North & Mid-Wales Trunk Road Agent

MID-WALES SAFETY SCHEMES

WelTAG Stage 3

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CONFIDENTIAL

North & Mid-Wales Trunk Road Agent

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WelTAG Stage 3

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1 INTRODUCTION

1.1 CONTEXT

1.1.1. In 2017, the Welsh Government (WG) identified a need to undertake improvements at congestion pinch points on the trunk road network throughout Wales. This led to an initiative to develop a strategy for overtaking and pinch-point improvements on the mid-Wales trunk road network, to improve safety, reliability, and resilience, while making best use of existing infrastructure.

1.1.2. The initiative had strong Ministerial support centred around improved connectivity for all north-south trunk road links, with particular focus on sections of the A487, A483, the A470 and the A44 (W).

1.1.3. The North and Mid-Wales Trunk Road Agent (NMWTRA) appointed WSP to undertake a WelTAG Stage One, Two and Three appraisal of potential schemes. This report presents the Stage Three: Full Business Case of the WelTAG process, including option refinement and design. This WelTAG Stage Three will include an appraisal of each short-listed scheme, up to preliminary design, confirming land requirements and carrying out consultation to gauge acceptability and deliverability. Full detailed design will follow on for selected schemes that are considered most deliverable and beneficial at this stage. This WelTAG Stage Three will be updated to reflect updated designs, cost estimates and appraisals for schemes progressing through to the detailed design stages.

1.2 ALIGNMENT OF STUDY TO CHANGING POLICIES & ASPIRATIONS

1.2.1. Throughout the study life cycle, from WelTAG Stage 1 (2017/2018) through to the current WelTAG Stage 3 study, there have been various changes in policy, guidance and aspirations. Of particular note is the Carbon Agenda and the New Wales Transport Strategy, which has been published during this WelTAG Stage 3.

1.2.2. It is important that the study is reviewed and evolves at each stage to reflect changes in policy and confirm that the objectives and outcomes stay relevant. The below provides a brief overview of each WelTAG stage, the key changes made to reflect updated policies, and whether the recommendations made at each stage remain relevant:

WelTAG Stage 1

1.2.3. The WelTAG Stage 1 study was completed in 2017/18. The outcome of the WelTAG Stage 1 included over 100 potential schemes across the four primary mid Wales trunk roads. It recommended that initial schemes to be taken forward from the overall strategy should be assessed based on a node-to-node approach i.e. schemes within a close geographic area to implement improvements in a more holistic way over a section of trunk road. It was agreed that the node-to-node approach would provide a better opportunity to deliver improvements that address key policy areas, including the Wellbeing of Future Generations Act, Active Travel, Green Corridor initiative, the Wales Way and measures to address the climate emergency.

1.2.4. Upon review, it is felt that the findings and recommendations of the WelTAG Stage 1, in principle, remain relevant following the issue of the New Wales Transport Strategy. The study aimed to provide a long-term programme of schemes that would improve safety and resilience of the network, tackling pinch points and making best use of existing infrastructure. During the study, the decision to focus on node-to-node improvements to bring more holistic benefits for all modes and to better address biodiversity and the environment, aligns well with current policy.

WelTAG Stage 2

1.2.5. Two separate WelTAG Stage 2 studies were subsequently progressed (2018/19) for the A487 and A470 Trunk Roads. These WelTAG Stage 2 studies were focussed on identifying the most deliverable and beneficial schemes within each node-to-node corridor and were identified as 'Batch 1'. 'Batch 1' schemes were defined as those schemes which are deliverable in the shorter-term and provide guaranteed overtaking opportunities to improve safety on the network. Based on this criterion, the identified Batch 1 schemes focussed on Differential Acceleration Lanes (DAL), as these are shorter in length and therefore limit the amount of additional land required, making best use of existing infrastructure.

1.2.6. As agreed through consultation with WG and NMWTRA, Batch 1 options were appraised as part of a node-to-node, longer-term improvement strategy to enable a holistic review of improvements through specific Route Sections. The A470 WelTAG Stage Two appraised options contained within Route Sections C02 (Brecon to Builth Wells) and C04 (Llangurig to Talerddig), whilst the A487 WelTAG Stage Two study appraised options contained within Route Sections C07 (Aberaeron to Aberystwyth) and C08 (Aberystwyth to Machynlleth).

1.2.7. The outcome of the Stage Two studies included the following recommendations for further development and consideration of 'Batch 1' schemes, for the mid-Wales overtaking strategy:

- **A470:** Progress improvements between Llangurig (Site 27), Llanidloes (63c) and Caersws (62a); plus, an additional stand-alone scheme at Pontybat (Site 34b). These schemes comprise new roundabouts at Caersws and Pontybat, and the introduction of an additional lane to overtake slower-moving vehicles on the exit from roundabouts at three of the sites (Llangurig, Llanidloes & Pontybat).
- **A487:** Progress improvements between Aberarth and Llanrhystud (Sites 17a and 18); plus, a stand-alone scheme at Machynlleth (Site 53). These schemes comprise a climbing lane north of Aberarth and the introduction of an additional lane to overtake slower-moving vehicles on the exit from roundabouts at the other two sites (Llanrhystud and Machynlleth).

1.2.8. In line with the rationale noted above for WelTAG 1, the findings and recommendations of the WelTAG 2 study, in principle, remain relevant following the issue of the New Wales Transport Strategy

WelTAG Stage 3

1.2.9. During the delivery of WelTAG Stage 3, significant new polices have been published, including the New Wales Transport Strategy. For this reason, a robust review of the study has been carried out, to ensure the approach, objectives and options best align with the WTS priorities and objectives. The below summarises the key updates and additional considerations that have been incorporated:

- ***Study Objectives*** – A review of the study objectives against the Wales Transport Strategy has been carried out. Although the general focus of the objectives remains similar to those at stage 2, the updated wording links more closely to the WTS and provides greater emphasis on key areas such as carbon, climate resilience, modal shift and enhanced biodiversity. The updated objectives can be found in Section 2.10.
- ***Study name*** – The Study name has been amended to Mid Wales Safety Schemes to reflect a slight shift in focus to a wider safety remit for all users. Although the focus of providing safe discrete overtaking opportunities, to reduce incidents and driver stress on the SRN, is still very

relevant to the study, it is not considered an absolute requirement to have formal overtaking as part of a scheme.

- ***Sustainable Transport*** – As part of the Stage 3 preliminary design development, a WCHAR has been completed for each scheme to identify opportunities for improved active travel, including links to and improved public transport infrastructure where appropriate, both within and outside scheme extends.
- ***Future Ready, climate resilience and carbon reduction*** – Greater focus has been placed on creating future ready schemes that are more resilient to climate change and identify opportunities to reduce carbon at each project stage, utilising WSP's future ready checklist (aligned to WFGA wellbeing goals). Carbon assessments are currently underway for all schemes to provide additional focus on reducing carbon through design, specification and construction.
- ***Enhancing biodiversity*** – Biodiversity Net Gain (BNG) assessments have been completed for all potential schemes and landscape proposals developed following this to achieve a net gain through additional planting.

1.3 STUDY AREA AND SITES

1.3.1. The refined study area for the WelTAG Stage Three, including the scheme-type proposed at each individual site along a Route Section, is summarised at Table 1-1. A plan showing the location of the seven short-listed sites, in the context of Mid-Wales, is provided as Figure 1-1.

1.3.2. Plans illustrating each individual site to be appraised as part of this WelTAG Stage Three study are provided at Figure 1-2 to Figure 1-8.

1.3.3. Outline designs for each of the seven options can be found at **Appendix A**.

Table 1-1 – Route Sections and Sites

Road	Route Section	Node to Node	Site ID / Location	Proposed Mitigation
A470	C02	Brecon to Builth Wells	34b – Pontybat	New Roundabout and DAL
	C04	Llangurig to Talerddig	27 – Llangurig	DAL
			62a – Caersws	New Roundabout
			63c – Llanidloes	DAL
A487	C07	Aberaeron to Aberystwyth	17a – Aberarth	Climbing Lane
			18 – Llanrhystud	New Roundabout and DAL
	C08	Aberystwyth to Machynlleth	53 – Machynlleth	DAL

Figure 1-1 - Site Locations Plan

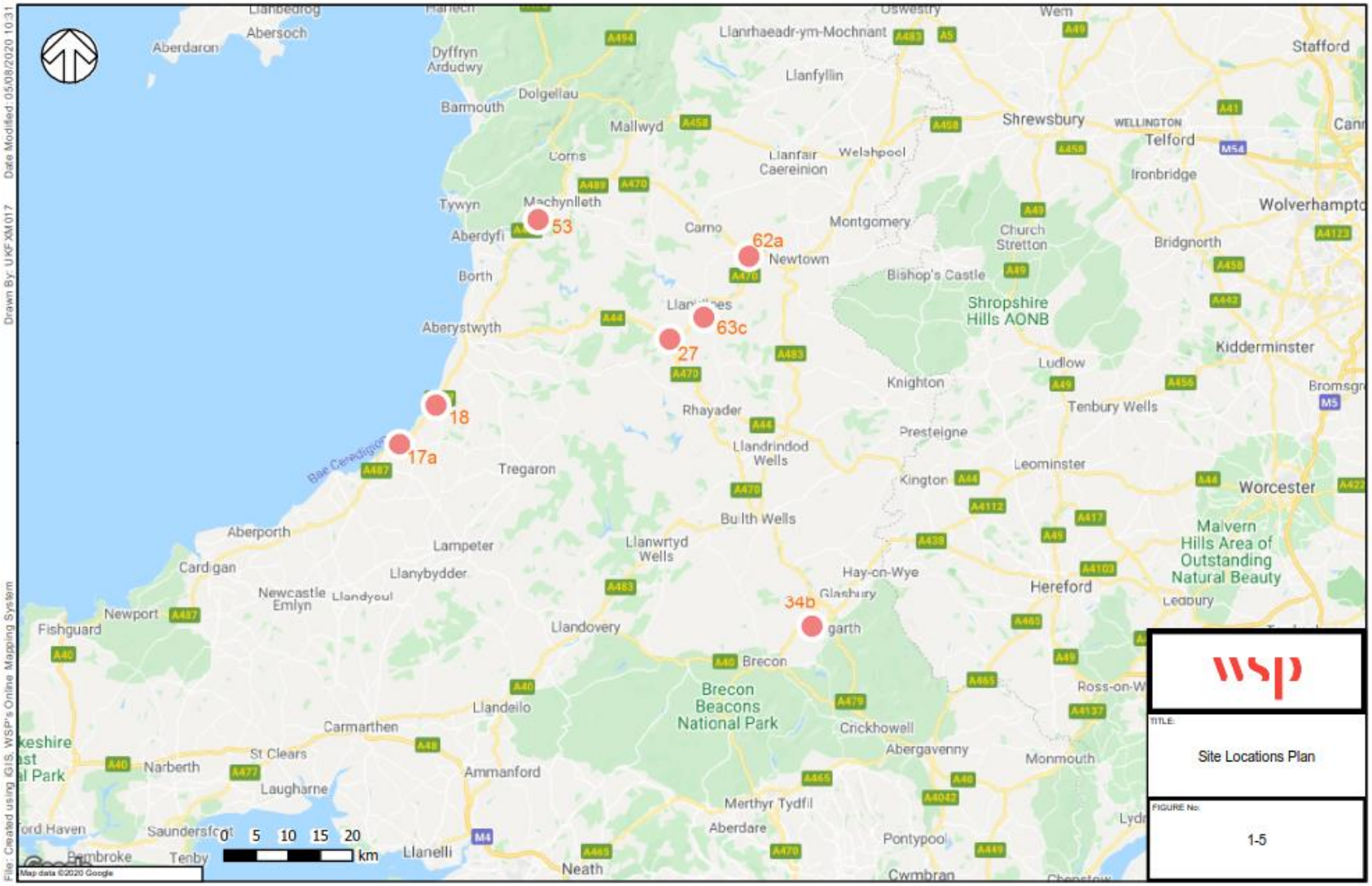


Figure 1-2 - Site 17 & 17A Aberarth

Figure 1-3 - Site 18 Llanrhystud

Figure 1-4 - Site 27 Llangurig

Figure 1-5 - Site 34b Pontybat

Figure 1-6 - Site 53 Machynlleth

Figure 1-7 - Site 62a Caersws

Figure 1-8 - Site 63c Llanidloes

1.4 APPROACH

1.4.1. WelTAG is the Welsh Transport Appraisal Guidance and provides a framework for appraising changes to the transport network. The latest version of this guidance (WelTAG 20171) has been used as the basis for this appraisal. As well as embedding the Well-being of Future Generations (Wales) Act 2015, WelTAG combines the principles of the HM Treasury Green Book and the Five Case Model for Better Business Cases, with WebTAG best practice for transport appraisals. The process covers the complete lifecycle of a proposed intervention, from problem identification to scheme design, and implementation and evaluation.

1.4.2. The contents of each Stage Report should follow the structure of the Five Cases Model used by the Welsh Government and HM Treasury. The Five Cases, as applied to the transport appraisal, are summarised as follows:

- **Strategic Case:** Does the case for change, fit with policies and well-being objectives?

[1] Source: https://beta.gov.wales/sites/default/files/publications/2017-12/welsh-transport-appraisal-guidance.pdf

Accessed February 2018

- **Transport Case:** Does the proposal offer good public value for money and maximise contribution to the Well-being Goals?
- **Financial Case:** Is the proposed spend affordable?
- **Commercial Case:** How can the scheme be procured? Is it commercially viable?
- **Management Case:** Is the scheme achievable? Can it be delivered?

1.4.3. The WelTAG guidance states that the purpose of the Stage Three: Full Business Case is to:

"make a full and detailed assessment of the preferred option[s] to inform a decision as to whether or not to proceed to implementation."

1.4.4. As such, this WelTAG Stage Three Full Business Case report includes and achieves the following:

- determines whether a transport option exists that can address the issues identified, contribute positively to the Well-being goals and objectives, and can be delivered within technical and financial constraints;
- selects the preferred option[s] for procurement;
- agrees the monitoring and evaluation plan and describes the methods that will be used to provide the evidence required during and post-implementation; and
- confirms arrangement for the future monitoring and evaluation work.

1.4.5. Whilst WelTAG provides a fixed framework for appraisal, the guidance acknowledges that the level of detail provided in WelTAG reports should be proportionate to the impacts under consideration. All major impacts and issues that could have a significant influence on the delivery of a scheme option should be presented, but the level of detail of any analytical work should be proportionate to the scale and significance of the impact and sufficiently accurate for the decisions that need to be made.

1.4.6. The aim of this study is to cover each element of the Five Cases Model (as above). The level of detail provided will be proportionate to the scale and significance of the impacts and associated risks identified. The study will use the five ways of working as set out in the Well-being of Future Generations Act. Issues affecting the deliverability of options, anticipated benefits and the mitigation of any adverse impacts will also be covered within this Stage Three study.

1.5 REPORT STRUCTURE

1.5.1. The structure of this Stage Three report is as follows:

- **Chapter 2: Strategic Case** - this chapter provides a summary of the Strategic Case for the seven schemes, recommended in the WelTAG Stage Two studies for the A487 and A470. It includes an evidence-based description of the current problem, and identifies the process undertaken and the measures that are included within Stage Three. The objectives for the Stage Three study are also outlined in this chapter.
- **Chapter 3: Transport Case** - this chapter provides a summary of the appraisal against the objectives and aspects of well-being.
- **Chapter 4**: **Financial Case –** this chapter provides an updated cost estimate of the seven options, based on refined scheme designs. A final agreed project price and funding mechanism will also be identified in this chapter.

- **Chapter 5: Commercial Case** – this chapter includes a description as to whether the seven options can be considered commercially viable and provides an analysis as to whether measures could be packaged together for a phased delivery. A final scope, deliverables and timescales will also be provided in this chapter.
- **Chapter 6: Management Case** – this chapter sets out the monitoring and evaluation plan and identifies whether there is any requirement for the collection of data in advance of scheme implementation.

1.5.2. The conclusion of this Stage Three report includes a list of options that have been recommended to be taken forward to final detailed design development. Following detailed design of selected options, the WelTAG Stage 3 report will be updated to reflect any significant changes (e.g. option costs and impacts), and recommendations for Stage Four (Implementation) will be provided, based on their ability to solve the problems and meet the study objectives.

2 STRATEGIC CASE

2.1 OVERVIEW

2.1.1. This Chapter of the WelTAG Stage Three report builds upon the Strategic Case included as part of the WelTAG Stage Two reports for the A487 and A470 Batch 1 schemes. It provides a narrative of how the short list of measures was derived and considers in greater detail how each measure tackles the problem.

2.1.2. Whilst the Strategic Case is largely unchanged, additional data in terms of updated policy, traffic flow data, and road traffic collision data has since been released. The following sections provide an updated analysis in terms of this baseline data. This Stage Three report therefore provides additional and updated information where relevant and is intended to be read in conjunction with the previous reports.

2.2 LEGISLATION AND POLICY

2.2.1. Key policies which have been considered in detail as part of the previous WelTAG Stage One and WelTAG Stage Two studies include:

- The Future Generations Framework;
- The Well-being of Future Generations (Wales) Act 2015;
- Active Travel (Wales) Act 2013;
- Transport Policy Wales (TAN 18);
- The Wales Transport Strategy (2008);
- National Transport Finance Plan 2017 (particularly 'Intervention R27b' which specifically identified a north-south pinch-point overtaking opportunities programme on the A487 and A470);
- National Transport Finance Plan 2018 Update;
- The Wales Way Initiative;
- Prosperity for All: Economic Action Plan;
- Prosperity for All: A Low-Carbon Wales 2019;
- The Green Corridors on the Welsh Government Trunk Road and Motorway Network Initiative (July 2018);
- New Mobility Now (2017);
- The Marches and Mid-Wales Freight Strategy (February 2018);
- The 2015 Mid-Wales Joint Local Transport Plan (JLTP);
- The Powys Council Local Development Plan (LDP); and
- The Ceredigion LDP.

2.2.2. Additional polices considered as part of this WelTAG Stage Three, and any relevant updates has also been provided such as the New Wales Transport Strategy (WTS), 2021. The emergence of the WTS during the development of the Strategic Case for WelTAG Stage Three has further informed

the study objectives which were developed at WelTAG Stage One and ratified during Stage 2. The objectives have been reviewed in close consideration of the 20-year ambitions and the five-year priorities. In reviewing the objectives, particular attention was paid to references to creating a resilient and future-proofed network, managing the impact of climate change, protecting and enhancing biodiversity and ecosystem resilience, improving access to the natural and cultural heritage, as well as opportunities to improve the accessibility and attractiveness of sustainable transport choices.

2.2.3. Overall, the outcomes of this WelTAG study have the potential to positively contribute to supporting delivery of the Well-being of Future Generations (Wales) Act Well-being Goals through supporting a more resilient Wales, a healthier Wales and a Wales of cohesive communities. The proposals for A483/ A5 Halton Roundabout seek to make best use of the Strategic Road Network in this location.

2.2.4. A summary of the key policies is provided below.

LLWYBR NEWYDD: THE WALES TRANSPORT STRATEGY 2021

2.2.5. The new Wales Transport Strategy was launched in March 2021. The Wales Transport Strategy aims to create 'an accessible, sustainable transport system" with four key 20-year ambitions:

Good for people and communities

A transport system that contributes to a more equal Wales and to a healthier Wales, that everyone has the confidence to use.

Good for the environment

A transport system that delivers a significant reduction in greenhouse gas emissions, maintains biodiversity, and enhances ecosystem resilience and reduces waste.

Good for the economy and places in Wales

A transport system that contributes to our wider economic ambitions, and helps local communities, supports a more sustainable supply chain, uses the latest innovations and addresses transport affordability.

