

# **M4 Junction 17 Capacity Improvement Scheme**

Full Business Case  
Wiltshire Council

20 April 2017

# Executive summary

## Background

A Local Growth Fund Prioritisation Pro-forma for the M4 Junction 17 was prepared by Wiltshire Council in January 2014. Following approval, the M4 Junction 17 scheme was included in the Swindon and Wiltshire Strategic Economic Plan1 (SWSEP) submitted by the Swindon and Wiltshire Local Enterprise Partnership (SWLEP) in March 2014. An Outline Business Case (OBC) was submitted in October 2017, and was recommended for approval by the SWLEP board in November 2017 upon condition of a Full Business Case (FBC) being submitted.

The scheme addresses traffic problems experienced and observed at the M4 Junction 17 roundabout. This scheme has been considered several times and various options have progressed to modelling over the last two years (2014-2016). These studies looked at three options:

- Full signalisation of the roundabout
- Full signalisation of the roundabout plus widening eastbound off-slip
- Partial signalisation of the roundabout (M4 off-slips only)

The findings of these previous studies concluded that the first two proposals were both more expensive than the partial signalisation, whilst also having less success at addressing traffic problems. The two higher cost options were then discarded. What was previously considered the 'low-cost alternative' of partial signalisation, has been carried forwards as the core scenario within this Business Case.

## Drivers, problems and objectives

Wiltshire Council has key policies for spatial planning and transport that guide decisions on transport infrastructure investment. The relevant policies are the Wiltshire Local Transport Plan 2011-2026 (LTP3) and the adopted Wiltshire Core Strategy which includes the Chippenham Area Strategy and the Chippenham Transport Strategy. Additionally, the M4 being operated and maintained by Highways England, it is important that the proposed scheme matches the goals and objectives of the agency, as outlined by the Highways England 2015-2020 Strategic Business and Delivery Plan.

There are major opportunities to attract new investment around the main junctions of the M4 and in the nearby towns of Swindon, Chippenham, Corsham, Malmesbury and Royal Wootton Bassett. Demand is driven in part by businesses looking to move along the M4 from London searching for more space, relatively lower costs, and the benefits of good strategic transport links.

The scheme objectives (listed below) align closely with the business strategies for the scheme promoters, the Local Economic Partnership and for Central Government – most obviously in terms of the Government's broad goals for transport.

Scheme objective	Desired Outcomes
(1) Reduce instances of queues occurring on the M4 mainline	That queues on the M4 EB and WB off-slips do not exceed the length of that particular off-slip
(2) Minimise delays at the junction, specifically on the M4 off-slip EB in AM peak and M4 off-slip WB in PM peak	Future journey times for users of the M4 off-slips are lower than under the do-minimum scenario
(3) Reduce the total amount of collisions and accidents that occur at the junction.	Future accident rates at the junction are lower than current and past accident rates
(4) Improve the capacity of the junction to deal with congestion impacts of future development	Future capacity at the junction is increased from its current capacity

Observations of the current junction conclude that many of the incoming links are already near or at capacity. With significant growth in the area planned, it is highly likely that traffic on these links will exceed

<sup>1</sup> SWLEP SEP

capacity at Junction 17 within the period covered by the Chippenham Core Strategy (to 2026), thus increasing delays further. Particular problems include:

- Queueing during the AM peak time on the eastbound off-slip - caused by the volume of conflicting traffic on the circulatory part of the junction
- Similarly, a queue of longer length occurs during the PM peak on the westbound off-slip which is also caused by the traffic on the junction's circulatory part

The queues not only result in journey time increases but also, in the case of the PM peak hour, the length of the queue on the westbound off slip affects the level of safety with collisions occurring due to rear shunts or lane changing incidents. The length of the queue can also have serious safety implications on the M4.

Overall, the M4 Junction 17 scheme will aim to make the junction safer and more efficient and to provide smoother traffic flows for motorists entering and exiting the M4. The scheme will also improve overall reliability by helping to reduce collisions and time delays at the junction. This could help alleviate future congestion from proposed developments, and provide confidence in the network for further development in the area given the impact on journey times and reliability.

## Economic case

The potential impacts of the M4 Junction 17 scheme have been assessed in the following ways:

- Using a LinSig highway junction model to determine the impact of the scheme on the highway network
- Desktop studies to perform environmental screening and assessment
- Analysing socio-economic factors and collision statistics to determine the social and distributional impacts

The economic case has been prepared in a manner which is considered to be proportionate to the scheme investment cost of £1.460 million. Monetised benefits have been estimated using a junction model and bespoke spreadsheet modelling, consistent with WebTAG principles.

