highways england

M27 Southampton Junctions

PCF Stage 1 – Technical Appraisal Report

November 2016

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 EXECUTIVE SUMMARY

INTRODUCTION AND PROBLEM STATEMENT

1.1.1 This Technical Appraisal Report has been prepared by WSP | Parsons Brinckerhoff on behalf of Highways England to help inform the options identification process for the proposed M27 Southampton Junctions scheme.

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 scheme aims to reduce congestion and improve safety between M27 Junctions 8 and 5 (westbound). It seeks to do this through removing bottlenecks 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.

1.1.4 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, and local growth in housing and employment will be stifled.

OPTIONS CONSIDERED – SUB-SCHEMES

1.1.5 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 during PCF[1] Stage 1. These are set out in **Table 1-1**.

1.1.6 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.

OPTIONS CONSIDERED - SCHEME SCENARIO OPTIONS (SUB-SCHEME COMBINATIONS)

1.1.7 In addition, for the purpose of economic, operational and environmental assessment, combinations of sub-schemes were assessed as “scheme scenario options”. These scenario options represent the Do Something options, and have been compared to the Do Minimum. It has been assumed that the Do Minimum forecast growth in the study area, all committed schemes, includes the Smart Motorways Programme between M27 Junction 4 and 11.

[1] PCF - Project Control Framework

Table 1-1 Sub-Scheme Options

SUB-SCHEME	OPTIONS
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
	Option 2 : Through-about to A3024 Bursledon
	Option 3 : Free-flow Left-turn Slip Lanes at M27J8
	Option 4 : Through-about to A3025 Hamble Lane
	Option 5 : Tunnel under Windhover Roundabout
Sub-scheme 2: A3024 Eastern Access Corridor - *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 3: Dualling Full A3024 Corridor
Sub-scheme 3: Northam Rail Bridge Replacement - *Replacement of the existing A3024 Northam Rail Bridge over the railway in order to widen it from 2 to 4 lanes and increase its structural capacity*	Option 1: New bridge / Refurbish Existing
	Option 2: New Bridge / Raise and Refurbish Existing
	Option 3A: New Bridge / Demolish and Replace Existing / Close Subway
	Option 3B: New Bridge / Demolish and Replace Existing / Retain 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*
Sub-scheme 5: Bitterne Bridge Widening - *Capacity upgrades to the existing Bitterne Rail Bridge to allow a minimum of two full lanes of traffic in the peak direction over the bridge*	Option 1: Tidal Flow Gantry System
	Option 2: Widening of Existing Bridge
	Option 3: Replacement (Widening) of Existing Deck

1.1.8 The scheme scenario options assessed are:

- **Do Minimum** (M27 Junctions 4 to 11 Smart Motorway Scheme in place)
- **Do Something 1** (Dualling of A3024 Corridor)
  - Sub-scheme 1 - Option 1
  - Sub-scheme 2 - Level 3
  - Sub-scheme 3 - Option 3A
  - Sub-scheme 5 - Option 1
- **Do Something 2** (Signalised Junction Improvements of A3024 Corridor)
  - Sub-scheme 1 - Option 1
  - Sub-scheme 2 - Level 1
  - Sub-scheme 3 - Option 3A
  - Sub-scheme 5 - Option 1
- **Do Something 3** (Sub-scheme 1 only)

ASSESSMENT OF OPTIONS

1.1.9 Safety, technology and maintenance assessments were undertaken on each of the sub-scheme options. The operational assessment considered the scheme scenario options, as the traffic flows are influenced by the combination of sub-scheme options rather than individual sub-scheme options.

1.1.10 The scheme Options Estimate was developed by the Highways England Commercial team. The cost estimates for the sub-scheme options and scenario options are set out in **Table 1-2.**

1.1.11 An economic assessment was undertaken against the scheme scenario options. This was combined with the scheme costs to determine the benefit-cost ratio for the options, and the results are set out in **Table 1-3**.

Table 1-2 Scheme Cost Estimates

SCHEME ELEMENT	OPTION	MOST LIKELY COSTS IN 2014 PRICES (£000S)
Sub-Scheme 1	Option 1	£13,457
	Option 2	TBC
	Option 3	TBC
	Option 4	NOT COSTED
	Option 5	NOT COSTED
Sub-Scheme 2	Level 1	£9,331
	Level 2	NOT COSTED
	Level 3	£51,367

Sub-Scheme 3	Option 1	£47,310
	Option 2	£55,659
	Option 3A	£52,943
	Option 3B	352,943
Sub-Scheme 5	Option 1	NOT COSTED – INCLUDED UNDER SUB-SCHEME 2
	Option 2	£13,342
	Option 3	£15,151
Scheme Scenario Options*	**Do Something 1**	**£117,767**
	Do Something 2	**£75,731**
	Do Something 3	**£13,457**

** Based upon the sum of the costs for each of the individual sub-schemes that form the Do Something scheme scenario options. This may represent a slight overestimation of the costs as there would likely be efficiency savings if all the sub-schemes are considered together as a combined scheme.*

Table 1-3 Economic Assessment Results

TYPE	DS1[2]	DS2	DS3
Present Value of Costs	84,685	53,631	6,734
Present Value of Benefits	113,415	87,457	58,176
Net Present Value	28,730	33,826	51,442
BCR[3]	**1.34**	**1.63**	**8.64**
Sensitivity Tests – resultant BCRs			
DS1 without Smart Motorways	1.23	N/A	N/A
Northam Bridge Deterioration[4]	1.93	2.56	1.21

1.1.12 A qualitative Environment Assessment was undertaken which will be further updated when more surveys and quantitative data become available in future PCF stages.

1.1.13 This initial environmental assessment indicated that there are a number of key constraints associated with the scheme during construction and operation, with regards to air quality, noise, archaeology and the setting of built heritage that may result in large or major adverse effects. Key constraints and potentially significant

[2] DS – Do Something
[3] BCR – Benefit to Cost Ratio
[4] A simple deterioration model for Northam Rail Bridge was developed to represent the additional costs (due to travel time delays) that may be incurred in the Do Minimum scenario if the bridge is not replaced and further deteriorates, resulting in bus bans, one-way working and eventually full closure.

effects associated with any of the proposed options would require further investigation during future stages, and are shown in **Table 1-4.**

Table 1-4 Environmental Key Constraints

Construction	Operational
→ Sub-scheme 1 ▪ Option 2, 4 and 5 - Archaeology → Sub-scheme 2 ▪ Level 3 – Archaeology, Communities → Sub-scheme 3 ▪ All Options – Archaeology, Noise → Sub-scheme 5 ▪ Options 2 and 3 – Archaeology, Setting of Built Heritage, Materials, Noise	→ Sub-scheme 2 ▪ All Levels – Air Quality ▪ Level 3 - Noise → Sub-scheme 5 ▪ All Options – Air Quality ▪ Options 2 and 3 – Archaeology, Setting of Built Heritage

FURTHER ASSESSMENT REQUIRED IN PCF STAGE 2

1.1.14 During PCF[5] Stage 1 it was not feasible to assess all the potential combinations of sub-scheme options, but the focus was rather to identify and assess a limited number that were considered would provide a representative range of the likely viable, best performing scenario options. The Do Something scenario options identified in Stage 1 need to be reviewed in PCF Stage 2, especially regarding Sub-scheme 2 (as the three levels assessed in Stage 1 were intended to be a mechanism to obtain an indication / range of possible options), and further traffic assessment will be required.

1.1.15 The further assessment should include operational testing using the VISSIM microsimulation of the A3024 Corridor. Tests of the Do Something 1 option may provide a refined indication of the key pinch points and constraints along the corridor, and how these interact to influence the capacity of the corridor. These tests would result in a refinement of the proposed carriageway widening included in the Do Something 1 scenario option, and could inform the reduction or removal of the widening without compromising the forecast capacity of the A3024 corridor.

1.1.16 This could result in a significant reduction in the scheme (and land take) costs. By example, if a simplified estimate is applied that the scheme costs for Sub-scheme 2 (the A3024 Corridor) forming part of the Do Something 1 option could be reduced by £20m, then the BCR would increase from 1.34 to 1.75.

OPTIONS TO BE TAKEN TO PUBLIC CONSULTATION

1.1.17 Taking into account the assessments undertaken in PCF Stage 1 the recommendation is to take the Do Something scenario options and sub-scheme

[5] PCF – Project Control Framework

options given below to public consultation in PCF Stage 2. This will be subject to the outcomes of the proposed further assessments discussed above.

- **Do Something 1** scenario option, comprising:
  - Sub-scheme 1 - Option 1 Localised Junction Widening
  - Sub-scheme 2 - Level 3 Dualling Full A3024 Corridor
  - Sub-scheme 3 - Option 3A New Bridge / New Bridge and Close Subway
  - Sub-scheme 5 - Option 1 Tidal Flow Gantry System
- **Do Something 3** scenario option, comprising:
  - Sub-scheme 1 - Option 1 Localised Junction Widening
- **Additionally, alternative options for the following should be included:**
  - Sub-scheme 1 - Option 2 Through-about to A3024 Bursledon
    - Option 3 Left-turn Slip Lanes at M27 Junction 8
  - Sub-scheme 3 - Option 3B: New Bridge / New Bridge and Refurbish Subway (i.e. retain subway on eastern side of bridge)
  - Sub-scheme 5 - Option 2: Widen the existing bridge to the north.

OPTIONS REJECTED PRIOR TO PUBLIC CONSULTATION

1.1.18 The PCF[6] Stage 1 assessments have resulted in the following option being rejected and not recommended to be taken forward into PCF Stage 2:

- **Sub-scheme 1:**
  - Option 4: Through-about to A3025 Hamble Lane. Rejected on the basis that the option does not comply with the scheme objectives, in particular those relating to increasing highway and sustainable travel capacity along the A3024 eastern access corridor. Furthermore historic assessment of this option raised concerns about the impact of this option on the operation of A3025 Hamble Lane and the access to the Tesco superstore.
  - Option 5: Tunnel under Windhover Roundabout. Rejected on the basis that it was considered it would have a significantly higher cost in comparison with the other sub-scheme options, without providing proportionately higher benefits.

- **Sub-scheme 2:**
  - No options rejected at this stage, subject to further review of operational traffic assessment to refine the proposed options.

[6] PCF – Project Control Framework

- **Sub-scheme 3:**
  - Option 1: New Bridge / Refurbish Existing Bridge. Rejected on the basis that there would be a significant risk that Network Rail would not consent to the proposed design as it would not comply with their current requirements regarding headroom clearance.
  - Option 2: New Bridge / Refurbish and Raise Existing Bridge. Rejected on the basis that this option has a higher cost than replacing the existing bridge with a new bridge, and as such represents an avoidable future maintenance burden.
- **Sub-scheme 5:**
  - Option 3: Replacement (Widening) of Existing Deck. Rejected on the basis that it has a higher cost than Option 2 and would require full closure of the A3024 Bitterne Road West for discrete period(s) of time during construction, thereby resulting in significant travel time delays along the A3024.

2 INTRODUCTION

2.1 SCHEME BACKGROUND

2.1.1 The M27 Southampton Junction Scheme was announced as part of the RIS[7], now the RIP[8], for 2015-2020 by the DfT[9]. The RIP sets out a list of schemes that are to be developed by Highways England over the five-year period. Feasible solutions to schemes named in the RIP have been identified through the route strategies process, published by Highways England in April 2014[10].

2.1.2 WSP | Parsons Brinckerhoff has been commissioned by Highways England to provide design and engineering services for PCF[11] Stage 1: Option Identification in accordance with the Client Scheme Requirements (included in **Appendix A**).

2.1.1 The M27 Southampton Junctions Scheme aims to reduce congestion and improve safety between M27 Junctions 8 and 5 (westbound). It seeks to do this through removing bottlenecks 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 Junction 8/A3024 rather than via Junction 5/A335.

2.1.2 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, and local growth in housing and employment will be stifled.

2.2 PURPOSE OF THE REPORT

2.2.1 This TAR[12] brings together the traffic, economic, safety, operational, technical, maintenance and environmental assessments. In many cases, outcomes are based on other PCF Stage 1 products containing more detailed findings, as supporting evidence to this TAR. Consequently, this report is both linked to and informed by the following deliverables:

- Local Model Validation (Document Number: HE551514-WSP-GEN-PCF1-RP-T-00001_LMVR) and Traffic Data Collection Report (Document number: HE551514-WSP-VTR-PCF1-RP-D-00001-M27SJ_TDCR);
- Traffic Forecasting (Document number: HE551514-WSP-GEN-PCF1-RP-T-00002_TFR) and Economics Assessment Report (Document Number: HE551514-WSP-GEN-PCF1-RP-T-00003);

---

[7] Road Investment Strategy: for the 2015/16 -2019/20 Road Period
[8] RIP – Regional Investment Programme
[9] DfT – Department for Transport
[10] Route Strategies: April 2015-March 2020 - Publications - GOV.UK
[11] PCF – Project Control Framework
[12] TAR- Technical Appraisal Report

- Appraisal Summary Table (Document number: HE551514-WSP-GEN-PCF1-RP-PM-00015);
- Assessment of Implications on European Sites (Document number: HE551514-WSP-GEN-PCF1-RP-PM-00009);
- Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002); and
- Non-Motorised Users Context Reports (Document numbers: HE551524-WSP-ENM-PCF1-RE-PM-NMUCR01 and NMUCR02).

2.2.2 Both this TAR[13] and these assessments form the basis for deciding which scheme option(s) should be taken forward for further consideration in PCF Stage 2: Option Selection. This product is also a key input into the Scheme Assessment Report, to be produced at the next PCF Stage.

2.3 USE OF ACRONYMS AND FOOTNOTE

2.3.1 This report is contains 230 pages with many technical terms, to improve the readability of this report all abbreviations are expanded upon at the footnote on the same where they appear.

[13] TAR - Technical Appraisal Report

3 PLANNING BRIEF

3.1 SCHEME CONTEXT

ROAD INVESTMENT STRATEGY

3.1.1 In December 2014 the DfT[14] published the RIS[15], now the RIP[16], for 2015-2020. The RIP sets out a list of schemes that are to be developed by Highways England over the five-year period. The SRN's[17] 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.

3.1.2 Feasible solutions to schemes named in the RIS have been identified through the route strategies process, published by Highways England in April 2014[18] which collated evidence relating to network performance issues, specifically the Solent to Midlands Route Strategy[19] 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.

3.2 EXISTING PROBLEMS AND PLANNING CONTEXT

PROBLEM STATEMENT

3.2.1 The M27 Junction 8 and A3024 Bursledon Road should serve as one of the main corridors into the City of Southampton. However, due to congestion mainly caused by delays at key junctions and restricted road bridges, a large proportion of city centre-bound traffic uses the M27 Sections between Junction 8 and Junction 5 as an alternative route into the city centre. If traffic congestion is not addressed on this Section of the M27, as well as in and around M27 Junction 8, then the service provision along the M27 will deteriorate, and local growth in housing and employment will be stifled.

3.2.2 The M27 Southampton Junctions scheme aims, by improving M27 Junction 8 and the A3024 corridor (including the removal of the pinch point over Northam Rail Bridge), to encourage city-centre bound traffic to use the shorter sign-posted routes via M27 Junction 8 /A3024. This in turn will improve traffic flow and reliability on the M27 between Junctions 8 and 5.

3.2.3 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, and local growth in housing and employment will be stifled. Highways

---

[14] DfT – Department for Transport
[15] Road Investment Strategy: for the 2015/16 -2019/20 Road Period
[16] RIP – Regional Investment Programme
[17] SRN – Strategic Road Network
[18] Route Strategies: April 2015-March 2020 - Publications - GOV.UK
[19] Solent to Midlands Route Strategy 2015

England, Southampton City Council, Hampshire County Council and Eastleigh Borough Council have identified that improvements are necessary to reduce congestion at this vital arterial connection and to ensure that delays do not compromise potential future economic growth in the sub-region.

PLANNED LOCAL AND REGIONAL GROWTH

3.2.4 Planning for long term growth, PUSH (Partnership for South Hampshire) has identified through the Spatial Position Statement to 2034[20] (2016) that South Hampshire and Isle of Wight will require 104,350 net new homes. Southampton will require 19,450 new homes and Eastleigh Borough 14,950 (of which part will be in Hedge End, Botley and Hamble). Around 50% of this figure will be met by homes completed since 2011 and those with planning permissions or identified in Local Plans. Over the same period 97,700 jobs will be generated requiring 1 million m² of B-class employment, again focused on the cities where 40% of the current jobs are. Southampton expected to require 184,000m² primarily focused in the city centre and Itchen Riverside, former Ford site and in Eastleigh 114,000m². Southampton will remain as a Regional City Centre for retail and leisure. These development aspirations will require an integrated approach to delivery with transport infrastructure to support some of the growth. The Position Statement identifies Highways England's investment in M27 Southampton Junctions as one of the supporting mechanism to delivery.

3.2.5 Up to 2026, some of the new housing developments required to meet the growth have been identified north of the M27 between Portsmouth and Southampton. In particular North/East of Hedge End (6,000 dwellings), Welborne (6,500) and North Whiteley (3,500) – providing 55,600 additional dwellings for the South Hampshire region overall. In Southampton 5,450 homes ad planned and being delivered to 2026 in the city centre with Royal Pier Waterfront, Watermark West Quay, Station Quarter, and Chapel Riverside. The growth in Hedge End is likely to increase demand for trips into Southampton city centre, whether for employment, retail or leisure, using the existing crossing points of the M27. Local road infrastructure is planned to the south and east of Hedge End that will increase demand through Junction 8 and in turn onto A3024 via Windhover.

3.2.6 Further, the Port of Southampton is planning for substantial development in container traffic, up from 1.9m TEUs (twenty equivalent units) carrying 39m tonnes of cargo in 2015 to over 3m TEUs in 2035. Cruise passenger levels are also expected to increase from 1.7m visitors in 2015 to 3.46m in 2035. The growth in cargo can be expected to increase Heavy Goods Vehicle (HGV) traffic movements between the M27 and the Port. To maintain the attractiveness and competitiveness of the Port infrastructure is required to minimise impacts of congestion on Port operations and to ensure that it remains a leading destination.

[20] http://www.push.gov.uk/work/planning-and-infrastructure/push_spatial_position_statement_to_2034-2.htm

IDENTIFIED ISSUES

3.2.7 A number of existing issues have been identified:

- Limited capacity at M27 Junction 8 and the adjacent A27 Windhover Roundabout.
  - M27 Junction 8 is linked to the Windhover Roundabout by the A3024 (Bert Betts Way). The A3024 (Bert Betts Way) frequently queues back from the Windhover Roundabout to the M27 Junction 8 roundabout in the PM peak hour.
  - M27 Junction 8 is a key interchange connecting eastern Southampton, Hedge End, Botley and the Hamble peninsula with the wider highway network.
  - Current levels of demand at the M27 junction 8 are compounded by a number of unique locational factors. South Hampshire is the most urbanised and highly populated area in the South East of England (outside London) and is a key gateway to mainland Europe. There are three international transport hubs; namely the Port of Southampton, the Port of Portsmouth and Southampton International Airport. These represent key assets to the local economy, which act as significant traffic generators on the local network.
- Hedge End, Botley and Hamble are all identified by Eastleigh Borough Council as key development areas for housing growth with approximately 3,000 houses planned in the area over the next 20 years.
- There are in excess of 20 signal-controlled junctions along the length of the A3024 from the Southampton city boundary to the Inner Ring Road at the Six Dials jucntion. In 1973 a traffic gating scheme was implemented along this corridor, designed to manage traffic congestion, provide buses with priority and improve conditions for all traffic entering the city from the east. This was implemented before the M27 was constructed. The project involved the installation of linked traffic signals along the corridor designed to limit access from side roads onto the corridor at peak times to create more free-flow conditions on the main corridor. Several junctions were signalised along with banned, restricted or prevented turns.
- The Northam Rail Bridge is an ageing single lane, single carriageway bridge with low structural integrity and an existing weight restriction of 7.5 tons. In between two sections of dual carriageway, it acts as a congestion bottleneck and minimises the ability to provide bus priority, a route for pedestrians and cyclists and is a maintenance issue for SCC and Network Rail.
- Bitterne Rail Bridge is a wide single lane, single carriageway bridge on the A3024 at Bitterne rail station. It has sections of low structural integrity and also acts as a throttle for congestion in between two sections of dual carriageway, has poor provision for pedestrians and cyclists, limited ability to provide effective bus priority. The road is single carriageway but the lanes are ‘wide’ and operate as an informal dual carriageway but there are constraints when larger vehicles – such as buses or HGVs pass over it.
- Part of the A3024 from Northam River Bridge to Bitterne Road West (Lance’s Hill) has been declared as an Air Quality Management Area, where concentrations of NOx/NO^2 exceed international thresholds of 40µg/m^3. This accounts for approximately 100 deaths in Southampton each year. Source apportionment for the Southampton Air Quality Action Plan (2009) identifies that transport accounts for over half of the local NOx concentrations comes from traffic. On average just

under of quarter of the concentrations on Bitterne Road West comes from heavy goods vehicles.