Good for culture and the Welsh language

A transport system that supports the Welsh language, enables more people to use sustainable transport to get to arts, sport and cultural activities, and protects and enhances the historic environment.

2.2.6. The five-year priorities of the strategy are summarised below.

In order to deliver the vision and ambitions, Welsh Government will:

Priority 1: Bring services to people in order to reduce the need to travel

"… plan ahead for better physical and digital connectivity, more local services, more home and remote working and more active travel, to reduce the need for people to use their cars on a daily basis."

Priority 2: Allow people and goods to move easily from door to door by accessible, sustainable and efficient transport services and infrastructure.

"… actively aim to achieve a shift away from private car use to more sustainable transport modes for the majority of journeys. Invest in low-carbon, accessible, efficient and sustainable transport services and infrastructure that enable more people to walk, cycle and use public transport, and low-emissions vehicles."

Priority 3: Encourage people to make the change to more sustainable transport.

"… encourage people to change their travel behaviour to use low-carbon, sustainable transport. Make sustainable transport more attractive and more affordable, and by adopt innovations that make it easier to use."

2.2.7. The strategy will deliver the above ambitions through sustainable investment, in accordance with the Future Generations Act, following delivery / action plans, building partnerships, creating policies, building skills and capacity, and holding Welsh Government and partners to account.

2.2.8. The Wales Transport Strategy sets out mini plans which show how individual transport sectors and modes will deliver the priorities in Llwybr Newydd. Whilst the Strategy sets out individual mini-plans, it takes an integrated approach to transport through four pathways:

- decarbonisation
- equality
- integrated journey planning, and
- rural transport.

2.2.9. The Strategy sets out a mini plan Roads, streets and parking. In the context of the Study, the following priorities set out within the mini plan must be considered:

- maintain and operate the Strategic Road Network in a way that meets our statutory obligations, minimizes adverse environmental impacts, promotes active travel, sustains and creates employment in Wales and reduces the backlog of maintenance
- keep traffic moving by dealing improve asset management for road infrastructure to reduce the maintenance backlog, operate more efficiently, free up funding for improvements and maintain and enhance biodiversity, ecosystem resilience and protect historic environment assets on the soft estate
- rapidly with incidents and through efficient forward planning of maintenance to avoid disruptions
- upgrade, improve and future-proof our road network, addressing congestion pinch points and investing in schemes that support road safety, journey reliability, resilience, modal shift and electric bike, motorbike and vehicle charging
- work with Natural Resources Wales to manage the impact of climate change on road infrastructure by improving surface water drainage, managing flood risks and ensuring that new developments do not create harmful surface water discharges
- set a target to reduce the maintenance backlog to sustainable levels by 2030.

2.2.10. The Mid Wales Safety Schemes study is in line with these themes as it seeks to:

- Improve the safety of the road network for all users and reduces driver stress;
- Reduce greenhouse gas emissions through smarter design and construction;
- Protect and enhance biodiversity and ecosystem resilience;
- Improve journey time reliability on major trunk roads;
- Provide a more efficient network – less prone to incidents; with reduced long term maintenance; and
- Develop the most appropriate and sustainable solutions to transport issues to support modal shift.

THE FUTURE GENERATIONS FRAMEWORK

2.2.11. The Future Generations Framework expresses the Five Ways of Working and the seven Well-Being Goals as statutory prompts for consideration to inform thinking and shape the development of projects, as well as reviewing their effectiveness. The Five Ways of Working seeks to look at how to develop and run the project, whilst the seven Well-Being goals form part of the strategic case and the options appraisal.

2.2.12. The Five Ways of Working are designed to be the starting point of maximising contribution towards the seven Well-Being Goals. The Five Ways of Working have been summarised below.

- **Long-term**
  - How does the project support long-term well-being of people in Wales?
  - Will the project be self-sustaining, or require significant additional or different resources?
  - Consider what will happen to the project at the end of its proposed lifespan.
- **Prevention**
  - The broad consideration of all types of problems that the project can help prevent.
  - How does the project support the break of negative cycles such as poverty, poor health, environmental damage?
  - How can the project minimise its own negative impacts? (e.g. resources, emissions, social, community).
- **Integration**
  - How does the project integrate with other public bodies well-being objectives?
  - How does the project maximise its contribution to all of the goals by aligning with relevant public body strategies and well-being objectives?
  - What measures are in place to ensure that the project continues to positively contribute to the well-being goals throughout its lifespan?
- **Collaboration**
  - What other stakeholders are working towards similar goals around sustainability and well-being?
  - How does the project ensure collaboration will continue throughout the lifetime of the project?

- **Involvement**
  - How has the project been shaped by key stakeholders affected by the project, and particularly their needs and challenges?
  - How will key stakeholders affected by the project continue to influence the project throughout its lifespan?

2.2.13. An overview of how this study contributes to the Five Ways of Working is provided in the following sub-section.

The Five Ways of Working

Long-Term

2.2.14. The project aims to improve the safety of the network by providing safe overtaking opportunities along the Trunk Road Network (TRN) in Wales. Improvements will be sought by putting forward a number of options that look to make better use of available road space to improve safety, reduce driver stress, and improve journey time reliability on the road network.

2.2.15. In addition to the long-term aspiration of improving movement for vehicles on the road network, the study also aims to contribute towards providing enhanced green infrastructure and facilitate better movement for Non-Motorised Users (NMU).

2.2.16. Specific focus has also been given to the design of options, to enable them to be considered 'future-ready'. For example, designing for future mobility needs, such as consideration of Active Travel and electric vehicles.

Prevention

2.2.17. There are locations identified within the study areas where a number of collisions have occurred. The project will consider any specific cluster / pinch point where incidents have occurred as a result of overtaking manoeuvres and look to mitigate or reduce the risk of collisions with any proposals.

2.2.18. As part of the seven Well-Being Goals, the use of resources will be qualitatively appraised to minimise the project's own negative impacts. Considerations are also made for the social and community impacts of the project.

Integration

2.2.19. National, regional and local policies all refer to the acceptance of any schemes with an ability to enhance connectivity and encourage economic growth. Specifically, the Marches and Mid-Wales Freight Strategy (February 2018) identifies overtaking opportunities as a possible highway enhancement which can reduce driver frustration and increase safety on the network. The strategy outlines the need for interventions to be provided that allows freight vehicles and passenger cars a safe opportunity to overtake slow-moving farm vehicles and HGVs on the network.

2.2.20. Other existing strategies and policies relevant to improving safety, that have been examined and identified by WSP and will be supported by the proposed interventions include:

- National Transport Finance Plan 2018 Update;
- The Wales Way Initiative;
- The Green Corridors on the Welsh Government Trunk Road and Motorway Network Initiative (July 2018);

- Prosperity for All: Economic Action Plan;
- Prosperity for All: A Low-Carbon Wales 2019;
- The Marches and Mid-Wales Freight Strategy (February 2018);
- The 2015 Mid-Wales Joint Local Transport Plan (JLTP);
- The Powys Council Local Development Plan (LDP); and
- The Ceredigion LDP.

Collaboration

2.2.21. The project will ensure collaboration will continue throughout the lifetime of the project through working closely with stakeholders and taking account of completing mutual goals.

Involvement

2.2.22. Stakeholder workshops and consultations were undertaken as part of the WelTAG Stage One and Stage Two, respectively, with key representatives from Powys Council, Ceredigion Council, Welsh Government, Community Councils, Cabinet Members for Transport and public transport operators. This consultation identified their challenges and problems.

2.2.23. Ongoing consultation with stakeholders will continue to be held throughout the study, at key stages.

THE WELL-BEING OF FUTURE GENERATIONS (WALES) ACT 2015

2.2.24. The Well-being of Future Generations (Wales) Act (WFGA) strives to improve the social, economic, environmental and cultural well-being of Wales. Its goals, as summarised in 'The Essentials of the Act' are to plan and provide for:

- a prosperous Wales which is innovative, productive and low carbon, using resources efficiently and proportionately (including acting on climate change);
- a resilient Wales which maintains and enhances a biodiverse natural environment with the resilience and capacity to adapt to change (for example, climate change);
- a healthier Wales where peoples physical and mental well-being is maximised, and future health benefits are understood;
- a more equal Wales that enables people to fulfil their potential no matter what their background or circumstance;
- a Wales of cohesive communities which promotes attractive, viable, safe and well-connected communities;
- a Wales of vibrant culture and thriving Welsh language that promotes and protects the culture and heritage of Wales including the Welsh language; and
- a globally responsible Wales, which when doing anything takes account of the economic, social, environmental and cultural well-being of Wales and how this could be improved, to make a positive contribution towards global well-being.

2.2.25. The seven Well-being Goals of the WFGA form the basis of all national, regional and local policy.

Active Travel (Wales) Act 2013

2.2.26. The Active Travel (Wales) Act, enshrined in legislation in 2013 and enforced in September 2014, requires the Government and local authorities in Wales to actively promote and provide for walking and cycling as a mode of transport. The Act contributes towards the seven Well-being Goals of the WFGA in providing for 'a healthier Wales'.

2.2.27. The Act creates new duties for highway authorities to consider the needs of pedestrians and cyclists and make better provision for them. This includes improving infrastructure on existing Trunk Roads to improve provision and the safety of pedestrians and cyclists.

2.2.28. As stated in the Active Travel Annual Report (2016/17), dated October 2017, the provision of new and improved Active Travel infrastructure forms an integral part of major new Trunk Road schemes. This is due to the multi-year development and construction periods involved, which allows for active travel measures to be incorporated as part of overall scheme costs.

NATIONAL POLICY GUIDANCE

Active Travel Act Guidance, July 2021

2.2.29. The Active Travel Act Guidance (2021) is split into two parts:

- Part 1: provides an outline summary of the aims, processes and key considerations associated with the act. Part 1 signposts to relevant chapters of the guidance as an aid for the various partners who will be involved in the implementation of the act, but who may not require detailed technical information on active travel design.
- Part 2: provides detailed technical advice on how infrastructure should be planned and designed. All personnel involved in highway planning and design will need to be familiar with both parts, but particularly with part 2.

2.2.30. The key duties of the act have previously been set out as part of the review of the Active Travel Act (2013). In short this requires local authorities to publish and keep up to date Active Travel network maps, to take reasonable steps to enhance the provision made for walkers and cyclists and to have regard for the needs of walkers and cyclists when developing highway schemes.

2.2.31. This guidance explains what these duties mean in practice and advises the Welsh Ministers and local authorities on how to meet these duties. The Welsh Government requires that the advice in this guidance must be considered when designing active travel routes along a trunk road or where active travel routes cross or join trunk roads.

2.2.32. This is supported by the inclusion of guidance on the integration of walking and cycling with public transport at stops, stations and interchanges.

2.2.33. With regard to design the guidance states that walking and cycling routes should be:

- coherent
- direct
- safe
- attractive
- comfortable

- inclusive

2.2.34. The guidance also includes further specifics including type of cycle lane infrastructure, visibility requirements at crossings, surface quality, dimensions, vehicular speed reduction, permeability in design, cycle parking etc.

Planning Policy Wales Technical Advice Note (TAN) 18: Transport

2.2.35. Planning Policy Wales (TAN 18) sets out key considerations and national priorities development and infrastructure. National policies suggest that proposals should not have an impact on sustainable accessibility, must improve or not affect economic connectivity, and be built with environmental conservation in mind. TAN 18 specifically refers to improvements to the TRN as schemes which are of national importance due to their ability to enhance connectivity and encourage economic growth.

National Transport Finance Plan 2018 Update

2.2.36. The National Transport Finance Plan (NTFP) was updated in 2018 to provide additional information and progress since 2017. A revised programme of works to cover the next two-year period was also provided, as well as timescales for financing, delivery of schemes and estimated expenditure.

2.2.37. Improving safety through increasing overtaking opportunities on the A487 and A470 had been identified previously as part of the 2017 NTPF update. The NTFP 2018 update still identifies north-south improvements and overtaking opportunities on the A487 and A470 within its programme of works. The progress update since December 2017, however, now states that up to 18 schemes are being taken forward to final feasibility stages. The preliminary timescales set out in the Plan have also been updated to indicate a delivery period from 2018 to 2021.

The Wales Way Initiative

2.2.38. The Wales Way initiative has been developed by WG to boost tourism in North, West and Central Wales. The initiative has identified three national touring routes including 'The Coastal Way' and 'The Cambrian Way' which highlight unique Welsh experiences along each route. 'The Coastal Way' extends for 180-miles (290km) along Cardigan Bay, via Pembrokeshire, Ceredigion and Gwynedd and includes the A487.

2.2.39. 'The Cambrian Way' is a north-south journey along the spine of Wales and extends for approximately 185 miles (300km). 'The Cambrian Way' routes through the Snowdonia and Brecon Beacons National Parks. The route largely follows the A470.

Prosperity for All: Economic Action Plan (EAP) (2017)

2.2.40. The purpose of the Economic Action Plan (EAP) is to support delivery of Prosperity for All – the national strategy for Wales. The Plan sets out a vision for inclusive growth and commits to a five-year programme of transport capital funding, to drive efficiencies in the delivery of transport projects and provide greater certainty for suppliers to invest. It sets a headline target of driving 20% efficiencies across the five-year investment portfolio for new projects.

2.2.41. The EAP also aims to decarbonise transport networks and improve air quality in the communities that they serve. It aims to introduce a range of measures to help to reduce the carbon footprint of vehicular traffic (taxis and buses) in Wales to zero within ten years (2027). Further details are set out in the 'Prosperity for All: A Low Carbon Wales' plan.

Prosperity for All: A Low Carbon Wales 2019

2.2.42. The purpose of the Low Carbon Wales Plan sets the foundations for Wales to transition to a low carbon nation. The overall aim for the Transport Sector, as set out in the Plan, is to reduce emissions by 43% from baseline levels by 2030, through implementation of the proposals as set out in the Plan. This includes Proposal 15 to promote the decarbonisation of private sector fleets in Wales. Proposal 15 specifically includes a goal to reduce emissions from road and rail transport through vehicle and fuel efficiency measures and considering options to improve local air quality.

2.2.43. This Mid Wales Safety Scheme study supports Proposal 15 through looking to improve overtaking opportunities, which has the potential to improve journey time reliability and vehicle movement in Wales.

The 'Green Corridors on the Welsh Government Trunk Road and Motorway Network' Initiative (2018)

2.2.44. In July 2018, the WG introduced an initiative to develop Green Corridors alongside key Trunk Road and motorway networks throughout the country, to deliver against the Economic Action Plan. Priority areas include:

- Gateways into Wales (initially looking at opportunities on the first five miles of the trunk road and motorway network) e.g. A494 (Deeside), M4 and A483.
- The trunk roads along the 3 designated routes that make up the Wales Way, including the A470 (The Cambrian Way) and the A487 (The Coastal Way).
- Routes into and around our principal towns and cities (and strategic sites) e.g. Wrexham, Bangor, Cardiff, Carmarthen, Newtown and Llandrindod Wells.

2.2.45. The initiative will see a push towards the introduction of 'Nature Based Solutions' including tree-planting, wildflower areas, Non-Motorised User (NMU) improvements and safe crossing points.

2.2.46. The aim of the initiative is to improve the benefits of land associated with the highway network by delivering benefits for a range of economic, environmental, social and cultural benefits and show innovation in the sustainable management of green transport infrastructure. Work will begin along three key routes (A487, A470 and A55) which make up 'The Wales Way', as well as entrances into Wales via the M4, M48, A483, A5 and A494 Deeside.

2.2.47. The proposals set out in the initiative will contribute to meeting the seven Well-being Goals of the WFGA.

New Mobility Now (2017)[2]

2.2.48. WSP's New Mobility Now publication (2017) describes the changes that are starting to occur in the transport and mobility sector and what this could mean for public and private developers, and network and service operators. The document also builds on how new forms of transportation can

[2] https://www.wsp.com/-/media/Campaign/Global/Document/WSP-New-Mobility-Now.pdf

improve place making. New Mobility Now recognises the potential for reaffirming fair modal hierarchy where active and sustainable modes are prioritised.

REGIONAL POLICY GUIDANCE

The Marches and Mid-Wales Freight Strategy February 2018

2.2.49. The Marches Local Enterprise Partnership (LEP), in partnership with the WG, neighbouring authorities, Highways England (HE) and the Department for Transport (DfT) have developed a Joint Appraisal Framework (JAF) to prioritise road investment programmes which address the transport needs of the area. The JAF focuses of those interventions which are best suited to improve intra-regional and inter-regional journey time and journey time reliability.

2.2.50. Overtaking opportunities have been identified in the strategy as a possible highway enhancement. The strategy outlines the need for interventions to be provided that allows freight vehicles and passenger cars a safe opportunity to overtake slow-moving farm vehicles and HGVs on the trunk road network.

2.2.51. The latest Marches and Mid-Wales Freight Strategy (February 2018) also identifies the A483, A470, A487 and A44 as likely routes within the Marches and Mid-Wales with schemes in place to increase the number opportunities for overtaking and improve safety.

2.2.52. This study has considered the Marches and Mid Wales JAF appraisal and will also ensure that any schemes align with local layby and school 20mph schemes.

The Mid-Wales Joint Local Transport Plan (JLTP) (2015)

2.2.53. The Mid-Wales Joint Local Transport Plan (JLTP) covers the period from 2015 to 2020 and has been jointly prepared by the Mid-Wales local authorities Ceredigion, Powys and Gwynedd (for Meirionnydd). One of the key aims is to address issues and opportunities for passing, pinch points and constraints on the strategic road network in Mid-Wales. The JLTP also lists the A483, the A487 and A470 as key links for both internal and external journeys to the region.

2.2.54. Section 7 of the JLTP states that over the medium and long-term, the Mid-Wales local authorities will continue to work closely with WG to bring forward improvements to existing strategic connection issues around these key corridors (including the A483, A487 and the A487 Dyfi Crossing), to improve access to markets, jobs and services.

LOCAL POLICY GUIDANCE

Powys Council Local Development Plan (adopted April 2018)

2.2.55. The Local Development Plan (LDP) for Powys Council states at Policy T1 ‘Travel, Traffic and Transport Infrastructure’ that transport infrastructure improvements will be supported where they promote sustainable growth, maximise efficiency and safety and improve public and private transport integration. It goes on to state that transport infrastructure and traffic management improvements should also incorporate measures to ensure the safe and efficient flow of traffic for all transport users, and effectively manage any impacts on the network to acceptable levels.

Powys Council Towards 2040 – the Powys Well-being Plan (2018)

2.2.56. The Powys Well-being plan was launched in July 2018 and contains 4 local objectives and 12 well-being steps to achieve those objectives, setting out what the Public Service Board wants Powys to look like in 2040. The four local objectives are:

- People in Powys will experience a stable and thriving economy
- People in Powys will enjoy a sustainable and productive environment
- People in Powys will be healthy, socially motivated and responsible
- People in Powys will be connected by strong communities and a vibrant culture

2.2.57. The objectives of this study will be developed to ensure that they integrate with these aims.

Ceredigion Council Local Development Plan (2007 – 2022)

2.2.58. The Ceredigion LDP was formally adopted in April 2013 and includes a number of transport related objectives, including the need to promote and enhance the social, cultural and economic characteristics of key towns and rural settlements in Ceredigion by maximising connectivity (Objective 5) and to assist in improving the potential for sustainable travel and the connectivity of the county (Objective 16).

Ceredigion Local Well-being Plan 2018-2023

2.2.59. The Ceredigion Local Well-being Plan published May 2018 outlies how the council aims to ensure that strong and resilient individuals and communities are built while balancing the immediate needs with the needs of the future generations. This plan is based around and six Well-being aims which are:

- Prosperous, sustainable and connected communities;
- Communities that support individuals from all backgrounds to live fulfilling independent lives;
- Environmentally responsible and safe communities that can adapt and respond to the effects of climate change;
- Enable every child to have the best start in life
- Enable people to create and grasp opportunities and meet challenges throughout their lives; and
- Enable people to live active, happy and healthy lives.

