highways england

M27 Southampton Junctions improvement scheme

Assessment report

2018

M27 Southampton Junctions Scheme Assessment Report

1. Executive Summary

1.1 Introduction

1.1.1 This Project Control Framework (PCF) Stage 2 Scheme Assessment Report (SAR) has been prepared by CH2M on behalf of Highways England to help inform the options selection process in accordance with the Client Scheme Requirements (CSR - included within Appendix A) so that a preferred route for the M27 Southampton Junctions scheme can be announced in early 2018. Subject to Stage Gate Assessment Review (SGAR) Stage 2 approval the scheme would proceed in to PCF stage 3.

1.1.2 The M27 Southampton Junctions scheme is located in South Hampshire, which is the most urbanised and highly populated area in the South East of England (outside London) and is a key gateway to mainland Europe.

1.1.3 The primary aims of the scheme is to reduce congestion and improve safety between M27 Junctions 8 and 5 (westbound) within the confines of protecting and enhancing the environment as a Highways England license requirement. It seeks to do this through removing bottlenecks (including the removal of the pinch point), and increasing capacity on the local network along the A3024 corridor (which connects the M27 Junction 8 to the Southampton City Centre) in order to encourage traffic to use the shorter, sign-posted routes to the city centre via M27 Junction 8/A3024 rather than via M27 Junction 5/A335. This in turn will improve traffic flow and reliability on the M27 between Junction 8 and Junction 5.

1.1.4 The scheme area stretches from Six Dials junction to the west, along the A3024 corridor to Windhover Roundabout and Junction 8 of the M27 to the east, and is shown in the overview map within Appendix B .

1.1.5 It should be noted that this (M27 J8-5) link is wholly within the extents of the Tranche 3 Smart Motorway Programme (SMP) M27 J4 - J11 scheme; which consists of an upgrade to dual four All-Lane Running. The hard shoulder will be retained between junctions 7 and 8, this section is already 4 lanes.

1.1.6 If traffic congestion is not addressed on the M27 between Junctions 8 and 5, as well as in and around M27 Junction 8, then the service provision along the M27 will deteriorate, the potential benefits from the Smart Motorway Programme (SMP) M27 J4 - J11 scheme would not be fully realised and local growth in housing and employment will be stifled.

1.1.7 A number of public consultation events seeking the views and comments from local residents and relevant stakeholders was organised and delivered during September and October 2017.

1.2 Road Investment Strategy

1.2.1 The Solent to Midlands Route Strategy Study (Solent to Midlands Route Strategy 2015)[1], completed during 2014, was a high-level route assessment that identified long-standing congestion hot spots and safety concerns on the Strategic Road Network (SRN). It confirmed the need for improvement options along the local road network in order to reduce traffic demand along the M27 between Junction 8 and Junction 5. Subsequently the M27 Southampton Junctions Scheme was included in the Department for Transport's (DfT) Road Investment Strategy (RIS). The RIS sets out a list of schemes that are to be developed by Highways England over the five-year period. The SRN's ability to support economic growth is a key consideration of the Investment Programme, alongside the need to protect the environment and to work with local partners.

1.2.2 The scheme need was confirmed by the Autumn Statement 2014 and inclusion within the RIS. It forms part of Highways England Delivery Plan 2015-2020. Feasible solutions to schemes named in the RIS have been identified through the route strategies process, published by Highways England in April 2014[2] which collated evidence relating to network performance issues, specifically the Solent to Midlands Route Strategy for the M27 Southampton Junctions scheme. The work-stream also engaged local stakeholders with regards the existing issues and the potential range of options or solutions available.

1.3 Project details

1.3.1 Project title and scheme type:

- The project is titled the '**M27 Southampton Junctions**'.
- The project is predominantly road-based and includes the replacement of one bridge structure.

1.3.2 The ID number for M27 Southampton Junctions is E20.

1.3.3 The PIN for this scheme is 551514.

1.3.4 The MS number is MP-0265.

[1] Solent to Midlands Route Strategy 2015 - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416762/Solent_to_Midlands.pdf

[2] Route Strategies: April 2015-March 2020 - Publications - GOV.UK

1.4 Progress to date

1.4.1 PCF Stage 2 includes a more detailed analysis of the scheme and sub-scheme options that were highlighted to be taken forward during PCF Stage 1 and further identification of a reduced number of overall scheme options to be taken forward to public consultation during PCF Stage 2, after which the 'preferred option' will be selected.