- The A3024 is a high frequency bus corridor with a peak of over 25 buses per hour using the section west from Bitterne village to the city centre. These services are a combination of local, cross city and inter urban. The bus services benefit from the Bitterne bus priority gating scheme along Bursledon Road and Bitterne Road West, and the physical bus lanes on Northam Road. However, the physical constraints of the Northam and Bitterne Rail Bridges limit the impact of the bus priority measures along the corridor.
- Provision for cyclists along the corridor is disjointed with the dual carriageway section of Bitterne Road West having none. Levels of cycling on the eastern side of Southampton are lower than the west, and this has implications on health of residents. Southampton has lower than average levels of physical activity (24% achieving recommended minimum of 30 minutes per day) and conversely higher levels of people obese and overweight (63.5%). The corridor has been identified in the emerging Cycle Southampton strategy as one of the core corridors Southampton Cycle Network, and as such would expect to have a high degree of segregated provision. Current provision of facilities for cyclists does not achieve this and doesn't produce an environment that this conducive to cycling. Trips are either along the corridor or use part of it for cross city trips, for example daily two-way cycle flows on Bursledon Road are 85 and at Northam River Bridge 225.
- Pedestrians are severed by the corridor in parts with crossings points concentrated at junctions. The Buller Road junction close to Bitterne Rail station has limited pedestrian facilities on some arms forcing pedestrians to cross around three arms of the junction to reach a bus stop. Within 500m of the corridor are 13 schools (include Itchen College) where trips to school require crossing the road. Around Bitterne village there are subways that connect community facilities (library and leisure centre) with the local retail centre.

3.3 SCHEME BACKGROUND

3.3.1 A number of studies by Highways England and the local authorities have considered potential improvement for M27 Junction 8 and the local road network. These are described in brief in **Table 3-1**.

Table 3-1 Summary of Previous Studies

DOCUMENT REVIEWED	KEY FINDINGS
M25 to Solent and Solent to Midlands Route Strategy Evidence Report'- Highways England (2014).[21]	This strategy mainly focused on the route as a whole. The M27 between Junction 8 and 7 Westbound is listed as Number 8 in the ten busiest Sections on the route. In addition that link was listed in the ten least reliable journey time locations (65.5%) with a national rank as 288. Issues related to the environment, economic development and air quality were raised by the report.
M27 Junction 5-8 Route Strategy - Options Assessment Report - Parsons Brinckerhoff (2014) HA[22] Reference 105	This OAR[23] identified a number of potential options with the aim to provide a solution to improve traffic throughput at M27 Junction 8 and reduce congestion on the mainline without adversely affecting the other arms at the interchange and Windhover Roundabout. The report was published in March 2012 in which three options (1a, 1b and 1c) were tested in detail and a preferred option was identified (Option 1b). The off network options (2a, 2b and 2c) were generated through stakeholder consultation. No formal study has been completed. No options were developed for the replacement of Northam Rail Bridge and improvements along the A3024 Bursledon Road.
M27 Junction 5-8 Strategic Outline Business Case - Parsons Brinckerhoff (2014). HA[24] Reference 105	The business case focused on the preferred option 2c for M27 Junction 8 and Windhover Roundabout, alongside improvements to the A3024 Bursledon Road, the replacement of Northam Rail Bridge and changes at the Wide Lane bridge. The total cost of the scheme was estimated at £129.6 million. The expected value for money was high.
Transport for South Hampshire – Transport Delivery Plan (2012-2026).[25]	By supporting transport development, economic growth and further employment and job opportunities can be secured. TfSH[26] is a partnership between Hampshire, Portsmouth, Southampton and Isle of Wight councils. By working together, the body has more power and authority for transport decisions in the area. The partnership works a lot with other organisations, such as the Department for Transport and Network Rail. The plan identifies M27 Junction 8 and Windhover Roundabout as a Highways Scheme targeted for investment. This Roundabout is an existing congestion hotspot and delays are forecast to worsen in the future. Junction 8 of the M27 is linked to the Windhover Roundabout by the A3024 (Bert Betts Way). The A3024 (Bert Betts Way) frequently queues back from the Windhover Roundabout to the M27 Junction 8 Roundabout in the PM peak hour due, in the main, to vehicles having difficulty entering the Windhover Roundabout. This can also result in the queue backing up along Dodwell Lane. This is understood to block

[21] Solent to Midlands Route Strategy 2015
[22] HA – Highways Agency
[23] OAR – Options Assessment Report
[24] HA – Highways Agency
[25] Transport for South Hampshire – Transport Delivery Plan (2012-2026).
[26] TfSH – Transport for South Hampshire

DOCUMENT REVIEWED	KEY FINDINGS
	the M27 westbound off slip entry onto the M27 Junction 8 Roundabout resulting in a queue on the M27. Due to the queue at Windhover Roundabout from traffic heading south along Bert Betts Way as far back as Dodwell Lane through M27 Junction 8, it has been known to block the right turn into Dodwell Lane and therefore can result in a queue back towards M27 Junction 8 and in severe cases block the M27 eastbound off slip entry onto the M27 Junction 8 Roundabout.
Hampshire Local Transport Plan (2011-2031).[27]	The plan is similar to the Transport Delivery Plan for the wider area of South Hampshire in the Transport Delivery Plan, but focuses on transport improvements with the county boundary of Hampshire. One of the duties the Council has is to collect and monitor data on the level of traffic within Hampshire "to help better understand pressures on the network". This helps to advise the government in advising on future plans and policies.
Strategic Economic Plan (SEP) -Enterprise M3 Local Enterprise Partnership (2014).[28]	This plan supports measures to be delivered in partnership with the Highways Agency to complement the development of the Solent to M25[29] (including the M3/A3 corridors) and Solent to Midlands[30] (A34/M3/M27/A31 and A43 corridors) Route Strategies.
Roads Investment Strategy -Department for Transport (2015).[31]	The Road Investment Strategy stated the requirement for the M27 Southampton Junctions Scheme to provide additional capacity at M27 Junction 8 through improvements to the Windhover Roundabout. In addition, parallel improvements to the local road network funded through their investment plan will improve two railway bridges, near Junction 5 and in central Southampton, to allow traffic to avoid unnecessary travel on the motorway.

3.4 SCHEME OBJECTIVES

3.4.1 The aim of the scheme is to identify changes at M27 Junction 8, Windhover Roundabout and along the A3024 eastern access corridor, between Windhover Roundabout and the Six Dials junction, in order to encourage Southampton city-centre bound traffic to use the shorter sign-posted routes via M27 Junction 8 / A3024 corridor, thereby reducing demand along the M27 between Junction 8 and Junction 5.

3.4.2 Following PCF[32] Stage 1 Value Management Workshops, a set of enhanced strategic objectives were established and are set out below in **Table 3-2** and **Table 3-3**.

[27] Hampshire Local Transport Plan (2011-2031).
[28] Enterprise M3 Strategic Economic Plan - March 2014 | Enterprise M3
[29] M25 to Solent Route Strategy 2015
[30] Solent to Midlands Route Strategy 2015
[31] Road Investment Strategy Statement
[32] PCF - Project Control Framework

3.4.3 The primary objectives, aligned with the key Highways England outcome, are set out in Table 3-2. Secondary objectives, linked to the strategic objectives of SCC[33], are set out in **Table 3-3**. The additional secondary objectives are included due to the scheme falling predominantly on the SCC road network, and SCC's participation in the development of the scheme.

3.4.4 The tables describe how implementing the M27 Southampton Junctions scheme will help to achieve the outcomes, and how each objective's success could be measured. These objectives will continue to be developed and refined as the design evolves, during the course of PCF Stage 2, when more stakeholder requirements are taken into account, once the preferred option is selected and in subsequent PCF Stages so that measures for achieving objectives are aligned with the POPE[34] 1-year and 5-year assessments.

[33] SCC – Southampton City Council
[34] POPE – Post Opening Project Evaluation

Table 3-2 Primary Transport Objectives and Expected Outcomes

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 1: Supporting economic growth.	→ Increase traffic capacity across M27 Junction 8 and Windhover Roundabout to facilitate the anticipated consented development growth in Eastleigh. → Release highway capacity along the M27 between Junction 8 and Junction 5, facilitating consented development growth in the region and key movements between the region and the Southampton docks. → Increase highway and sustainable travel capacity along the A3024 corridor and across Northam and Bitterne Rail Bridges, unlocking development capacity for the creation of jobs, businesses and housing. → Improve resilience to accommodate capacity demands from committed future developments and to ensure access to South Hampshire's international gateways.	In the 12 months from scheme opening measure for, and compare with compatible data for existing conditions : → Traffic flows and bus passenger movements across M27 Junction 8 and Windhover Roundabout. → The amount of traffic destined for Southampton city centre originating from east of M27 Junction 8 using Junction 5 and the A335 as route, in comparison to the amount of traffic using the A3024. → Traffic flows and bus passenger movements along the A3024 between the M27 and Six Dials Junction. → Levels of local employment that could be attributed to the scheme (based upon interviews with the Solent LEP[35]). → Approved local development (linked to available network capacity - based upon interviews with Eastleigh Borough Council and Highways England Operations).

[35] Solent Local Enterprise Partnership

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 2: A safe and serviceable network	→ Improve safety through reduced conflict between NMU[36]'s and vehicular traffic. → Reduce accident frequency through reduced delays, queuing and driver frustration. → Improve the "whole life" safety record at M27 Junction 8 and along the M27 between Junction 8 and Junction 5 due to reduced delays and congestion. → Reduce the requirement for maintenance on Northam Rail Bridge (by designing for maintenance), reducing the exposure of maintenance staff to health and safety risks.	Comparing the five-year period from scheme opening year, with the five years to December 2016, measure: → the total number of accidents, and → the number of accidents involving NMUs Both the above to be measured in accident rate per journey kilometre travelled, and will be measured on the M27 between Junction 8 and Junction 5, as well as along the A3024 corridor, including M27 Junction 8 and Windhover Roundabout. Comparing the five-year period from scheme opening year, with the five years to December 2016, measure maintenance works costs for Northam Rail Bridge.

[36] Non-Motorised Users

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 3: A more free flowing network	→ Reduce congestion and delays along the M27 between Junction 8 and Junction 5, improving journey times for all traffic along the M27. → Reduce congestion and delays on the approaches to M27 Junction 8 and A27 Windhover Roundabout, improving journey times for all traffic routes through the junctions. → Improve capacity resulting in reduced congestion and delays along the A3024 corridor, which will result in a retention of local traffic within the local road network. → Improve capacity at Northam Rail Bridge and Bitterne Rail Bridge, resulting in reduced congestion and delays, reducing the journey times across the bridge Sections.	In addition to those set out in ***Objective 1***, in the 12 months from scheme opening measure for, and compare with compatible data for existing conditions: → Average journey times across M27 Junction 8 and Windhover Roundabout for both buses and general traffic. → Average peak hour queue lengths on all approaches to M27 Junction 8 and Windhover Roundabout. → Average journey times along the A3024 corridor between the M27 and Six Dials Junction for buses and general traffic. → Average journey times along the M27 between Junction 8 and Junction 5 for general traffic. → Traffic incidents reported to SCC[37] traffic management along the A3024 corridor between the M27 and Six Dials Junction.

[37] SCC – Southampton City Council

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 4: An improved environment	→ Where practicable maintain or reduce vehicle emission levels within AQMA[38] No.2 (Bitterne Road West) and the future Southampton Clean Air Zone. → Where practicable maintain or reduce road traffic noise levels within the designated Noise Important Areas along the A3024 corridor. → Where practicable maintain or reduce road traffic noise levels within the designated Noise Important Areas at M27 Junction 8. → Where practicable improve the setting of nearby scheduled monuments along the A3024 corridor. → Improve NMU[39] facilities and the amenity for users (including footpath and cycleways) at M27 Junction 8 and A27 Windhover Roundabout and at the junctions along the A3024 corridor. → Where practicable ensure no net loss of biodiversity.	In the 12 months from scheme opening measure for, and compare with compatible data for existing conditions: → Nitrogen dioxide levels at receptor locations → Noise exposure of the population within the noise important areas → NMU movements at M27 Junction 8, Windhover Roundabout and along and across the A3024 corridor between the M27 and Six Dials Junction. Undertake post-project monitoring of habitat improvements at 1 year and 5 years after opening.

[38] AQMA – Air Quality Management Area
[39] NMU – Non-Motorised User

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 5: A more accessible and integrated network	→ Deliver capacity enhancements to the A3024 eastern access corridor, supporting the use of sustainable modes, including buses. → Improve pedestrian and cycle facilities at M27 Junction 8. → Improve pedestrian and cycle facilities at A27 Windhover Roundabout. → Improve safety and NMU[40] facilities at junctions along the A3024 corridor, minimising potential points of conflict between NMUs and vehicular traffic. → Improve NMU facilities at Northam Rail Bridge.	In the 12 months from scheme opening measure for, and compare with compatible data for existing conditions: → Traffic flows along the A3024 corridor between the M27 and Six Dials Junction. → Average peak hour queue lengths and delays on all approaches to junctions along the A3024 corridor between the M27 and Six Dials Junction. → The number of pedestrians and cyclists using the NMU facilities. → NMU movements at M27 Junction 8, Windhover Roundabout and along and across the A3024 corridor between the M27 and Six Dials Junction. → Bus passenger movements across M27 Junction 8, across Windhover Roundabout and along the A3024 between the M27 and Six Dials Junction.

[40] NMU – Non-Motorised User

Table 3-3 Secondary Transport Objectives

OBJECTIVE	HOW THE SCHEME WILL HELP TO ACHIEVE THE OBJECTIVE	HOW EACH OBJECTIVE COULD BE MEASURED
Objective 6: Support Southampton City Council in moving forward a wider transport strategy to improve access to and connectivity for all modes with the city centre and along the A3024 corridor	→ Improve capacity resulting in reduced congestion and delays along the A3024 corridor, which will result in a retention of local traffic within the local road network (Refer to Primary Objective 3). → Improve capacity and optimise signal settings along the A3024, thereby maximising opportunities for local journeys to use sustainable modes (Refer to Primary Objective 5). → Improve safety and NMU[41] facilities at junctions along the A3024 corridor (Refer to Primary Objective 5).	Refer to **Table** 3-2
Objective 7: Support local strategic aims (as set out in the South Hampshire Joint Strategy and Southampton City Council LTP3[42])	→ Developing transport improvements that support sustainable economic growth (Refer to Primary Objective 1). → Ensuring reliable access to and from South Hampshire's international gateways for people and freight (Refer to Primary Objective 3), → Optimising the capacity of the highway network and improving journey time reliability for all modes (Refer to Primary Objective 3). → Maintaining or delivering air quality improvements (Refer to Primary Objective 4). → Improving road safety. (Refer to Primary Objective 2).	Refer to **Table** 3-2

[41] NMU – Non-Motorised User
[42] Local Transport Plan 3

3.5 SUMMARY OF CONSULTATION WITH PUBLIC BODIES

3.5.1 During PCF[43] Stage 1 the project team liaised closely with SCC[44] and HCC[45] through a series of meetings, including workshops and Steering Group meetings. SCC and HCC were represented on the scheme Project Board.

3.5.2 A meeting was held with Network Rail on 08 November 2016 to discuss Northam and Bitterne Rail Bridges.

3.5.3 No further consultation with public bodies was undertaken during PCF Stage 1.

[43] PCF – Project Control Framework
[44] SCC – Southampton City Council
[45] HCC – Hampshire County Council

4 EXISTING CONDITIONS

4.1 DESCRIPTION OF LOCALITY

4.1.1 This section describes the scheme's location in relation to the Strategic Road Network and the local road network.

4.1.2 Southampton is one of Britain's major port cities located in the South East England Government Office region. Situated on the south coast of England, Southampton is approximately 75 miles (121 km) south-west of London and 19 miles (31 km) north-west of Portsmouth. The city is one of the major economic hubs in the region and home to a regional international airport, two universities and two international ports.

4.1.3 The city is orbited by the M27 and M271 motorways, with the former acting as the main access route to the city from areas further east (such as Fareham, Portsmouth and Waterlooville) whilst also joining with the M3 to north of Southampton, providing the main access route for vehicles travelling to the city and wider area from further north. Access to the city centre from the north is primarily facilitated by the A33 and the A335 roads which connect up to the M27 Junction 5 and M3 Junction 14 respectively whilst access to the city centre from the east is mainly provided by the A334 and A3024 roads which connect up to the M27 via Junction 7 and 8 respectively. Access from the west if via the M271 (from M27 Junction 3) and the M271 / A35 Redbridge Roundabout.

4.1.4 The scheme location relative to the Strategic Road Network is illustrated in **Figure 4-1**.

4.1.5 **Figure 4-2** shows that the M27 Southampton Junctions Scheme extent stretches from the M27 Junction 8 Roundabout in the east, located outside of the city boundary, to the Six Dials Junction, located towards the city centre.

4.1.6 Windhover and M27 Junction 8 Roundabouts are located approximately 5.5km to the east of Southampton City Centre; just to the north of Bursledon and are surrounded by green undeveloped fields which are currently used for a variety of purposes from farming to open market trading. The Tesco Extra Southampton Bursledon Towers supermarket store is located directly to the south of Windhover Roundabout with its access located off Hamble Lane. The location of Windhover and M27 Junction 8 Roundabouts are shown in more detail in **Figure 4-3**.

4.1.7 The A3024 primarily routes through the residential and commercial urban areas of eastern Southampton with the Windhover and M27 Junction 8 Roundabouts connecting the corridor to the M27. The Northam Rail Bridge is located on the A3024, to the west of the River Itchen, and currently acts a key constraint on the A3024 Eastern Access Corridor.