2.2.60. The objectives of this study will be developed to ensure that they integrate with these aims.

2.3 ECONOMY

2.3.1. Infrastructure has been identified as being key to the economic development of Powys and Ceredigion and improvements to existing pinch points on the road network could address active travel, traffic congestion and parking issues which currently hinder economic progress in the area.

2.3.2. Tourism is another key part of the economy. As set out in The Wales Way[3], 'The Coastal Way' which traverses the A487 study area, is one of two key driving routes which bring tourists through Powys/Ceredigion. Between 2014 and 2016, an estimated 5.7 million-day visits were made to

3 http://www.thewalesway.com

Ceredigion, whilst an estimated 5.4 million-day visits were made to Powys, during the same period. The total estimated visitor spend was approximately £145 million and £162 million, respectively[4].

2.3.3. There are several proposed developments in mid-Wales that are likely to encourage economic growth and support new jobs that are identified in the Stage One and Stage Two reports for the A487 and A470 Batch 1 schemes. Key developments located within the study area along the A487 and A470 corridors include the now completed Newtown Bypass, proposed residential development at Cylch Peris to the south of Llanrhystud, the proposed new Dyfi Bridge on the A487 north of Machynlleth, proposed residential and educational development schemes south of Machynlleth town centre, and aspirations for the introduction of a DAL scheme to the north of Comins Coch. A new railway station is also proposed for Pen-y-Garn on the A487 at Bow Street.

2.3.4. This study will ensure that schemes to improve safety take into consideration any proposed improvements and align with any national and local schemes.

2.3.5. No other major schemes or developments have been identified within the study areas (or in the vicinity of Route Sections) that could conflict with or have an impact on any improvements proposed as part of this WelTAG Stage Three study.

2.4 POPULATION DEMOGRAPHICS

2.4.1. According to 2011 Census Data, an average of approximately 60% of all residents in the Powys and Ceredigion county areas are of 'economically active ages' (between 16 and 64 years of age). The population demographics suggest that the majority of residents would directly benefit from improved journey time reliability by improving key routes.

2.4.2. When considering Powys county on its own, Census Data suggests that 57.6% of Powys residents are between the ages of 16-64. This is over 4% lower than the Wales national average. In Ceredigion, 61.4% of Ceredigion residents are between the ages of 16-64, this is only 0.2% higher than Wales. Of the Powys residents, there are 15% that do not own a car or van, compared to 72.9% of residents that own between 1-2 cars or vans. 12% of the Powys population own 3 or more cars or vans. Of the Ceredigion residents, there are 18.4% that do not own a car or van, compared to 70.7% of residents that own between 1-2 cars or vans. 11% of the Ceredigion population own 3 or more cars or vans.

2.5 INFRASTRUCTURE

ROAD NETWORK

2.5.1. A detailed description of the existing characteristics and infrastructure present along each of the four trunk roads (A470, A487, A44 & A483) is provided in the WelTAG Stage One and WelTAG Stage Two reports, as prepared previously.

4 https://gov.wales/sites/default/files/statistics-and-research/2019-05/regional-local-tourism-profiles-2014-2016-local-authority-summary.pdf

2.5.2. Key characteristics of the seven identified option locations selected to be considered as part of this WelTAG Stage Three study have been summarised below.

Site 34b Pontybat

2.5.3. Site 34b at the Pontybat Crossroads is located along the A470 to the north-east of Brecon. The existing priority crossroads junction at Pontybat comprises a main carriageway measuring approximately 8.10 metres wide. The eastern and western arms form the A470 and A438, respectively. The northern arm of the junction also forms part of the A470 and continues routing northbound to Llyswen. The southern arm of the junction carries Llanfilo Road and also provides access onto the National Cycle Network Route 8.

2.5.4. Immediately north and south of the junction, centre median strips are provided along the carriageway to help separate eastbound and southbound traffic. The median strips comprise areas of red hatched markings bordered by a broken white line. Within the vicinity of the junction, the roads are subject to the national speed limit. There is no lighting within the proximity of the junction.

2.5.5. The setting of the Pontybat Crossroads is primarily rural in nature and pedestrian facilities are limited. An existing footway is provided along the southern side of the carriageway of the A470, for a length of approximately 60 metres only from the crossroads junctions. A short section of footway is also provided along the northern side of the carriageway of the A438. Both footways are set back from the main carriageway and provide access to existing bus stops.

2.5.6. Existing bus stop facilities at the Pontybat crossroads junctions comprise of dedicated bus cages, shelters and seating facilities. The existing bus stop on the A470 (western arm) is served by T4 and T14 TrawsCymru bus services between Brecon and Cardiff. The existing bus stop on the A438 (eastern arm) is served by the T14 TrawsCymru service to Hay-on-Wye.

2.5.7. With the exception of the existing bus stop lay-bys, there are no other lay-bys, structures or junctions within the immediate vicinity of the Pontybat Crossroads.

Site 27 Llangurig

2.5.8. Site 27 at Llangurig is located along the A470. The existing roundabout junction located approximately 300 metres southeast of Llangurig comprises a three-arm roundabout with an Inscribed Circle Diameter (ICD) of approximately 35 metres. The northern and southern arms of the junction carry mainline traffic north and southbound along the A470. The western arm of the junction carries the A44.

2.5.9. Site 27 starts immediately north of the roundabout junction along the A470. The road follows an approximate east-west alignment and comprises a carriageway measuring approximately seven metres wide. The centre of the carriageway of the A470 in this location is marked by a broken white line. The road is subject to the national speed limit. There are no footways provided along the length of the A470 at Site 27. However, street lighting is provided.

2.5.10. There are no lay-bys, structures or junctions within the immediate vicinity of Site 27.

Site 63c Llanidloes

2.5.11. Site 63c at Llanidloes is located along the A470. The A470 forms the northern and southern arms of a four-arm roundabout junction immediately north of Llandiloes. The eastern and western arms of the junction carry the B4518 and an access road to residential areas, respectively. The roundabout is subject to a 30mph speed limit. The A470 in this location comprises a carriageway measuring

approximately 7.5 metres wide. The road follows an approximate north-south alignment and bends to follow the existing alignment of the River Severn. Footways are not provided along the route and there is no street lighting provided. The centre of the carriageway is marked by a broken white line.

2.5.12. There are existing rural access gates and junctions to the north and south of the carriageway along the A470 within the vicinity of Site 63c. However, there are no existing lay-bys, bus stops or other key junctions identified along the route.

Site 62a Caersws

2.5.13. Site 62a at Caersws is located at the junction of the A470 and A483. At Site 62a, the existing A470 / A489 priority junction at Caersws comprises a carriageway measuring approximately 5.8 metres wide. The eastern and western arms of the junction carry the A489 and the A470, respectively. The northern (minor) arm of the junction carries the A489 northbound to Caersws village. The minor arm of the junction comprises a carriageway measuring approximately 5.5 metres wide. A 50mph speed limit is introduced on approach to the junction in both directions. The A489 (northern arm) and A470 (western arm) of the junction also carries the National Cycle Network Route 81. There are no footways provided along the main carriageway and street lighting is only provided within the vicinity of the A470 / A489 junction.

2.5.14. Immediately east and west of the junction, the centre of the carriageway is marked by a solid double white line. Approximately 15 metres west of the A470 / A489 junction, the A470 routes over a railway line and a level crossing facility is provided with automatic barriers in place. A further 13 metres west, the A470 forms the major arm of a priority junction with Moat Lane, which carries the National Cycle Network Route 81 southbound towards Newtown.

2.5.15. Site 62a also includes the northern (minor) arm of the A470 / A489 junction into Caersws. The minor arm (A489) of the junction continues northbound into Caersws. There are a number of rural access junctions and gates to the eastern and western sides of the carriageway along the A489 at this location. The speed limit reduces to 30mph on approach to the village, at a point approximately 350 metres northwest of the A470 / A489 junction. An existing lay-by is located along the eastern side of the carriageway of the A489 (northern arm), approximately 260 metres north of the junction. The lay-by is proposed to be retained as part of the intervention. Street lighting is present from this point onwards, however, there are no footways provided along the A489 on approach to Caersws.

2.5.16. Approximately 50 metres north of Site 62a, the A487 routes over the River Severn. With the exception of the railway level crossing on the A470 to the west of the A470 / A489 junction and the existing lay-by on the A489 (northern arm), there are no other lay-bys, structures or junctions within the immediate vicinity of Site 62a.

Site 17 and 17a Aberarth

2.5.17. Site 17 & 17a at Aberarth is located along the A487. Within the vicinity of Site 17 & 17a, northeast of Aberarth, the A487 follows an approximate northeast-southwest alignment and comprises a carriageway measuring approximately 5.8 metres wide. The road routes along the coastline and is subject to the national speed limit. There are no street lights present along the route. Footways are also not provided along this section of the A487.

2.5.18. Within the sites, the centre of the carriageway on the A487 is marked with a broken white line, indicating that overtaking opportunities are available. However, approximately 2.6 kilometres northeast of Aberarth, centre median strips are provided along the carriageway to help separate

north and southbound traffic. The median strips comprise areas of white hatched markings bordered by a solid white line, which act as deterrents to using the opposing lane as an overtaking opportunity. The road also changes in gradient at this location, however, no advance warning signage to advise drivers is provided.

2.5.19. Google Map information indicates that there is an existing bus stop located at the northern extents of Sites 17a, along the southern side of the carriageway of the A487 at Morfa Mawr. Whilst no bus stop facilities can be identified on the ground, there is an existing lay-by located along the southern side of the carriageway measuring approximately three metres wide. Existing bus services that routes along the A487 include the T1 and T5 TrawsCymru services to Cardigan and Carmarthen.

2.5.20. An existing lay-by is located along the northern side of the carriageway on the A487, approximately two kilometres northeast of the Aberarth. Signage is present to advise drivers of temporary stopping opportunity at this location. With the exception of the existing lay-by and several rural farm accesses along the carriageway at both sites, there are no other junctions or structures within the immediate vicinity of the site.

Site 18 Llanrhystud

2.5.21. Site 18 at Llanrhystud is located along the A487. Site 18 commences from a point located approximately 1.4 kilometres south of Llanrhystud and approximately 1.5 kilometres north of Llanon. The A487, within the vicinity of Site 18, follows an approximate north-south alignment and comprises a carriageway measuring approximately six metres wide. The centre of the carriageway is marked with a broken white line, indicating that overtaking opportunities are available.

2.5.22. The road is subject to the national speed limit at Site 18, with the exception of a change in speed limit on approach to Llanrhystud, where the speed limit reduces to 40mph. There are no street lights present along the route at Site 18. Footways are also not provided along this section of the A487.

2.5.23. The existing A487 / Morfa Caravan Park access is located immediately south of Llanrhystud. The junction comprises a 7.5 metres wide main carriageway. The Morfa Caravan Park access road form the north-western (minor) arm of the junction and comprises a carriageway measuring approximately four metres wide. The junction is located within the 40mph speed limit. An existing footway is located to the north of the junction along both sides of the carriageway, and street lighting is present.

2.5.24. With the exception of a number of field access gates located along the northern and southern sides of the carriageway along the A487, there are no other lay-bys, structures or junctions within the immediate vicinity of Site 18.

Site 53 Machynlleth

2.5.25. Site 53 at Machynlleth is located along the A487. At Site 53, the carriageway of the A487 measures approximately 7.5 metres wide. The A487 forms the western and north-eastern arms of a four-arm roundabout junction to the south of Machynlleth. The A487 (westbound) is predominantly subject to the national speed limit with the exception of a 30mph speed limit which is introduced on approach to Machynlleth. The centre of the carriageway is marked by a broken white line for the majority of the route.

2.5.26. The route is primarily rural in nature and transects through open countryside. Pedestrian facilities are limited along the route and primarily provided within settlements, as well as on approach to

Machynlleth. A shared footway / cycleway is provided along the southern side of the carriageway. The carriageway is lit on approach to the key junctions and settlements along the route.

2.5.27. With the exception of a number of field access gates located along the northern and southern sides of the carriageway along the A487, there are no other lay-bys, structures or junctions within the immediate vicinity of Site 53.

NON-MOTORISED USERS

2.5.28. As highlighted above, the sites are all primarily rural in nature, and transect through countryside, small settlements and along the coastline. As such, existing Non-Motorised User (NMU) provision is limited along the route and primarily provided within settlements.

2.5.29. In keeping with national and local policy guidance, this study will ensure that designs for any of the proposed interventions take into consideration improvements for pedestrians and cyclists and align with any national and local schemes.

2.5.30. A detailed overview of existing NMU provision along each short-listed Route Section is provided in the following sub-sections.

2.5.31. The results of the full WCHAR audits is attached at **Appendix B**.

Site 34b Pontybat

2.5.32. There is limited footway provision along the A470. Within the vicinity of Site 34b at the Pontybat Crossroads specifically, there are no dedicated pedestrian or cyclist facilities provided along the A470, until the Pontybat Crossroads junction at Site 34b. Short sections of footway are provided along the northern and southern sides of the carriageway, to the east and west of the junction to provide access to bus stops.

Site 27 Llangurig

2.5.33. There is no footway provision available along the A470 from Llangurig to Llanidloes, or within the vicinity of Site 27.

Site 62a Caersws

2.5.34. There is no dedicated footway provision along the A470 between Llandinam and Caersws. Footways are provided along the Route Section on entry to Caersws, to the north of Site 62a, measuring approximately 1-1.5 metres wide along both sides of the carriageways. Pedestrian facilities are also provided in Caersws village in the form of a zebra crossing. The footway discontinues on exiting the village.

2.5.35. The A470 / A489 priority junction at Caersws (Site 62a) also carries the National Cycle Network Route 81.

Site 63c Llanidloes

2.5.36. Within the vicinity of Site 63c at Llanidloes, there is no footway provision along the A470 from Llangurig to Llanidloes. A footway is provided along the western side of the carriageway approximately one kilometre south of Llanidloes town centre. The footway discontinues at the A470 / B4518 junction.

Site 17 and Site 17a Aberarth

2.5.37. Between Aberaeron and Aberystwyth, the provision between settlements for NMU's is poor. Within the vicinity of Site 17 & 17a, there is no dedicated pedestrian or cyclist provision between Aberarth and Llanon. A footway is provided at the A487 / Heol-Y-Mor junction, on approach to Llanon town. Footways are provided along the length of the A487 through Llanon village, before discontinuing at the A487 / Cylch Peris junction.

Site 18 Llanrhystud

2.5.38. Within the vicinity of Site 18 at Llanrhystud, there are no dedicated pedestrian or cyclist facilities between Llanon and Llanrhystud. Footways are provided along both sides of the carriageway throughout Llanrhystud, before discontinuing on exiting the town.

2.5.39. There are no dedicated pedestrian or cyclist facilities between Llanrhystud and Blaenplwyf. Footways are provided along both sides of the carriageway of the A487 through Blaenplwyf and Chancery for a length of approximately 500 metres, before discontinuing.

Site 53 Machynlleth

2.5.40. Between Aberystwyth and Machynlleth, there is limited provision for NMU's between settlements. At Derwenlas, a shared use path is provided along the western side of the carriageway of the A487 and extends towards Machynlleth for approximately 800 metres, before continuing along the southern side of the carriageway. The shared use path then provides a continuous pedestrian and cycle connection along the eastern side of the A487 carriageway between Derwenlas and Machynlleth town centre.

National Cycle Network

2.5.41. There are existing Sustrans National Cycle Network (NCN) routes located within the vicinity of the A470 and A489.. NCN route 81 and 82 are accessible from Aberystwyth, Caersws, Llangurig and Machynlleth, whilst NCN 822 is accessible from Aberaeron. NCN Route 8 also routes parallel to the A470 from Brecon to Builth Wells.

PUBLIC TRANSPORT

Rail

2.5.42. Rail services within the study area in Powys operate from the main stations which are located at Builth Road, Machynlleth, Newtown and Welshpool. Builth Road railway station is situated on the Heart of Wales line and provides services between Shropshire and Llanelli.

2.5.43. Machynlleth, Newtown and Welshpool railway stations are all situated on the Cambrian Line in Mid-Wales, and accommodate rail services between Shrewsbury, Aberystwyth and Pwllhelli.

2.5.44. Ceredigion provides two railway stations in Aberystwyth and Borth. Aberystwyth railway station is located on the Cambrian Line and is serviced by Transport for Wales services between Aberystwyth and Shrewsbury. Borth railway station is also located on the Cambrian Line in Mid Wales and provides services between Birmingham International and Aberystwyth.

2.5.45. In 2017, funding was secured from the UK and WG for the construction of a new railway station at Bow Street, which will enhance connectivity by rail along the A487. Bow Street Station opened in February 2021.

2.5.46. With the exception of Site 62a at Caersws, none of the other site options are within close proximity to existing railway lines. An existing railway level crossing is located within the Site 62a area, approximately 15 metres west of the A487 / A470 junction.

Bus

2.5.47. Powys has several urban settlements that offer direct links to other urban areas, as well as rural settlements. Existing bus services in Powys that serve the A470 at the Pontybat crossroads include the TrawsCymru T4 and T14 services which provide connections from Cardiff to Newtown and Hereford, respectively. The TrawsCymru T4 service routes northbound at the Pontybat Crossroads and continues along the A470 to Builth Wells.

2.5.48. Existing bus services in Ceredigion County that serve the A487 include the TrawsCymru T1, T2 and T5 services providing connections from Aberystwyth to Carmarthen, Bangor and Haverfordwest, respectively.

2.5.49. As highlighted above, the majority of the seven options are not located within the vicinity of any existing bus stops, with the exception of Sites 34b (Pontybat Crossroads) and 17a (Aberarth). Existing bus stop facilities at the Pontybat crossroads junctions comprise of dedicated bus cages, shelters and seating facilities.

2.5.50. At Pontybat, the existing bus stop on the A470 (western arm) is served by T4 and T14 TrawsCymru bus services to Brecon and Cardiff. The existing bus stop on the A438 (eastern arm) is served by the T14 TrawsCymru service to Hay-on-Wye.

2.5.51. Google Map information indicates that there is an existing bus stop located at the northern extents of Sites 17a, along the southern side of the carriageway of the A487 at Morfa Mawr. Whilst no bus stop facilities can be identified on the ground, there is an existing lay-by located along the southern side of the carriageway measuring approximately three metres wide. Existing bus services that route along the A487 include the T1 and T5 TrawsCymru services to Cardigan and Carmarthen.

TRAVEL PATTERNS

2.5.52. The 2011 Census showed that approximately 23% of Welsh households did not have access to a car or van, meaning that travel by non-car modes including walking, cycling and public transport forms a vital part of Wales' mobility.

2.5.53. Further 2011 Census Data has been analysed to provide a high-level indication of existing travel patterns within the study area. The recorded modal split for Powys and Ceredigion councils has been tabulated along with the Wales national average, for comparison.

2.5.54. As highlighted at Table 2-1, the proportion of commuter trips made by car or van is approximately 61-62% in both countries which is approximately 9% lower than the national average for Wales. Travel by public transport accounts for approximately 3% of commuter trips in Ceredigion and 1% of trips in Powys county, compared to a national average of 7%. Conversely, trips made by walking and cycling account for approximately 14% and 13% of commuter trips in Ceredigion and Wales, respectively, compared to a national average of 11% in Wales.