1.4.2 High level progress to date includes the following;

- Development of a preferred option,
- Supply output data from corridor modelling to SYSTRA to input into the Sub Regional Transport Model (SRTM),
- Scenario testing of options to identify journey time improvements using microsimulation traffic modelling,
- Early Contractor Involvement (ECI) collaboration with Balfour Beatty Major Projects (BBMP) for Northam Road Rail Bridge and Bitterne Rail Bridge, including review of buildability,
- Consultation meetings and collaboration with Hampshire Country Council (HCC), Southampton City Council (SCC) and its Highways maintenance contractor Balfour Beatty Living Places (BBLP), and also Network Rail (NR) in relation to the new bridge structure and construction of Northam Road Rail Bridge and Bitterne Rail Bridge,
- Value management workshops with SCC, HCC and BBMP
- Production of land referencing plans and schedules in collaboration with SCC and HCC, Eastleigh Borough Council (ECC),
- Early stakeholder engagement with bus operators using the A3024 corridor,
- Early stakeholder engagement with Southampton Football Club and Hampshire Police in connection with safe access to the stadium from the A3024 and proposed changes to Northam Road Rail Bridge,
- Development of consultation materials for the Public Information Exhibitions (PIE) and the six-week consultation period,
- Development of PCF Stage 2 PCF Products.

1.5 Options Considered – Sub-schemes

1.5.1 Following on from PCF Stage 1 assessments, as detailed within the Technical Appraisal Report (TAR), during PCF Stage 2 for the purpose of assessment and simplicity, the scheme has been sub-divided into five sub-schemes, which were considered in terms of technical feasibility and environmental impact. These are set out in Table 1-1.

1.5.2 The sub-scheme options were designed to an outline level to allow their assessment as part of PCF Stage 1 and to allow a cost estimate to be developed by the Highways England Commercial team. During PCF Stage 2, refinement of the sub-scheme options using a variety of traffic modelling was used to determine the best performing option that could be taken forward for consultation. Further, a refreshed cost estimate was developed by the Highways England Commercial team to inform the financial and economic case for the scheme.

Sub-scheme	Options (PCF Stage 1)	Options (PCF Stage 2)	Options (PRA)
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout Upgrades - *Capacity upgrades to M27 Junction 8 and the Windhover Roundabout (A27/A3024/A3025)*	Option 1: Localised Junction Widening and Signalisation (M27 Junction 8 and Windhover Roundabouts)	Option 1: Localised Junction Widening and Signalisation (M27 Junction 8 and Windhover Roundabouts)	Option 1: Localised Junction Widening and Signalisation (M27 Junction 8 and Windhover Roundabouts)
Sub-scheme 2: A3024 Eastern Access Corridor (west of Windhover Roundabout to east of Six Dials) - *Highway network improvements aimed at enhancing traffic movements and capacity for all travel modes along the A3024 Eastern Access Corridor*	Level 1: Signal Control Improvements		
	Level 2: Junction and Signal Improvements	Level 2: Junction and Signal Improvements	
	Level 3: Carriageway widening, junction and Signal Improvements		
Sub-scheme 3: Northam Road Rail Bridge – *Capacity upgrades to allow minimum two full lanes of traffic in each direction over the Also to include new 5m wide Non-Motorised Users (NMU) bridge to the south side of the proposed bridge*	Option 3A: New Bridge / Demolish and Replace Existing / Close Subway	Option 3A: New Bridge / Demolish and Replace Existing / Close Subway	
Sub-scheme 4: Wide Lane Bridge Widening – *Widening the existing Wide Lane Bridge under the railway line, located to the north of Swaythling Station, and amendments to the Junction of the A27 Wide Lane / A335 Stoneham Way*	*In September 2016 a decision was made by Highways England to remove Sub-scheme 4: Wide Lane Bridge from the scope of the scheme. This decision is currently going through the Highways England Change Control Process.*		
Sub-scheme 5: Bitterne Bridge – *Improve NMU*	Option 1: Tidal Flow Gantry System		

facilities and movements over the bridge.	Option 2: Widening of existing bridge	No alterations to the carriageway width or alignment but includes improvements to the NMU provision adjacent to the carriageway.	
	Option 3: Replacement (Widening of Existing Deck)		

Table 1-1 Sub-Scheme Options from PCF Stage 1

1.5.3 For the combination of options assessed during the PCF Stage 2 appraisal, refer to Section 1.9 and to the Options and Outputs section contained within the CSR in Appendix A which details the two Appraisal Options considered.

