investigation is the potential for securing third party funds towards the capital costs. Normally this would be a reference to development funding from sites coming forward which rely on the trunk road for access and which may overload existing junctions. Wrexham CBC will be able to capture these opportunities up to the limits of development viability. This traditional approach has been extended in two particular ways which may be relevant to transport developments in the corridor.

- Development of 'revolving funds' using borrowing powers to create a capital funding stream with downstream repayment from increased rates of local economic activity. These require specific sanction by Government and usually lie entirely within the public sector.
- Development of franchising or leasing type approaches towards public assets to enable private sector investment and revenue generation. Some past examples have been controversial and possibly not very successful (e.g. some PFI deals, rail franchises) but the scope of such deals could be wider and need not involve the public sector being liable for unrealistic levels of revenue payment.

6.4.9 Finally, it is noted that the corridor scheme could involve public transport improvements and small infrastructure works. This raises the possibility of community involvement with both and quality partnership work with public transport operators.

6.5 Risk Allocation and Transfer

6.5.1 The general principal in risk management is that risks should be passed to the party best able to manage them. These risks lie between the client (Welsh Government and Wrexham CBC) and its prospective suppliers (contractors) and the risk allocation matrix in **Table 19** summarises the generic position of both parties.

Table 19: Risk Allocation Potential

Category	Clients	Contractor	Shared	Notes
Development risk	X			The client bears responsibility that its scheme is well planned and a deliverable proposal.
Procurement risk	X		X	The client is responsible for procurement and its effectiveness. Contractor also involved if subs are involved.
Design risk			X	Detailed design is mainly a contractor responsibility for built elements, but the client will be concerned with service design aspects.
Construction risk		X		Contractor as delivery organisation.
Programme risk			X	Client bears funding-related risks and the contractor, those affecting delivery.
Implementation risk			X	Joint co-ordination of construction activities.

Category	Clients	Contractor	Shared	Notes
Operating risk	X			Clients bear risk as asset owners unless transferred to third party under contractual arrangement.
Revenue risk	X			Clients bear risk as asset owners unless transferred to third party under contractual arrangement.
Termination risk			X	Contractor carries most risk of early termination, but some remains with the client.
Financing risks	X			Payment and funding responsibility lies with the client.

Source: Mott MacDonald

6.5.2 As the sponsor for the scheme, the clients would need to underwrite any cost overruns if they occurred due to delays on their part. It is expected that contingencies will be included in the contracts devised to ensure cost overruns due to delays in delivery are absorbed by the contractor.

6.5.3 The principal commercial risks relate to the consequences of national policy changes and funding pressures affecting the prospects for the scheme. By their nature, this type of risk is strategic and the impact on procurement is implicitly accepted by the clients.

6.5.4 The remaining commercial risks are connected with the financial consequences to the Welsh Government and/or Wrexham CBC of the project. The principal commercial risks on this basis are:

- Procurement of any additional services, unforeseen at present;
- Sufficiency of scheme funding (accuracy of cost estimation / inflation); and
- Schedule-based risks.

6.5.5 Each of the project components is categorised by a particular level of associated risk and the financial impact arising would need to be captured in a Quantified Risk Assessment at the Outline Business Case stage of the project.

6.6 Procurement strategy

Contractual Framework

6.6.1 Contractors and other consultant support will be procured on behalf of the Welsh Government and Wrexham CBC for the agreed corridor scheme(s), in line with the clients' Procurement Strategies. The relevant client business and procurement representatives will work together to identify and develop the sourcing requirements.

Contract Management

6.6.2 The Welsh Government and its Agents and Wrexham CBC collectively have extensive experience in the procurement and delivery of a wide range of transport investments. There are sufficient resources available to project manage all external consultants and contractors to be appointed to deliver the scheme once its scope is finalised. Wrexham CBC also has experience public transport tendering and community transport development.

6.6.3 The forms of contract cannot be defined at the present time, but it is likely that a framework will need to be developed to define the form of co-operation between Welsh Government and Wrexham CBC plus any private sector partners involved in managing delivery.

- 6.6.4 A draft programme is not available at this stage. However, the timescale range that delivering the schemes may take runs for a period in excess of 10 years. Typically, smaller schemes within the corridor would be capable of development and delivery within a 5-year time frame while larger schemes, such as upgrading the full corridor, with major infrastructure elements, would occupy a much longer period.
- 6.6.5 The range of intermediate scale schemes such as junction improvements would fall within the 5-10-year horizon, typically seen with transport planning cycles at local authority level.

7 Recommendations

This section provides a summary of the options that should be progressed to WelTAG Stage 2 and the steps to be taken between completing Stage 1 and commencing Stage 2.