Table 2-1 – Travel Patterns (2011 Census Data)

Method of Travel to Work	Ceredigion (%)	Powys (%)	Wales (%)
Work mainly at or from home	21	23	11
Underground, metro, light rail or tram	0	0	0
Train	0	0	2
Bus, minibus or coach	3	1	5
Taxi	0	0	0
Motorcycle, scooter or moped	0	0	1
Driving a car or van	56	57	64
Passenger in a car or van	5	5	7
Bicycle	1	1	1
On foot	13	12	10
Other method of travel to work	0	0	0
Total	**100**	**100**	**100**

TRAFFIC FLOWS

2.5.55. A summary of traffic flows along the A487 and A470, within the study area, is provided at Table 2-2.

2.5.56. Annual Average Daily Traffic (AADT) flows have been derived from permanent Automatic Traffic Count (ATC) surveys provided by the DfT (2018). The nearest ATC survey counters to each of the proposed sites has also been identified.

2.5.57. The percentage increase or decrease each year has also been calculated for each survey location, to provide an indication of average traffic flows across the latest five-year period available.

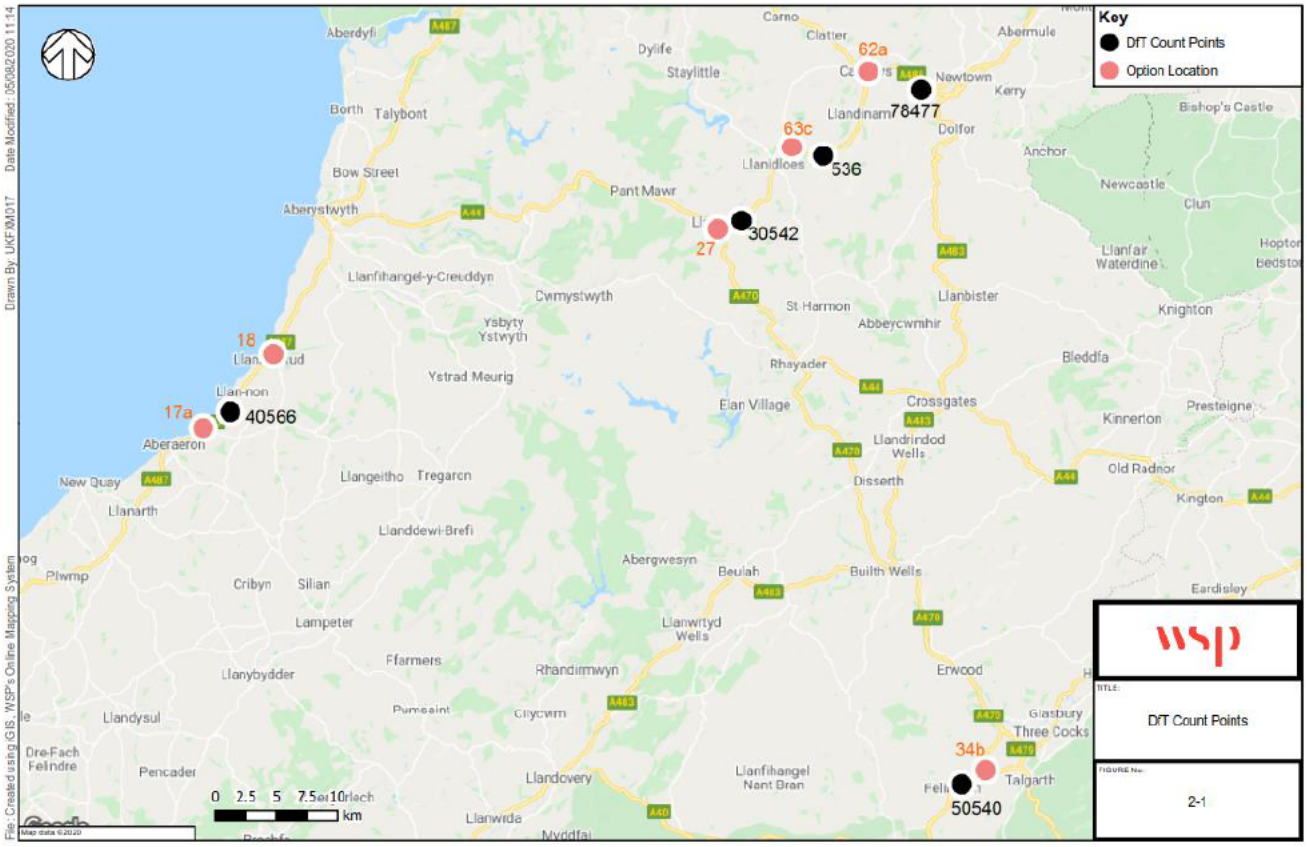
Table 2-2 – AADT Flows

Site no.	Site Name	Count ID (DfT)	7-day average two-way AADT (all vehs)					Speed Limit (mph)
			2014	2015	2016	2017	2018	
17 & 17a	Aberarth	40566	6,269	6,537 (+4.28%)	6,769 (+3.55%)	6,834 (+0.96%)	6,866 (+0.47%)	60
18	Llanrhystud	40566	6,269	6,537 (+4.28%)	6,769 (3.55%)	6,834 (+0.96%)	6,866 (+0.47%)	60
27	Llangurig	30542	4,565	4,534 (-0.68%)	4,710 (+3.88%)	4,780 (+1.49%)	4,817 (+0.77%)	60

34b	Pontybat	50540	8,899	9,011 (+1.26%)	9,361 (+3.88%)	9,490 (+1.38%)	9,565 (+0.79%)	60
53	Machynlleth	10564	5,591	5,062 (-9.46%)	5,257 (+3.85%)	5,323 (+1.26%)	5,360 (+0.70%)	60
62a	Caersws	78477	8,137	8,268 (+1.61%)	7,747 (-6.30%)	7,858 (+1.43%)	7,914 (+0.71%)	50
63c	Llanidloes	536	6,374	6,183 (-3.00%)	6,426 (+3.93%)	6,520 (+1.46%)	6,569 (+0.75%)	60

2.5.58. A plan showing the location of the DfT count sites is provided at Figure 2-1.

Figure 2-1 - DfT Count Sites



2.5.59. As part of the WelTAG Stage Three study, additional travel surveys have been undertaken at the scheme sites located at the Pontybat Crossroads on the A470, and the existing Llanrhystud priority junction on the A487. Both surveys comprised of Manual Classified Count (MCC) turning count surveys. The traffic survey results are provided at **Appendix C**.

2.5.60. The survey at the Pontybat Crossroads junction was undertaken on 28th January 2020, from 07:00 to 19:00 hours. The survey also captured use of the existing bus stops at the crossroads. Recorded

AM and PM peak hours movements at the existing crossroads junction have been tabulated at Table 2-3 and Table 2-4.

2.5.61. Vehicular movements have been calculated as Passenger Car Units (PCUs). The total percentage of HGV movements has also been calculated and summarised in italics for each turning movement.

Table 2-3 – Pontybat Crossroads Traffic Survey Results AM Peak Period (January 2020)

		To			
From		**A438 (E)**	**Llanfilo Road (S)**	**A470 (W)**	**A470 (N)**
	A438 (E)	0 *(0%)*	3 *(0%)*	307 *(5.2%)*	8 *(0%)*
	Llanfilo Road (S)	2 *(0%)*	0 *(0%)*	2 *(0%)*	1 *(0%)*
	A470 (W)	298 *(6.7%)*	3 *(0%)*	0 *(0%)*	203 *(7.4%)*
	A470 (N)	10 *(15.8%)*	1 *(0%)*	222 *(19.6%)*	0 *(0%)*

Table 2-4 – Pontybat Crossroads Traffic Survey Results PM Peak Period (January 2020)

		To			
From		**A438 (E)**	**Llanfilo Road (S)**	**A470 (W)**	**A470 (N)**
	A438 (E)	0 *(0%)*	5 *(0%)*	283 *(2.1%)*	7 *(0%)*
	Llanfilo Road (S)	0 *(0%)*	0 *(0%)*	6 *(0%)*	2 *(0%)*
	A470 (W)	248 *(6.5%)*	3 *(0%)*	0 *(0%)*	170 *(4.7%)*
	A470 (N)	3 *(15.8%)*	2 *(0%)*	174 *(10.1%)*	0 *(0%)*

Note: (%) indicates HGV percentages

2.5.62. The survey at Llanrhystud was undertaken on 4th March 2020, from 07:00 to 19:00 hours. Recorded AM and PM peak hours movements at the existing priority junction, which includes TRICS-calculated trip data associated with the adjacent caravan park, have been tabulated at Table 2-5 and Table 2-6.

2.5.63. The total percentage of HGV movements has also been calculated and summarised in italics for each turning movement.

Table 2-5 – Llanrhystud Priority Junction Traffic Survey Results - AM Peak Period (with Caravan Park) (March 2020)

		To		
From		**A487 (S)**	**Minor Road**	**A487 (N)**
	A487 (S)	0 *(0%)*	116 *(75%)*	318 *(7.0%)*

	Minor Road	57 *(75%)*	0 *(0%)*	46 *(75%)*
	A487 (N)	241 *(9.0%)*	90 *(75%)*	0 *(0%)*

Table 2-6 - Llanrhystud Priority Junction Traffic Survey Results - PM Peak Period (with Caravan Park) (March 2020)

		To		
From		**A487 (S)**	**Minor Road**	**A487 (N)**
	A487 (S)	0 *(0%)*	67 *(75%)*	223 *(6.0%)*
	Minor Road	71 *(75%)*	0 *(0%)*	121 *(75%)*
	A487 (N)	365 *(4.0%)*	106 *(75%)*	0 *(0%)*

Note: (%) indicates HGV percentages

PERSONAL INJURY COLLISION (PICS)

2.5.64. Collision analysis has been undertaken for each of the seven sites using data made available by STATS 19. Collision data for the most recent five-year period available, from 1st January 2015 to 31st December 2019, has been obtained. Personal Injury Collision (PIC) records have been used to analyse existing highway safety on the trunk road network, within the vicinity of the site option locations. The study area only included PICs which have occurred within close proximity of the seven short-listed site options. PICs which have been recorded to occur off the mainline or on minor roads (with no connection to the sites specifically) do not form a part of this analysis.

2.5.65. Reported PICs have been categorised by severity and site option in Table 2-7. Full details of PICs reported within the study area are provided at **Appendix D**.

2.5.66. In addition to the severity of collisions, cluster sites have also been identified. A cluster site is defined as *'four or more collisions including a Killed or Seriously Injured (KSI) rating within a 100m radius'*. A detailed review of PICs recorded, by Route Section, is also provided below.

Table 2-7 – Breakdown of PICs by Site (2015 – 2019)

Collision Severity	Site Option						
	17 & 17a	18	27	34b	53	62a	63c
Fatal	0	0	0	0	0	0	1
Serious	2	8	2	3	6	0	9
Slight	14	20	4	7	11	13	15
Total	**16**	**28**	**6**	**10**	**17**	**13**	**25**

Site 17 & 17a Aberarth / Site 18 Llanrhystud

2.5.67. Within the vicinity of Aberarth (site option 17 & 17a) and Llanrhystud (site option 18), there have been no fatalities, 10 serious collisions and 34 slight injury collisions recorded.

2.5.68. A review of detailed incident descriptions confirms that two slight injury collisions have occurred as a result of poor overtaking manoeuvres on the A487 within the vicinity of Site 18 at Llanrhystud. An incident occurred on the 19th February 2015 as a result of a vehicle overtaking a large lorry, despite there being a solid white line in the centre of the carriageway. The vehicle collided with the lorry to avoid oncoming traffic.

2.5.69. Another slight injury collision is recorded to have occurred on 6th May 2016. The incident description confirms that the incident occurred as a result of a vehicle overtaking on approach to a brow in the road. To avoid oncoming traffic, the driver braked suddenly and lost control of the vehicle.

2.5.70. One serious incident has also been reported to have occurred as a result of an overtaking manoeuvre. The incident occurred on 24th October 2015 and resulted in two serious and one slight injury casualties. A vehicle attempted to overtake and veered into oncoming traffic resulting in a collision.

2.5.71. None of the incidents recorded within the vicinity of Aberarth have been recorded as occurring due to poor overtaking manoeuvres.

2.5.72. No other cluster sites have been identified as the collisions are relatively spread out across the route, within the vicinity of the short-listed site options, and do not highlight any hotspots.

Site 27 Llangurig

2.5.73. Within the vicinity of Site 27 at Llangurig, there have been two serious and four slight injury collisions recorded.

2.5.74. A review of detailed incident descriptions confirms that one the serious injury collisions which occurred on the 20th March 2017, was a result of a poor overtaking manoeuvre. A vehicle has overtaken another vehicle and then loss control. Wet surface conditions have also been attributed to the cause of this collision.

2.5.75. No cluster sites have been identified as the collisions are relatively spread out across the route, within the vicinity of the short-listed site options, and do not highlight any hotspots.

Site 34b Pontybat Crossroads

2.5.76. Within the vicinity of the Pontybat Crossroads, there have been no fatalities, three serious collisions and seven slight injury collisions.

2.5.77. A review of detailed incident descriptions confirms that one the slight injury collisions which occurred on the 18th October 2017, was a result of a poor overtaking manoeuvre. A vehicle has stopped to turn off the main carriageway. An oncoming vehicle has attempted to overtake which has resulted in a collision.

2.5.78. No cluster sites have been identified as the collisions are relatively spread out across the route, within the vicinity of the short-listed site options, and do not highlight any hotspots.

Site 53 Machynlleth

2.5.79. Within the vicinity of Machynlleth (site option 53), there have been no fatalities, six serious injury collisions and 11 slight injury collisions recorded.

2.5.80. A review of detailed incident descriptions confirms that one slight injury collision, which occurred on the 25th August 2015, was a result of a poor overtaking manoeuvre. A vehicle has slowed down on the main carriageway. An oncoming vehicle has assumed that vehicle ahead is stationary and attempted to overtake which has resulted in a collision.

2.5.81. No cluster sites have been identified as the collisions are relatively spread out across the route, within the vicinity of the short-listed site options, and do not highlight any hotspots.

Site 62a Caersws

2.5.82. Within the vicinity of site 62a at Caersws, there have been 13 slight injury collisions recorded. The majority of these incidents have occurred at or within the vicinity of A489 / A470 junction at Caersws. This cluster site also includes a PIC involving a motorcycle casualty. A total six PICs at this location were noted to have involved young drivers. The junction is currently a priority-controlled staggered crossroads junction.

2.5.83. Whilst outside of the site design and study area, it is also noted that a fatal PIC was recorded to have occurred on the A489, to the north of Caersws, and involved four vehicles resulting in two casualties. The incident took place on the 8th October 2016 along a straight section of road with no junctions located in close proximity. The incident description confirms that the collision occurred as a result of an overtaking manoeuvre.

Site 63c Llanidloes

2.5.84. Within the vicinity of Site 63c, there has been one fatality, nine serious and 15 slight casualty incidents recorded.

2.5.85. The fatal incident occurred south of the A470 / B4581 roundabout junction in Llanidloes. The incident took place on the 15th March 2016 and involved two vehicles, resulting in three casualties. The incident description confirms that the collision occurred as a result of two vehicles overtaking a lorry.

2.5.86. One of the slight injury collisions which has occurred along the A470, within the vicinity of Site 63c, has also occurred as a result of an overtaking manoeuvre. The incident description confirms that a vehicle attempted to overtake two vehicles ahead (at the same time) which resulted in the need to brake sharply and lose control of the vehicle.

2.5.87. A total of five slight and two serious injury collisions have also been reported on the A470, approximately two kilometres east of the A44 / A470 junction at Llangurig. The road has a relatively steep gradient and also navigates around a bend, causing blind spots.

2.5.88. A third notable cluster has been identified at the A470 / B4518 roundabout junction in Llanidloes. There have been seven recorded collisions at this location, either at or on approach to the junction, including one fatality, two serious and three slight injury collisions.

Overall PIC Summary

2.5.89. The majority of PICs recorded, approximately 26% have resulted in a serious injury collision in terms of severity. Approximately 1% have resulted in a fatality. The remaining 73%, have resulted in a slight injury collision in terms of severity. Considering that all site options are located along sections

of the strategic road network, this level of PICs is considered typical when taking account of the type and characteristics of the road.

2.5.90. However, a review of the incident descriptions confirms that there have been instances of poor overtaking manoeuvres resulting in collisions near the majority of the site options. The records confirm that provision of increased overtaking opportunity may provide some betterment to road safety.

2.6 ENVIRONMENT

2.6.1. An environmental assessment was conducted for each of the original ten node-to-node Route Sections in the WelTAG Stage One report. This included a review of:

- Special Area of Conservation (SAC) / Sites of Special Scientific Interest (SSSI) / Areas of Outstanding Natural Beauty (AONB) / National Parks located in proximity to identified Route Sections;
- Impacts on Air Quality and proximity to any existing Air Quality Management Areas (AQMAs)
- Proximity to local watercourses and any impacts on biodiversity;
- Proximity to Scheduled Monuments or Listed Buildings; and
- Any impacts on walking and cycling routes including designated Public Rights of Way (PRoWs)

2.6.2. An initial environmental appraisal was also undertaken as part of the WelTAG Stage One and Stage Two studies. The key environmental characteristics of the Route Sections, specifically within the vicinity of the seven identified sites selected to be considered as part of this WelTAG Stage Three study have been summarised below.

Site 17 & 17a Aberarth

- A number of Listed Buildings (Grade II) are located directly adjacent to the A487; and the majority are in Aberarth.
- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route. Noise sensitive receptors (NSRs) have been identified approximately 140m to the east and 120m to the north of the Scheme.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.
- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.

Site 18 Llanrhystud

- The A487 runs within or adjacent to, Llanrhystud Conservation Area.
- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route.
- NSRs have been identified approximately 40m and 115m to the north of the Scheme.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.

- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.

Site 27 Llangurig

- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route. have been identified approximately 100m to the south-west and between 230m to 270m to the south, north-west and north of the Scheme.
- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.

Site 34b Pontybat Crossroads

- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.
- There is existing infrastructure within the carriageway and along the route which will need to be considered including existing bus stops and footway provision within the immediate vicinity of the crossroads junction.
- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.
- A National Cycle Route (NCN 81) is located within 2km of the study area, at Moat Lane.
- No AQMAs or Noise Impact Areas (NIAs) are located within 2km of the study area. NSRs have been identified adjacent to the Scheme in the West, approximately 5m and 20m distance from the westbound and eastbound carriageways respectively, and 200m to the south-east of the Scheme.

Site 53 Machynlleth

- A National Cycle Route intersects with the A487 within the vicinity of Machynlleth (NCN Route 82).
- There is existing infrastructure within the carriageway and along the route which will need to be considered including an existing footway/ cycleway located along the southern side of the carriageway
- The A487 passes through Machynlleth Conservation Area.
- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route.
- NSRs have been identified approximately 20m to the south-east, between 50m to 80m to the south and 130m to the north of the Scheme.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.

- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.

Site 62a Caersws

- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route. have been identified approximately 20m to the north-west, 60m to the south-east and approximately 130m to the south-west of the Scheme.
- There is a level crossing at the A470 and A489 junction.
- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.
- A National Cycle Route intersects with the A487 and crosses the A487 at this site.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.

Site 63c Llanidloes

- No AQMAs or NIAs are located within 2km of the study area. However, the A487 is likely to be the primary source of air and noise pollution due to the high traffic flows along the route. NSRs have been identified parallel to the road, located approximately 10m to 60m west of the Scheme.
- Hedgerows, woodlands, farms and agricultural land with livestock are located directly adjacent to the road.
- There are no Special Protection Areas (SPA) or AONB located within 2km of the study area.

Overall Environmental Summary

2.6.3. The initial assessment confirmed that any potential options will need to take account of existing infrastructure along the routes, as well as features of interest and environmental importance in any design schemes.

2.6.4. It is also noted that there were no air quality issues identified within two kilometres of the seven short-listed site option locations. However, it was noted that both the A470 and A487 are likely to be the primary source of noise and air pollution due to high traffic flows along the routes (as would be expected on the TRN).