1.6 Options rejected prior to Public Consultation

1.6.1 The PCF Stage 2 assessments have resulted in the following options being discarded from further consideration:

- Sub-scheme 1:
  - Option 2: Through-about to A3024 Bursledon – this option provides no clear benefits in terms of journey times or alleviating traffic congestion over Option 1. It would impact on the woodland area within the roundabout and would cost approximately 10% more than Option 1 do deliver.
  - Option 3: Left-turn Slip Lanes at M27 Junction 8 – this option provides no clear additional benefits in terms of journey times or alleviating traffic congestion over Option 1. It poses great deliverability challenges with more work required on the SRN, and would cost approximately 10% more than Option 1 do deliver
- Sub-scheme 2:
  - Level 3: Full dualling of the A3024 – this option provides no extra scheme benefits of alleviating traffic congestion along the A3024. Due to

the estimated construction costs and required land take it is an option that is not to be taken forward.

- Sub-scheme 3:
  - Option 3B: New Bridge / New Bridge and Refurbish Subway (i.e. retain subway on eastern side of bridge) – this was removed from the scheme due to the possibility to reroute NMUs between the railway boundary and the eastern abutment. It was deemed unnecessary to provide an extension to the existing subway which would lead to higher construction costs but also safety issues with a longer subway being proposed.
- Sub-scheme 5:
  - Option 1: Tidal flow gantry system – due to the construction costs and no added benefit to the traffic journey times it was deemed that this option was not suitable.
  - Option 2: Widen the existing bridge to the north - due to the construction costs and no added benefit to the traffic journey times it was deemed that this option was not suitable.

1.7 Option taken forward for Public Consultation

1.7.1 Taking into account the assessments undertaken in PCF Stage 2, the option that was taken to the six week public consultation and PIE was Appraisal Option 1 as shown in Table 1-2 and as detailed within the CSR in Appendix A and section 1.9 of this document. High level plans presented within the Consultation Brochure that were made available to the public is located within Appendix E and shows the locations of junction improvements.

1.7.2 Due to the fact that further assessments were being undertaken at the time of the consultation for Appraisal Option 2, the proposal was to provide the public with information on the full scheme proposals (Appraisal Option 1) as Appraisal Option 2 was a partial scheme of Appraisal Option 1.

1.8 Assessment of Appraisal Options

Scheme Scenario Options

1.8.1 As described in the TAR at PCF Stage 1, for the purpose of economic, operational and environmental assessment, combinations of sub-schemes were assessed as “scheme scenario options”.

1.8.2 As listed in the TAR at PCF Stage 1, the Do-Something 2 scenario option was taken forward to PCF Stage 2 for further refinement as this was the best preforming of them all and consisted of:

- Sub-scheme 1 - Option 1 (localised widening and signalisation at M27 Junction 8 and A27 Windhover Roundabout)
- Sub-scheme 2 - Level 1 (junction traffic signal equipment refresh only along A3024 corridor between Windhover Rbt and Six Dials)
- Sub-scheme 3 - Option 3A (replacement of Northam Rail Bridge)
- Sub-scheme 5 - Option 1 (contra-flow system on Bitterne Bridge)

Appraisal Options

1.8.3 During PCF Stage 2 Highways England requested to assess two options, called Appraisal Options, as detailed in Table 1-2. The development of the appraisal options as per the CSR, from PCF Stage 1 into PCF Stage 2 occurred as follows:

- Following the completion of PCF Stage 1, the **Do Something 2** option was taken forward.
- During PCF Stage 2 the interventions forming part of Sub-scheme 2 were further refined to maximise the journey time improvements along the corridor and included elements of the Level 1 (traffic signal refresh only), Level 2 (Level 1 plus local junction interventions) and Level 3 (Level 2 plus carriageway dualling along the length of the corridor) interventions identified in PCF Stage 1.
- Hence the Appraisal Option 1 in PCF Stage 2 is described as **Do Something 2B** and represents the amended version of Do Something 2 from Stage 1. This option was fully assessed in terms of economics and environmental impacts.
- A second appraisal option, named Appraisal Option 2 was introduced in PCF Stage 2 which represents a partial Appraisal Option 1 scheme including;
    - Sub-scheme 1 and
    - a single junction from Sub-scheme 2.
- This is described as **Do Something 3** and this option was fully assessed in terms of economics and environmental impacts.
- For the purpose of this report the two options described and reviewed in PCF Stage 2 are Appraisal Option 1 as shown on Location Plan in Appendix C and Appraisal Option 2 as shown on Location Plan in Appendix D and as per Table 1-2 below.