For each of the seven environmental aspects, an appraisal of the scheme has been undertaken to identify whether significant beneficial or adverse environmental effects are likely to arise. There is one nationally designated site within the footprint of the works area, (Stanton St Quintin Quarry and Motorway Cutting SSSI), crosses both carriageways of the main M4 and extends over the soft estate in the centre of the junction at to the east of the junction. This is a Geological SSSI and therefore liable to damage from any engineering works in the vicinity, including from vibration, drilling, disturbance to soil etc. Discussion has been held with Natural England and an assent for work has been granted.

Within the study period of 2011 to 2015, 47 collisions occurred in or nearby the junction, with significant clustering occurring at both the M4 westbound and eastbound off slips. In providing signals where these two collision clusters occur, it is suggested that some of these accidents will be avoided due to the clear indication to vehicles of when they can expect to be stopping or going. This reduction in the frequency of accidents that occur will have some economic benefit due to the social, damage, legal and administrative costs, and fewer instances of off slip lanes being shutdown to clear or resolve a collision.

## Appraisal scheme costs

A robust approach to the estimation of scheme costs has been developed by the scheme designers and is based on benchmarked construction values from recent schemes. An £0.117 million risk allowance has been added, along with a 3% optimism bias allowance.

The total costs, once converted to 2010 market prices and values using the default rates included in TUBA, and discounted to 2010, produce a PVC of investment of £1.11 million PV.

## Value for Money

The economic benefits of the M4 Junction 17 scheme are shown to far outweigh its costs and any negative impacts. The scheme has an Initial **BCR of 12.50** suggesting a **Very High Value for Money**.

It is clear that using the partial signalisation scheme road users will experience significant benefits compared to the Do Minimum case. Most importantly, journey times will be reduced for users of the M4 eastbound off-slip in the AM peak period (in 2026 the average delay per pcu across the junction will

reduce from 331 seconds to 122 seconds) and the M4 westbound off-slip in the PM peak period (in 2026 the average delay across the junction will reduce from 301 seconds to 37 seconds).

The findings of the qualitative assessments are not considered to be significant enough to warrant any increase or decrease in the Value for Money category of the scheme. The slight adverse environmental impacts that have been identified are for landscape and ecology/biodiversity. They will be mitigated where possible, with the potential to reduce the impacts to neutral. The scheme also offers slight beneficial impacts in relation to local air quality and greenhouse gas emissions and beneficial social impacts regarding accidents.

Assessment Type	Partial signalisation	Detail
Present Value of Benefits (PVB)	£13.87 million PV	2010 prices, discounted to 2010 in line with DfT guidance.
Present Value of Costs (PVC)	£1.11 million PV	2010 prices, discounted to 2010. Includes Optimism Bias at 3%.
Net Present Value (NPV)	£12.76 million PV	The NPV indicates by how much the benefits of a scheme exceed the costs. This NPV is for the 'initial BCR'.
BCR	12.50	Not adjusted for other non-monetised impacts due to proportionate approach adopted for small scale schemes
Qualitative Assessment	Slight Adverse	Most impacts are neutral although there is potential Slight Adverse impact to biodiversity and landscape (which have the potential to be mitigated), and Slight Beneficial impact to Air Quality.
Key Risks, Sensitivities	£0.117 million PV	Key risks identified include cost increase due to necessary design changes during construction. To cater for this and other eventualities, a risk budget has been included in scheme costs. This is equivalent to approximately 13% of construction costs
VfM Category	Very High	Monetised assessments suggest that the VfM category should be Very High for the proposed scheme.

Sensitivity tests undertaken as part of the Economic Case demonstrate that:

- Scheme economic performance is greatly reduced under a scenario in which there are lower levels of background traffic growth compared to the Core Scenario. However, the BCR remains in the High Value for Money category.
- In a High growth scenario, the BCR of the scheme is doubled. However, the level of background growth assumed in that scenario is very high and compromises the operation of the junction, with impacts on the A350 and A249 leading to very high forecast do Minimum levels of delay. It is unlikely that that level of growth and the associated forecast Do Minimum conditions would occur, drivers would instead respond by retiming or rerouting their journey
- The scheme BCR is shown to reduce in scenarios where the predicted level of housing growth within Chippenham is not met, where the estimated benefits are reduced by 33%, or where scheme costs increase by 33%. However, in each case the BCR remains above 8.