2.7 FUTURE READY - WFGA

2.7.1. As mentioned previously, a wider objective as part of the overall study is to ensure that the proposed interventions are designed to provide future-ready solutions. For example, designs which cater for drier and / or wetter climates and contribute towards more renewable and sustainable principles, including accommodating for more electric and / or autonomous vehicles.

2.7.2. A Future-Ready Checklist has been created, comparing key actions to the WFGA Well-being Goals. The key aspects include:

- Climate;
- Technology;

- Society; and
- Resources.

2.7.3. The full Checklist outlining relevant policies and key actions in terms of design development for the seven short-listed options is provided as **Appendix E**. A summary table highlighting relevant action points is provided at **Table 2-8**, and also confirms what steps are being taken for each site.

Table 2-8 – Future-Ready Checklist

Future Ready Checklist		WFGA Well-Being Goals							Proposed Action on Project	Applicable to Site Option Design						
		Prosperous Wales	Resilient Wales	Healthier Wales	More Equal Wales	Cohesive Community	Vibrant culture and language	Globally responsible Wales		17 & 17a	18	27	34b	53	62a	63c
Climate	Heavier rainfall / water table changes / global sea level changes could cause local surface water and river flooding:								Need to ensure designed drainage capacity is sufficient to handle future run-off with climate change. Consideration to be made as part of drainage strategy if existing/proposed soakaways included in strategy.	✓	✓	✓	✓	✓	✓	✓
	Drier summers could cause droughts and ground shrinkage.								Design considerations for impacts of drier conditions.	✓	✓	✓	✓	✓	✓	✓
	Multi hazard' events could become more frequent (storms bringing wind, rain and flooding).								Work with the client to identify if any vulnerable sections of the network with regard to potential for multi-hazard events at proposed option locations.	✓	✓	✓	✓	✓	✓	✓
Technology	Existing infrastructure could be re-purposed for new uses (e.g. fixed line telephone networks turned into broadband carriers).								Consideration of existing and proposed ducting / infrastructure for future use, where appropriate, E.g., changing future needs such as 5G.	✓	✓	✓	✓	✓	✓	✓
	Self-healing active surfaces could help increase durability and longevity.								Consideration of material use for prolonged asset life or reduced maintenance.	✓	✓	✓	✓	✓	✓	✓
	New materials could interact with the environment, cleaning the air, generating energy.								Air quality unlikely to be a big issue in mid Wales, however, consideration could be given to power generation materials (e.g., solar/wind) to power localised road infrastructure (lighting/signs) or creation to feed into grid.	✓	✓	✓	✓	✓	✓	✓
	Electric vehicles could require adaptation of the highway.								Consideration of electric vehicles should be included in node to node strategy for improvements e.g. location and accessibility for EV users to access charging from the strategic network.	✓	✓	✓	✓	✓	✓	✓
Society	Growing interest in health and healthy living could drive better master-planning and connected public transport.								Key consideration of study to encourage more sustainable and active travel (modal shift / reduce demand on highway). WCHAR being completed for each site. Study outcomes governed by WFGA.	✓	✓		✓	✓	✓	
	By mid-2039, more than 1 in 12 of the population could be aged 80 or over.								Where appropriate, infrastructure for improved access to non-car-based travel to be incorporated into designs (e.g., access to bus stops etc)	✓	✓		✓	✓	✓	
	Homeworking, online shopping and the decline of the 'pub' could mean there's less reason or need to travel.								This will have a positive impact on the trunk road network capacity. Genuine potential for changing working practices and recognition of reduced need to travel post COVID 19.	✓	✓	✓	✓	✓	✓	✓
Resources	Grid energy prices are forecast by DECC to be 40% higher by 2030.								Consideration of renewable energy options (e.g., to power lighting / VMS) or options to provide net gain in power generation above local highway network (e.g., Solar power generation along active travel links)	✓	✓	✓	✓	✓	✓	✓
	Long term projects could have to operate in a very low or near zero net greenhouse gas emission UK.								Carbon neutral/zero to be a consideration in all options. Encourage EV through better infrastructure provision. Renewable power generation.	✓	✓	✓	✓	✓	✓	✓
	The circular economy could become mainstream: products designed for re-use; landfill waste becomes much less common (and much more expensive).								Yes, More of a consideration at detailed design stage for material specification	✓	✓	✓	✓	✓	✓	✓
	Nature and ecosystems could become more valued and better integrated, requiring more sensitive designs, preservation and assets that improve ecosystems rather than impacting them.								Mid Wales Safety Scheme study incorporating Green Corridor approach and Biodiversity Net Gain calculation on each project and at strategy level.	✓	✓	✓	✓	✓	✓	✓

2.8 STATUTORY CONSULTATION

2.8.1. Stage One and Stage Two stakeholder workshops were undertaken as part of the previous studies for potential overtaking schemes, in which key council representatives, Welsh Government and NMWTRA attended to inform the study. The workshops enabled respective stakeholders to identify existing issues and problems relating to congestion and delay on the TRN and contribute towards the study.

2.8.2. A summary of organised workshops and consultation events is provided below.

WELTAG ONE CONSULTATION

2.8.3. A Stakeholder Consultation Workshop was held on 11th April 2018, in Machynlleth, to discuss the Mid Wales Overtaking WelTAG Stage One Study. Key stakeholders including WG and NMWTRA, Powys Council, Ceredigion Council, Sustrans and emergency services were consulted to undertake a factual exercise to identify key issues, constraints, objectives and overtaking opportunities.

2.8.4. The findings of the workshop formed a key part of issue identification, development of objectives and initial site development.

2.8.5. A summary of the Stakeholder Workshop was included in the WelTAG Stage 1 Report.

WELTAG TWO CONSULTATION

2.8.6. A Study Review Group (WG / NMWTRA / WSP) was held on 7th June 2018 to discuss and review the potential A487 & A470 'initial schemes' to be included as part of WelTAG Stage Two Study. The key point raised in the meeting was that consideration should be given to developing a programme of schemes within a preferred 'node to node' strategy to provide and consult on a more holistic basis through specific sections.

2.8.7. Further consultation on potential 'Batch 1' Schemes has also been undertaken as part of a 'four-stage' consultation strategy. The strategy was agreed with WG for schemes that are considered to be deliverable for implementation in the current funding window (2020 at the time consultation was undertaken). The four stages are summarised below.

1) ***Local Council*** – On 21st May 2019, a consultation meeting was held in Newtown with Ceredigion and Powys local councils to run through the WelTAG Stage 2 (Batch 1) Studies for the A487 and A470, including emerging outcomes for preferred node to node and Batch 1 sites likely to be progressed. Both local councils were also consulted on the next steps for consultation. Both councils confirmed their support of the initiative and emerging outcomes. Notes of the meeting are included in the WelTAG Stage Two Study.

2) ***Local Members*** – On 4th and 5th July 2019, Ceredigion and Powys local members and councillors were consulted on the emerging outcomes of the WelTAG Stage Two Batch 1 studies, including the approach for the next steps of consultation. At both meetings, local members and councillors provided support for the initiative and the emerging outcomes. Notes of the meetings were included in the WelTAG Stage Two Study.

3) ***Landowner Discussions*** – Whilst not undertaken as part of the previous studies consultation strategy, it was decided that landowners directly affected by the proposed Batch 1 schemes would be consulted as part of the Stage Three Study and feed into design development, as well as assessment of acceptability and deliverability appraisals.

4) ***Wider / public consultation*** – Whilst not undertaken as part of the previous studies consultation strategy, it was decided that wider consultation with members of the public would be carried out during WelTAG Stage Three, to provide information on preferred node to node strategies and potential Batch 1 schemes. Following consultation with Local Councillors and Members, it is considered most appropriate to carry out separate Public Information and Consultation for each proposed Batch 1 site.

WELTAG THREE CONSULTATION

2.8.8. Further consultation on potential 'Batch 1' Schemes brought forward from WelTAG Stage 2 has been undertaken in line with the previously defined 'four-stage' consultation strategy. The strategy was updated to enable continuity of consultation while managing the risks and constraints of the Covid19 Pandemic.

1) ***Local Council*** **/ Members / Community Council**– On the 22nd May and 25th June 2020, a consultation meeting was held via skype with Powys CC and Ceredigion CC, respectively. The project team provided an update on the study and current options, as well as agreeing the next stages of the consultation strategy. It was agreed with both councils that they would take on responsibility for informing the local members and community councillors.

   A key outcome of the meeting with Ceredigion CC, was the extension of the proposed scheme to the north of Aberarth, to bring Options 17a (Southbound climbing lane) and Option 17 (Northbound climbing lane) into a single option to provide a more coherent alignment and provide greater opportunity for an active travel link between communities.

2) ***Landowner Discussions*** – Discussions with key landowners directly affected by the schemes has been carried out through WelTAG Stage 3 to gauge acceptability, capture comments and update design proposals accordingly. Landowner discussions and subsequent design updates are ongoing.

3) ***Wider / public consultation*** – Initial public consultation exercises have been carried out for five of the seven schemes to date, including A487 Sites 17&17a (North of Aberarth) and Site 18 (Llanrhystud), and A470 Site 34b (Pontybat), Site 27 (Llangurig) and Site 63c (Llanidloes). Public Consultation was carried out online, via the Welsh Government website. Published consultation material and feedback report can be found in Appendix M.

   Public consultation for the remaining two schemes will be carried out at an appropriate stage. A second round a public consultation is also currently being considered to provide opportunity for the public to provide comments on updated schemes. Secondary consultation will likely be held face-to face if covid19 restrictions allow.

2.9 PROBLEM IDENTIFICATION

2.9.1. Following a review of the baseline information and consultation with stakeholders during WelTAG Stages One and Two, numerous issues associated with the existing Trunk Road Network were identified.

2.9.2. The findings of the previous workshops formed a key part of issue identification, development of objectives and initial option development for the Stage One study. The following issues were identified which would require addressing as part of any future study:

- Driver frustration due to poor journey time and reliability.

- Road safety due to forecast annual traffic growth and existing minimal overtaking opportunities.
- Topographical constraints and pinch points, particularly considering slow moving HGVs / caravans / agricultural vehicles etc.
- Lack of competitive sustainable travel options by means of walking and cycling.
- Poor journey times and journey time reliability due to lack of overtaking opportunities.
- Annual traffic growth predicted to increase year on year.
- Seasonality of traffic flows due to tourism.
- Road traffic collision hotspots.
- History of short-term improvements not offering long-term benefit.
- Lack of modern infrastructure restricting business opportunities.

2.9.3. Identified issues, in combination with current policies and guidance, inform and define study objectives for the intervention.

2.10 STUDY OBJECTIVES

2.10.1. The WelTAG guidance states that:

"Under the Act, each public body must work to improve the four aspects of well-being in Wales: economic, social, environmental and cultural. To do this they must set and publish well-being objectives designed to maximise their contribution to each of the well-being goals".

Study Objectives during WelTAG Stage 1 and 2

2.10.2. During WelTAG Stage 1, study objectives were developed with input from stakeholders, to best align with identified problems and current policies. To confirm the relevance of the objectives, they were mapped against the Wellbeing of Future Generations Goals and the Wellbeing aspects, as below:

Table 2-9 – Previous objectives during the Mid-Wales Overtaking Study – WelTAG 1&2

Well-Being of Future Generations Goal	Aspect of Well-Being	Objective
A Prosperous Wales & A Wales of Cohesive Communities	Economic	Improve links to main centres of population and economic activity.
A Resilient Wales	Economic	Improve safe overtaking opportunities on the trunk road network in Mid-Wales.
	Economic	Improve journey time and reliability along the trunk road network in Mid-Wales.
A Healthier Wales	Economic	Reduce the number of traffic collisions along the trunk road network in Mid-Wales.
	Social	
	Social	Reduce driver stress along the trunk road network in Mid-Wales.
	Social	Improve walking and cycling facilities.

A More Equal Wales & A Wales of Vibrant Culture and Thriving Welsh Language	Cultural	
A Globally Responsible Wales	Environment	No significant adverse impacts on environmental sensitive receptors during construction and operation.

Updates to Study Objectives at WelTAG Stage 3

2.10.3. During WelTAG Stage 3, significant updates to policy, guidance and aspirations, such as the New Wales Transport Strategy (WTS), has necessitated a review of study objectives to ensure they remain relevant. This has led to the creation of updated objectives as below:

- Improve safety on the network for all users
- Reduce driver stress / frustration
- Support modal shift to active modes (walking and cycling) for shorter journeys and public or third sector transport for longer journeys
- Improve connectivity between mid-Wales communities
- Protect and enhance biodiversity and ecosystem resilience
- Reduce greenhouse gas emissions through smarter design, construction, operation and maintenance of the road network, including support to Electric Vehicle (EV) charging
- Encourage and support key economic sectors of the Mid Wales economy, such as tourism, by improving links to work, leisure and education
- Create a more resilient strategic road network, including managing the impact of climate change by future proofing infrastructure
- Improve journey time reliability for longer journeys on the strategic road network.

2.10.4. The general focus of the updated objectives remains similar to those at WelTAG Stage 1 & 2, however, the updated wording links more closely to the WTS and provides greater emphasis on key areas such as carbon, climate resilience, modal shift and enhanced biodiversity.

2.10.5. As an additional check on the relevance of the updated objectives, the below summary sheet maps the new objectives against previously identified problems, Wellbeing Goals; and WTS Priorities and Ambitions. Full A3 versions of the below summary sheet can be found in Appendix L, for both the Powys and Ceredigion Schemes, which also includes Local Wellbeing Goals for each council.

Table 2-10 – Objective Summary Table

Criteria		Mid Wales Safety Schemes - Transport Planning Objectives								
		TPO1	TPO2	TPO3	TPO4	TPO5	TPO6	TPO7	TPO8	TPO9
		Improve safety on the network for all users	Reduce driver stress / frustration	Support modal shift to active modes (walking and cycling) for shorter journeys and public or third sector transport for longer journeys	Improve connectivity between mid-Wales communities	Protect and enhance biodiversity and ecosystem resilience	Reduce greenhouse gas emissions through smarter design, construction, operation and maintenance of the road network, including support to Electric Vehicle (EV) charging	Encourage and support key economic sectors of the Mid Wales economy, such as tourism, by improving links to work, leisure and education	Create a more resilient strategic road network, including managing the impact of climate change by future proofing infrastructure	Improve journey time reliability for longer journeys on the strategic road network
Transport Problems										
TPR1	Poor journey time reliability due to a lack of safe overtaking opportunities.	+++	+++	0	++	0	0	++	++	+++
TPR2	Driver frustration due to poor journey time and reliability.	+++	+++	0	++	0	0	++	++	+++
TPR3	Topographical constraints and pinch points, particularly considering slow moving HGVs / caravans / agricultural vehicles etc.	+++	+++	+	++	+	0	++	++	+++
TPR4	Lack of competitive sustainable travel options by means of walking and cycling.	+	0	+++	+++	0	++	+++	++	+
TPR5	Annual traffic growth predicted to increase year on year.	++	++	++	+	0	0	+	0	+
TPR6	Seasonality of traffic flows due to tourism.	+	+	+	+	0	0	++	0	+
TPR7	Poor road safety & road traffic collision hotspots.	+++	+++	0	+	0	0	+	++	+++
TPR8	History of short-term improvements not offering long-term benefit.	0	0	0	++	+	+	++	++	++
TPR9	Lack of modern transport infrastructure restricting business opportunities	+	+	++	++	++	+++	+++	+++	++
Well-Being Goals										
WBG1	A Prosperous Wales	+	0	++	++	+++	+++	++	+++	+
WBG2	A Resilient Wales	0	0	++	0	+++	+++	0	+++	0
WBG3	A Healthier Wales	+++	+++	++	+	+	+	++	+	+
WBG4	A More Equal Wales	0	0	++	+++	0	0	++	0	0
WBG5	A Wales of Cohesive Communities	++	++	+++	+++	+	+	++	+	+
WBG6	A Wales of Vibrant Culture and Thriving Welsh Language	0	0	++	++	0	0	++	+	+
WBG7	A Globally Responsible Wales	0	0	+	0	++	+++	0	++	0
Wales Transport Strategy										
WTSP1	Bring Service to people in order to reduce the need to travel	0	0	+	++	+	+	+	+	0
WTSP2	Allow people and goods to move easily from door to door by accesible sustainable and efficient transport services and infrastructure.	++	++	+++	+++	0	++	+++	+++	+++
WTSP3	Encourage people to make the change to more sustainable transport	0	0	+++	+	+	0	++	++	0
WBA1	Good for People and Communities	++	++	+++	+++	0	++	+++	++	++
WBA2	Good for the Environment	0	0	+++	0	+++	+++	0	+++	0
WBA3	Good for the Economy and Places in Wales	+	+	+	++	0	0	+++	++	++
WBA4	Good for Culture and the Welsh Language	0	0	+	+	0	0	++	0	0

2.11 STAGE THREE LIST OF SITES

2.11.1. The potential sites which have been brought forward for further appraisal at this stage are located along Route Sections C02, C04, C07 and C08. Plans showing the outline design details for each option can be found at **Appendix A.**

2.11.2. After the initial feasibility of each option was assessed as part of the WelTAG Stage One and Stage Two studies, a total of seven sites have been short-listed and are included as part of this Stage Three study. An overview of the interventions proposed are detailed in **Table 2-11**.

2.11.3. As part of the WelTAG Stage Three study, the seven options have been further refined and the design developed to take account of issues including landscape mitigation and improved provision for non-motorised users, where feasible. This includes incorporating more significant updates to the following schemes:

- Site 17a (North of Aberarth) – following consultation with Ceredigion County Council, the decision was made to combine the adjoining option 17 to create a more coherent alignment and provide wider benefits for active travel; and
- Site 62a (Caersws) – the addition of a new footbridge over the River Severn has been incorporated into the option, to improve safety and connectivity for all users.

Table 2-11 – Summary of Stage Three Sites

Site	Description
Site 17 & 17a Climbing lane to the north-east of Aberarth.	It is proposed to introduce two new climbing lane sections, in accordance with CD109, north of the village of Aberarth. One climbing lane will provide 850m of formal overtaking opportunity in the northbound direction, whilst the other will provide 1000m of formal overtaking in the opposing southbound direction. Improvement to the highway geometry and alignment are proposed to increase visibility and safety. Existing private accesses will be stopped up within the climbing lane scheme and alternative private access arrangements provided. Along the length of the scheme, it is proposed to introduce 3.2km of new shared use foot/cycleway as part of the Active Travel Wales initiative to improve links for non-motorised users within the area. In addition, an existing layby is being replaced by a more formal stopping area with costal viewing point to support tourism. The area also provides potential opportunity for EV charging and other amenities e.g. potential for cycle infrastructure and support to wider cycle hire facilities.