Figure 4-1: Wider Strategic Road Network

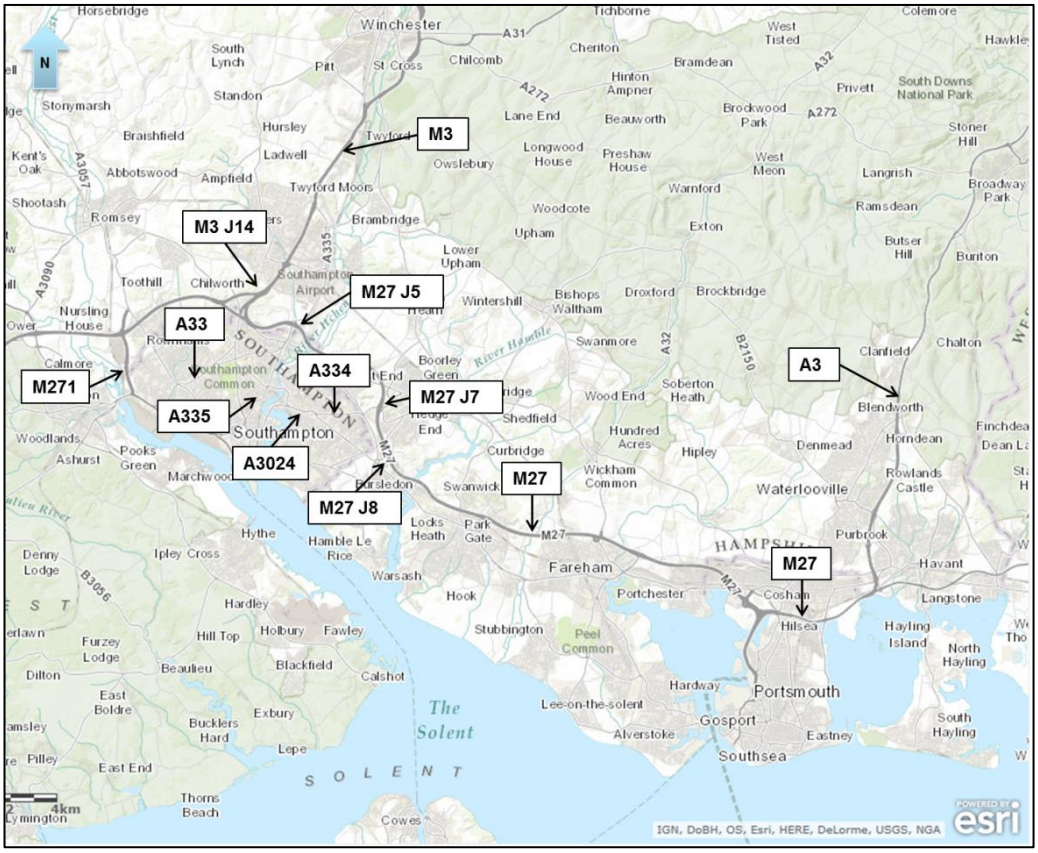


Figure 4-2 M27 Southampton Junctions Scheme Location

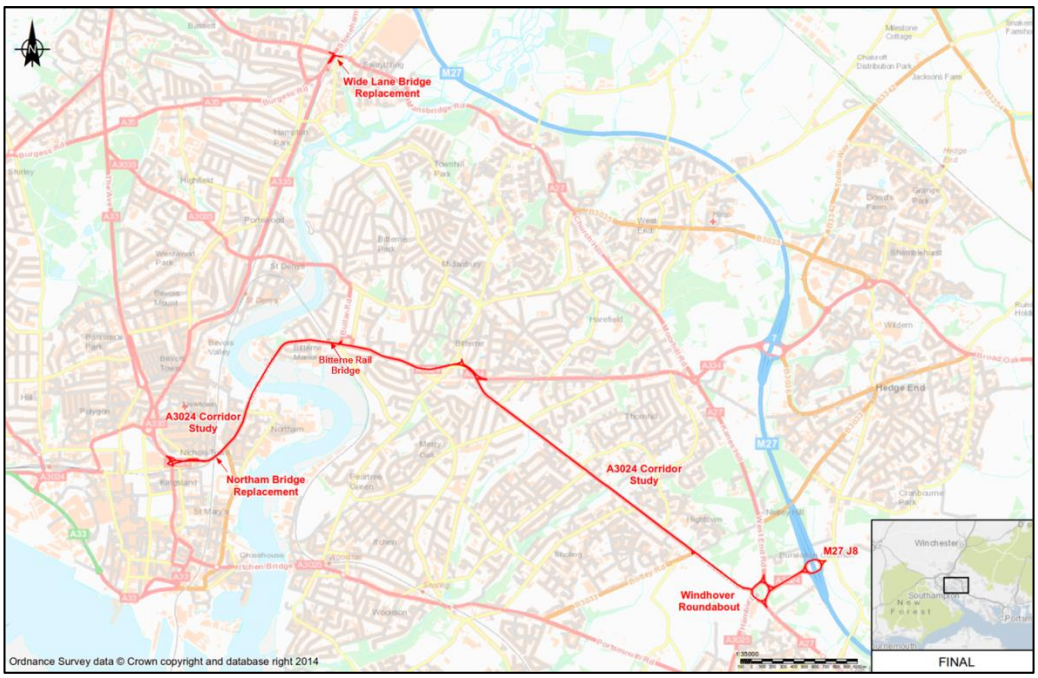
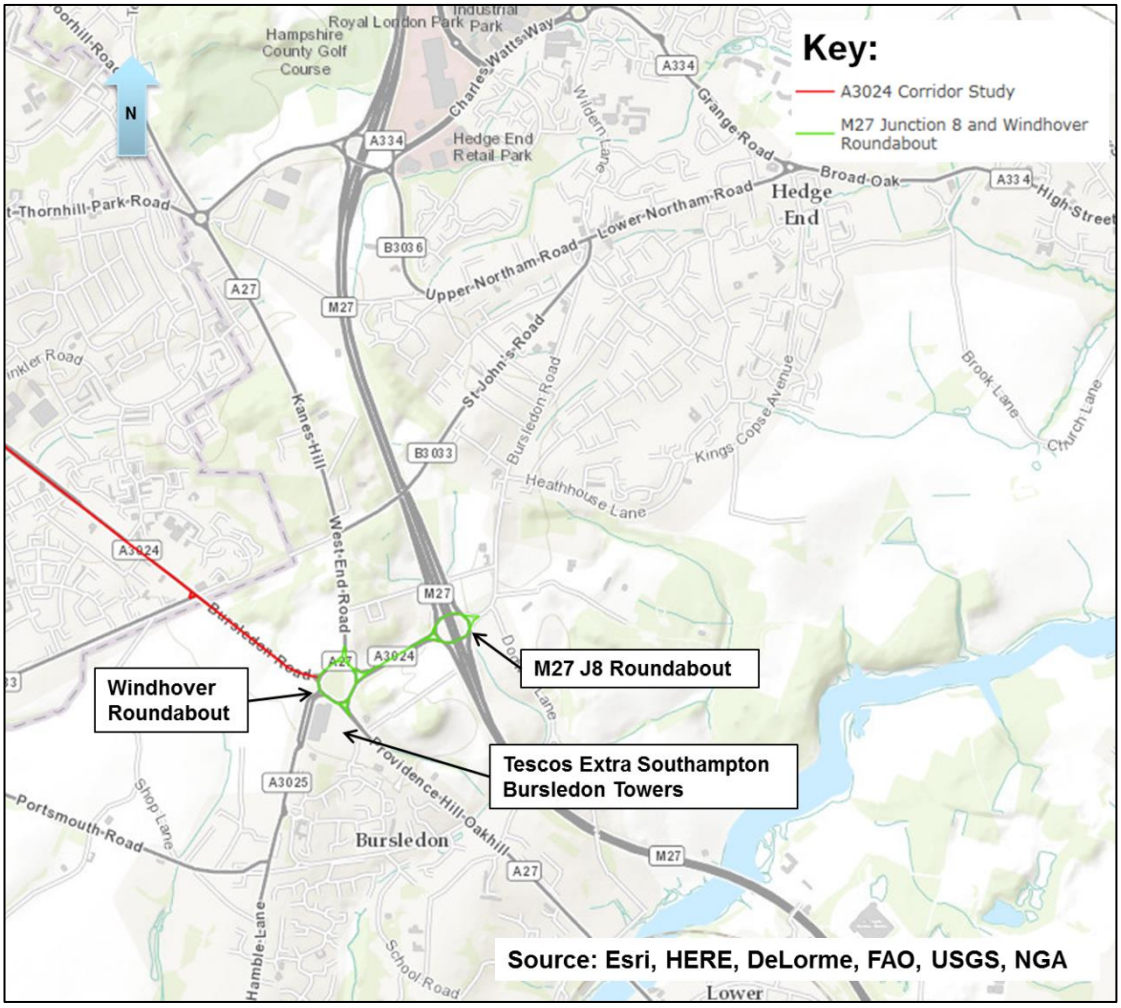


Figure 4-3: Windhover and M27 Junction 8 Roundabout locations



4.2 EXISTING HIGHWAY NETWORK

4.2.1 As shown in **Figure 4-1**, the M27 Southampton Junctions Scheme encompasses the following three distinct Sections of integrated highway network in and around Southampton:

- M27 Junction 8 Roundabout;
- Windhover Roundabout; and
- A3024 Eastern Access Corridor (including the Northam Rail Bridge and Bitterne Rail Bridge);

4.2.2 A map showing the locations and street names relevant to this section of the report can be found in **Appendix B-1**.

M27 JUNCTION 8

4.2.3 The M27 Junction 8 Roundabout enables access to and from the M27 which connects to the wider SRN[46] facilitating access to Southampton from areas further east, such as Fareham, Portsmouth and Waterlooville, and areas further north, via M3, such as Winchester, Basingstoke and London.

4.2.4 Junction 8 of the M27 is a grade separated Roundabout located below the main M27 carriageway and consists of four arms:

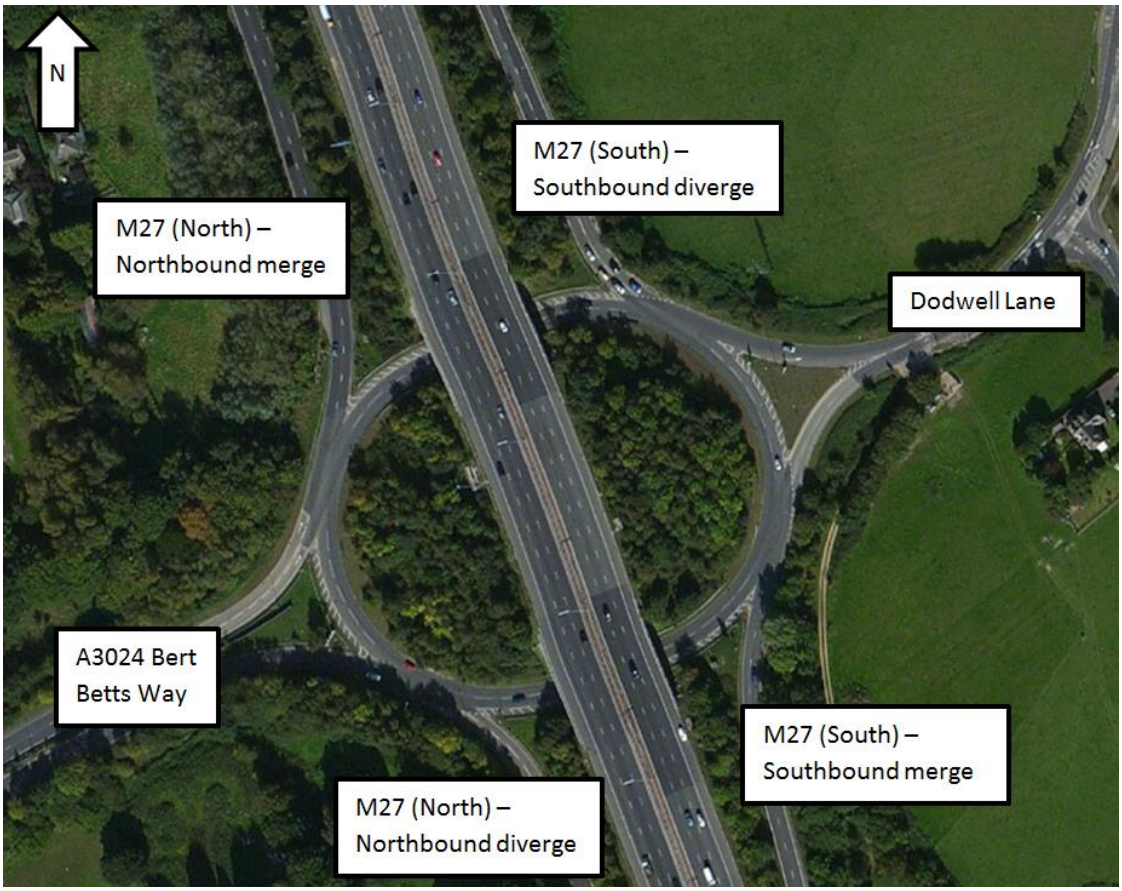
- A3024 Bert Betts Way – dual carriageway link between M27 Junction 8 and the Windhover Roundabout. On the approach to the M27 Junction 8 Roundabout, the left lane is designated for traffic turning left to the M27 northbound carriageway and travelling straight ahead to Dodwell Lane. The right lane is designated for traffic turning right to the M27 southbound carriageway and travelling straight ahead to Dodwell Lane.
- M27 (North) – dual lane entry to the M27 northbound carriageway and a dual lane exit from the M27 southbound carriageway spaced roughly 100m from one another on the northern Section of the Roundabout. These carriageways provide access to and from the M27 north of Junction 8. Both the merge and diverge are approximately 600m long with the M27 southbound diverge being slightly longer (circa 650m).
- Dodwell Lane – predominantly single carriageway road routing towards Hedge End, approximately 1.8km northeast of the M27 Junction 8 Roundabout. On the approach to the M27 Junction 8 Roundabout, Dodwell Lane flares into two lanes for approximately 30m.
- M27(South) - dual lane entry to the M27 southbound carriageway and a dual lane exit from the M27 northbound carriageway spaced roughly 100m from one another on the southern Section of the Roundabout. The merges and diverges provide access to and from the M27 south of M27 Junction 8. Both carriageways are approximately 300m in length.

[46] SRN – Strategic Road Network

4.2.5 The M27 Junction 8 Roundabout is fully lit and contains two lanes of circulating traffic. The Roundabout contains hatching in between the entry and exit carriageways of each arm with all four arms joining the M27 Junction 8 Roundabout via a priority give-way Junction layout. The Inscribed Circle Diameter is roughly 150m.

4.2.6 **Figure** 4-4 illustrates the existing layout of the M27 Junction 8 Roundabout in detail.

Figure 4-4: Existing layout of the M27 Junction 8 Roundabout



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

NON-MOTORISED USER FACILITIES

4.2.7 There are no NMU[47] facilities at M27 Junction 8 with the nearest facilities along Dodwell Lane.

[47] NMU – Non-Motorised User

WINDHOVER ROUNDABOUT

4.2.8 The A3024 Bert Betts Way connects the M27 Junction 8 Roundabout with Windhover Roundabout (located to the west of M27 Junction 8) via a short length of dual carriageway. Windhover Roundabout is a five arm, part signalised Roundabout providing links to the city centre, north of the city centre and areas south-east of the city such as Hamble-le-Rice, Bursledon and Lower Swanwick. The entrances to the Roundabout from A3024 Bursledon Road and from A3025 Hamble Lane are traffic signal controlled; whilst the remaining junctions of the Roundabout are priority give way.

4.2.9 Windhover Roundabout is an at grade Roundabout Junction made up of five arms:

- **A3024 Bert Betts Way** – short dual carriageway link between Windhover Roundabout and M27 Junction 8. On the approach to the Roundabout, the left lane is designated for turns to the A27 Providence Hill and A3025 Hamble Lane, leading to B3397. The right lane is designated for turns to A27 West End Road and A3204 Bursledon Road. The A3024 westbound carriageway joins the Windhover Roundabout via a priority give-way Junction layout.
- **A27 Providence Hill** – predominantly single carriageway road between Windhover Roundabout and the bridge over the River Hamble, approximately 1.6km to the southeast of the Roundabout. On the approach to Windhover Roundabout, the A27 flares into two lanes for approximately 90m, with the left lane designated for turns to A3204 (Bert Betts Wat) and A3025, leading to B3397. The right lane is designated for turns to A27 and A3024 (Bursledon Road). The A27 northbound lanes join Windhover Roundabout via a priority give-way Junction layout.
- **A3025 (leading to B3397)** – predominantly single carriageway road routing to Hamble – le – Rice approximately 4.5km to the south of the Roundabout. On the approach to Windhover Roundabout, the A3025 widens into a dual carriageway for approximately 250m starting at the four arm Roundabout access to Tesco. Just before the entrance to the Roundabout, the A3025 flares into three lanes for approximately 15m, with the left lane being dedicated for left turns only to the A3024 (Bursledon Road). The other two lanes are designated for the A27 and M27. The A3025 northbound lanes join Windhover Roundabout via a signalised Junction layout.
- **A3024 Bursledon Road**– predominantly wide single carriageway road routing to Southampton City Centre, approximately 7.5km to the west of the Roundabout. On the approach to Windhover Roundabout the A3024 (W) initially flares into two lanes for approximately 20m and then flares into three lanes for approximately 30m with the left lane designated for turns to A27 (N), the middle lane designated for flows to A3024, and the right lane for turns to A3024, A27 and A3025. The A3024 eastbound lanes join Windhover Roundabout via a signalised Junction layout.
- **A27 West End Road** – predominantly single carriageway road routing to Kanes Hill, approximately 0.5km north of Windhover Roundabout. On the approach to the Roundabout the A27 flares into two lanes for approximately 30m with the left lane designated for turns to A3024 (Bert Betts Way) and A27(Providence Hill). The right lane designated for turns to A3025 (Hamble Lane) and A3024

(Bursledon Road). The A27 (N) southbound lanes join Windhover Roundabout via a priority give-way Junction layout.

4.2.10 Windhover Roundabout is fully lit and predominantly contains three clearly designated lanes of traffic, apart from where the outer lane is hatched in between the exits and entrances of each arm. Windhover Roundabout contains some straight road Sections on the south-east, south-west and north-west Sections of the Roundabout. This means that the Roundabout's ICD[48] ranges from roughly 150m to 180m.

4.2.11 **Figure 4-5** illustrates the existing layout of the Windhover Roundabout in detail.

Figure 4-5 Existing layout of the Windhover Roundabout

Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

[48] ICD – Inscribed Circle Diameter

NON-MOTORISED USER FACILITIES

4.2.12 The following NMU[49] facilities are at or in close proximity to Windhover Roundabout:

- Pedestrian / cycle paths around the perimeter of the roundabout from A3024 Bursledon Road to A27 West End Road; and from A27 Providence Hill to A3025 Hamble Lane.
- A pedestrian path running through the roundabout's central island.
- An uncontrolled pedestrian crossing point at A27 West End Road close to the circulatory area leading to the splitter island;
- An uncontrolled pedestrian crossing point leading from the splitter island at A27 West End Road leading to the pedestrian path in the roundabout's central island;
- 2 No uncontrolled pedestrian crossing points in A27 Providence Hill approximately 25m from the circulatory area leading to the splitter island; and
- An uncontrolled pedestrian crossing point leading from the splitter island at the A27 Providence Hill leading to the pedestrian path in the Roundabout's central island;

4.2.13 Apart from at the junctions of A3024 Providence Hill and A27 West End Road where there are basic uncontrolled pedestrian and cycling facilities for crossing the Roundabout, there are no other NMU facilities present to assist crossing the Roundabout.

A3024 EASTERN ACCESS CORRIDOR

4.2.14 The A3024 corridor provides strategic access into Southampton from the east connecting M27 Junction 8 with the city centre at the Six Dials Junction, via the Windhover Roundabout. The A3024 routes broadly on an east-west alignment and carries traffic to and from the eastern side of Southampton to destinations in the city centre and beyond. The route goes through the eastern suburbs of Thornhill, Bitterne and Northam. It comprises of, from east to west:

- Bert Betts Way
- Bursledon Road;
- Maybray King Way;
- Bitterne Road West;
- Northam River Bridge;
- Northam Rail Bridge; and
- Northam Road.

4.2.15 A location plan of the roads considered as part of the M27 Southampton Junctions Scheme can be found in **Appendix B-1**.

[49] NMU – Non-Motorised User

4.2.16 At Maybray King Way the corridor is joined by the A334 Bitterne Road East and West End Road becoming the primary access route into the city centre from the east. It crosses the River Itchen at Northam River Bridge, West Coastway Line at Bitterne Rail Bridge and the South West Main Line at Northam Rail Bridge.

4.2.17 The A3024 corridor from M27 Junction 8 to Six Dials Junction in the city centre is 7.45km in length and crosses the Southampton City Council / Hampshire County Council boundary to the east of Botley Road. The A3024 alternates between a single and dual carriageway road at different sections along the corridor. The Northam Rail Bridge, on the A3024 Northam Road, currently represents a pinch point in the network as it can accommodate only one lane of traffic per direction.

4.2.18 For the majority of its length within Southampton, from the Gavan Road Junction to the city centre, the A3024 corridor is subject to a 30mph speed limit. The portion prior to this point (from Windhover Roundabout to Gavin Road) is subject to a 40mph speed limit. The dual carriageway Section of the A3024 from Windhover Roundabout to M27 Junction 8, Bert Betts Way, is subject to the national speed limit (70mph).