7.1 Proposed Short List

7.1.1 This WelTAG Stage 1 study concludes that the short list should comprise the following solutions:

- CAP1a – Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 Junction 4 and Junction 5;
- JNC3 – 3rd lane on A483 to serve Wrexham, J3-J6;
- CAP8 – A483 wider corridor hotspot package, beyond J3-6 – Gledrid, Halton, Posthouse;
- TRR1 – A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3 in order to reduce pressure on J4;
- TDM1a – West Wrexham town sustainable transport package – new development & workplace travel planning including agile working, active travel package, major bus improvement package, and Park & Share site; and
- RAL4a – Rail frequency enhancement package – service frequency, increased parking, all mode access to Wrexham General.

7.1.2 Eleven other solutions can be considered as component parts of the six main solutions and therefore should also be included in the short list. These component parts might be considered as stand-alone schemes if the wider package is not progressed, or as a short term solution with the wider package representing the longer term solution:

- JNC7 (comprehensive Junction 4 improvement) and JNC4 (Improve capacity at Junction 5), as component parts of package CAP1a;
- ACT6 (Junction 5 active travel improvements), ACT7 (Junction 4 active travel improvements), ACT10 (Cross-A483 active travel package), BUS6 (A483 corridor bus priority measures on B5605), BUS8 (Junction 5 bus priority), BUS10 and BUS11 (bus improvement packages), as component parts of package TDM1a;
- CAP2 as a short term capacity solution for CAP8; and
- TRS3 (rerouting strategy) as a component part of TRR1.

7.1.3 Short list solutions for the A483/A5 transport corridor are not mutually exclusive. It would be possible to deliver them all or to deliver a smaller number as part of a corridor strategy

7.2 Next Steps

7.2.1 The outcomes from this WelTAG Stage 1 study can now be used to:

- Justify in future plans the reasons why certain solutions have been shortlisted while other solutions have been discounted;
- Devise an overall strategy, delivery and funding programme for the A483/A5 transport corridor;
- Liaise further with stakeholders on the solutions to be taken forward; and
- Commission more detailed work on each shortlisted solution.

7.2.2 The next steps for Welsh Government and Wrexham CBC are to:

- Agree that the short list can be progressed to WelTAG Stage 2, Outline Business Case;
- Decide which organisation would be responsible for further work on each solution;
- Undertake more detailed option assessment for each of the shortlisted solutions, to identify the exact extent of improvements required, particularly for the sustainable transport packages TDM1a and RAL4a;
- Undertake more detailed costing, transport modelling, and environmental impact work as set out in the Delivery Case, in preparation for WelTAG Stage 2;
- Liaise with Highways England on the links with cross-border solutions;
- Prepare Outline Business Cases for shortlisted solutions, potentially separately rather than as a single set of measures; and
- Identify suitable funding sources.

7.2.3 As individual solutions are progressed through WelTAG Stage 2, the Design Objectives should be used to guide option development:

- Provide safe and convenient access for active modes at all new developments along the corridor;
- Future-proof the transport network for increased demand; and
- Future-proof the transport network with regard to maintenance liabilities.

7.2.4 The purpose of WelTAG Stage 2 (Outline Business Case) will be to examine the short list in greater detail, focusing on the problems that these solutions are intended to address, and the means by which the solutions will lead to the desired outcomes. Preferred options would then be identified at the end of Stage 2.

Appendices

A. Solutions Long List

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A. Solutions Long List

Reference	Solution
P&R1	P&R to serve western area (hospitals/university) – site located to the south
P&R2	P&R to serve western area (hospitals/university) – site located to the north
P&R3	Park and share site near J4 or J5
P&R4	Park and ride solutions for Wrexham Industrial Estate
JNC1	Additional lanes on J4 offslips to reduce green time needed, therefore increasing capacity for A525
JNC2	Increased capacity at Junction 4 -slip road widening, dedicated lanes, widening structures, new signing (various options)
JNC3	3rd lane on A483 to serve Wrexham, J3-J6
JNC4	Improve capacity at J5 - slip road widening, dedicated lanes, widening structures, new signing
JNC5	New local link road(s) parallel to A483 between J3 and J5
JNC6	A525 to Croesnewydd Road link (avoids J4)
JNC7	Comprehensive J4 improvement – combines solutions JNC1 and JNC2
SAF1	Improve safety of traffic flow on A483 Chirk bypass (retain 2 lanes)
SAF2	Tackle identified accident cluster sites (non-A483)
SAF3	Carriageway relining
SAF4	Improved merges onto A483 to meet design standards
CAP1	Improve capacity (dualling) of A483/A5 south of Ruabon
CAP1a	CAP1 + JNC4 and JNC7 (i.e. Improve capacity (dualling) of A483/A5 south of Ruabon & improve capacity at A483 J4 / J5)
CAP2	Improve junction capacity on A483 + A5 south of Ruabon (short term)
CAP3	Further capacity improvements at Posthouse junction (A483/A55)
CAP4	A483 / A5 Halton roundabout capacity improvements
CAP5	A483 Gledrid Roundabout capacity improvements
CAP6	Convert wide single carriageway to 3 lanes south of Ruabon
CAP7	Dualling wide single sections of A483
CAP8	A483 wider corridor hotspot package, beyond J3-6 (Gledrid, Halton, Posthouse) – combines CAP 3, 4, 5
ACT1	Cycle lanes/provision through junctions 3,4,5 and 6
ACT2	Wrexham wide cycle network improvements
ACT3	Active travel 'ultra-investment' along A483 corridor to Wrexham / station
ACT4	Cycle routes to Wrexham Industrial Estate (LTP)
ACT5	West Wrexham to town centre active travel link (LTP)
ACT6	Junction 5, Plas Coch and Mold Road active travel improvements
ACT7	Junction 4 and Ruthin Road active travel improvements
ACT8	B5101 / Gatewen Road active travel improvements (crosses A483) including link to Coedpoeth
ACT9	Upgrade and increase number of access points onto the railway path west of Croesnewydd Rd
ACT10	Cross-A483 Active Travel Package – cycle lanes across J3-6 (ACT1) + cycle routes on Mold Rd (ACT6)/Ruthin Rd (ACT7) + town centre link (ACT5) + ACT8 + ACT9
SIG1	Change signals at key junctions to release more traffic from local network to A483
SIG2	Wrexham-wide traffic signalling optimisation
SIG3	Ramp metering on A483 on-slips
SIG4	Tidal flow system with 3 rd lane on A483 south of Ruabon
SMA1	Smart corridor technology for route choice leaving the town
SMA2	Better real-time information on the road network
SMA3	Variable message signing on A483 corridor / variable speed limits on A483