Site 18 Roundabout and DAL improvement south of Llanrhystud.	Site 18 starts at the southern extent of Llanrhystud. It extends for 1.1km along the A487. It is proposed to introduce a DAL in accordance with CD109 which will provide guaranteed overtaking for 250 metres in a southbound towards Aberaeron, with a new roundabout at the southern extent of Llanrhystud. Three private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved. Negotiations with third party landowners is required for additional land purchase and stopping up of existing access points and new access routes. There are existing footways to the north of Site 18 which will be retained and included in the proposed scheme, to ensure provision for NMU's along the improved section of the A487.
Site 27 DAL on the A470 East of Llangurig	Site 27 commences at Llangurig Roundabout and extends eastwards for 1.3km along the A470 towards Llanidloes. It is proposed to introduce a DAL in accordance with CD109 which will provide guaranteed overtaking for 250 in the eastbound direction. Three private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved. Negotiations with third party landowners is required for additional land purchase and stopping up of existing access points and new access routes. The scheme design also includes improvements to horizontal curvature after the DAL tying into the existing alignment. There is no existing NMU provision along this section of the A470.
Site 34b Roundabout and DAL on A470 at the Pontybat Crossroads	Site 34b commences south of Llyswen and extends southbound for 1.1km along the A470 towards Brecon. It is proposed to introduce a DAL in accordance with CD109 and CD 116 which will provide guaranteed overtaking for 250 metres in the westbound direction, with a new roundabout at the eastern end at the junction of the A470/A438 Five private means of access will be stopped up and alternative access provided. An existing bus lay-by along the A470 (westbound) is also to be stopped up and re-located some 90m east of its existing location. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved. Negotiations with third party landowners is required for additional land purchase and stopping up of existing access points and new access routes. There is included in the proposed scheme provision for NMU's along the improved section of the A438. A shared footway / cycleway is proposed to be provided along both sides of the carriageway on the eastern arm of the roundabout junction. The proposed shared footway / cycleway extends for a length of approximately 35m and will provide access to the existing and proposed relocated bus stop.
Site 53 DAL to the south of Machynlleth roundabout.	Site 53 starts at the existing roundabout at the southern extent of Machynlleth and extends for 250 metres along the A487 towards Derwenlas and Aberystwyth. It is proposed to increase the size of the existing roundabout and introduce a DAL in accordance with CD109 and CD 116, which will provide 250 metres of overtaking opportunity in a westbound direction. Nine private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved. Negotiations with third party landowners is required for

	additional land purchase and stopping up of existing access points and new access routes. An existing shared-use cycleway/footway will remain along the length of the scheme adjacent to the westbound carriageway, with improved NMU provisions around the new roundabout.
Site 62a Roundabout at A470 / A489 South of Caersws	Site 62a commences south of Caersws and extends northwards and eastwards along the A470 and A489 towards Caersws and Welshpool. It is proposed to construct a new roundabout and associated roads mainly off line in accordance with CD109 and CD 116. Four private means of access will be stopped up and alternative access provided. Existing laybys along the route are to be maintained. The proposed scheme is considered feasible with no departures from standard from DMRB. Negotiations with third party landowners is required for additional land purchase and stopping up of existing access points and new access routes. As part of the Active Travel Wales initiative, it is proposed to improve facilities for Non-Motorised users (NMUs) within the area as part of the Scheme, which includes a new shared use foot/cycleway linking the village of Caersws to the existing National Cycle Network 81, reallocating road space. This will include a new pedestrian footbridge to cross the River Severn which will segregate non-motorised users from road traffic, improving safety for all users.
Site 63c DAL at A470 Llanidloes	Site 63c commences at Llanidloes Roundabout and extends northbound for 1.1km along the A470 towards Llandinam. It is proposed to introduce a DAL in accordance with CD109 which will provide guaranteed overtaking for 250 in the northbound direction. Three Private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved. Negotiations with third party landowners is required for additional land purchase and stopping up of existing access points and new access routes. There is no existing NMU provision along this section of the A470.

3 TRANSPORT CASE

3.1 OVERVIEW

3.1.1. The purpose of the WelTAG Stage Three appraisal is to make a full and detailed assessment of the preferred sites to inform a decision as to whether or not to proceed to implementation. The detailed design and appraisal work will be used to refine and inform the measures proposed and will help to fully realise the benefits of the proposals and to help mitigate any adverse impacts.

3.1.2. The seven short-listed options will be appraised against the three WelTAG areas to ensure that the proposals can help to address the problems identified. The three WelTAG areas are:

- Economy;
- Environment; and
- Social and Cultural.

3.1.3. The Stage Three appraisal will allow a Full Business Case to be completed for each option. Once the full specification of a scheme is known:

"the details of the anticipated impacts and the narrative as to how the proposed intervention will meet the objectives and likely impacts, will assist in the planning of the monitoring and evaluation which will be carried out in WelTAG Stages Four and Five."

3.1.4. The WelTAG Stage Three will also determine whether a transport option exists that can address the identified problems and can be delivered within technical and financial constraints.

3.2 APPRAISAL CRITERIA

3.2.1. The appraisal of options has been summarised using Appraisal Summary Tables (ASTs) for comparison of their performance against the appraisal criteria. The sites can then be recommended for implementation. The AST for each option can be found in **Appendix F**.

3.2.2. ASTs extract the core economic, environmental and social impacts from each transport proposal, under the respective appraisal criteria. At Stage Three, the following appraisal areas have been considered, as outlined in **Table 3-1.**

Table 3-1 – WelTAG Impact Areas

Environment	Social and Cultural	Economy
Air Quality	Physical Activity	Journey Time Changes and Journey Time Reliability
Noise	Severance / Permeability	Capital Costs and Land
Landscape	Transport Safety	
Historic Environment	Personal Security	
Biodiversity	Journey Quality	
Water Environment	Accessibility	

3.2.3. Quantitative assessment of embodied carbon is currently being completed for the preliminary design. This will be used as a baseline to target carbon reductions through detailed design. Mitigation of negative impacts of construction will be further developed to provide an overall whole life reduction in carbon footprint.

3.3 APPRAISAL METHODOLOGY

3.3.1. As part of this Stage Three study, the appraisal undertaken is a combination of quantitative and qualitative impacts, based upon the scale of impact anticipated under each appraisal.

3.3.2. In accordance with the WelTAG guidance the significance and scale of the impacts throughout the assessment has been appraised using a seven-point scale, as illustrated at **Figure 3-1**.

Figure 3-1 - WelTAG Appraisal Seven-Point Scale

Large Beneficial	Moderate Beneficial	Slight Beneficial	Neutral	Slight Adverse	Moderate Adverse	Large Adverse
+++	++	+	0	-	--	---

3.3.3. The following sub-section outlines different appraisal methodologies used for the individual WelTAG areas.

ENVIRONMENTAL APPRAISAL

3.3.4. The environmental appraisal methodology, for each criterion, is detailed below.

Air Quality

3.3.5. A semi-quantitative air quality appraisal of impacts to potential sensitive receptors (e.g. dwellings) or Air Quality Management Areas (AQMAs) within 200 metres of sites was proposed including:

- Baseline monitoring at each site comprising three diffusion tubes per site over a three-month period.
- Review of scheme design and preliminary traffic data.
- Preparation of a GIS model to assess distances to receptors potentially affected by the sites.
- Dispersion modelling undertaken using the available traffic data / site designs.

3.3.6. The air quality appraisal has therefore been adapted to provide a qualitative appraisal of air quality impacts on potential sensitive receptors (e.g. dwellings) or Air Quality Management Areas (AQMAs), within 200 metres of site options, in the interim.

Noise

3.3.7. A semi-quantitative noise appraisal of impacts to potential sensitive receptors (e.g. dwellings) or Noise Action Planning Priority Areas (NAPPAs) within 300 metres of sites has been undertaken and reported in **Appendix G**.

3.3.8. The appraisal included:

- Baseline noise monitoring at each site along the A470 and A487 using the short-term measurement procedure in the 'Calculation of Road Traffic Noise'.
- Noise modelling using CadnaA (Computer-aided noise Abatement software) based on the noise monitoring data including do-minimum and do-something scenarios.

Landscape

3.3.9. The Landscape appraisal has been undertaken in accordance with Transport Appraisal Guidance (TAG) Unit A3 (May 2019) guidance for Impacts on Landscape. Landscape Appraisal worksheets have been produced for each site in **Appendix G**. The following activities have been undertaken to inform the appraisal:

- Review of available data contained within the LANDMAP datasets.
- Site visit to undertake a landscape site appraisal and to verify the information within the LANDMAP information.

Preliminary Landscape Design

3.3.10. A preliminary landscape design has been prepared for each site in **Appendix G.** These identify where replacement planting / screening is required to achieve an appropriate level of mitigation. These designs are preliminary and will be subject to further refinement to address potential clashes with services or other constraints not currently known about. The designs follow direction provided in LA117 Landscape Design and indicate the Environmental Function and Landscape Elements.

Historic Environment

3.3.11. The Historic Environment appraisal has been undertaken in accordance with TAG Unit A3 (May 2019) guidance for Impacts on the Historic Environment. Historic Environment Appraisal worksheets have been produced for each site in **Appendix G**. The following key sources have been used to inform the appraisal:

- CADW - information on statutory designations including scheduled monuments and listed buildings.
- Historic Environment Record (HER), primary repository of historic environment information, including past investigations, find spots, etc.
- Historic Wales National Heritage List and Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) database.
- Internet – conservation areas and locally listed buildings data.
- Historic Ordnance Survey maps from the first edition (1860–70s) to the present day (for considering the impact of previous development).
- British Geological Survey (BGS) – online solid and drift geology digital mapping (provides an indication of likely nature and depth of subsurface deposits).
- Google satellite imagery and Streetview (for a rapid appraisal of possible setting impacts); and
- Walkover survey of the sites to undertake and assess the setting of assets.

Biodiversity

3.3.12. The Biodiversity appraisal has been undertaken in accordance with TAG Unit A3 (May 2019) guidance for Impacts on Biodiversity. Biodiversity Appraisal worksheets have been produced for each site in **Appendix G**. The appraisal has been informed from the following studies / surveys:

- Preliminary Ecological Appraisals (PEAs) for each site
- Habitat condition assessment data from Biodiversity Net Gain assessment

Preliminary Ecological Appraisals (PEAs)

3.3.13. To inform the ecological baseline of the sites and to ascertain if further ecological assessments are needed, a PEA has been undertaken following the standard and best practice methodology for extended Phase 1 habitat surveys (JNCC, 2010) and the Chartered Institute of Ecology and Environmental Management's (CIEEM) Guidelines for Preliminary Ecological Appraisal. A PEA for each site is included in **Appendix G**.

Biodiversity Net Gain assessments (BNG)

3.3.14. The BNG assessment has been completed in accordance with industry recognised best practise, the Biodiversity metric 2.0 and the Principles and Guidance for UK Construction and Developments, to ensure that the BNG process that is measurable, transparent, consistent, efficient and mitigates programme and budget risks for both developers and decision makers.

3.3.15. The BNG assessment adheres to the following three steps:

- Step 1: Assessment of the biodiversity baseline (by calculating the baseline units).
- Step 2: Inform mitigation proposals (by quantifying land take and the type of habitats affected during the scheme).
- Step 3: Assessment of final Proposed Development designs (by quantifying and evaluating the proposed mitigation so that the project can achieve a positive outcome for biodiversity).

3.3.16. The BNG assessment is included in **Appendix K.**

Water Environment

3.3.17. The Water Environment appraisal has been undertaken in accordance with TAG Unit A3 (May 2019) guidance for Impacts on the Water Environment. Water Environment Appraisal worksheets have been produced for each site in **Appendix G**. The following desk-based information was used to inform the appraisal:

- Fluvial, surface water, reservoir flood mapping (NRW).
- Water Framework Directive monitoring data (NRW).
- OS historical mapping.
- River Basin Management Plans (NRW).
- MAGIC online mapping.
- Local Flood Risk Management Strategy.

3.3.18. We have assumed that a Flood Risk Assessment, hydraulic modelling, Water Framework Directive Assessment or any environmental permit applications are not required at preliminary design stage.

SOCIAL AND CULTURAL

Physical Activity

3.3.19. A qualitative appraisal to assess potential levels of walking, cycling and other physical exercise that could be undertaken as a result of site options and measures has been provided. This has been based on whether there are any non-motorised user / Green Corridor improvements proposed to be delivered alongside the overtaking measures at different sites.

3.3.20. A WCHAR audit has been undertaken of all design options to highlight opportunities for increased physical activity and refine design options. The results of the full WCHAR audits is attached at **Appendix B**.

Severance

3.3.21. TAG Unit A4.1 (Social Impact Appraisal; November 2014) outlines that severance can be defined as the separation of residents, particularly pedestrians, from facilities and services they use within their community caused by changes to transport infrastructure or to traffic flows. There are four broad levels of severance, and these were applied to the WelTAG seven-point scale as follows:

- Large positive (+++): People will be encouraged to make journeys on foot and travel to destinations that were previously out of reach;
- Moderate positive (++): Pedestrian journeys will be more attractive, and some people will be encouraged to make some journeys on foot;
- Slight positive (+): All people wishing to make pedestrian movements will be able to do so, and there will probably be some benefit to movement;
- Neutral (0): Little or no change to pedestrian movement;
- Slight negative (-): All people wishing to make pedestrian movements will be able to do so, but there will probably be some hindrance to movement;
- Moderate negative (- -): Pedestrian journeys will be longer or less attractive; some people are likely to be dissuaded from making some journeys on foot; and
- Large negative (- - -): People are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity or to a permanent loss of access to certain facilities for a particular community. Those who do make journeys on foot will experience considerable hindrance.

3.3.22. TAG Unit A4.1 also suggests that the number of people affected should be estimated to determine the impact, and therefore the number of crossing points, as well as their likely footfall. This information was used to ascertain if and how each scheme option would affect pedestrian movement in the vicinity of the options. The assessment also takes into consideration the outcome of the WCHAR audits.

3.3.23. A qualitative appraisal has been undertaken to assess the extent of potential improvements to existing severance issues between key centres.

Transport Safety / Incidents

3.3.24. TAG Unit A4.1 (Social Impact Appraisal; November 2014) states that transport interventions may alter the risk of individuals being killed or injured as a result of accidents. The methodology undertaken to assess the accident impact of each option was informed by the records in the DfT STATS19 database.

3.3.25. Based on the detailed descriptions of incidents provided as part of the STATS19 data, a detailed analysis has been undertaken to ascertain whether the measures proposed will have any effect on the number and severity of PICs occurring. Incidents have been categorised according to whether the proposed interventions are able to reduce the possibility or occurrence of collisions using a' Yes/No/Maybe' style analysis. For example, incidents that have occurred as a result of poor overtaking manoeuvres have been categorised as 'Yes', whilst incidents occurring as a result of driving under the influence have been categorised as 'No'.

3.3.26. A summary of the analysis for each site option is provided below.

Table 3-2 – Transport Safety Analysis Summary Table

Site / Incident Prevention (no. of PICs)	Option						
	17 & 17a	**18**	**27**	**34b**	**53**	**62a**	**63c**
Yes	1	5	1	5	1	7	2
Maybe	6	1	2	1	0	6	1
Total Incident Prevention Benefit	£390,959	£7,019,795	£5,412,420	£3,246,409	£141,220	£1,470,178	£2,078,595

Note: Values are in 2010 prices

Personal Security

3.3.27. TAG Unit A4.1 (Social Impact Appraisal; November 2014) outlines that transport interventions may affect the level of security for transport users, and that the assessment of impacts should reflect both changes in security and the likely number of users affected.

3.3.28. Depending on the nature of the intervention, an assessment of changes in security can be appraised reflecting impacts on the security of road users. Although there are no formal guidelines for the security of road users, it outlines that the guidelines for public transport passengers, such as surveillance, can be applied to road users. The guidance notes that:

- Road users are more vulnerable to crime in circumstances where they are required to stop their vehicles or travel at slow speeds, such as at the approaches to signals or in congested conditions;
- Road users are more vulnerable to crime at locations where they are required to leave their vehicles, such as at service stations, car parks and so on; and

- The importance of each indicator is likely to vary according to the location and nature of the road. For example, emergency call facilities are likely to be more important than surveillance when considering a rural road.

3.3.29. WelTAG guidance outlines that the appraisal should assess how safe people feel in terms of personal security (as opposed to accident prevention). The approach adopted considered how vulnerable and susceptible road users were to the fear of crime.

3.3.30. A qualitative appraisal has been undertaken to assess potential improvements to road user security. This has been based on proposed improvement to visibility and space provided to allow safe overtaking of slow-moving vehicles.

Journey Quality

3.3.31. TAG Unit A4.1 (Social Impact Appraisal; November 2014) defines journey quality as a measure of the real and perceived physical and social environment experienced while travelling. Journey quality impacts can be divided into traveller care, travellers' views and traveller stress.

3.3.32. A qualitative appraisal has been provided to assess the impact of each site option on the key aspects, as outlined below:

- Traveller Care – including level of facilities available, information provided and general transport environment;
- Traveller Views – including ease of navigation, duration of the journey and a route's aesthetic quality; and
- Traveller Stress – including driver frustration, fear of accidents / collision and route uncertainty.

3.3.33. The overall impact score assigned to each option to indicate the potential changes in the quality of a journey was arrived at using a qualitative appraisal process as outlined in TAG Unit A4.1. This involved determining the likely impact each option would have in terms of reducing road users' perceived fear of accidents, reducing the frustration road users were likely to be subject to, and the extent to which ease of navigation and the provision of information were likely to be improved.

3.3.34. It was taken into consideration during the assessment that an option may have varying impacts in terms of journey quality upon different road users, such as between HGVs and commuters.

Access to Employment and Services

3.3.35. A qualitative appraisal has been undertaken to ascertain journey times to key centres of employment and services, following implementation of the proposed schemes. The assessment has been based on the total length of overtaking opportunity provided.

3.3.36. Whilst existing WelTAG 2017 guidance outlines access to employment and services as two separate appraisal areas, both areas have been combined as part of this assessment as there is considered to be little or no difference in appraisal outcomes between the two.

ECONOMIC APPRAISAL

Journey Time and Journey Time Reliability Changes

3.3.37. A quantitative appraisal has been undertaken to assess changes in journey times across all affected modes as a result of improved overtaking opportunities. The appraisal considers any changes in the variation in journey times between times of day and between journeys made at the same time each

day i.e. morning and evening peak periods. Benefit has been calculated based on the recorded number of vehicles, the length of any proposed acceleration lane, the distance from a previous overtaking opportunity on the network, vehicle speeds and the length of time taken to overtake.

3.3.38. Any Journey Time and Journey Time Reliability Changes are also based on a calculated increase or decrease in delay as a result of a proposed intervention. This has primarily been based on individual junction modelling results for the proposed roundabout and DAL, or roundabout only, options at Caersws (Site 62a), Pontybat (Site 34b) and Llanrhystud (Site 18).

3.3.39. The following assumptions have also been made to calculate the Present Value of Benefits (PVB) of the proposed Sites:

- It is assumed there are no overtaking opportunities for 10km before each Site (this is assumed as a worst-case scenario).
- Existing vehicle speeds are assumed to be between 30 and 45mph. This has been based on average vehicular speeds extracted from the INRIX database (2017).
- The assumed vehicle speed when overtaking is 60mph.

3.3.40. Whilst the WelTAG 2017 guidance outlines journey time and journey time reliability changes as two separate appraisal areas, both areas have been combined within this assessment, as the appraisals are proportionate to one another, with little or no difference in appraisal outcomes between the two considered likely to take place.

3.3.41. Table 3-3 summarises the journey time and journey time reliability changes for each of the seven options.

Table 3-3 – Journey Time Changes and Benefits

Item	Option						
	17 & 17a	18	27	34b	53	62a	63c
Journey Time Changes (thousand PCU hours for 1st year)	80.2	16.9	7.6	5.8	16.9	-	3.2
Overtaking Benefit	£20,289,278	£5,240,618	£2,676,595	£1,955,826	£4,715,057	£ -	£1,321,013
Junction Benefit	£ -	£794,820	£ -	£581,592	£ -	£362,043	£ -

Note: Values are in 2010 prices

Capital Costs

3.3.42. The estimates have been compiled using rates taken from SPONS Civil Engineering and Highways Works Price Book 2018 or historic rates from previous projects, considered appropriate. Further detailed information is provided within the Financial Case. A summary of the scheme costs is provided below.