4.2.19 In 1973 a traffic gating scheme was implemented along the corridor, designed to manage traffic congestion, provide buses with priority and improve conditions for all traffic entering Southampton city centre from the east. More details are included in Section 4.3.

4.2.20 Sections of the A3024 corridor have bus priority measures installed with facilities such as bus lanes and bus gates; there are also dedicated cycle facilities along the corridor, these are listed in **Table 4-1** and **Table 4-2** below.

Table 4-1: Bus Priority located on the A3024 (Refer to Appendix B-1 for location plan)

DIRECTION	START	END	OPERATING HOURS	LENGTH
Westbound	Orpen Road	Kathleen Road	7-9.30 am Mon-Fri	560m
Westbound	Bursledon Road	Bitterne Road East	24 hours	70m
Eastbound	Glenfield Avenue	Bitterne Road	24 hours	100m
Westbound	Princess Court	Kent Road	24 hours	115m
Westbound	Kent Road	Wilson Street	24 hours	130m
Westbound	Northam Rail Bridge	Brinton's Road	24 hours	125m
Westbound	Brinton's Road	Six Dials	24 hours	160m
Eastbound	Brinton's Road	Northam Rail Bridge	24 hours	80m

Table 4-2 Cycle Facilities located on the A3024

DIRECTION	START	END	OPERATING HOURS	LENGTH
Westbound	Hinkler Road	North East Road	On Road Cycle Lane	330m
Eastbound	Upper Deacon Road	Bursledon Road	On Road Cycle Lane	175m
Eastbound	Deacon Road	Ruby Road	On Road Cycle Lane	240m

4.2.21 There are 30 individual bus stop locations, mostly provided with bus shelters and real time passenger information, along the corridor.

NORTHAM RAIL BRIDGE

4.2.22 The Northam Rail Bridge, on the A3024 Northam Road (Refer to **Appendix B-1**), currently represents a pinch point in the network as it can accommodate only one lane of traffic per direction. The bridge currently has a 7.5 tonne weight limit, although buses are permitted to use the bridge.

4.2.23 From the Brinton's Road Junction (west of the bridge) to the Brittania Road (B3038) Junction (east of the bridge), the A3024 Northam Road is circa 330m in length and predominantly of single carriageway standard with one lane of traffic flowing in each direction.

4.2.24 From the Brinton's Road Junction, the eastbound side of the road starts off as three lanes of traffic (for circa 80m) but narrows to merge into one lane on the approach to the section of the road that actually crosses over the railway tracks. On the approach to the signalised 3-arm Junction with Brittania Road (B3038), the eastbound lane widens to accommodate three lanes of traffic for circa 25m with the right lane designated for right turns into Brittania Road (B3038) only.

4.2.25 On the approach to the Briton's Road Junction, the westbound side of the road initially widens to accommodate two lanes of traffic for circa 85m (with the left lane designated as a bus lane) but continues to widen to accommodate three lanes of traffic for an additional circa 35m; with the left lane being designated for straight ahead (towards the Six Dials Junction) and left turn movements into Northam Road leading to Old Northam Road.

4.2.26 The speed limit on the Northam Rail Bridge is 30mph.

BITTERNE RAIL BRIDGE

4.2.27 The Bitterne Rail Bridge, on the A3024 Bitterne Road West (Refer to **Appendix B-1**), currently represents a pinch point to the Local Road Network as it includes for one lane of traffic per direction.

4.2.28 In the westbound direction, from the A3035 Bullar Road/Athelstan Road Junction (East of the bridge) to the Rampart Road Junction is circa 290m and is predominately single carriageway with one traffic lane flowing in each direction over the bridge. After the bridge the road flares out to two traffic lanes at the Rampart Road Junction.

4.2.29 In the eastbound direction, from the Rampart Road Junction to the Bullar Road/Athelstan Road Junction is circa 290m and is predominately single carriageway with one traffic lane flowing in each direction over the bridge. After the bridge the road flares out to three lanes at the Bullar Road/Athelstan Road Junction. The left hand lane is designated for turns onto the A3035 Bullar Road and the other two lanes are designated to continue on Bitterne Road West, no right turns are permitted.

4.2.30 The speed limit on the Bitterne Rail Bridge is 30mph.

SIGNALISED JUNCTIONS

4.2.31 The following signalised junctions are located along the A3024 corridor, between the Windhover Roundabout and the Six Dials Junction, linking connector roads to the A3024 (Refer to **Appendix B-1** for a road location map of the Scheme):

Table 4-3 Signalised Junctions along the A3024 Corridor

A3024 SECTION	CONNECTOR ROAD
Bursledon Road	→ Windhover Roundabout (part signalised) → B3033 Botley Road; → Coates Road; → Warbuton Road; → Orpen Road; → Gavan Road; → Kathleen Road; → North East Road; → Upper Deacon Road; → White's Road; → Ruby Road; → Bitterne Road East.
Bitterne Road East	→ Cobbett Road; → Athelstan Road; → Priory Road; → Centurion Industrial Park.
Northam Road	→ Union Road; → Britannia Road; → Brinton's Road; → Six Dials Junction.

4.2.32 All signalised junctions have some level of pedestrian crossing facility within them. Along the corridor there is one separate puffin pedestrian crossing, located on A3024 Northam Road at Kent Street.

4.2.33 Parking and waiting restrictions apply to the entire length of the corridor, with no waiting at any time applied from the city boundary (east of Botley Road) to Six Dials Junction. An exception exists at the Athelstan Road Junction where loading restrictions apply on the southern side, outside existing businesses, between 07:30 and 09:30.

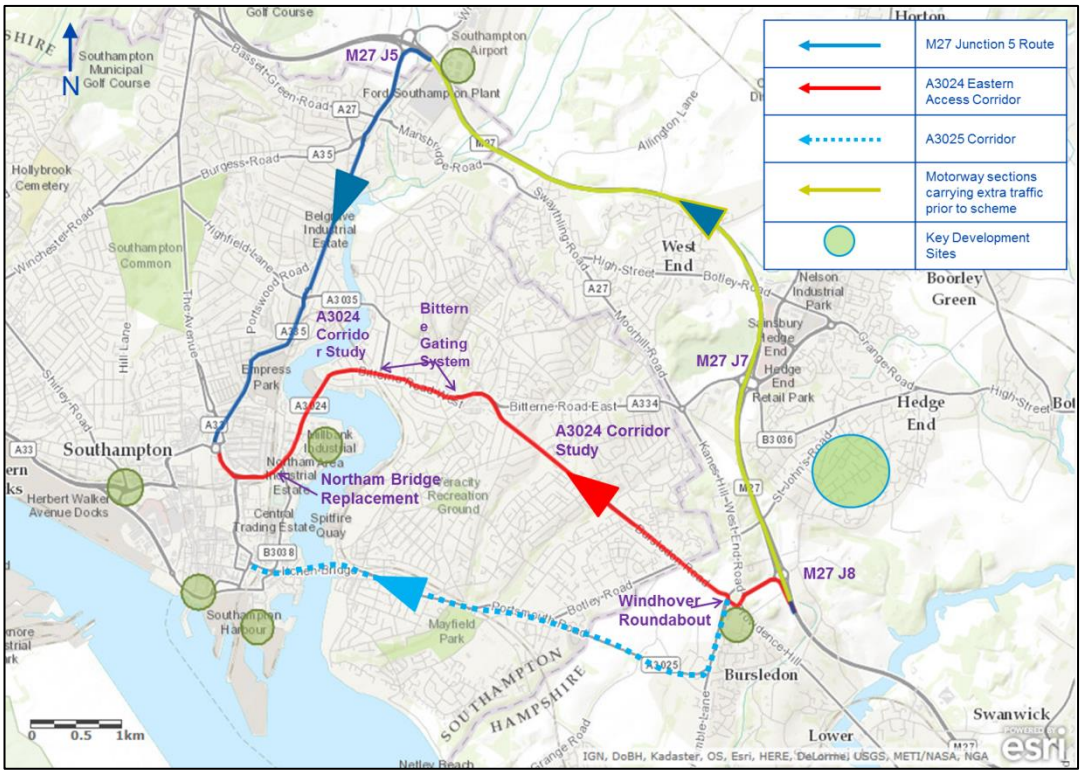
4.3 EXISTING TRAFFIC CONDITIONS

INTRODUCTION

4.3.1 The M27 Junction 8 and A3024 Bursledon Road should serve as one of the main corridors into Southampton city centre. However, due to congestion at M27 Junction 8, Windhover Roundabout and long the A3024 Eastern Access Corridor (including restricted capacity of rail bridges), a large proportion of city centre-bound traffic uses an alternative route via the M27 between Junction 8 and Junction 5, exiting at Junction 5 and then travelling to the city centre along the A335.

4.3.2 ANPR[50] data collected in April 2016 was used to observe the journeys taken along the strategic routes between the M27 Junction 8 and the Southampton city centre (Refer to **Figure 4-6**). Routes from the M27 east of Junction 5 to the city centre along the A3024 corridor, the A3025 corridor and via M27 Junction 5 were compared. The ANPR data showed that in the inbound direction, approximately 46% of the daily (12-hour) trips are using the Junction 5 / A335 route, equating to 1,137 trips per day. 37% of trips use the A3024 corridor and 17% use the A3025 corridor. In the outbound direction no trips use the Junction 5/A335 route, and 76% use the A3024 corridor.

Figure 4-6 ANPR Route data



[50] ANPR - Automatic Number Plate Recognition

4.3.3 This route choice places additional demand on the M27 between Junction 8 and Junction 5 which otherwise could be routed onto the local network. This section of the M27, as evidenced in the Route Strategy Evidence Report for Solent to Midlands[51], suffers from network stress (congestion) and delays (in top 10% of the trunk road network for both).

4.3.4 This section of the report describes the key traffic flows and conditions on the local and strategic network. The areas under consideration are:

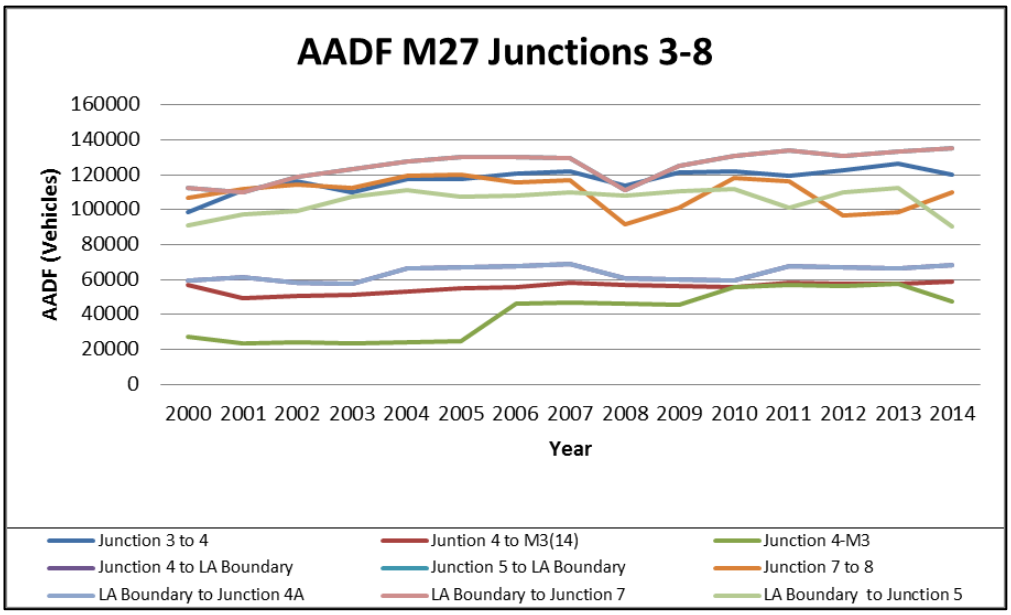
- The M27 between Junction 8 and Junction 5.
- M27 Junction 8 and Windhover Roundabout (including Bert Betts Way); and
- The A3024 Eastern Access Corridor (between Windhover Roundabout and Six Dials Junction in Southampton);

M27 JUNCTION 5 TO 8

4.3.5 The M27 between Junction 5 and Junction 8 suffers from network stress (congestion) and delay as indicated in Section 4.3.3.

4.3.6 The following graph displays a summary of how the AADF[52] at each of the individual counter in the study area has changed over the past ten years. The locations of the count sites are shown in **Figure 4-8**.

Figure 4-7 Annual Average Daily Flow Data for 2000 to 2014



[51] Solent to Midlands Route Strategy 2015
[52] AADF – Annual Average Daily Flows

Figure 4-8: AADF[53] Count Locations

Sources: IGN, DoBH, OS, Esri, HERE, DeLorme, INCREMENT P, USGS, METI/NASA

4.3.7 The counter with the highest flows in 2014 was along the M27 between Junction 7 and Junction 5 (LA Boundary - Junction 7), where an AADF of 135,409 vehicles was recorded in 2014. Flows at this location have increased by 21% since 2000. This section has consistently had the largest volume of traffic compared to the other counters in the study area.

4.3.8 Traffic at each of the count other counter has also increased since 2010, with the exception of the section west of M27 Junction 5 (LA Boundary to Junction 5), which has decreased by 0.6%.

[53] AADF - Annual Average Daily Flow

M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT

4.3.9 There is an existing issue due to congestion at M27 Junction 8, resulting from traffic tailing back from Windhover Roundabout and the A3024 corridor onto the M27 mainline. This contributes to congestion and impacts on the safety of users travelling along the M27 and into Southampton.

4.3.10 Junction 8 of the M27 is linked to the Windhover Roundabout by the A3024 (Bert Betts Way). The A3204 (Bert Betts Way) often queues back from the Windhover Roundabout to the Junction 8 Roundabout in the PM peak hour due, in the main, to vehicles having difficulty entering the Windhover Roundabout. This can also result in the queue backing up along Dodwell Lane. This is understood to block the M27 westbound offslip entry onto the Junction 8 Roundabout resulting in the queue on the M27. “Keep Clear” markings have been considered in the past to aid entry onto the Junction 8 Roundabout but their effectiveness and enforcement was questioned and there were costs and impact associated with closure of the slip road.

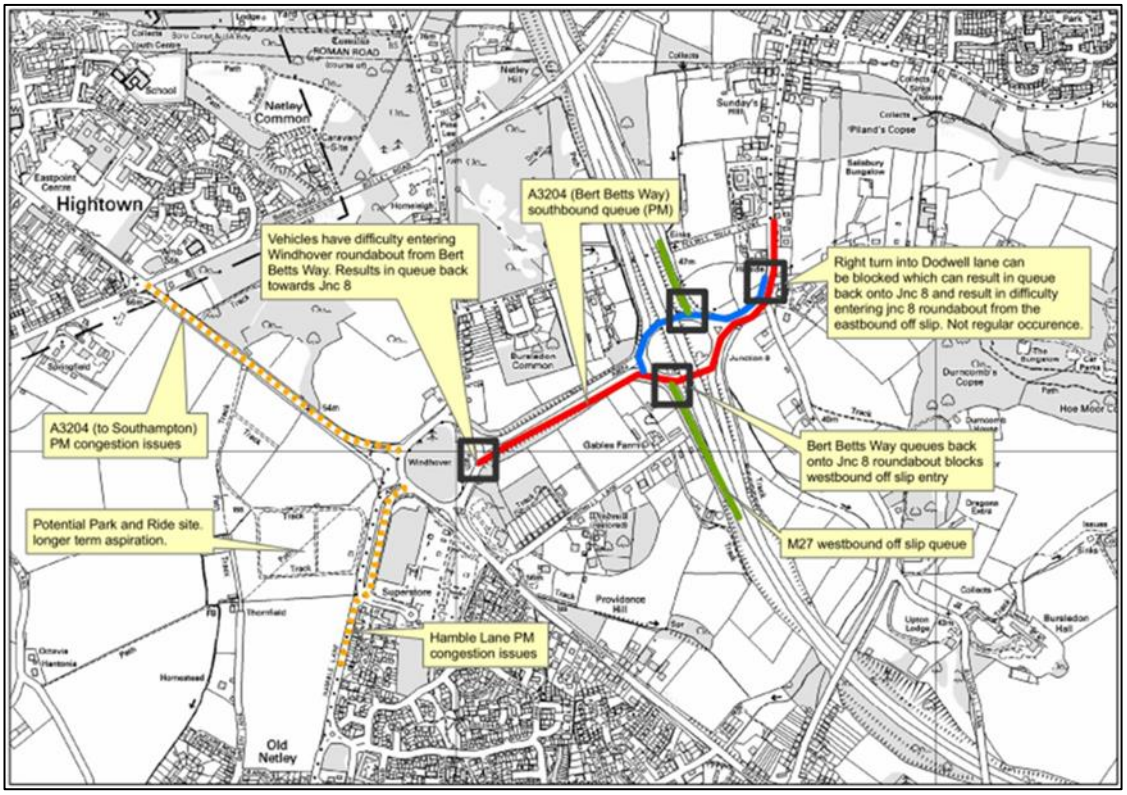
4.3.11 It has also been reported to Highways England and HCC[54] that the queue from Windhover Roundabout can also extend as far back as the Dodwell Lane Junction with Dodwell Lane. This has been known to block the right turn into Dodwell Lane and therefore can result in a queue back towards Junction 8, and in severe cases can block the M27 eastbound offslip entry onto the Junction 8 Roundabout. “Keep Clear” markings have been installed at the Dodwell Lane Junction with Dodwell Lane. Anecdotally this is understood to have improved the situation.

4.3.12 Windhover Roundabout is only part signalised, with signals on the A3025 Hamble Lane and A3204 Bursledon Road arms. Beyond Windhover Roundabout both Hamble Lane and Bursledon Road suffer from congestion in the AM and PM peak.

4.3.13 **Figure 4-9** highlights the existing traffic issues at Junction 8 and Windhover Roundabout.

[54] HCC – Hampshire County Council

Figure 4-9 M27 Junction 8 and Windhover Roundabout Traffic Issues



Source: Southampton City Council

4.3.14 **Table 4-4** and **Table 4-5** show the observed turning flows for the M27 Junction 8 and Windhover Roundabouts based on a traffic survey in December 2013.