## Financial case

The total scheme outturn cost, on which this Business Case for funding is based, is £1.460 million including inflation and risk but excluding optimism bias. This is based on:

- £0.185 million of preparation costs
- £0.236 million for preliminaries (including site setup and traffic management)
- £0.693 for construction
- £0.200 supervision and other works
- £0.117 million for quantified risk budget
- £0.029 million for inflation

The funding package for the scheme is made up of:

- £0.500 million of funding from the Local Growth Fund
- £0.960 million of funding from Local contribution (including sunk costs)

## Commercial case

The lead client on this project is Wiltshire Council. The work to deliver the scheme was offered to participants either individually, or in a package alongside the A350 Section 3 Chippenham Bypass Improvement Scheme. Following tender assessment, the preferred contractor will be appointed to deliver both schemes.

The successful tender the contractor provided a method statement in the eventuality of being awarded the combined contract, highlighting how their structure generating efficiencies and streamlining between contracts:

- Individual delivery teams have been identified
- Experienced resources are available to work within both teams
- The delivery teams will report to the same Core Management Team and Project Board

The total procurement value of the two schemes is £6.665 million, of which £0.958 million (outturn prices for construction and preliminaries elements only) for M4 Junction 17. However, costs which are currently included in the risk budget may be transferred across into the construction costs as the scheme is developed, leading to an increase in the actual value to be procured. The procurement process was run in strict accordance with the legislative framework set out within the Wiltshire Council Corporate Procurement Strategy (2012).

Wiltshire Council has selected the NEC3 Engineering and Construction Contract (ECC), Option B re-measurement priced contract with bill of quantities. Under Option B, Wiltshire Council has provided detailed designs and a bill of quantities, against which tenderers have provided a contract price that is built up using rates.

The main works contract (the M4 Junction 17 scheme element of the contract) is expected to be in place for 5 months (July 2017 to December 2017), with completion confirmed once the roundabout circulatory and adjoining roads are fully opened and when all traffic management (excluding the new signals) has been removed. Snagging will be undertaken by Wiltshire Council throughout construction, to maintain a list of defects and omissions in the works, ensuring that the scheme is completed to a high standard.

Wiltshire Council will meet with the contractor as frequently as is deemed necessary by the Project Manager. The contractor will provide regular progress and financial updates to Wiltshire Council, which will include updates to the project programme.

## Management case

The M4 Junction 17 scheme is being procured in combination with the A350 Chippenham Bypass Improvements (Badger-Brook & Chequers) scheme. The successful contractor has provided a detailed programme of works which plan for how they will manage the construction phases of both schemes. It is expected that the construction of M4 Junction 17 will be complete by 1<sup>st</sup> December 2017. Assurances have been given by the contractor that unforeseen delays on one project will not affect the other, as two separate delivery teams have been identified.

The delivery of the M4 Junction 17 scheme will build upon experience from the local pinch-point scheme, completed by Wiltshire Council in March 2015, and the Bumpers Farm improvements, completed in February 2016. Wiltshire Council will establish a Project Board for delivering the M4 Junction 17 scheme. The Project Board will take overall responsibility for its delivery and will be formed by Council representatives that have a sufficient level of authority to act on behalf of the Council. Meetings of the Project Board would take place at least monthly, but would also be linked to key milestones, where they would consider progress through Highlight and Exception Reports, changes to the risk register, and changes to the Scheme Implementation Programme.

This FBC represents Stage 4 of the SWLEP agreed 'business case development' process. The SWLEP will use the FBC, combined with the tender results, to decide whether the scheme should progress to construction. Following FBC approval, Wiltshire Council will proceed to select a contractor for the commencement of construction.

Public consultation for the scheme is not planned due to the limited scale of the scheme, however the public and stakeholders will be kept abreast of the scheme milestones.

The objectives and success indicators for the M4 Junction 17 scheme are set out in the Strategic Case. Benefits resulting from reduced queue lengths, reduced journey times for M4 off slip users, personal injury accident reductions, and mitigation of future development impacts are emphasised.

Monitoring and evaluation of the scheme's impacts will occur 1 year and 5 years after the scheme is implemented. A budget of £10,000 has been established to fund the monitoring and evaluation of the scheme, specifically monitoring queue lengths and delays experienced at the junction as well as reviewing collision rates.