Table 3-4 – Scheme Costs Summary

Item	Option						
	17 & 17a	18	27	34b	53	62a	63c
Scheme Cost Total (£)	17,433,769	5,950,951	5,110,058	7,178,772	8,229,195	5,955,405	3,705,046

Note: Values are in 2018 prices

Land

3.3.43. Appraisal guidance states that an assessment of the land impact of a scheme should evaluate the extent to which the scheme is likely to result in a reduction in the amount of agricultural land, and whether there is any development directly associated with the option. The methodology employed therefore involved assessing the anticipated land requirements, identifying the potential economic, cost of acquisition, and whether the required land is associated with developments which rely specifically on the option.

3.3.44. The amount of land required for each option is shown below.

Table 3-5 – Land Take

Item	Option						
	17 & 17a	18	27	34b	53	62a	63c
Land Take (m^2)	180,190	45	48	43	54	29	48

VALUE FOR MONEY ASSESSMENT

3.3.45. The Benefit-Cost Ratio (BCR), as set out in the previous WelTAG Stage Two study for each site option has been further refined and evaluates each scheme's benefit for both Journey Time and Transport Safety, as set out above, and evaluated against the total scheme costs in terms of capital and revenue. A quantitative appraisal has then been undertaken to calculate approximate cost savings per casualty based on WebTAG 4.1.1 'Accident costs' and Table 3/1 COBA Manual. A summary TEE table is provided below.

Table 3-6 – TEE Summary

Item	Option						
	17 & 17a	18	27	34b	53	62a	63c
Overtaking Benefit	£20,289,278	£4,715,058	£2,676,595	£1,955,826	£4,715,057	£ -	£1,321,013
Junction Benefit	£ -	£794,820	£ -	£581,592	£ -	£362,043	£ -
Incident Prevention Benefit	£390,960	£7,019,795	£5,412,420	£3,246,409	£141,220	£1,470,178	£2,078,595
PVB	**£20,680,238**	**£12,529,673**	**£8,089,016**	**£5,783,827**	**£4,856,278**	**£1,832,221**	**£3,399,609**
Scheme Cost	£9,750,089	£3,911,187	£2,857,874	£4,014,832	£4,602,297	£3,330,647	£2,072,101
PVC	**£9,750,089**	**£3,911,187**	**£2,857,874**	**£4,014,832**	**£4,602,297**	**£3,330,647**	**£2,072,101**
NPV	£10,930,148	£8,618,485	£5,231,142	£1,768,995	£253,981	-£1,498, 426	£1,327,507
BCR	**2.12**	**3.20**	**2.83**	**1.44**	**1.06**	**0.55**	**1.64**

Note: Values are in 2010 prices.

OTHER ISSUES

3.3.46. Further potential issues have also been appraised. These include:

- Overall Acceptability - assessing the receptivity of the public, local authorities and key stakeholders.
- Technical, Operational and Financial Feasibility – measuring the extent to which a measure is technically, operationally or financially feasible given proposed budget and timeframes.
- Deliverability and Risk – where possible, a qualitative statement has been undertaken highlighting any possible risks to deliverability.

3.4 APPRAISAL SUMMARY TABLES

3.4.1. The appraisal of each option has been illustrated in **Appendix F** of the report, which also provides a detailed description behind the score awarded for each appraisal area. They provide a summary of each potential impact, indicating the nature of the impact, its severity, who is expected to be affected, and at which locations. These tables can be used for comparison between each option over a wide range of appraisal criteria.

3.4.2. A concise version of the Appraisal Summary Tables can be seen on the following page. This concise table displays all the option appraisals alongside one another, to allow for ease of

comparison. The concise table includes option scores against each of the objectives and appraisal criteria (outlined in Section 3.3), against the seven-point assessment scale.

Table 3-7 – Appraisal Summary Table

		Economy				Environment						Social & Cultural								Objectives									
ID	Description	Journey Time Changes	Capital Costs (2018 Prices)	Value for Money NPV (£) (BCR)	Land (sqm)	Air Quality	Noise	Landscape	Historic Environment	Biodiversity	Water Environment	Accidents	Physical Activity	Severance	Personal Security	Journey Quality	Accessibility	Personal Affordability	Acceptability	Improve safety on the network for all users	Reduce driver stress / frustration	Support modal shift to active modes (walking and cycling) for shorter journeys and public or third sector transport for longer journeys	Improve connectivity between mid-Wales communities	Protect and enhance biodiversity and ecosystem resilience	Reduce greenhouse gas emissions through smarter design, construction, operation and maintenance of the road network, including support to Electric Vehicle (EV) charging	Encourage and support key economic sectors of the Mid Wales economy, such as tourism, by improving links to work, leisure and education	Create a more resilient strategic road network, including managing the impact of climate change by future proofing infrastructure	Improve journey time reliability for longer journeys on the strategic road network
17 & 17A	Climbing Lane of 500m along the A487 North-East of Aberarth.	+++	£17.4 M	£20.7 M (2.12)	-	0	0	0	-	0	0	++	+++	++	+	+++	+	0	+++	++	+++	+++	++	+++	++	+++	++	+++
18	A differential acceleration lane (DAL) to the South of Llanrhystud for 250m.	++	£5.9M	£12.5 M (3.2)	-	0	-	0	0	0	0	+++	+++	++	+	+++	+	0	++	+++	+++	+++	++	++	++	+	++	++
27	A differential acceleration lane (DAL) to the East of Llangurig Roundabout for 250m.	+	£5.1M	£8.1M (2.83)	-	0	0	-	0	0	0	+++	0	0	0	+	+	0	++	+++	+++	0	+	++	+	+	++	+
34b	New roundabout and differential acceleration lane (DAL) at Pontybat Crossroads	+	£7.2M	£5.8M (1.44)	-	0	0	-	-	+	0	+++	++	0	0	+++	+	0	+++	+++	+++	++	+	++	+	+	++	+
53	A differential acceleration lane (DAL) to the South of Machynlleth for 250m.	++	£8.2M	£4.9M (1.06)	-	-	--	0	---	-	0	++	+	0	0	+	+	0	0	++	+++	+	++	-	+	+	++	++
62a	New roundabout to the south of Caersws	+	£6.0M	£1.8M (0.55)	0	0	+	0	-	0	-	+++	+++	++	+	+++	+++	0	+	+++	+	+++	+++	++	+	++	++	+
63c	A differential acceleration lane (DAL) to the North of Llanidloes for 250m	+	£3.7M	£3.4M (1.06)	-	0	0	0	0	0	0	+++	+	0	0	++	+	+	0	+++	+++	+	++	+	0	+	++	+

Key

Large Beneficial	Moderate Beneficial	Slight Beneficial	Neutral	Slight Adverse	Moderate Adverse	Large Adverse
+++	++	+	0	-	--	---

3.5 APPRAISAL OVERVIEW

3.5.1. The concise Appraisal Summary Table outlines how each option performs against the Study objectives as well as the founding WelTAG principles of economy, environment, social and cultural development. The concise table demonstrates that no single option can provide a positive contribution to all Impact Areas and the Study Objectives. A generalised commentary is provided below.

Site 17 & 17a – Climbing Lane along the A487 North-East of Aberarth

3.5.2. The option to provide climbing lanes north of Aberarth has scored positively against the appraisal criteria.

3.5.3. Option 17 & 17a will have a neutral impact on both noise/air quality and water environment, as there are no works proposed within fluvial flood risk areas and there are no NIAs within 2km of the Scheme. The option is also proposed to achieve a significant net gain under Biodiversity Net Gain.

3.5.4. The introduction of 3.2k of new shared use path will greatly improve the opportunities for travel by sustainable modes within the study area and beyond.

3.5.5. This scheme is anticipated to provide some benefit to the general economy through improved journey times and reliability. The estimated PVB is £20.7m and based on the proposed scheme costs, this option has a BCR of 2.12, indicating high value for money.

3.5.6. Following the public consultation, this option has strong public and stakeholder support.

Site 18 – DAL to the South of Llanrhystud

3.5.7. The option to provide a DAL to the south of Llanrhystud has scored positively against the appraisal criteria.

3.5.8. Option 18 is likely to have a neutral impact on environmental impacts. However, Option 18 has scored as slightly adverse in regard to noise due to Noise Sensitive Receptors (NSRs) being identified within 40m of the Scheme which may be subject to minor adverse noise impacts during construction and operational phases. The option is also proposed to achieve a net gain under Biodiversity Net Gain.

3.5.9. Option 18 will also include an NMU link and provide a shared footway / cycleway along the western side of the A487 which will tie in existing footways. A large beneficial impact on physical activity and modal shift is therefore anticipated.

3.5.10. The option is also expected to significantly reduce the number of PICs occurring along the route.

3.5.11. Overall, the option is anticipated to provide some benefit to the general economy through improved journey times and reliability. The estimated PVB is £12.5M and based on the proposed costs, this option has a BCR of 3.2, indicating high value for money.

3.5.12. Following the public consultation, this option has positive public and stakeholder support.

Site 27 – DAL on A470 East of Llangurig

3.5.13. The option to provide a DAL to the east of Llangurig has generally scored positively against the appraisal criteria.

3.5.14. Option 27 is likely to have a neutral impact on both air, noise and water environment, as there are no works proposed within fluvial flood risk areas and there are no NIAs within 2km of the Scheme. The option is also proposed to achieve a significant net gain under Biodiversity Net Gain.

3.5.15. The option is also expected to significantly reduce the number of PICs occurring along the route.

3.5.16. This option is anticipated to provide some benefit to the general economy through improved journey times and reliability. The estimated PVB is £8.1M and based on the proposed costs, this option has a BCR of 283, indicating high value for money.

3.5.17. Following the public consultation, this option has positive public and stakeholder support.

Site 34b – DAL and New Roundabout at Pontybat

3.5.18. The option to provide a new roundabout junction and DAL at the existing Pontybat Crossroads junction has scored positively against the appraisal criteria.

3.5.19. Option 34b is likely to have a neutral impact on both air, noise and water environment, as there are no works proposed within fluvial flood risk areas and there are no NIAs within 2km of the Scheme. The impact of lighting columns is expected to have a slight adverse impact on landscape while there is also an expected impact against historic environment with regards to the proximity of two non-designated assets.

3.5.20. The option is also expected to significantly reduce the number of PICs occurring along the route.

3.5.21. This scheme is anticipated to provide some benefit to the general economy through improved journey times. The estimated PVB is £5.8m with a BCR of 1.44 indicating medium value for money.

3.5.22. Following the public consultation, this option has strong public and stakeholder support.

Site 53 – DAL at Machynlleth

3.5.23. The option to provide a DAL to the south of Machynlleth has had a mixed impact against the appraisal criteria.

3.5.24. Option 53 is likely to have a neutral impact on the water environment, as there are no works proposed within fluvial flood risk areas. However, Option 53 has scored large adverse against historic environment due to its impact on designated heritage assets, and moderately adverse in regard to noise due to NSRs being identified within 20m of the Scheme which may be subject to minor adverse noise impacts during construction and operational phases.

3.5.25. Option 53 includes minimal improvements to existing walking and cycling facilities. An existing shared-use footway / cycleway will remain along the length of the scheme adjacent to the westbound carriageway, with improved NMU provisions around the new roundabout. A slight beneficial impact on physical activity and journey quality is therefore anticipated.

3.5.26. This scheme is anticipated to provide some benefit to the general economy through improved journey times as a result of increased overtaking opportunities. The estimated PVB is £4.9m with a BCR of 1.06 indicating low value for money.

Site 62a – New Roundabout Junction South of Caersws

3.5.27. The option to provide a new roundabout junction at the A470 / A483, south of Caersws, has scored positively against the appraisal criteria.

3.5.28. Option 62a, has been scored as slightly adverse in regard to water environment, due to the option being located within a fluvial flood risk area associated with the River Severn. The proposed scheme would also cause a localised increase in impermeable area. There is also a proposed slight adverse impact against historic environment due to the impact to the setting of the Grade II listed Caersws bridge.

3.5.29. Option 62a is expected to have a large beneficial impact on pedestrian movement, physical activity and the promotion of modal shift. The option includes for provision of a formal shared footway / cycleway along the A489 and A470 within the vicinity of the existing junction to provide safe, off-road cycling provision for existing cyclists travelling along the National Cycle Network with increased access to local amenities.

3.5.30. This scheme is anticipated to slight benefit to the general economy through improved journey times and reliability. The estimated PVB is £1.8m. The BCR is calculated to be 0.55 indicating low value for money.

3.5.31. Although this option is yet to complete the proposed public consultation, this option has strong stakeholder support.

Site 63c – DAL at Llanidloes

3.5.32. The option to provide a DAL along the A470 at the Llanidloes roundabout has generally scored positively against the appraisal criteria.

3.5.33. Option 63c is likely to have a neutral impact on all environmental criteria while significantly reducing the number of PICs occurring along the route with improvements to journey quality.

3.5.34. The estimated PVB is £3.4m with a BCR of 1.64 indicating medium value for money.

3.5.35. Whilst indicating a low value for money, overall, Option 63c is anticipated to improve journey times as a result of the intervention and is therefore considered to have a positive impact on economy.

3.5.36. Overall neutral public support for the scheme has been received during the public consultation. Negative responses are currently being addressed, including amendments to scheme proposals, with the aim of achieving strong public support.

4 FINANCIAL CASE

4.1 OVERVIEW

4.1.1. The Financial Case provides an assessment on whether an option is affordable. It also sets out whether a scheme is financially viable in the long-term. It covers both capital and revenue requirements over the lifetime of the project and the implications of these for the balance sheet, income and expenditure accounts for public sector organisations.

4.2 FINANCIAL MODEL

4.2.1. The WelTAG appraisal guidance states that the lifetime costs of the project are to include occurrence, price, source of funding, maintenance liabilities, risk allowances, environmental, social and cultural impacts and any externalities.

4.3 APPROACH TO ASSESSING AFFORDABILITY

4.3.1. An assessment has been undertaken to establish an accurate representation of what options will cost. Consultation with NMWTRA and the design teams has been completed to develop the latest estimates based on previous works delivered for and on behalf of NMWTRA. Where previous experience cannot be used, options costs have been based on the latest estimates available. These have been estimated using feasibility drawings, where available, and rates from Spon's Civil Engineering and Highway Works Price Book 2018. Where no costing information was available assumptions have been made around the scale of the costs based upon recently completed examples of similar schemes.

4.4 SCHEME COSTS

4.4.1. Costs and quantities have been derived directly from feasibility design drawings / models, contractor's overheads and preliminaries. Traffic Management costs have been applied to the construction costs at recommended percentages as outlined in SPONS. Consultancy preparation and supervision fees have been applied at 12% and 5% for the construction costs, respectively. Land costs have been estimated based on a flat rate for UK average cost of agricultural land per acre. Finally, an optimism bias of 20% was applied.

4.4.2. A refined set of cost estimates has been established. A summary of the option costs is illustrated in **Table 4-1**.

4.4.3. The costs are based on the following assumptions:

Contingencies:

- **Head office overheads** - this is not included within the rates. This percentage covers estimating and commercial management, planning and design, purchasing, surveying, insurance, wages and bonuses and site safety. It recommends a percentage of 5% to 10% onto net turnover. An assumed 5% has been applied.
- **Profit -** the level of profit is governed by the degree of competition but recommends an addition of 5% to 15% onto net turnover. An assumed 10% has been applied.
- **Preliminaries** - where no detailed information is available, it is suggested that when preparing a preliminary estimate an addition of between 15% and 35% of net contract value is made to cover

contractor's on-site costs, both time and non-time related. A 25% value has been applied, based upon the level of detail available at this stage. The includes traffic management.

- **Preparation costs** - in accordance with DMRB volume 13, part 2, chapter 7, 7.3
- **Supervision costs -** in accordance with DMRB volume 13, part 2, chapter 7, 7.4
- **Optimism bias** – 20% has been applied in accordance with WebTAG 3.5.9, Table 9. This has not been applied to costs for Land or Preliminaries.

Table 4-1 – Estimated Costs (£)

Item	Option						
	17&17a	18	27	34b	53	62a	63c
Construction Subtotal	1,713,518	2,825,713	**2,426,428**	3,408,723	3,907,500	2,827,828	1,759,281
Preliminaries (25%) Including TM	428,379	706,428	606,607	852,180	976,875	706,957	439,820
Total Construction Cost	2,141,897	3,532,141	3,033,035	4,260,904	4,884,374	3,534,785	2,199,101
Preparation Costs (12%)	257,027	423,856	363,964	511,308	586,125	424,174	263,892
Supervision costs (5%)	107,094	176,607	151,651	213,045	244,219	176,739	109,955
Sub-Total	***2,506,020***	***4,132,605***	***3,548,651***	***4,985,258***	***5,714,719***	***4,135,698***	***2,572,949***
Optimism Bias (20%)	415,528	826,521	709,730	997,052	1,142,944	827,140	514,590
Grand Total	**2,921,548**	**4,959,127**	**4,258,382**	**5,982,310**	**6,857,662**	**4,962,838**	**3,087,539**

4.4.4. A full breakdown of costs for each option is provided at **Appendix H**.

4.5 PROPOSED FUNDING STREAMS

4.5.1. Funding for some of the initial Batch 1 schemes is fully funded through the Pinch Point Programme by Welsh Government.

4.6 VALUE FOR MONEY AND AFFORDABILITY

4.6.1. The proposed options are deemed to be affordable and good value for money, and therefore can be implemented within the prescribed timeframes. Funding for these options is considered to be secured within financial year budgets.

5 COMMERCIAL CASE

5.1 OVERVIEW

5.1.1. The Commercial Case considers whether it will prove possible to procure the identified scheme(s) and continue to support the venture during its lifecycle. It will address aspects such as potential funding and income streams, procurement methods, private and / or public-sector supplier opportunities, payment mechanisms, risk allocation, contract length and where applicable, human resources issues.

5.1.2. At Stage Three, each option has undertaken a detailed assessment. As such, a defined set of deliverables has been established with costs and routes to procurement both set out. Thus, a detailed commercial assessment of each option can now be carried out.

5.2 OUTPUT BASED SPECIFICATION

5.2.1. The Strategic Case identifies the short-list of options which could be implemented to overcome the identified problems and achieve the study objectives to varying degrees of success.

5.2.2. Interdependencies and efficiencies can be achieved by grouping certain A487 options together for procurement such as those between Aberarth and Aberystwyth.

5.2.3. The Full Business Case has undertaken the necessary processes which has ensured the following:

- Secured funding;
- Implementation timeframe;
- Value for Money; and
- Established whole life costs within the means of the operator.

5.2.4. As such, a robust Commercial Case is attainable at WelTAG Stage Three.

5.3 PROCUREMENT STRATEGY

Procurement Framework

5.3.1. Any procurement strategy developed as a result of the outputs of this Full Business Case will follow and comply with both NMWTRA and Welsh Government agreed procurement processes and any national or European legislation relevant at the time of tendering.

5.3.2. Both NMWTRA and Welsh Government are frequent engineering and construction clients, with a wealth of experience in delivering infrastructure projects, primarily via partnering arrangements and within existing framework agreements.

5.3.3. Adopting a collaborative approach to procurement and building on existing relationships the strategy will be to engage early with Framework Contractors where appropriate to use their expertise in relation to engineering solutions and their intelligence in relation to the local supply chain.

5.3.4. Consideration will also be given as to how to embed the requirements of the Well Being of Future Generations Act, with particular focus on the development of the local supply chain, creating and sustaining employment and training opportunities throughout the delivery of the proposals.

5.3.5. The options identified will be delivered in a number of phases. It is likely that a number of the options will be delivered either individually or packaged to ensure maximum benefits are derived.

5.3.6. The delivery of the options will require evaluation and management of risk, finance and performance. By utilising Framework Contractors, there is an opportunity to build on lessons learned from previous projects and benefit from a process of continuous improvement, including procurement and delivery strategies.