Table 4-4 Observed Traffic Flows AM Peak Period (2013)

ORIGIN / DESTINATION	DODWELL LANE	M27 (S)	A27 (S)	HAMBLE LANE	A3024 (W)	A27 (N)	M27 (N)	TOTAL
Dodwell Lane	0	176	12	77	56	4	354	679
M27 (S)	89	0	48	305	222	15	316	995
A27 (S)	9	64	0	62	218	189	49	591
Hamble Lane	44	316	119	0	74	367	242	1162
A3024 (W)	59	427	162	67	0	188	327	1230
A27 (N)	10	74	128	294	19	0	56	581
M27 (N)	258	142	54	341	249	17	0	1061
TOTAL	469	1199	523	1146	838	780	1344	6299

Table 4-5 Observed Traffic Flows PM Peak Period (2013)

ORIGIN / DESTINATION	DODWELL LANE	M27 (S)	A27 (S)	HAMBLE LANE	A3024 (W)	A27 (N)	M27 (N)	TOTAL
Dodwell Lane	0	79	8	35	60	1	138	321
M27 (S)	191	0	35	159	272	6	25	688
A27 (S)	17	44	0	33	73	100	48	315
Hamble Lane	106	266	171	0	144	249	293	1229
A3024 (W)	96	241	215	61	0	82	265	960
A27 (N)	11	28	151	291	67	0	31	579
M27 (N)	489	8	33	152	260	6	0	948
TOTAL	910	666	613	731	876	444	800	5040

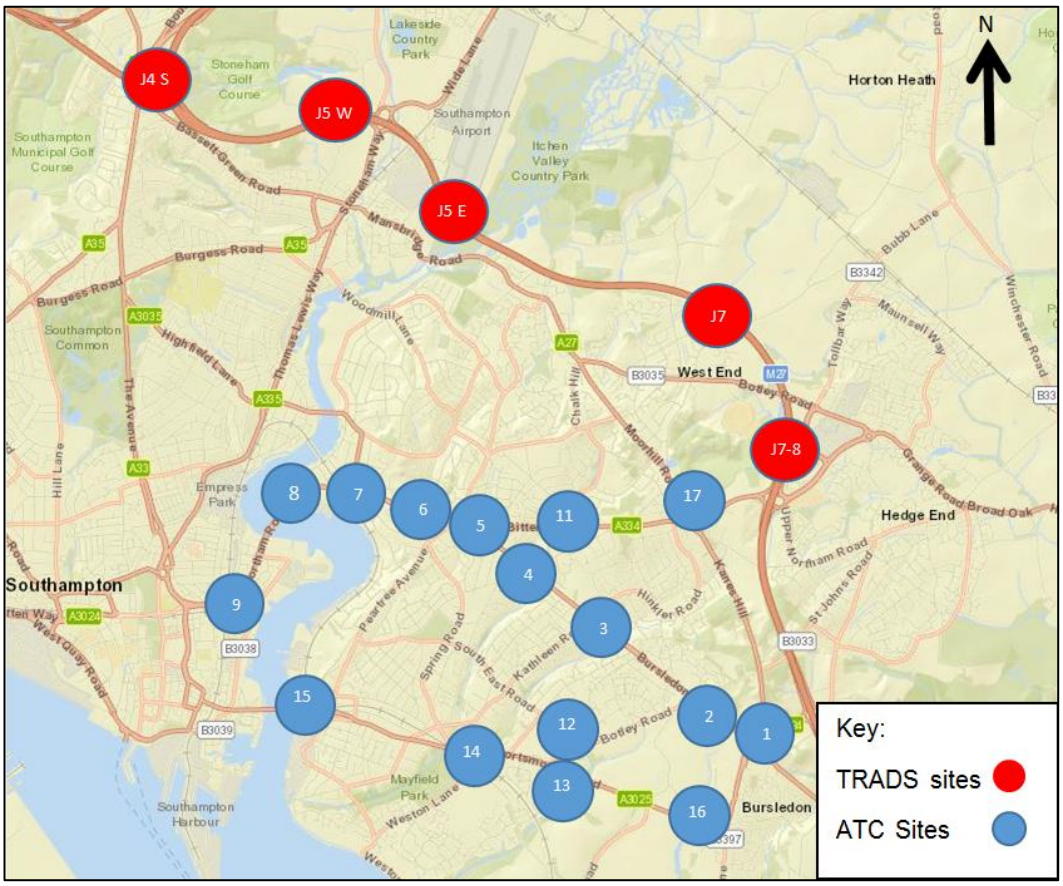
A3024 CORRIDOR

4.3.15 The A3024 Eastern Access Corridor provides strategic access into Southampton from the east linking M27 Junction 8 with the city centre via Windhover Roundabout and the Six Dials Junction (A3024 / A33 Kingsway / A33 St Andrews Road / New Road). The A3024 corridor runs broadly on an east-west alignment and carries traffic to and from the eastern side of Southampton to destinations in the city centre and beyond.

4.3.16 The corridor includes a number of signalised junctions, all of which have some form of NMU[55] crossing provision. There is a single separate puffin pedestrian crossing located on Northam Road at Kent Street.

4.3.17 **Figure 4-10** shows the locations of the ATCs[56] within Southampton and the Highways England Traffic Flow Data System count locations along the M27. The ATC and TRADS[57] sites record the number and type of vehicles passing a point in both directions.

Figure 4-10 AADT and TRADS survey sites within Study Area



[55] NMU – Non-Motorised User
[56] ATC – Automatic Traffic Counter
[57] TRADS - Traffic Flow Data System

Sources: IGN, DoBH, OS, Esri, HERE, DeLorme, INCREMENT P, USGS, METI/NASA

4.3.18 Traffic counts undertaken in April 2014 indicate that a significant volume of traffic on the A3024 corridor with an average 2-way AADT[58] of 16,316 vehicles. The busiest section of the corridor is across Northam Rail Bridge which has a 2-way AADT flow of over more the 27,000 vehicles. Counts are shown in **Table 4-5**.

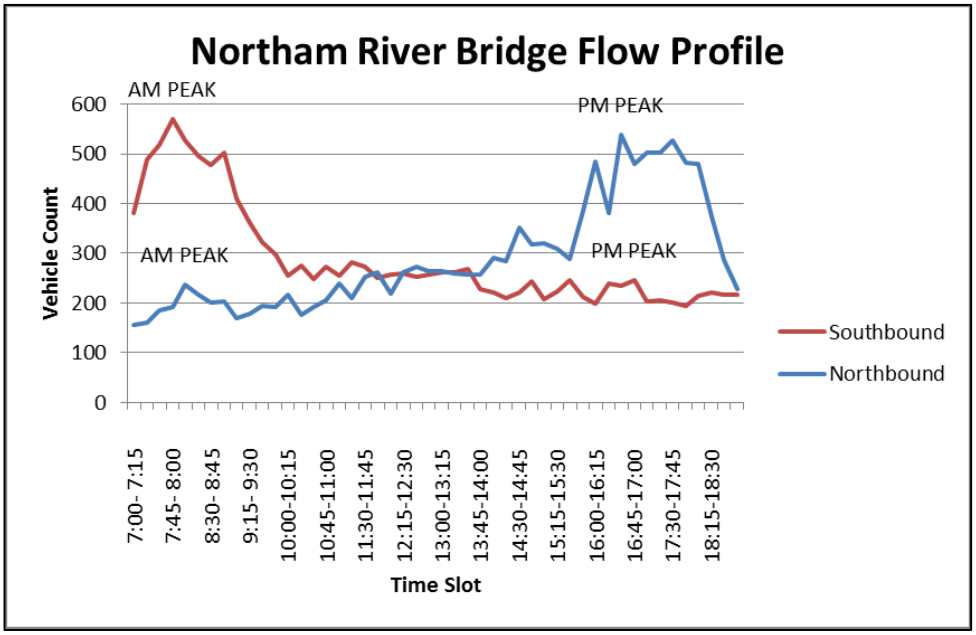
Table 4-6 2014 Traffic flows along the A3024 Corridor

	NEW ROAD		NORTHAM RAIL BRIDGE		BURSLEDON ROAD		THORNHILL PARK ROAD		WEST END ROAD	
	West	East	South	North	West	East	West	East	West	East
Car	4891	3954	11107	11036	6171	6517	6399	5904	5371	5638
L/MGV[59]	856	770	2057	2166	1103	1019	1149	1001	723	667
Bus	184	257	270	272	21	26	50	52	17	27
Pedal Cycle	50	55	173	123	43	24	45	33	47	38
HGVs[60]	15	16	295	316	199	230	76	71	33	29
Total Traffic Flow	5996	5052	13896	13913	7537	7816	7719	7061	6191	6399
Total Two Way AADT	11048		27809		15353		14780		12590	
Corridor AADT	16316									

4.3.19 The traffic flows along the A3024 corridor are of a tidal nature, with flows inbound into Southampton in the morning peak outbound in the evening peak. **Figure 4-11** demonstrates this for the count location on Northam River Bridge.

[58] AADT – Annual Average Daily Traffic
[59] L/MGV – Large/Medium Goods Vehicle
[60] HGV – Heavy Goods Vehicle

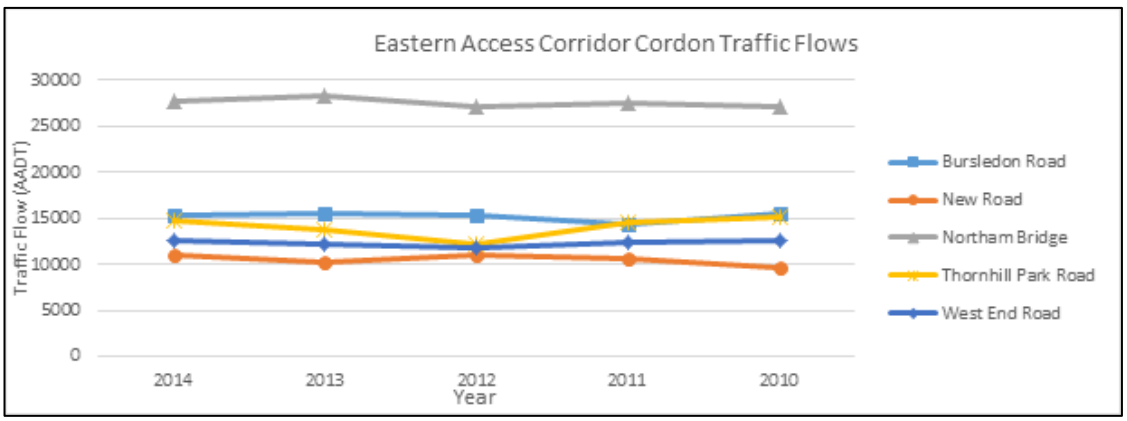
Figure 4-11 Daily Flow Profile across Northam River Bridge



4.3.20 The 2014 recorded mode split average along the corridor is car (including motor cycles) 82.1%, Light & Medium Goods Vehicles 14.6%, Bus 1.9%, pedal cycles 0.7% and HGVs 1.9%. The level of HGV[61] traffic on New Road is very low making up 0.2%, reflecting the desire line for HGVs towards the Eastern Docks.

4.3.21 **Figure 4-12** shows that over time traffic levels along the A3024 corridor have remained relatively constant, with occasional annual variations. There has not been a discernible growth in traffic since 2010.

Figure 4-12 Annual Change in AADT[62] Flows along A3024 Corridor (provided by SCC)



[61] HGV – Heavy Goods Vehicle
[62] AADT – Annual Average Daily Traffic

THE BITTERNE TRAFFIC SCHEME (BITTERNE GATING SYSTEM)

4.3.22 Northam Rail Bridge represents a significant bottleneck on the A3024 in terms of traffic capacity. The carriageway narrows down from two lanes in each direction to one lane in each direction. In order to limit/meter the flow of traffic across the bridge, the Bitterne Traffic Scheme (also described as the Bitterne Gating System) has been in place since 1973 which controls traffic entering the corridor.

4.3.23 The traffic gating scheme was implemented along the corridor and designed to manage traffic congestion, provide buses with priority and improve conditions for all traffic entering the city from the east. The scheme is part of a wider Intelligent Transport System called the “Bitterne Traffic Scheme”. The scheme also incorporates linked traffic signals, which is designed to limit access from side roads onto the A3024 during peak periods, with the following key aims:

- To manage traffic congestion;
- To provide buses with priority; and
- To improve conditions for all traffic entering the city from the east in AM peak.

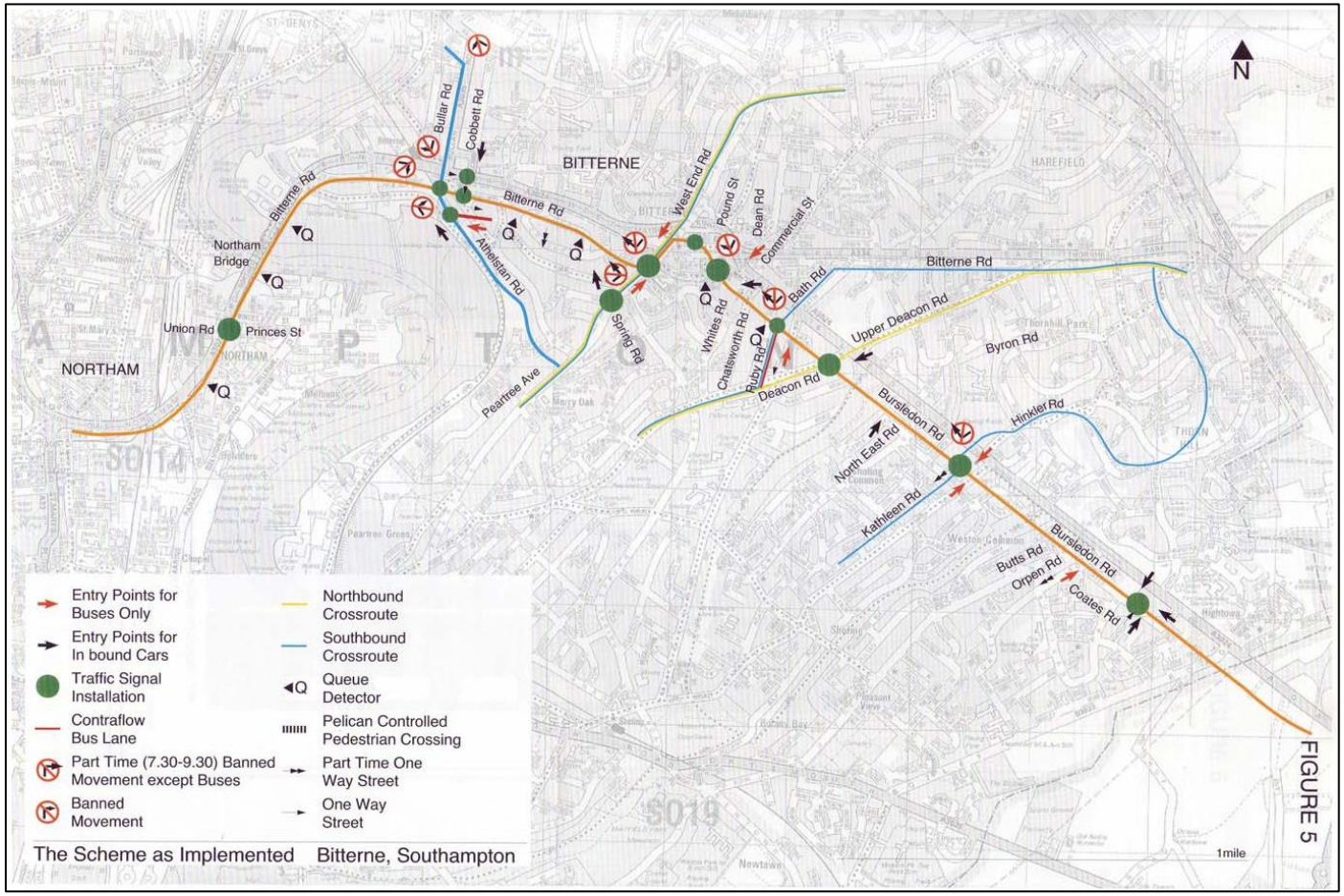
4.3.24 The scheme manages the traffic signals along the A3024 corridor (east of the Itchen River) during the morning peak and applies a number of measures between 07:00 and 09:12 on an Urban Traffic Control system. The system queues traffic in certain locations and uses traffic signal timings to release traffic in a controlled manner to ensure that buses have free flow on the main route into the city.

4.3.25 During the operation of the scheme, fixed panel VMS[63] are used to close roads, ban turning movements or divert all other traffic except buses along to other entrance points on to the main route. These are also enforced by traffic regulation orders (TROs) for the dedicated time of operation of the scheme.

4.3.26 Figure 4-13[64] shows an overview of the scheme.

[63] VMS – Variable Message Signs
[64] Keeping Buses Moving: A guide to traffic management to assist buses in urban areas https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/329973/ltn-1-97__Keeping-buses-moving.pdf

Figure 4-13: Bitterne Traffic Scheme



4.4 ACCIDENTS AND JOURNEY TIME RELIABILITY

ACCIDENTS

4.4.1 This Section of the report focuses on the accident data of the Scheme. The key areas under consideration are:

- M27 Junction 8 Roundabout;
- Windhover Roundabout; and
- A3024 eastern access corridor (including the Northam Rail Bridge and Bitterne Rail Bridge);

4.4.2 Accident records are included under **Appendix B-2** and **Appendix B-3**.

M27 JUNCTION 8

4.4.3 M27 Junction 8 is in the top 50 sites for casualties on the Route Strategy Evidence Report for Solent to Midlands[65] (ranked 31st).

4.4.4 PIA[66] data for the five years from 01 April 2011 to 31 March 2016 was received from HCC[67]. This data includes injuries and accidents for M27 Junction 8 which includes 300m into the A3024 (Bert Betts Way) and Dodwell Lane respectively.

4.4.5 **Table 4-7** presents an overview of the collision data by year in terms of the accident severity. The highest number of collisions recorded in a given year was 13 in 2014, and the lowest in a full calendar year was five in 2015.

Table 4-7 Accident Severity Data for M27 Junction 8

	2011	2012	2013	2014	2015	2016	TOTAL
Serious	0	0	0	0	0	1	1
Slight	7	10	10	13	5	2	47
Total	7	10	10	13	5	3	48

4.4.6 The one serious accident in 2016 was attributed to driver error with driver colliding into the back of the driver in front.

[65] Solent to Midlands Route Strategy 2015
[66] PIA – Personal Injury Accident
[67] HCC – Hampshire County Council

4.4.7 A total of 39 accidents (81%) were attributed to the driver behind hitting the rear of the driver in front. This indicates that the queueing traffic on the Roundabout arms plays a significant role in recorded accidents.

4.4.8 Two collisions involved NMUs[68], resulting in slight injuries, with one occurring in 2012 and the other in 2015.

- One involved a cyclist travelling on the circulatory of the Roundabout, approaching the eastbound diverge, and colliding with a car pulling out of the M27 offslip. The contributory factors were driver/rider error and road environment contributions.
- The other accident involved a pedestrian. The pedestrian got out of a van in the offside lane, travelling south along the M27 Junction 8 offslip, and confronted the driver of the car behind. The second car moved off, clipping the pedestrian and the rear of the van, as he moved into nearside lane.

WINDHOVER ROUNDABOUT

4.4.9 PIA[69] data for the five years from 01 October 2011 to 31 December 2015 for Windhover Roundabout and its approaches was received from HCC[70].

4.4.10 **Table 4-8** presents an overview of the collision data by year in terms of the accident severity. The highest number of collisions recorded in a given year was 12 in 2014, and the lowest (four) in 2015.

Table 4-8 Accident Severity for Windhover Roundabout

	2011	2012	2013	2014	2015	TOTAL
Serious	3	1	1	0	0	5
Slight	8	4	5	12	4	33
Total	11	5	6	12	4	38

4.4.11 Accident analysis shows that a total of 38 collisions occurred on Windhover Roundabout or along the approaches during the five year period. This equates to an average of 7.2 PIAs per year.

4.4.12 Of the five serious accidents occurring on Windhover Roundabout or on the approaches, three can be directly attributed to driver error. The fourth accident was attributed to an animal crossing the road and the driver swerving to avoid the animal.

[68] NMU – Non-Motorised User
[69] PIA - Personal Injury Accident
[70] HCC – Hampshire County Council

The final accident was attributed to an oil spillage on the carriageway causing the rider to slide and fall off their vehicle.

4.4.13 Three collisions involved NMUs[71], all of which were cyclists, resulting in slight injuries. Two occurred in 2011 and one in 2012.

- The first was a cyclist travelling south, and while negotiating the Roundabout was struck by a car entering the Roundabout from Bert Betts Way.
- The second was a cyclist travelling northeast negotiating the Roundabout, who was struck by a van travelling in the same direction who switched lanes without signalling. The contributory factor was driver/rider error.
- The third was a cyclist travelling southeast on the West End Road approach to the Roundabout when he was struck from behind by a car who failed to see him. The contributory factor was driver/rider error.

A3024 CORRIDOR

4.4.14 PIA[72] data for the five years from 01 January 2011 to 31 December 2015 was received from SCC[73], and included data along the A3024 corridor between Windhover Roundabout and Northam Rail Bridge.

4.4.15 **Table 4-9** presents an overview of the collision data by year in terms of the accident severity. The highest number of collisions recorded in a given year was 56 in 2011 and the lowest 31 in 2014.

Table 4-9 Accident Severity for the A3024 Corridor

	2011	2012	2013	2014	2015	TOTAL
Serious	18	6	7	6	8	45
Slight	38	30	30	25	28	151
Total	56	36	37	31	36	196

4.4.16 The A3024 corridor experienced a total of 196 accidents during this period which included 53 NMU[74] incidents (29 cyclists and 24 pedestrians). 24 NMUs were seriously injured with no fatalities. 70 serious non-NMU accidents were recorded with no fatalities.