1.8.4 For the purposes of appraisal (including costing) the sub-schemes were combined as set out in Table 1-2.

Appraisal Option 1 (Do Something 2B – Whole Scheme)	
Sub-scheme 1 –	Local widening and signalisation of approach arms to M27 J8 and A27 Windhover Roundabout. Includes

Junctions:	NMU improvements.
Sub-scheme 2 – Eastern Access Corridor:	Package of local junction improvements and alterations, including signal upgrades, junction widening and carriageway widening along the A3024 between Windhover roundabout and east of Six Dials junction in Southampton. A combination of Level 1, 2 and 3 options from PCF Stage 1 were selected based on the VISSIM microsimulation assessment of the A3024 corridor's operational performance. Package includes local accessibility and connectivity improvements along the A3024 to support active travel modes and NMUs.
Sub-scheme 3 – Northam Road Rail Bridge Replacement:	Replacement of the A3024 Northam Road Rail Bridge, upgrading the current two-way single lane crossing with two-way dual crossing (amended option 3A from PCF Stage 1)
Sub-scheme 5 – Bitterne Rail Bridge:	No alterations to the carriageway width or alignment, but includes improvements to the NMU provision adjacent to the carriageway.
Appraisal Option 2 (Do Something 3 Preferred Scheme)	
Sub-scheme 1 – Junctions:	Sub-scheme 1 (as in Appraisal Option 1) but including the improvements included under Sub-scheme 2 for the junction of A3024 Bursledon Road and B3033 Botley Road.

Table 1-2 Scheme Appraisal Options

1.8.5 The scheme Options Estimate was developed by the Highways England Commercial team and supplied to CH2M to inform the economic appraisal. An economic assessment was undertaken against the Appraisal Options and was combined with the scheme costs to determine the benefit-cost ratio for the options. The results are set out in Table 1-3.

	Appraisal Option 1 – Do Something 2B	**Appraisal Option 2 – Do Something 3**	**Accidents**
Estimated Accident Savings	9,168	10,721	Based on COBA-LT assessment
Estimated Cost (2016 values)	132,606	19,812	Sum of relevant sub-scheme cost estimates
Present Value of Costs (PVC – 2010	86,784	8,465	Discounted according to WebTAG guidance

values discounted)			
Present Value of Benefits (PVB)	79,149	16,019	Includes accident benefits, greenhouse gas reductions, travel time savings and vehicle operating cost savings
Benefit Cost Ratio (BCR)	0.91	1.89	

Table 1-3 Scheme Options Summary (£000's)

1.8.6 In 2017 Southampton City Council were successful in an National Productivity Investment Fund (NPIF) bid that secured funding for junction improvement works along the A3024 corridor with Botley Road being one those junctions. It is therefore required that Botley Road junction improvements will be taken out of the Highways England proposals due to the fact that Southampton City Council have secured funding in place and will be able to deliver those Botley Road improvements before March 2020 prior to the Highways England M27 Junction 8 Improvement Scheme.

1.8.7 The outcome of the engineering, economic and environmental assessments carried out showed that the full scheme (Appraisal Option 1) was low in value for money and the partial scheme (Appraisal Option 2) was medium value for money. Both options improve safety, reduce congestion at M27 Junction 8 and Windhover Roundabout and provide connectivity for pedestrians and cyclists but with Appraisal Option 2 performing better economically this has therefore been put forward as the preferred route.

1.9 Further Assessment Required in PCF Stage 3

Traffic Modelling

1.9.1 In liaison with the TPG Business Partner a decision needs to be made whether the strategic modelling should switch to the SERTM or to another modelling platform (which could include an improved version of the SRTM). Whilst this would require a significant amount of effort to include detail to a local cordon of the SERTM, with associated data collection and local validation effort required, it would improve the robustness of the assessment. The local model validation could be improved in terms of route choice (reflecting the current patterns whereby traffic is using the route via M27J5 / A335) and the junction and journey time validation between M27J8 and Six Dials along the A3024. This would remove the need to separately model M27 J8, Windhover Roundabout and A3024/Botley Road in an effort to improve the realism of the assessment, which has been required through PCF Stages 1 and 2.