5.3.7. There are a number of potential procurement routes available for consideration and NMWTRA and Welsh Government will consider, where appropriate, the use of technical advisors to assist in the scheme tendering and management.

The two main procurement routes identified are:

- NMWTRA Contractor Framework; and
- Find a Tender Service (FTS)

5.3.8. The NMWTRA Contractor framework involves new construction works, improvement works, maintenance renewals, emergency works and supplier design for activities including civils, tunnels, environmental and geotechnical, highways, coastal engineering, town centre improvements and integrated transport schemes. The framework is split into four lots which are outlined in Table 5-1.

Table 5-1 – NMWTRA Contractor Framework Lots

Lot Title	Lot 1a	Lot 1b	Lot 2a	Lot 2b
Lot Region & Scope	North & Mid Wales (including Dual Carriageways)	North & Mid Wales (including Dual Carriageways)	North Wales (excluding Dual Carriageways)	Mid Wales (excluding Dual Carriageways)
Project £ Banding	£0 - £5,000,000	£5,000,000 - £30,000,000	£0 - £1,000,000	£0 - £1,000,000
Procurement Route	Mini-competition / Direct Award	Mini-competition only	Mini-competition / Direct Award	Mini-competition / Direct Award

5.3.9. The most appropriate Lot for this package of works is Lot 1 - North and Mid Wales, including Dual Carriageway works. The procurement route of each option is set out at Table 5-2.

Table 5-2 – Procurement Route

Site	NMWTRA Contractor Framework Lot
17a Aberarth	Lot 1a
18 Llanrhystud	Lot 1a
27 Llangurig	Lot 1a
34B Pontybat	Lot 1b
53 Machynlleth	Lot 1b
62A Caersws	Lot 1a

63C Llanidloes	Lot 1a

5.3.10. NWTRA and the WG will also consider, where appropriate, the use of private sector technical advisors to assist with the development, procurement and management of measures considered within this study. Whilst the strategy for the appointment of technical advisors would need to be finalised as each site comes to fruition, it is envisaged that NMWTRA and the WG would need to supplement its own in-house resource. At this stage, it is expected that NWMTRA and WG have sufficient resources available to develop and implement policy and procedural measures that do not require capital investment and can also accommodate small infrastructure projects with delivery timescales in the region for 0 – 18 months with the support of partnering authorities.

5.3.11. In addition to NMWTRA's Contractor Framework, there are options within the FTS procurement process. Only two would be applicable to this package of works. The FTS process is a new recognised procurement route for awarding construction projects. However, it requires the longest timescales to reach the point of contract award and will result in the Welsh Government incurring higher direct procurement costs than it would with the other alternative options.

5.3.12. It is anticipated that any measure below the upper limit of £30 million would utilise the NWMTRA Contractor Framework, subject to the required skills and experience of framework contractors for specific options.

5.4 PAYMENT MECHANISMS

5.4.1. Payment mechanisms for all schemes would be as per the NMWTRA Contractor Framework.

5.4.2. The delivery of this programme of works will require evaluation and management of risk, finance and performance. By utilising the NWMTRA Contractor procurement route, there is an opportunity to build on lessons learnt from previous projects and benefit from a process of continuous improvement, including procurement and delivery strategies.

5.4.3. Consideration should also be given to the requirements of the Well-Being of Future Generations Act and how the Well-Being goals could be embedded within contracts, with a focus on the development of the local supply chain to create and sustain employment and provide training opportunities throughout the delivery of proposals. This is likely to be in the form of performance monitoring in areas such as employment, education, local supply chains and community initiatives.

5.5 RISK ALLOCATION AND TRANSFER

5.5.1. The allocation and transfer of risk will be managed proactively so that contractors delivering the scheme do not take unnecessary or unreasonable risks.

5.5.2. Placing risk with the party best able to manage it will lead to:

- Optimal pricing from the suppliers;
- Fewer performance and commercial issues during the contract term;
- A reduced likelihood that the contract fails completely, and the supplier prematurely exits the agreement, or becomes insolvent; and
- A climate of open and honest business dealings for mutual benefit.

5.5.3. At this stage, it is envisaged that the NMWTRA would hold development, procurement, operating, revenue and financing risk, whilst the Contractor would bear design, construction and programme risk with transfer of ownership as appropriate to the specific project type and procurement / contractual route.

5.5.4. The risks identified are as follows:

- Work will need to be undertaken within the existing carriageway of the A470 / A487, which will require contractors to work in the vicinity of existing underground services. Whilst this risk cannot be eliminated entirely, contractors will need to manage risks as far as possible by carrying out a GPR survey and reducing the amount of work undertaken within close proximity.
- There may be a risk to public safety as there is potential for motorists to be affected by the glare from luminaires, if not installed correctly. This risk can be mitigated by the designer / contractor ensuring that all luminaires are installed with a zero-degree tilt to reduce glare.

DESIGN RISKS

5.5.5. Design risks have been reviewed during the design development stage, and where possible eliminated. Where it has not been possible to eliminate risks, these have been reduced as far as possible and residual risks noted within the design hazard risk register. Known risks have also been noted on drawings within the works information pack to ensure the contractor is aware and can suitably plan their works around identified risks. The detailed design risks are documented in the following Design Risk Management Schedules for each site option.

5.5.6. An initial Project Risk Register outlining key design risks that have been identified throughout the option refinement process is attached at **Appendix I.**

6 MANAGEMENT CASE

6.1 OVERVIEW

6.1.1. The Management Case 'covers the delivery arrangements for the project and its management during its lifetime'. The WelTAG guidance states that in the Stage Three report, the Management Case needs to '…identify the requirement for the collection of data which needs to be carried out in advance of the project's implementation'.

6.1.2. It covers the arrangement for procurement, construction and on-going operation of the intervention, details of the monitoring arrangements and the undertaking of the evaluation plan. The management case should embed the Five Ways of Working.

6.2 KEY PROJECT PARTIES AND ROLES

6.2.1. The key project parties and roles for the project are shown below:

Welsh Government

Ultimate client commissioning the study and part of the Project Board overseeing delivery.

- [redacted] – WG Highways Lead
- [redacted] - WG Project Director.

North & Mid Wales Trunk Road Agent (NMWTRA)

- [redacted] - Project Director; and
- [redacted] - Lead Project Sponsor.

WSP

- [redacted] - Project Director
- [redacted] - Project Manager
- [redacted] - Appraisal Manager
- [redacted] – Environmental Appraisal Lead
- [redacted] – Economic Appraisal Lead
- [redacted] – Social Appraisal Lead.

6.3 REVIEW GROUP

6.3.1. A Review Group made up of representatives from key stakeholder organisations was independently set up to guide the WelTAG process and to meet regularly to discuss the project. Its members were as follows:

- Welsh Government;
- North and Mid Wales Trunk Road Agent; and
- WSP

6.4 COMMUNICATIONS AND STAKEHOLDER MANAGEMENT PLAN

6.4.1. Stakeholder engagement has been planned, communicated and agreed with the Project Board from the outset of the study. It has been delivered through a mix of formal stakeholder workshops and ongoing liaison at key stages throughout the study to collate data, discuss potential impacts and ensure buy-in to study objectives, approach and outcomes.

STAKEHOLDER IDENTIFICATION AND ENGAGEMENT STRATEGY

6.4.2. An initial exercise to identify key and specific stakeholder interest and involvement, including Statutory Bodies / Authorities, User Groups and Customers has been carried out and will be reviewed and updated at key stages of the study.

6.4.3. All identified stakeholders have been categorised based on their interest and influence over the project, both during the current and future stages, with clear actions for the project team assigned to them as part of the engagement strategy. Stakeholders have been categorised both at Macro and Micro levels to identify general and specific stakeholder interest, respectively.

6.4.4. A summary of this exercise, identifying specific interests and issues, the approach to engagement and key actions is as follows:

Table 6-1 – List of Stakeholders

Level of Interest / Influence	Stakeholder	Issues	Approach
High level of interest and influence	**Operational** ▪ Welsh Government ▪ NMWTRA	▪ Confirmation of scope and delivery timescales ▪ support from key stakeholders. ▪ Traffic disruption during delivery. ▪ Project risk. ▪ Project objectives / benefits, scope and timescales. ▪ Establishing the Business Case	**Manage Closely** ▪ Key staff identified and invited to attend exhibitions and participate in workshop and regular meetings. ▪ Regular updates. ▪ Engagement with frontline staff
	Statutory ▪ Powys County Council and Ceredigion Council (Lead Local Flood Authority, Environmental Health Officers covering noise and air quality). ▪ Network Rail ▪ Public Utilities	▪ Impact of options on the environment. ▪ Minimise impact on ecology and ensure correct process followed. ▪ Interface with NR. ▪ Impact on historic structures. ▪ Impact on statutory undertakers. ▪ Conveying the scale / scope of the project.	**Keep Satisfied** ▪ Establish early dialogue. ▪ Invited to provide information and views on the proposals and participate in workshop and regular meetings. ▪ Regular updates.

	Emergency Services ▪ Police ▪ Ambulance ▪ Fire	▪ Interface with NMWTRA traffic officers in responding to incidents	**Keep Satisfied** ▪ Establish early dialogue. ▪ Invited to provide information and views. ▪ Regular updates.
Mid-Level - Need to build understanding or rationale	**Customers - Major Users** ▪ Local residents. ▪ Public transport operators. ▪ Sustrans. ▪ A407 / A417 Services. ▪ Local Developers. ▪ Commuters. ▪ Local businesses. ▪ Media. ▪ Hospital Managers. ▪ Ramblers. ▪ North Wales Tourism ▪ Road Haulage Association ▪ The RAC/AA ▪ RoSPA ▪ Archaeological Trust ▪ Local Wildlife Trust ▪ Local Action Groups	▪ Traffic disruption during delivery and project risk. ▪ Integration with benefits to the business community. ▪ Benefits to the community from reduced congestion. ▪ Balance between local impact and with national and regional strategic objectives. ▪ Cycling and walking improvement opportunities.	**Keep Informed** ▪ Directly invited via letter to provide their views via questionnaires online. ▪ Directly informed and invited to the consultation exercises (possibly at later stages).
Low Level - Not directly involved / interested	**Customers – General Public**	▪ Disruption during construction. ▪ Ongoing traffic delays. ▪ Perceived / historic road safety issue.	**Monitor** ▪ Possible development of bespoke public website. ▪ Inform via local press, social media, posters etc.

STAKEHOLDER CONSULTATION

6.4.5. Stakeholder consultation has been carried out both informally and formally throughout the WelTAG process for this study, through events, workshops and other engagement. Stakeholder workshops were undertaken throughout Stage One and Stage Two of the studies.

6.4.6. Events which have been held to date include:

- A Stakeholder Consultation Workshop was held on 11th April 2018, in Machynlleth, as part of the Stage One study.
- A Study Review Group (WG / NMWTRA / WSP) was held on 7th June 2018 to discuss and review the potential A487 & A470 'initial schemes' to be included as part of WelTAG Stage Two Study.
- A Local Councils consultation meeting (with both Powys and Ceredigion Councils) on the 21st May 2019, in Newtown.
- A Local Members consultation meeting (with Local Members of both Powys and Ceredigion Councils) on the 4th and 5th July 2019. Notes of the meetings were included in the WelTAG Stage Two Study.

- Local Council consultation meetings with both Powys and Ceredigion Councils on the 22nd May 2020 and 26th June 2020, respectively.
- Landowners Discussions have taken place (and are ongoing) as part of the Stage Three Study and feed into design development, as well as assessment of acceptability and deliverability appraisals.
- Initial public consultation exercises have been carried out for five of the seven schemes to date, including A487 Sites 17&17a (North of Aberarth) and Site 18 (Llanrhystud), and A470 Site 34b (Pontybat), Site 27 (Llangurig) and Site 63c (Llanidloes). Public Consultation was carried out online, via the Welsh Government website. Public consultation for the remaining two schemes will be carried out at an appropriate stage.

6.5 ASSURANCE AND APPROVAL PLAN

6.5.1. Traffic Regulation Orders (TROs) for any changes to road restrictions are anticipated to be required before some of the short-listed options can progress to delivery.

6.5.2. The design of some of the options will also require a Departure from Standard and would therefore be subject to a departure review to confirm acceptability. These include:

- Site 17 & 17a at Aberarth - five private means of access will be stopped up and alternative access provided. Two existing laybys have been proposed to be stopped up and replaced with a formal rest area within the scheme. The proposed scheme is considered feasible with two departure from standard from the DMRB which have both been approved.
- Site 18 at Llanrhystud - ten private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved.
- Site 27 at Llangurig - three private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved.
- Site 34b at Pontybat - five private means of access will be stopped up and alternative access provided. Bus Layby on the A470 westbound to be stopped up and re-located. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved.
- Site 53 at Machynlleth - five private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved.
- Site 63c at Llanidloes - three private means of access will be stopped up and alternative access provided. The proposed scheme is considered feasible with one departure from standard from the DMRB which has been approved.

6.5.3. There are no required Departures from Standard at Site 62a, at Caersws.

6.6 MEASURE IMPLEMENTATION

6.6.1. There are a number of options available to facilitate the implementation of the likely measures. It is envisaged that measures that involve physical works are likely to be procured through NMWTRA as the appropriate Trunk Road Agent (TRA) to cover all refined and short-listed options. TRAs have further options to procure construction directly through their maintenance partnerships, or via existing Consultant and Contractor Frameworks.

6.6.2. Proposals associated with the use of Traffic Orders or which involve policy, publications, communication and advertising are likely to be undertaken jointly by WG.

6.6.3. By adopting a flexible approach to implementation and integrating robust measurement and evaluation of the performance of these measures to meet the objective, measures can be adjusted based on an improving evidence base. As such, measures which have been identified as 'likely measures' will be implemented as soon as is practicably possible.

6.7 RISK MANAGEMENT STRATEGY

6.7.1. Key risks have been identified for each option. An initial Project Risk Register outlining key design risks that have been identified throughout the option refinement process is attached at **Appendix I.**

6.7.2. Each option will need to develop specific risk registers as and when they are proposed.

6.8 MONITORING AND EVALUATION

6.8.1. A Monitoring and Evaluation Plan has been produced at Stage Three. This includes the undertaking of the appropriate monitoring and evaluation activities to assess whether the scheme outputs are outcomes have been achieved.

6.8.2. The Monitoring and Evaluation Plan details the type of evidence which will be used in the evaluation report and how this evidence will be collected. The plan provides evidence of:

- the inputs that were used both as the scheme was implemented and during its on-going operation;
- what options were implemented;
- the impacts of the options;
- to what extent interventions met their objectives; and
- how these objectives were achieved.

6.8.3. As per the five stages of WelTAG, it will be critical to monitor the impacts of the measures during and post implementation. The monitoring of outcomes during implementation in Stage Four will allow for adjustments to be made, if required, to realise the benefits of the intervention and mitigate any unforeseen adverse impacts.

6.8.4. The longer-term evaluation provided in Stage Five covers both the process of delivering the scheme and the outcomes achieved. This makes WelTAG a learning process, and future WelTAG appraisals will benefit from the sharing of experience gained elsewhere.

6.8.5. To monitor and evaluate the impact of each option and capture their associated impact, the following monitoring criteria is proposed to be used:

- Accidents;

- Incident Prevention;
- Traffic Flows / Surveys;
- Speed (INRIX);
- Congestion (INRIX);
- Journey Times (INRIX);
- Air Quality (diffusion tubes and sensors);
- Noise monitoring; and
- Ecological surveys.

6.8.6. The following methods of monitoring and evaluation would be undertaken. The monitoring would be the same for every option.

- Through analysis of incident data, it will be possible to determine whether the proposed intervention has been successful in mitigating incidents from occurring and / or the severity of incidents reported.
- Accident data will also be reviewed to test the impact of all options. Through reviewing accident data, it will be possible to determine whether increased overtaking opportunity has had an influence on driver safety, as accidents (as a result of poor overtaking manoeuvres) are anticipated to decrease.
- Journey time data provided by INRIX will also be reviewed, as it is anticipated that along with a decrease in incident occurrence on the network, journey time reliability will increase as a result of increased overtaking opportunity on the network.
- Congestion and speed data provided by INRIX will be analysed in conjunction with traffic survey data (where available) to review the level of congestion on the wider network and within the vicinity of intervention locations. Data provided by INRIX will highlight whether congestion levels have increased / decreased as a result of increased overtaking opportunity on the network.
- To determine the effectiveness of the option, a neutral period (both post and pre-implementation) of the option will be determined.

6.8.7. It is noted that as the proposed interventions only include for short sections of new highway (primarily at new / existing roundabout junctions) to increase overtaking opportunity, it is not envisaged that there will be any major increase in traffic as a result. The proposed schemes are intended to allow existing vehicles which may be stuck behind slow-moving vehicles opportunity to overtake. This increased overtaking opportunity is also not expected to result in increased speeds over the posted speed limit. However, monitoring average speeds and traffic flows may provide an indication of easing congestion on the network as a result of increased overtaking opportunity.

ENVIRONMENTAL MONITORING

6.8.8. Given that one of the study's objectives is to ensure that there are no significant adverse impacts on environmental sensitive receptors during construction and operation, the following environmental monitoring and evaluation criteria will also be used to evaluate the outcomes of proposed interventions. The monitoring would be the same for every option.

- Air Quality – monitoring data (including the use of diffusion tubes and Zephyr air quality sensors) will be used during the construction phases, and once schemes are operational. Air quality monitoring data will also be supplemented by volumetric traffic counts. These monitors will provide high resolution air quality measurements.
- Noise – noise monitoring will be undertaken at the nearest noise sensitive receptors (e.g. residential dwellings etc.) in line with current common practice/guidance. Measurements should be taken in accordance with the Calculation of Road Traffic Noise (CRTN) and BS 7445 before and after completion of the scheme to ensure that there is no increase in noise pollution to meet the objective.
- Ecology – Surveys to be undertaken as part of this WelTAG Stage Three will provide a robust baseline. Repeated surveys will be undertaken to determine whether the scheme has any adverse impacts both during and post construction, if required.

7 SUMMARY AND CONCLUSIONS

7.1 OVERVIEW

7.1.1. This WelTAG Stage Three report has presented the development, appraisal and evaluation of potential schemes along the A470 and A487 so far, which could increase the safety of the trunk road network by providing safe and guaranteed overtaking opportunities or by improving the operational performance of existing junctions. These 'Initial Schemes' are considered to be deliverable in the shorter term while providing benefit to overtaking, journey time or journey time reliability. The appraisal of options as part of this WelTAG Stage Three has been undertaken in accordance with the WG's latest version of WelTAG (December 2017).

7.1.2. A set of objectives were defined for the study based on identified problems and opportunities to:

- Improve safety on the network for all users
- Reduce driver stress / frustration
- Support modal shift to active modes (walking and cycling) for shorter journeys and public or third sector transport for longer journeys
- Improve connectivity between mid-Wales communities
- Protect and enhance biodiversity and ecosystem resilience
- Reduce greenhouse gas emissions through smarter design, construction, operation and maintenance of the road network, including support to Electric Vehicle (EV) charging
- Encourage and support key economic sectors of the Mid Wales economy, such as tourism, by improving links to work, leisure and education
- Create a more resilient strategic road network, including managing the impact of climate change by future proofing infrastructure
- Improve journey time reliability for longer journeys on the strategic road network.

7.1.3. The proposed interventions have also been assessed against their ability to provide future-ready solutions (e.g. design which caters for dryer and / or wetter climates) and contributes towards more renewable and sustainable principles, including accommodating electric vehicles.

7.1.4. All of the above objectives are considered to be in keeping with the WGFA Wellbeing Goals.

7.1.5. Once the appraisal has been completed (to include all environmental aspects etc. when monitoring data is available), an updated evaluation of these schemes will be provided, and recommendations made for WelTAG Stage Four.