[71] NMU – Non-Motorised User
[72] PIA – Personal Injury Accident
[73] SCC – Southampton City Council
[74] NMU - Non-Motorised User

4.4.17 Analysis of the accident data has shown three common trends which led to accidents occurring along the A3024 corridor:

- Motorists disobeying traffic signals and causing collisions with other vehicles. This was common to A3024 Bursledon Road/Coates Road/ Warburton Road and A3024 Bitterne Road East/ Maybray King Way junctions.
- Driver error in terms of judging other vehicles speeds and path. This was common to six junctions along the corridor.
- Motorists failing to see other vehicles or pedestrians when entering or exiting the petrol stations on Rampart Road and Kent Street.

JOURNEY TIME RELIABILITY

4.4.18 The M27 between Junctions 8 and 5 suffers from this increased network stress (congestion) and delay as evidenced in the Route Strategy Evidence Report for Solent to Midlands[75], and is currently in worst 10% of the trunk road networks for delay.

4.4.19 There is no specific evidence available related to journey time reliability along this section of the M27.

JOURNEY TIME RELIABILITY – M27 JUNCTION 8 / WINDHOVER ROUNDABOUT

4.4.20 There is no specific evidence available related to journey time reliability for journeys through M27 Junction 8 and Windhover Roundabout.

4.4.21 There is however anecdotal evidence that during the peak periods (in particular the AM peak) traffic along the M27 mainline heading northbound uses the northbound offslip and onslip at M27 Junction 8 to route through the Junction and access the lane-gain to the north of Junction 8. This has an impact on the capacity of Junction 8 as it adds demand through the circulatory that should theoretically remain on the mainline.

JOURNEY TIME RELIABILITY – A3024 CORRIDOR

4.4.22 The A3024 corridor has no historic data relating to journey time reliability along the corridor. However the identified constraints along the corridor such as the narrow bridges at Northam Rail Bridge and Bitterne Rail Bridge, and the large number of signalised junctions, have a negative impact on journey time reliability.

4.4.23 ANPR[76] data has been collected as part of PCF[77] Stage 1 but has not been used to analyse journey time reliability.

---

[75] Solent to Midlands Route Strategy 2015
[76] ANPR – Automatic Number Plate Recognition
[77] PCF – Project Control Framework

4.5 TOPOGRAPHY, LAND USE, PROPERTY AND INDUSTRY

4.5.1 This Section of the report outlines the existing topography for the entire scheme and the land use, property and industry for each sub-scheme.

TOPOGRAPHY

4.5.2 Generally the scheme shallowly slopes towards the River Itchen and Southampton Waters. The highest point along the scheme is around Windhover Roundabout (61.0 mAOD) and the lowest is as the scheme passes over the River Itchen (2.8 mAOD).

LAND USE, PROPERTY AND INDUSTRY

4.5.3 Sub-scheme 1 – Land use in the immediate area of Sub-scheme 1 comprises arable land (generally located to the north and east of Windhover Roundabout). Various light industrial and commercial uses exist in the surrounds (within 500m of the scheme footprint) including, but not limited to; pub/restaurant and accommodation establishments, automotive repair, car/caravan dealerships, a car boot sale market site and a supermarket store. The village of Bursledon is located immediately to the south of Windhover Roundabout.

4.5.4 Sub-scheme 2 - The A3024 corridor predominately passes through built-up residential, light industrial commercial areas between Windhover Roundabout at the east and up to (and not including) Six Dials Junction in the west (approximately 7 km of existing road). The eastern extent of the corridor (east of Hightown approaching the M27 is less urbanised with more rural/agricultural land uses including areas of allotments and public open space. The Sub-scheme 2 alignment follows the existing highways alignments.

4.5.5 Sub-scheme 3 - Northam Rail Bridge is owned partially by Network Rail and partially by SCC[78], and carries the A3024 over the Brighton Main Line (BML2) and Southampton Eastern Docks Branch (SOY) lines. Adjacent to the north of the bridge are areas of overgrown unused land owned by SCC and Network Rail. Land use to the west of Northam Rail Bridge is predominantly residential, becoming more industrial to the east of the bridge with Shamrock Quay fronting the River Itchen. Immediately south of the bridge is land currently owned by Southern Gas Networks. Southampton Football Club (which is located approximately 100m to the south) has aspirations to develop this area of land to create a park. Other areas are understood to be on long-term lease to Siemens from Network Rail.

4.5.6 Sub-scheme 5 –Bitterne Rail Bridge is a Network Rail structure carrying the A3024 over the St Denys Junction to Portcreek Junction (SDP1) rail line. Bitterne Manor Primary School is located adjacent to the south of the bridge. Other land uses in the immediate surrounding area include residential (north and south of the existing structure), light industrial and commercial.

[78] SCC – Southampton City Council

4.6 CLIMATE

4.6.1 This section of the report considers the existing climate for the entire Scheme.

4.6.2 The following climate figures were obtained from the Meteorological Office website for the nearest weather station, Southampton Weather Centre (Location: 50.901, -1.403). The figures are averaged over the years 1981-2010, and are, as follows:

- Average mean daily maximum temperature: 15.1°C
- Average mean daily minimum temperature: 7.7°C
- Annual average number of days with an air frost: 33.0 days
- Annual average number of hours with sunshine: 1689.3 hours
- Average annual rainfall: 779.4 mm
- Annual average number of rainy days (>=1mm): 114.7 days

4.6.3 The study area in terms of rainfall, sunshine and temperatures, is shown to be fairly close to the all-England statistical norm.

4.7 DRAINAGE

4.7.1 This Section of the report considers the existing carriageway drainage systems for each sub-scheme. A desk study has been undertaken using data collected from a site visit to identify the existing drainage for the scheme. No records relating to the existing drainage systems have been sourced at this stage.

4.7.2 The following judgement has been made based the information collated during the desk study to determine the drainage arrangements. As built and condition survey records will need to be obtained from Hampshire County Council and Southampton City Council at a future PCF Stage. If full information is not available a full inventory and condition survey will need to be undertaken at a future PCF Stage, as identified in paragraph 13.1.6 of this Technical Appraisal Report.

4.7.3 The existing surface water collection system consists of kerbs and gullies for all the sub schemes. The following observation were made of the drainage systems and their discharge:

- Sub scheme 1:
  - M27 Junction 8 Roundabout - the gullies appear to discharge into a surface water sewer.
  - Windhover Roundabout - the gullies appear to discharge into a ditch and a surface water sewer.
- Sub schemes 2, 3 and 5
  - A3024 Eastern Access Corridor - the discharge point(s) along the corridor are not known at this stage of the scheme. As the scheme topography falls to a low point at the River Itchen the ultimate outfall may be the River Itchen.

4.8 GEOLOGY

4.8.1 This Section outlines the geology of the entire scheme.

4.8.2 The geological and hydrogeological maps and memoirs to which the site relates are summarised as follows:

1. British Geological Survey, Solid and Drift Geology, 1:50,000, Southampton, England and Wales Sheet 315, 1987, (Keyworth, Nottingham : BGS);
2. British Geological Survey, Hydrological map of Hampshire and the Isle Of Wight, 1:100,000 000, (1979) (Keyworth, Nottingham : BGS);
3. British Geology Survey online 'Geology of Britain" Viewer (http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer/);
4. British Geological Survey web-hosted Onshore Geoindex (http://www.bgs.co.uk/geoindex/);
5. HAGDMS, Highways England, Geotechnical Data Management System[79];and
6. Groundsure Report, M27 Road Improvements, 2016. Ref GS-3280712 and GS-3280713.

HISTORIC INVESTIGATIONS

4.8.3 There are no historic ground investigations publically available along the length of the site.

EXISTING EARTHWORKS

4.8.4 There is no existing earthworks data along the A3024 corridor. Earthworks data was found around the M27 Junction 8. **Table 4-10** summarises these earthworks.

GENERAL GROUND CONDITIONS

4.8.5 The published geology indicates the area is dominated by the London Clay Formation overlying the Lambeth Group at depth. The London Clay is described as being "Very dense medium to fine silty SAND, Hard sandy CLAY". The Lambeth Group is described as a "Mottled CLAY".

4.8.6 The Bagshot Sands and the Wittering Formation, which are part of the Bracklesham Beds are present across most of the scheme, apart from around the A3024 Northam Road and A3024 Bitterne Road West and the very northeast of the scheme around M27 Junction 8. These strata, as described from previous studies, are thought to be "fine- to medium-grained SAND with occasional gravel".

[79] http://www.hagdms.co.uk

Table 4-10 Existing Earthwork Details

EARTHWORK REFERENCE	EARTHWORK TYPE	EARTHWORK CHAINAGE		CARRIAGEWAY DIRECTION	HEIGHT / DEPTH (M)	GEOLOGY CODE
		FROM	TO			
3_M27_30662	Embankment	0	537	E/B	0*	LC
3_M27_30663	Embankment	0	108	E/B	0*	LC
3_M27_30664	Embankment	0	198	E/B	0*	LC
3_M27_30665	Embankment	0	427	E/B	0*	LC
3_M27_30796	Embankment	0	203	E/B	0*	LC
3_M27_30797	Embankment	0	106	W/B	0*	LC
3_M27_30798	Embankment	0	436	W/B	0*	LC
3_M27_46685	At Grade	0	342	E/B	0	LC
3_M27_46714	At Grade	0	272	W/B	1.7	LC
3_M27_46717	At Grade	0	340	W/B	2.4	LC
3_M27_59805	At Grade	0	106	E/B	0	LC

*Extracted Directly from HAGDMS.

4.8.7 The strata in this area are predominantly dipping shallowly to south – southwest.

4.8.8 Superficial deposits where present are limited to River Terrace Deposits on land and Tidal flat deposits along the shoreline.

4.8.9 There are no geological SSSI[80] or regionally important geological and geomorphological sites within the area to be affected by either route alignment. However, there is a non-geological SSSI located at OS grid reference SU 434 130 along the scheme.

4.8.10 The summary of the exploratory hole information in close proximity to the scheme that was obtained from BGS[81] Geoindex is presented in **Table 4-11**.

[80] SSSI - Sites of Special Scientific Interest
[81] BGS – British Geological Survey

Table 4-11 Summary of exploratory borehole data from the BGS

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SE116	WEST END MIN OF TRANSPORT BH176	1968	448360	111170	4.57
SU41SE111	WEST END MIN OF TRANSPORT BH171	1968	448420	111270	7.62
SU41SE112	WEST END MIN OF TRANSPORT BH172	1968	448430	111260	16.76
SU41SE126	WEST END MIN OF TRANSPORT BH186	1968	448460	111140	16.76
SU41SE128	WEST END MIN OF TRANSPORT BH188	1968	448460	111080	6.4
SU41SE114	WEST END MIN OF TRANSPORT BH174	1968	448460	111190	10.67
SU41SE125	WEST END MIN OF TRANSPORT BH185	1968	448460	111160	7.62
SU41SE109	WEST END MIN OF TRANSPORT BH168	1968	448460	111280	16.76
SU41SE110	WEST END MIN OF TRANSPORT BH169	1968	448470	111270	7.62
SU41SE113	WEST END MIN OF TRANSPORT BH173	1968	448480	111240	10.36
SU41SE123	WEST END MIN OF TRANSPORT BH182	1968	448500	111180	16.76
SU41SE124	WEST END MIN OF TRANSPORT BH183	1968	448510	111160	7.62
SU41SE127	WEST END MIN OF TRANSPORT BH187	1968	448520	111130	9.14
SU41SE115	WEST END MIN OF TRANSPORT BH175	1968	448580	111260	4.57
SU41SE119	WEST END MIN OF TRANSPORT BH179	1968	448130	111040	4.57
SU41SE118	WEST END MIN OF TRANSPORT BH178	1968	448190	111080	5.18
SU41SE129	WEST END MIN OF TRANSPORT BH189	1968	448540	111020	4.57
SU41SE502	GREEN LANE DEPOT TP3	Unknown	447640	111030	2.7 - Confidential
SU41SE121	WEST END MIN OF TRANSPORT BH180	1968	448010	111060	4.57
SU41SE122	WEST END MIN OF TRANSPORT BH181	1968	448030	110960	5.18
SU41SE120	WEST END MIN OF TRANSPORT BH179A	1968	448040	111020	7.01
SU41SE510	GREEN LANE DEPOT TP11	Unknown	447600	111080	3.55 - Confidential
SU41SE511	GREEN LANE DEPOT TP12	Unknown	447610	111090	3.5 - Confidential
SU41SE508	GREEN LANE DEPOT TP9	Unknown	447560	111100	3.6 - Confidential
SU41SE501	GREEN LANE DEPOT TP2	Unknown	447630	111120	3 - Confidential
SU41SE500	GREEN LANE DEPOT TP1	Unknown	447580	111130	3.5 - Confidential
SU41SE117	WEST END MIN OF TRANSPORT BH177	1968	448300	111140	4.57
SU41SE349	BOTLEY/BURSDEN ROAD BH1	1976	447340	111330	15

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SE567	BURSLEDON ROAD TH4	1960	447212	111489	3
SU41SE568	BURSLEDON ROAD TH5	1960	447225	111500	Unknown
SU41SE566	BURSLEDON ROAD TH3	1960	447180	111510	3
SU41SE221	THORNHILL FLATS and MAISONETTES BH4	1958	446610	111980	7.69
SU41SE220	THORNHILL FLATS and MAISONETTES BH3	1958	446680	112020	7.77
SU41SE235	THORNHILL SECTION 4 BH10	1958	446860	111770	15.24
SU41SE234	THORNHILL SECTION 4 BH9	1958	446950	111700	4.57
SU41SE225	THORNHILL C	1958	447100	111580	24.38
SU41SE564	BURSLEDON ROAD TH1	1960	447110	111552	3
SU41SE570	BURSLEDON ROAD TH7	1960	447132	111578	3
SU41SE565	BURSLEDON ROAD TH2	1960	447142	111530	3
SU41SW1051	SITA SITE DRIVERS WHARF SOUTHAMPTON TP9	2001	443393	112864	1 - Confidential
SU41SW249	NORTHAM ROAD BRIDGE NO.2	Unknown	443220	112880	15.84
SU41SW248	NORTHAM ROAD BRIDGE NO.1	Unknown	443180	112880	18.28
SU41SW247	NORTHAM ROAD BRIDGE NO.3	Unknown	443240	112900	13.41
SU41SW246	NORTHAM ROAD BRIDGE NO.4	Unknown	443280	112930	12.49
SU41SW245	NORTHAM ROAD BRIDGE NO.5	Unknown	443280	112980	16.45
SU41SW244	NORTHAM ROAD BRIDGE NO.6	Unknown	443290	112980	13.87
SU41SW243	NORTHAM ROAD BRIDGE NO.7	Unknown	443290	113040	9.91
SU41SW242	NORTHAM ROAD BRIDGE NO.8	Unknown	443310	113060	12.8
SU41SW241	NORTHAM ROAD BRIDGE NO.9	Unknown	443320	113120	16.76
SU41SW895	BRYANSTON ROAD T13	1983	443210	113180	20.1
SU41SW872	BITTERNE ROAD TPS 1-5+BHS 1-6	1982	443300	113180	10
SU41SW898	BITTERNS ROAD TP16	1982	443140	113250	13
SU41SW896	BRYANSTON ROAD T14	1893	443230	113250	10
SU41SW897	BITTERNS ROAD TP15	1893	443180	113290	10
SU41SW899	BITTERNS ROAD TP17	1893	443240	113300	10
SU41SE353	BITTERNE SEWER BH4	Unknown	445750	112750	5
SU41SE701	BITTERNE ROAD IMPROVEMENT SCHEME 110	1972	445500	112770	Confidential

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SE755	BITTERNE SOUTHAMPTON 4	1983	445149	112913	Confidential
SU41SE754	BITTERNE SOUTHAMPTON 3	1983	445131	112936	Confidential
SU41SE698	BITTERNE ROAD IMPROVEMENT SCHEME 103	1972	445130	112950	Confidential
SU41SE752	BITTERNE SOUTHAMPTON 1	1983	445179	112954	Confidential
SU41SE753	BITTERNE SOUTHAMPTON 2	1983	445135	112966	Confidential
SU41SE699	BITTERNE ROAD IMPROVEMENT SCHEME 104	1972	445130	113000	Confidential
SU41SE246	BITTERNE ROAD BH6(560)	1968	445260	113000	19.81
SU41SE700	BITTERNE ROAD IMPROVEMENT SCHEME 108	1972	445330	113000	Confidential
SU41SE515	BITTERNE PARK T	1983	445130	113010	Confidential
SU41SE245	BITTERNE ROAD BH5(559)	1968	445210	113090	9.14
SU41SE696	BITTERNE ROAD IMPROVEMENT SCHEME 101	1972	445020	113100	Confidential
SU41SE583	BITTERNE BY-PASS 8	1980	445030	113110	Confidential
SU41SE244	BITTERNE ROAD BH4(558)	1968	445070	113120	24.38
SU41SE582	BITTERNE BY-PASS 7	1980	445095	113127	Confidential
SU41SE697	BITTERNE ROAD IMPROVEMENT SCHEME 102	1972	445080	113140	Confidential
SU41SE581	BITTERNE BY-PASS 6	1980	445040	113145	Confidential
SU41SE243	BITTERNE ROAD BH3(557)	1968	445040	113150	24.38
SU41SW1029	UNIT 8 DRIVERS WHARF SOUTHAMPTON 1B	2001	443318	112752	6 - Confidential
SU41SW1025	UNIT 8 DRIVERS WHARF SOUTHAMPTON 1	2001	443318	112752	6 - Confidential
SU41SW1026	UNIT 8 DRIVERS WHARF SOUTHAMPTON 2	2001	443341	112757	20 - Confidential
SU41SW1037	UNIT 8 DRIVERS WHARF SOUTHAMPTON WS7	2001	443323	112758	3 - Confidential
SU41SW683	DIXON and CARDUS LTD NORTHAM RD S/HAMPTON	1941	443260	112780	115.21
SU41SW1056	RAMPART ROAD P.S. BITTERNE F	1989	443860	113410	5
SU41SW1057	RAMPART ROAD P.S. BITTERNE G	1989	443890	113410	5
SU41SW536	BITTERNE PARK RELIEF SEWER BH9	1969	443940	113490	3.96
SU41SW537	BITTERNE PARK RELIEF SEWER BH10	1969	443950	113360	3.65
SU41SW721	BITTERNE PARK G	1983	443990	113340	Confidential
SU41SW722	BITTERNE PARK H	1983	444120	113370	Confidential
SU41SW723	BITTERNE PARK J	1983	444270	113370	Confidential

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SW724	BITTERNE PARK K	1983	444480	113340	Confidential
SU41SW725	BITTERNE PARK L	1983	444640	113230	Confidential
SU41SW726	BITTERNE PARK M	1983	444700	113330	Confidential
SU41SW218	NORTHAM BH9	1958	443190	112460	9.14
SU41SW215	NORTHAM BH6	1958	443160	112480	9.14
SU41SW213	NORTHAM BH4	1958	443100	112490	9.14
SU41SW210	NORTHAM BH1	1958	443090	112520	9.14
SU41SW214	NORTHAM BH5	1958	443130	112530	9.14
SU41SW222	NORTHAM BH13	1958	443230	112530	9.14
SU41SW152	NORTHAM 16 STOREY FLATS BH1	1959	443170	112560	15.24
SU41SW223	NORTHAM BH14	1958	443240	112560	9.14
SU41SW153	NORTHAM 16 STOREY FLATS BH2	1959	443210	112580	15.24
SU41SW211	NORTHAM BH2	1958	443130	112580	9.14
SU41SW216	NORTHAM BH7	1958	443170	112590	9.14
SU41SW219	NORTHAM BH10	1958	443200	112590	12.19
SU41SW1022	NORTHAM BRIDGE SOUTHAMPTON 6	1971	443100	112620	9.14
SU41SW217	NORTHAM BH8	1958	443190	112630	9.14
SU41SW224	NORTHAM BH15	1958	443240	112630	9.14
SU41SW229	NORTHAM BH20	1958	443290	112640	9.14
SU41SW212	NORTHAM BH3	1958	443150	112640	9.14
SU41SW1013	BITTERNE ROAD IMPROVEMENT SCHEME TP2	1972	444810	113070	2.9
SU41SW1011	BITTERNE ROAD IMPROVEMENT SCHEME 109	1972	444810	113070	5.5
SU41SW1016	BITTERNE ROAD IMPROVEMENT SCHEME TP5	1972	444820	113070	2.6
SU41SW1015	BITTERNE ROAD IMPROVEMENT SCHEME TP4	1972	444840	113060	3
SU41SW1014	BITTERNE ROAD IMPROVEMENT SCHEME TP3	1972	444850	113050	3
SU41SW1010	BITTERNE ROAD IMPROVEMENT SCHEME 107	1972	444860	113110	15.5
SU41SW1008	BITTERNE ROAD IMPROVEMENT SCHEME 105	1972	444860	113170	14.3
SU41SW1009	BITTERNE ROAD IMPROVEMENT SCHEME 106	1972	444860	113140	12.4
SU41SW72	BITTERNE ROAD BH1 (555)	1968	444890	113090	19.8