Reference	Solution
SMA4	Smart technology package (real time information, dynamic routing, variable speed limits on A483)
NRA1	New southern link road - A483 to Wrexham Industrial Estate
PAR1	Segregate hospital car parks for directional travel
PAR2	Parking controls at new developments (more restrictive than current standards)
BUS1	Increased bus service frequency across Wrexham area
BUS2	Improved bus services to Wrexham Industrial Estate
BUS3	WCBC set up own community interest bus company and run services in areas not already served (new bus services)
BUS4	Improved bus service quality on services across Wrexham area.
BUS5	More direct bus services to Wrexham from the south (express services via A483)
BUS6	A483 corridor bus priority measures (on old road – B5605)
BUS7	Integrated bus/rail ticketing
BUS8	Bus priority measures at J5
BUS9	Bus priority measures at A483 J4
BUS10	Major bus improvement package – improved quality (BUS4), increased frequencies incl. Ind Estate (BUS1 + BUS2), express services on A483 from south (BUS5), with targeted bus priority measures (BUS 6, 8), integrated ticketing (BUS7)
BUS11	Bus improvement package – capital only – improved quality (BUS4), targeting bus priority measures (BUS6,8)
RAL1	Better all mode access to Wrexham General station
RAL2	Increase rail service frequency Gobowen/Chirk/Ruabon to Wrexham-Chester
RAL3	Increased parking capacity at Wrexham General station
RAL4	Increased parking capacity at Ruabon and Chirk Stations
RAL4a	Rail frequency enhancement package: Increased rail services frequency (RAL2) + Increased parking at Ruabon/Chirk (RAL4) + Better all mode access to Wrexham General (RAL1/3)
RAL5	New rail station with Park & Ride close to J7 at Wrexham North (Rossett) (LTP)
RAL6	New rail station with Park & Ride close to J2 at Wrexham South (Johnstown)
TDM1	Comprehensive travel planning for all major development sites (new developments)
TDM1a	West Wrexham town sustainable transport package – new development & workplace travel planning, active travel package, major bus improvement package, and Park & Share site – TDM1,2,4,6 + ACT10 + BUS10 + P&R3
TDM2	Workplace travel planning for A483 corridor employers
TDM3	Residential travel planning for existing residential areas (PTP)
TDM4	Behaviour change - shift patterns for key employers i.e. hospital and university (peak spreading)
TDM5	Parish life scheme to encourage community car sharing for community and villages
TDM6	Working with major employers to promote agile working
TRS1	Commission wider Wrexham Transport Strategy
TRS2	Town centre strategy to deter car commuter trips
TRS3	Reroute strategy at key decision points
TRS4	Area wide travel strategy for Wrexham Industrial Estate
TRR1	A483 signing review for Wrexham town centre and industrial estate, including directing traffic from south into Wrexham at J3
TRR2	Improve junctions around western side of Wrexham (A5152) to encourage better use of road network overall
TRR3	Signing strategy to direct through traffic HGVs to use M6 for north-south journeys
TRR4	Local traffic must pay a charge to use A483 at peak times
TRR5	No car zones in Wrexham town centre
TRR6	HGV/freight (consolidation) system at corridors leading into Wrexham
POL1	Preserve potential active travel routes in planning policy