1.9.2 Further data collection to capture the movements between the M27 east of Junction 8 (as well as movements to/from Junctions 7 and 8) and the Southampton City Centre (via all routes, including M27 Junction 5) would ideally be undertaken to underpin the case for the need for the scheme.

Traffic Signals

1.9.3 Review of matrix signs at M27 Junction 8.

1.9.4 Further discussions with the bus operators to establish the long-term strategy.

1.9.5 The assessment of the existing UTC / SCOOT system managed by BBLP to ensure detail design elements linked to communications connections and SCOOT loop locations.

1.9.6 Assessment of BBLP requirements for the use of above ground detection and possible saving in ducting for detector loops at some junctions.

1.9.7 Engagement with HCC and SCC over the traffic signal management strategy across boundaries is needed to ensure systems collaborate.

Environmental

1.9.8 A number of protected species surveys are required to inform the PCF Stage 3 environmental assessment. These surveys include, but may not be limited to: bat roost survey, great crested newt surveys and reptile surveys.

1.9.9 The HRA Screening exercise should be discussed with Natural England and their formal view should be sought on the findings of the PCF Stage 2 work to inform the finalisation of the document at PCF Stage 3.

1.9.10 Further noise and air modelling is required at PCF Stage 3 to further inform the assessment of environmental impacts of the scheme. This modelling work will ideally be supported by further information on Heavy Good Vehicle (HGV) movements along the Scheme route, including information on night time. movements.

1.9.11 Further work to inform the cultural heritage baseline is required to inform the PCF Stage 3 environmental assessment. This work should include, an archaeological desk based assessment; and may require intrusive investigations.

Geotechnical

1.9.12 It is recommended that ground investigation of areas of proposed widened earthworks, proposed new structures, widened carriageways and areas considered to have the potential to cause harm to end users and controlled waters is carried out in PCF Stage 3 by a Specialist Ground Investigation

Contractor. The interpretative elements of a Ground Investigation Report should also be prepared by the PCF Stage 3 design consultant.

Highways

1.9.13 Additional traffic surveys to confirm the amount of traffic currently using the route via M27 Junction 5 and the A335 would support any conclusions drawn from the traffic modelling assessments.

1.9.14 The Preferred Option identified during PCF Stage 2 shall be subjected to further investigations during PCF Stage 3, Roundabout.

Operational Safety

1.9.15 Liaison and coordination will be required with the adjacent Smart Motorway Programme M27 J4-11 in respect of the developing Safety Plans for each and in respect of works at M27 J8.

1.9.16 A corresponding safety plan specifically for the local road network is developed as an interim document and (this is a separate non-PCF product) which will to be further developed liaising with SCC and HCC (presently maintained by Balfour Beatty Living Places & Amey respectively).

Statutory Process

1.9.17 Further design work and assessment would be undertaken on the preferred option at PCF Stage 3 to take into account policy and environmental considerations to ensure a promotable scheme is achievable.

1.10 Time Frames

1.10.1 The anticipated development and delivery of the scheme through all Highways England's PCF process is illustrated based upon a desired Start of Works to meet the RIS commitment of March 2020. However, careful consideration is required as the current assessments detailed in this SAR show that following the Planning Act 2008 statutory process means the RIS commitment is compromised.

PCF Stage	Completion Date
0	October 2015
1	January 2017
2	January 2018
3	May 2019
4	July 2020
5	December 2020
6	March 2023
7	February 2024

Table 1-4 Programme summary

Milestone	Month- Year
SGAR1	December 2016
SGAR2	January 2018
SGAR3	May 2019
SGAR4	July 2020
SGAR5	December 2020
SGAR6	March 2023
SGAR7	February 2024
Start of Works	December 2020
Open to Traffic	March 2023

Table 1-5 Key milestones

1.10.2 .

If you need help accessing this or any other Highways England information, please call **0300 123 5000** and we will help you.

This document is also available on our website at **www.highwaysengland.co.uk**
For an accessible version of this publication please call **0300 123 5000** and we will help you.

If you have any enquiries about this publication email **info@highwaysengland.co.uk** or call **0300 123 5000***.

Highways England creative job number GFD18_0231

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls. These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone. Calls may be recorded or monitored.

Printed on paper from well-managed forests and other controlled sources when issued directly by Highways England.

Registered office Bridge House, 1 Walnut Tree Close, Guildford GU1 4LZ
Highways England Company Limited registered in England and Wales number 09346363