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SW73	BITTERNE ROAD BH2 (556)	1968	444900	113050	24.38
SU41SW1012	BITTERNE ROAD IMPROVEMENT SCHEME TP1	1972	444920	113090	3.3
SU41SW82	COMPTON WALK UNDERPASS BH2	1965	442300	112450	9.14
SU41SW1021	NORTHAM BRIDGE SOUTHAMPTON 5	1971	443020	112470	9.14
SU41SW81	COMPTON WALK UNDERPASS BH1	1965	442240	112490	9.14
SU41SW453	ST MARYS SOTON NO.2	1971	442210	112610	14.63
SU41SW455	ST MARYS SOTON NO.4	1971	442250	112630	10.67
SU41SW1064	NORTHAM PRIMARY SCHOOL SOUTHAMPTON TP1	1993	443140	112410	Confidential
SU41SW782	SIX DIALS ROAD IMPROVEMENT BH1	1982	442790	112250	10
SU41SW1017	NORTHAM BRIDGE SOUTHAMPTON 1	1971	442820	112330	12.19
SU41SW1018	NORTHAM BRIDGE SOUTHAMPTON 2	1971	442860	112350	24.38
SU41SW1019	NORTHAM BRIDGE SOUTHAMPTON 3	1971	442890	112350	18.28
SU41SW670	STHN GAS BOARD GAS WORKS MARINE PARADE	1928	442900	112300	31.39
SU41SW669	STHN GAS BOARD GAS WORKS MARINE PARADE	1928	442900	112200	12.64
SU41SW1020	NORTHAM BRIDGE SOUTHAMPTON 4	1971	442930	112380	9.14
SU41SW362	GASWORKS	1899	442930	112320	12.65
SU41SW1065	NORTHAM PRIMARY SCHOOL SOUTHAMPTON TP2	1993	443100	112380	Confidential
SU41SW646/A-I	SOUTHAMPTON COLLEGE OF TECHNOLOGY	Unknown	442200	112150	Unknown
SU41SW639	PROPOSED LIBRARY FOR COLLEGE	1979	442200	112250	25
SU41SW645/A	SOUTHAMPTON COLLEGE OF ART A	1969	442250	112300	18.74
SU41SW645/B	SOUTHAMPTON COLLEGE OF ART B	1969	442250	112300	14.63
SU41SW491/A-I	NEW STREET BH1-5	1975	442320	112130	10
SU41SW785	SIX DIALS ROAD IMPROVEMENT BH4	1982	442390	112250	10.45
SU41SW743	NEW ROAD 1	1984	442400	112140	Confidential
SU41SW1	SIX DIALS BRIDGE NOS.1,2,3 SOUTHAMPTON	1960	442430	112130	15.24
SU41SW789	SIX DIALS ROAD IMPROVEMENT TH.C	1982	442460	112190	2.1
SU41SW712	CLIFFORD STREET TH3	Confidential	442520	112120	Confidential
SU41SW784	SIX DIALS ROAD IMPROVEMENT BH3	1982	442530	112190	10.3
SU41SW711	CLIFFORD STREET TH2	Confidential	442530	112100	Confidential

EXPLORATORY HOLE REF	HOLE NAME	YEAR	COORDINATES		DEPTH (METERS BELOW GROUND LEVEL)
			EASTING	NORTHING	
SU41SW1023	NORTHAM BRIDGE SOUTHAMPTON 7	1971	442540	112270	9.14
SU41SW713	CLIFFORD STREET TH4	Confidential	442550	112120	Confidential
SU41SW710	CLIFFORD STREET TH1	Confidential	442550	112110	Confidential
SU41SW714	CLIFFORD STREET TH5	Confidential	442560	112130	Confidential
SU41SW787	SIX DIALS ROAD IMPROVEMENT TH.B	Unknown	442560	112190	1.6
SU41SW786	SIX DIALS ROAD IMPROVEMENT TH.A	Unknown	442630	112210	1.7
SU41SW89	BELVIDERE SEWER DERBY ROAD BH1	1965	442690	112200	7.62
SU41SW783	SIX DIALS ROAD IMPROVEMENT BH2	1982	442700	112200	10
SU41SW90	BELVIDERE SEWER DERBY ROAD BH2	1965	442700	112300	6.09
SU41SW644	SOUTHAMPTON COLLEGE OF ART C	1969	442180	112290	18.75

4.8.11 Following analysis of historic ground investigations, the geological sequence across the surrounding area is shown in **Table 4-12**. Further ground investigation shall be required to confirm conditions.

Table 4-12 Summary of geological sequence

FORMATION	PROBABLE CONSTITUENTS	DERIVED APPROXIMATE DEPTHS TO TOP OF STRATA (MBGL[82])
Superficial Deposits		
Topsoil and Subsoil	-	GL[83]
Made ground	Sand with concrete, bricks and some flint gravel	GL
Tidal Flat Deposits	Soft to Very soft slightly silty CLAY with occasional pockets and bands of peat.	GL – 3.15 mbgl
River Terrace Deposits	Dense to Very Dense occasionally clayey silty SAND and GRAVEL	GL – 7.4 mbgl
Solid		
Bracklesham Beds (Wittering Formation overlying the Bagshot Formation)	Fine- to medium-grained SAND with occasional gravel	2.1 – 6.9 mbgl
London Clay	Very dense medium to fine silty SAND – Hard sandy CLAY	0.3 – 26.8 mbgl (London clay is encountered at the shallower depth to the northeast of the scheme and is not overlain by the Bracklesham Beds)
Lambeth Group	Mottled CLAY	108.5 mbgl

[82] MGBL – Meters Below Ground Level
[83] GL – Ground level

GROUND STABILITY

4.8.12 Potential stability hazards at the site as described in the GeoInsight Report are presented in **Table 4-13**:

Table 4-13 Stability Hazards

TYPE OF INSTABILITY	RISK RANGE
Collapsible Ground	Negligible - Low
Compressible Ground	Negligible - Moderate
Ground Dissolution	Negligible - Moderate
Landslide	Negligible - Moderate
Running Sand	Negligible - Low
Shrinking or swelling clay	Negligible - Moderate

HYDROGEOLOGY

4.8.13 Groundwater has been recorded in four BGS[84] historical boreholes and ranges between 1.60 mbgl[85] and 11.50 mbgl, usually on the Lambeth Group or Chalk strata boundary. However, some historic boreholes around Northam encountered an artesian water head.

4.8.14 The following hydrogeological findings were derived from the Groundsure Environsight Report for the study area:

Table 4-14 Hydrogeology Summary

CONTEXT	CLASSIFICATION RANGE
Bedrock Classification	Secondary A - Unproductive
Superficial Deposits Classification	Secondary A – Unproductive
Source Protection Zones	None
Vulnerability	Minor Aquifer Low – Minor Aquifer High.

4.9 MINING

4.9.1 The Groundsure Report (Ref GS-3280712 and GS-3280713) for the Scheme indicates there no instances of mining related activity on site or any natural cavities.

[84] BGS – British Geological Survey
[85] MGBL - Meters Below Ground Level

4.10 PUBLIC UTILITIES

4.10.1 Initially C2 Enquiries were submitted to identify any utilities within the vicinity of the scheme. Subsequently, C3 Enquiries were submitted to assess the potential impact of the proposed sub-schemes and estimate the cost of diverting the affected utilities.

4.10.2 The following utilities have been identified as affected:

- British Telecommunication / Openreach
- Southern Gas Network
- Southern Water
- Scottish Southern Energy
- Virgin Media
- Vodafone
- CLH Gas
- GTC
- Instalcom
- Redcentric

4.10.3 Refer to **Appendix B-4** for the utility reports and drawings for all sub-schemes.

4.11 STREET LIGHTING

4.11.1 This section considers the existing street lighting along the full extent of the scheme with the aim of assessing the current condition of the assets and recommending different levels of interventions to improve them.

4.11.2 The street lighting condition has been assessed in two parts. The first part is M27 Junction 8 and Windhover Roundabout, including Bert Betts Way, and the second is the A3024 eastern access corridor between Windhover Roundabout and the Six Dials Junction, which includes Bitterne Rail Bridge and Northam Rail Bridge. It should be noted that the street lighting equipment along the A3024 corridor, where no works are proposed, have not been assessed.

4.11.3 West Sussex County Council, Hampshire County Council and Southampton City Council joined forces for what is known as the 'South Coast Street Lighting PFI' which is a 25 year street lighting PFI[86] contract delivered by SSE[87]. Effectively SSE has taken over the responsibility for maintaining and providing the street lighting service in Southampton and Hampshire for a 25 year period. As part of the PFI process it is usual to have a CIP[88]. The CIP is where all the age expired columns are replaced and this can be anything up to 80% or even 90% of the lighting stock replaced within the CIP. It is normal for the CIP to last for 5 to 6 years. All remaining lighting units that are not part of the CIP are usually replaced at some time later in the contract. Some of the existing lighting infrastructure may be greater than 10 years old and would likely be replaced under the current PFI Lifetime Replacement program.

4.11.4 This report is based on a visual assessment from publically available data in Google Street View. The description of the equipment types and their age are provisional but adequate for the scope of Stage 1. In order to provide more detailed information, inventory data from Southampton City Council via SSE Contracting who are responsible for overseeing the current PFI, will be needed during later stages. The existing lighting installation uses a combination of LED[89] and SON[90] discharge lighting.

M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT

4.11.5 The M27 Junction 8 and Windhover Roundabout are connected via the A3024 Bert Betts Way and are currently lit by means of standard single arm and double arm street lighting columns. The assets appear to be of the same age and specification throughout.

4.11.6 The following observations have been made;

[86] PFI - Private Finance Initiative
[87] SSE - Scottish and Southern Energy Contacting Lighting Services
[88] CIP - Core Investment Period
[89] LED - Light-Emitting Diode
[90] SON – Sodium Oxide

- Both roundabouts and the connecting link road are illuminated to BS5489-1:1992 or 2003 (COP[91] for the design of road lighting) using standard street lighting equipment.
- The majority of the columns are approximately 10m nominal height with bracket arm(s) of 0.5m or greater with WRTL Arc lantern units with SON[92] lamps of 100w to 150w. Each lantern is individually switched via a lantern mounted photocell.
- Each column is serviced by a 230V SPN[93] Distribution Network Operator incoming supply or an un-switch private supply network.
- There are a small number of unknown type under bridge flood lighting units present on the M27 Junction 8 Roundabout.

WINDHOVER ROUNDABOUT

4.11.7 This Section comprises of 56 existing single arm road lighting columns which are to be considered as part of these works. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-10301 in **Appendix B-5**.

Figure 4-14: Windhover Roundabout Asset

Sources: Map data ©2016 Google

Figure 4-14 shows an existing road lighting column on Windhover Roundabout.

The column age is unknown, however it is envisaged that the luminaire units are approximately 15 years old and visually the structure appears to be in good condition.

[91] COP - Code Of Practice
[92] HPS - High Pressure Sodium
[93] SPN - Single Phase and Neutral

A3024 BERT BETTS WAY

4.11.8 This Section comprises of nine double arm road lighting columns which are to be considered as part of these works. For further information refer to drawing numbers HE551514-WSP-HGN-M27-DR-D-10301 and HE551514-WSP-HGN-M27-DR-D-10302 **Appendix B-5**.

Figure 4-15: A3024 Bert Betts Way Asset

Sources: Map data ©2016 Google

Figure 4-15 shows an existing road lighting column on the A3024.

The column age is unknown, however it is envisaged that the luminaire units are approximately 15 years old and visually the structure appears to be in good condition.

M27 JUNCTION 8

4.11.10 This Section comprises of 24 single arm road lighting columns which are to be considered as part of these works. There are also 4 under bridge mounted floodlights present at this location which are not identified on drawing HE551514-WSP-HGN-M27-DR-D-10302 in **Appendix B-5**. The drawings but need to be considered under these works. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-10302 in **Appendix B-5**.

Figure 4-16: M27 Junction 8 Asset

Sources: Map data ©2016 Google

Figure 4-16 shows an existing road lighting column on the M27 Junction 8 Roundabout.

The column age is unknown, however it is envisaged that the units are approximately 15 years old and visually the structure appears to be in good condition.

A3024 BITTERNE ROAD

Figure 4-17: M27 Junction 8 Asset

Sources: Map data ©2016 Google

Figure 4-17 shows an existing under bridge mounted floodlight on the M27 Junction 8 Roundabout.

The flood light age is unknown, however it is envisaged that the units are approximately 15 years old and visually they appear to be in good condition.

A3024 CORRIDOR

4.11.11 The A3024 is currently lit by means of standard single arm and double arm street lighting columns. The assets mainly appear to be of the same age and specification throughout.

4.11.12 The following observations have been made;

- The A3024 Junction with Brinton's Road is illuminated using standard street lighting equipment. The columns are approximately 12m nominal height and come complete with Philips WRTL Luma LED[94] lantern units. The equipment appears to be less than 5 years old. As the equipment appears to be new it is assumed that the Junction is illuminated to BS5489-1: 2013 (COP[95] for the design of road lighting).
- The A3024 appears to be illuminated using standard street lighting equipment. The majority of the columns are approximately 10m nominal height and come complete with bracket arm(s) of 0.5m or greater with Philips WRTL Iridium lantern units with SON lamps of 100w to 150w. It is assumed that it is illuminated to BS5489-1: 2003 or 2013 (COP for the design of road lighting).
- Each lantern appears to be individually switched via a lantern mounted photocell.
- It is assumed that each column is serviced by a 230V SPN[96] Distribution Network Operator incoming supply or an un-switch private supply network.

[94] LED – Light Emitting Diode
[95] COP - Code Of Practice
[96] SPN - Single Phase and Neutral

BRINTON'S ROAD JUNCTION WITH A3024

4.11.13 This Section comprises of a number of existing single arm road lighting columns with LED[97] lanterns which are to be considered as part of these works. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-20301 in **Appendix B-5**.

Figure 4-18: Brinton's Road Junction Asset

Sources: Map data ©2016 Google

Figure 4-18 shows an existing road lighting column on the Brinton's Road Junction.

The column age is unknown, however it is envisaged that the units are less than 5 years old and visually the structure appears to be of a good condition.

[97] LED – Light-Emitting Diode

A3024 FROM BRINTON'S ROAD JUNCTION TO NORTHAM RAIL BRIDGE

4.11.14 This Section comprises of a number of existing single arm road lighting columns with LED[98] lanterns which are to be considered as part of these works. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-20301 **Appendix B-5**.

Figure 4-19: Northam Rail Bridge Asset

Sources: Map data ©2016 Google

Figure 4-19 shows an existing road lighting column on Northam Rail Bridge.

The column age is unknown, however it is envisaged that the units are less than 5 years old and visually the structure appears to be of a good condition.

A3024 FROM NORTHAM RAIL BRIDGE TO BRITANNIA ROAD JUNCTION

4.11.15 This Section comprises of a number of existing single arm road lighting columns with SON[99] lanterns which are to be considered as part of these works. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-20301 in **Appendix B-5**.

[98] LED – Light Emitting Diode
[99] SON – Sodium Oxide

Figure 4-20: Northam Rail Bridge Asset

Sources: Map data ©2016 Google

Figure 4-20 shows an existing road lighting column on Northam Rail Bridge.

The column age is unknown, however it is envisaged that the units are less than 10 years old and visually the structure appears to be of a good condition.

A3024 NORTHAM ROAD

4.11.16 This Section comprises of a number of existing single arm road lighting columns and lanterns. The lighting column which falls into the scope of works form part of the Northam River Bridge structure is of a bespoke nature and has a decorative lantern fitting. For further information refer to drawing number HE551514-WSP-HGN-M27-DR-D-20302 in **Appendix B-5**.

Figure 4-21: Northam River Bridge Crossing Asset

Sources: Map data ©2016 Google

Figure 4-21 shows the affected road lighting column on the Northam River Bridge Crossing.

The column age is unknown, however visually the structure appears to be of a good condition. The column has a significant foundation.

A3024 BITTERNE ROAD WEST FROM RAMPART ROAD JUNCTION TO MIDANBURY LANE JUNCTION

4.11.17 This Section comprises of a number of existing single arm road lighting columns with SON[100] lanterns which are to be considered as part of these works. A number of the lighting columns which fall into the scope of works are mounted on the Bitterne Bridge deck. For further information refer to drawing numbers HE551514-WSP-HGN-M27-DR-D-20303 and HE551514-WSP-HGN-M27-DR-D-20304 in **Appendix B-5**.

Figure 4-22: Bitterne Road West Asset

Sources: Map data ©2016 Google

Figure 4-22 shows an existing road lighting column on the A3024 Bitterne Road West from Rampart Road Junction to Midanbury Lane Junction.

The column age is unknown, however it is envisaged that the units are less than 10 years old and visually the structure appears to be of a good condition.

[100] SON – Sodium Oxide

A3024 BURSLEDON ROAD FROM MAYBRAY KING WAY JUNCTION TO WINDHOVER ROUNDABOUT

4.11.18 This Section comprises of a number of existing single arm road lighting columns with SON[101] lanterns which are to be considered as part of these works. For further information refer to drawing numbers HE551514-WSP-HGN-M27-DR-D-20306 to HE551514-WSP-HGN-M27-DR-D-20310 in **Appendix B-5**.

Figure 4-23: Maybray King Way and Bursledon Road Asset

Sources: Map data ©2016 Google

Figure 4-23 shows an existing road lighting column on the A3024 Maybray King Way and Bursledon Road.

The column age is unknown, however it is envisaged that the units are less than 10 years old and visually the structure appears to be of a good condition.

[101] SON – Sodium Oxide

Figure 4-24: Cavan Street Junction Asset

Sources: Map data ©2016 Google

Figure 4-24 shows an existing road lighting column on the A3024 Bursledon Road at Gavan Street Junction.

The column age is unknown, however it is envisaged that the units are less than 15 years old and visually the structure appears to be of a good condition.

Figure 4-25: A3024 between Botley Road and Windhover Roundabout

Sources: Map data ©2016 Google

Figure 4-25 shows an existing road lighting column on the A3024 east of Botley Road Junction.

The column age is unknown, however it is envisaged that the units are less than 15 years old and visually the structure appears to be of a good condition.

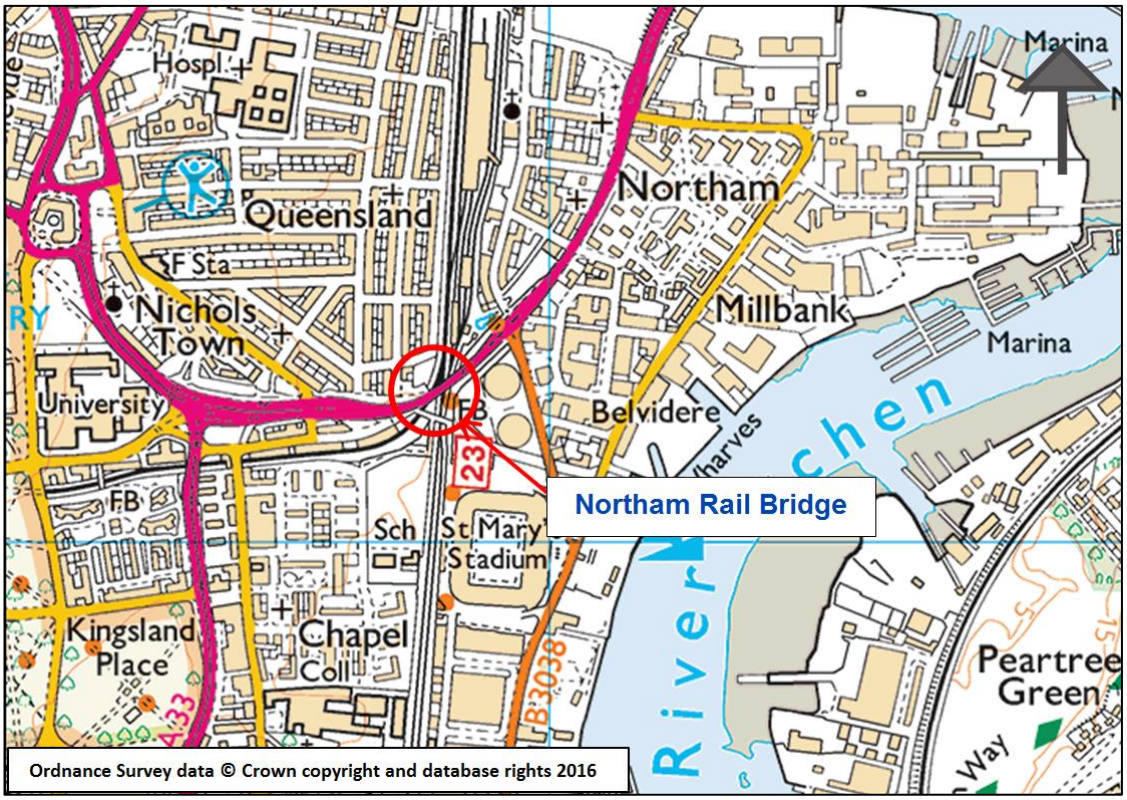
4.12 STRUCTURES

4.12.1 This Section of the report outlines the existing structures relating to Sub-scheme 3 and sub-scheme 5.

NORTHAM RAIL BRIDGE

4.12.2 Northam Rail Bridge constitutes Sub-Scheme 3 of the M27 Southampton Junctions Scheme; the location of the bridge is shown in **Figure 4-26**.

Figure 4-26 Northam Rail Bridge Location Plan



4.12.3 The existing bridge spans the BML2 (Waterloo (main lines) – Weymouth (Bournemouth Main Line)) and SOY (Northam Jn – Southampton Eastern Docks) railway lines. The bridge currently has a 7.5 tonne weight limit, although buses are permitted to use the bridge.

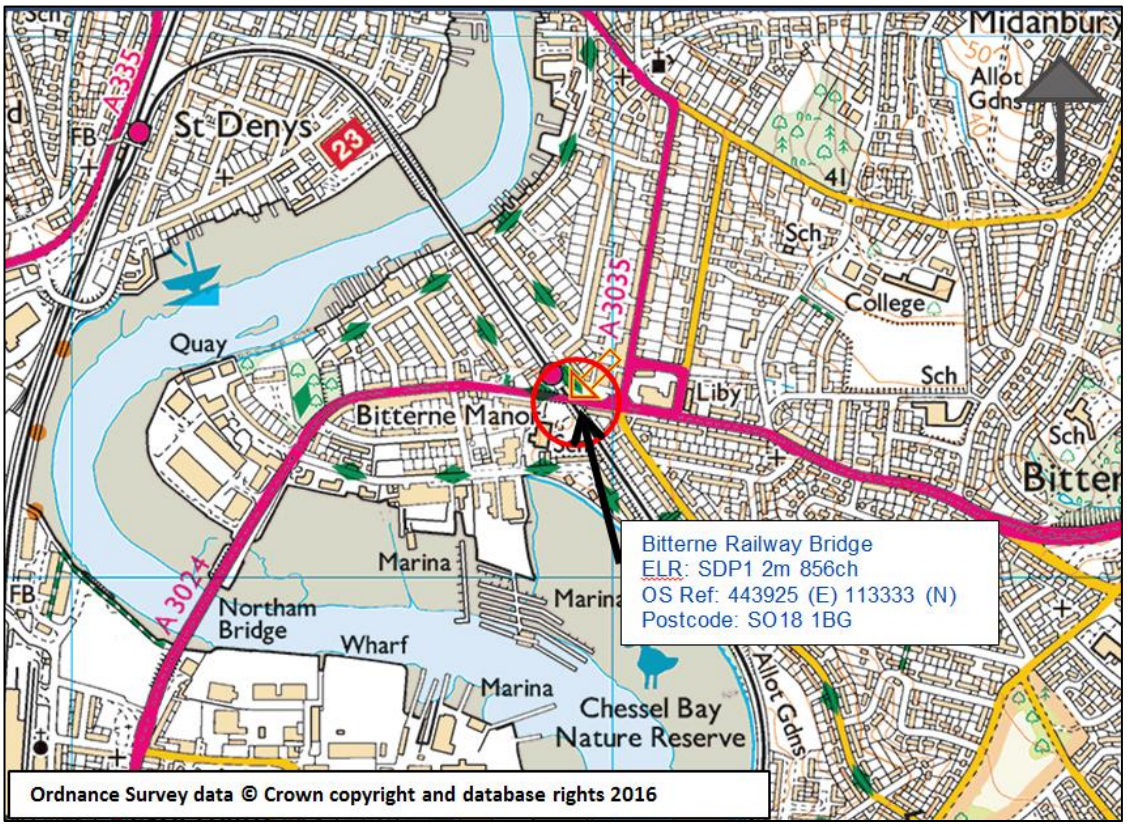
4.12.4 The existing bridge is a through truss type bridge where the deck supporting the road is at the level of the bottom chord of the edge trusses. The existing trusses are of riveted plate girder construction. This through truss form of structure is ideally suited for bridge spans in excess of 50m as required at this location. The bridge is supported on masonry abutments and a masonry pier. It is assumed that the bridge was constructed in-situ with scaffolding staging.

4.12.5 The existing condition is considered fair; refer to Structures Option Report (Document number: HE551514-WSP-SGN-PCF1-RP-S-00001-SOR-Northam) for the most recent structures examination report from Network Rail.

BITTERNE RAIL BRIDGE

4.12.6 The widening of Bitterne Bridge constitutes Sub-Scheme 5 of the M27 Southampton Junctions Scheme; the location of the bridge is shown in **Figure 4-27**.

Figure 4-27 Bitterne Rail Bridge Location Plan



4.12.7 The existing bridge spans the SDP1 (St Denys Jn – Portcreek Jn) railway line. The current footpaths either side of the single carriageway are not capable of supporting highway loading and are currently protected by Trief kerbs.

4.12.8 The current bridge (1932) comprises of 10 single span precast “concrete block” beams under the carriageway, each composed of encased twin riveted plate girders. The edge Sections supporting the footway and parapets are composed of concrete “pipe blocks” composed of three riveted plate girders connected with bottom stiffeners and concrete finished to form two service troughs in a “W” Section. The blocks are jointed with cement and a concrete topping screed above. The road surfacing is placed on to the concrete topping. Trief kerbs are installed to the edge of the carriageway to prevent vehicles from moving onto the footway.

4.12.9 For further information on the Bitterne Rail Bridge, please refer to the Structures Option Report (Document number: HE551514-WSP-SGN-PCF1-RP-S-00003-SOR_BITTERNE).

5 ENVIRONMENTAL STATUS

5.1 GENERAL

5.1.1 The Scheme is located in South Hampshire, mostly within an urban area in a landscape of low sensitivity.

5.1.2 The Scheme is located in the vicinity of both statutory and non-statutory designated nature conservation sites including SSSI[102], SAC[103], SPA[104], Ramsar sites, LNR[105] and SINC[106]. Habitats within the Scheme are likely to support protected and notable species.

5.1.3 There are many sensitive heritage assets located within the 500m study area of the Scheme including listed buildings and Scheduled Monuments.

5.1.4 There are 12 Noise Important Areas within 100m of the Scheme and 21 Noise Sensitive Receptors that have the potential to be adversely impacted. Preliminary traffic analysis indicates air quality impacts may be experienced in Redbridge/Millbrook Road AQMA[107], Town Quay AQMA and Bevois Valley AQMA.

5.1.5 The major surface water feature within the study area is the River Itchen and its related tributaries, which converge with the River Test and form Southampton Water. The majority of the Scheme is located within the low risk Flood Zone 1; however, some areas are within high risk Flood Zone 3 and medium risk Flood Zone 2.

5.1.6 This Section of the report outlines the environmental status for each sub-scheme.

5.1.7 The Environmental Constraints Maps for each sub-scheme can be found in **Appendix C.**

5.2 SUB-SCHEMES

5.2.1 There are no statutory designated landscape areas in close proximity to any of the sub-schemes. The landscape surrounding the sub-schemes has been identified as South Hampshire Lowlands and South Coast Plain NCAs[108].

---

[102] SSSI - Site of Special Scientific Interest
[103] SAC - Special Area of Conservation
[104] SPA - Special Protection Area
[105] LNR - Local Nature Reserves
[106] SINC – Sites of Importance for Nature Conservation
[107] AQMA – Air Quality Management Area
[108] NCA - National Character Area

5.2.2 There are several statutory ecological designations within 2km of the sub-schemes as follows:

- Sub-scheme 1 - One Ramsar, one SAC[109], One SPA[110], one SSSI[111], three LNRs;
- Sub-scheme 2 - One Ramsar, two SAC, one SPA, five SSSI, four LNR's;
- Sub-scheme 3 - One Ramsar, one SPA, two SSSI, one LNR; and
- Sub-scheme 5 - One Ramsar, one SAC, one SPA, three SSSI, one LNR.

5.2.3 The following designated historic assets are within 500m of each sub-scheme:

- Sub-scheme 1 - three Listed Buildings (one Grade II* and two Grade II listed) and no Scheduled Monuments;
- Sub-scheme 2 - ten Listed Buildings and two Scheduled Monuments;
- Sub-scheme 3 - nine Listed Buildings (Grade II) and no Scheduled Monuments; and
- Sub-scheme 5 - two Listed Buildings (Grade II) and two Scheduled Monuments.

5.2.4 NIAs[112] may potentially be adversely affected by sub-schemes. NIAs that overlap or are within 100m of the Sub-schemes comprise:

- Sub-scheme 1 - overlaps two NIAs;
- Sub-scheme 2 - overlaps seven NIAs and one is within 100m;
- Sub-scheme 3 - overlaps two NIA and one is within 100m; and
- Sub-scheme 5 - overlaps one NIA.

5.2.5 Review of the EA[113] Flood Map for Planning (Rivers and Sea) indicates the following;

- Sub-Schemes 1 is located within the low risk Flood Zone 1;
- Sub-scheme 2 is partially located within the high risk Flood Zone 3, including land immediately to the east of the River Itchen at the location of the A3024 Bitterne Road West (west of Hawkewood Road) and land immediately to the west of the River Itchen at the location of the A3024 Northam Road (east of the railway);
- Sub-scheme 3 is partially located within the medium risk Flood Zone 2 where the road crosses the railway. However, this risk appears to be associated with the railway that is located beneath the road. Land located immediately to the east of Sub-scheme 3 is located within the high risk Flood Zone 3, although this is beyond the extent of the Scheme area; and
- Sub-Schemes 5 is located within the low risk Flood Zone 1.

---

[109] SAC - Special Area of Conservation
[110] SPA - Special Protection Area
[111] SSSI - Site of Special Scientific Interest
[112] NIA – Noise Important Area
[113] EA - Environmental Agency

5.2.6 There are no statutory designated landscape areas in close proximity to any of the Sub-schemes. The landscape surrounding the Sub-schemes has been identified as South Hampshire Lowlands and South Coast Plain NCAs[114].

[114] NCA - National Character Area

6 ENVIRONMENT

6.1 INTRODUCTION

6.1.1 This Section of the report considers the existing environmental conditions for each individual sub-scheme for the following criteria:

- Noise and Vibration;
- Air Quality;
- Greenhouse Gases;
- Landscape and Townscape;
- Cultural Heritage;
- Nature Conservation;
- Road Drainage and the Water Environment;
- People and Communities;
- Geology and Soil;
- Historical Land Use; and
- Materials.

6.1.2 A Preliminary Environmental Risk Assessment (Document Number: HE551514-WSP-GEN-PCF1-RP-EN-00001) was prepared at PCF[115] Stage 0 and has been updated for the current PCF Stage 1.

6.1.3 An Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002) was produced at PCF Stage 1, with the available assessment and design information. The information presented below is a summary of the key points relating to the sub-scheme options and does not constitute all information relating to existing environmental conditions. The Preliminary Environmental Risk Assessment and the Environmental Study Report provide more detailed information and assessment of the Sub-scheme options.

6.2 NOISE AND VIBRATION

6.2.1 The Scheme consists of four Sub-schemes, three of which (Sub-schemes 2, 3 and 5) lie within the Southampton agglomeration, with many noise sensitive receptors lying within 100m of a given Sub-scheme road centreline. The fourth (Sub-scheme 1) has a more rural location, where noise sensitive receptors are fewer in number and set further back from the works.

[115] PCF – Project Control Framework

6.2.2 There are multiple NIAs[116] overlapping and in close proximity to the four Sub-schemes, as shown in **Table 6-1**. It should be noted in particular that there are NIAs located on A3024 Bursledon Road, A3024 Bitterne Road West, A3024 Northam Road, M27 northbound off and on slip roads and at the Windhover Roundabout.

6.2.3 From on-site observations it can be concluded that for the M27 Southampton Junctions Scheme as a whole, road traffic is the dominant source affecting to the existing noise climate, although rail movements and commercial uses will also contribute. The existing noise levels generally fall within the range 68-71 dB $L_{A10,18h}$ at locations close to the A3024 (i.e. within approximately 4m to 15m).

Table 6-1: Noise Important Areas

SUB-SCHEME	NIA	LOCATION	NIA TYPE AND OWNER
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout	5569	Overlap	Road (Highways England) / Road (Hampshire County Council)
	6207		
Sub-Scheme 2: A3024 Eastern Access Corridor	2204		Road (Southampton City Council)
	2205		
	2206		
	2207		
	2242		
	12264	Nearby	
	2251	Overlap	
	2210		
Sub-Scheme 3: Northam Rail Bridge		Nearby	
	RI_369	Overlap	Rail (Rail Authority)
	12661		Road (Southampton City Council)
Sub-Scheme 5: Bitterne Rail Bridge	2251		

Note:

1] The entries in this column identify whether the NIA actually overlaps the scheme extents or lies nearby (i.e. within about 100m)

[116] NIA – Noise Important Area

6.3 AIR QUALITY

6.3.1 SCC[117] has declared ten AQMA[118] within the City of Southampton of which the following are potentially affected by the Scheme:

- Eastleigh AQMA - located 600m south of Sub-scheme 1 and Sub-scheme 2 (eastern extent);
- Bitterne /Northam Road AQMA - intersected by Sub-scheme 2 and Sub-scheme 5;
- Bevois Valley AQMA - located 450m west of Sub-scheme 2 and 400m northwest of Sub-scheme 5;
- Town Quay AQMA - located 800m south of Sub-scheme 2 (western extent); and
- Redbridge/Millbrook Road AQMA - located 1.5km to the west of Sub-scheme 2.

6.3.2 All of SCC's AQMA's are designated due to exceedances of the Government's Air Quality Strategy objective for annual mean nitrogen dioxide[119]. This is primarily due to emissions of oxides of nitrogen from road vehicle exhausts.

6.3.3 In 2014, diffusion tube monitoring recorded concentrations of NO_2[120] between 34.6 micrograms per cubic metres (µg/m^3) and 39.5µg/m^3 within the Bitterne /Northam Road AQMA[121]. Sub-schemes 2 and 5 are located within the Bitterne/Northam Road AQMA.

6.3.4 The nearest monitoring site to Sub-schemes 1 and 2 is a roadside location named Bitterne AMS[122] (SCC[123] ref: N137), located approximately 4.5km and 2.2km north west of Sub-schemes 1 and 2 respectively. In 2014, the annual mean NO_2 concentration monitored at this site was 36µg/m^3. This represents an increase from previous years (since 2010). The average NO_2 concentration from 2010-2013 was 33.2µg/m^3. The nearest monitoring location which represents residential exposure is located across the A3024, approximately 25m to the south of Bitterne AMS.

6.3.5 The nearest monitoring site to Sub-scheme 3 is an urban centre location on Brinton's Road (Brinton's Road 1, Brinton's Road 2 and Brinton's Road 3) (SCC ref: N110, N111 and N112), located approximately 215m to the west of Sub-scheme 3. In 2014, the annual mean NO_2 concentration monitored at this site was 29.2µg/m^3. This concentration is similar to those of the previous three years, although no clear long-term trend is apparent. The highest concentration within this period was 32.3µg/m^3, monitored in 2010.

---

[117] SCC - Southampton City Council
[118] AQMA - Air Quality Management Areas
[119] The Air Quality Strategy objective for annual mean NO_2 is 40µg/m^3 (this is numerically the same as the EU Limit Value for annual mean NO_2)
[120] NO_2 - Nitrogen Dioxide
[121] AQMA – Air Quality Management Area
[122] AMS - Air Quality Monitoring Station
[123] SCC – Southampton City Council

6.3.6 The nearest monitoring site to Sub-scheme 5 is a roadside location approximately 300m to the west of the scheme at 81 Bitterne Road West (SCC[124] ref: N108). There is no data available for this site for 2014 as it had not been deployed at that time. However, the data can be used to define the baseline using the more recent 2015 data.

6.3.7 To date, TVBC[125] has not identified any AQMA's[126] in its administrative area. The most recent monitoring data has not identified any potential areas which may exceed air quality objectives.

6.3.8 TVBC does not currently operate any automatic monitoring sites. Non-automatic monitoring undertaken in 2014 comprised 17 NO_2[127] diffusion tubes positioned at selected kerbside, roadside, intermediate and urban background locations. In 2014, the tubes measured concentrations between 13.8µg/m^3 and 35.0µg/m^3.

6.3.9 Eastleigh Borough Council has declared three AQMAs within its borough. Analysis of the preliminary traffic data indicates that traffic impacts may be seen within the Eastleigh and the M3 AQMAs. Both have been declared for breach of the objective for annual mean nitrogen dioxide.

6.3.10 The four sub-schemes are located within the Southampton Urban Area (UK0091) for DEFRA[128] reporting of compliance with EU limit values for air quality. The latest report for 2014 indicates non-compliance with the limit value for annual mean NO_2 (40µg/m^3) and compliance with all other limit values[129].

6.3.11 All four Sub–schemes are located on PCM[130] links, with the data indicating roadside annual mean NO_2 concentrations along the scheme in the range of 29 – 39 µg/m^3 (just below the EU limit value).

6.3.12 On the wider network within Southampton, roadside annual mean NO_2 concentrations range between 23 - 63µg/m^3.

6.4 GREENHOUSE GASES

6.4.1 Greenhouse gases are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. For the purpose of the assessment of the potential impacts of a highways scheme on climate change, the gas of interest is carbon dioxide.

6.4.2 Consideration will be given at a later stage to construction and operational approaches to minimise the effect of Greenhouse Gases.

---

[124] SCC – Southampton City Council
[125] TVBC - Test Valley Borough Council
[126] AQMA - Air Quality Management Areas
[127] NO_2 - Nitrogen Dioxide
[128] DEFRA – Department for Environment, Food and Rural Affairs
[129] DEFRA, Air Pollution in the UK 2014 – Compliance Assessment Summary (http://uk-air.defra.gov.uk/library/annualreport/index)
[130] PCM – Pollution Control Mapping

6.5 LANDSCAPE AND TOWNSCAPE

6.5.1 There are no statutory or non-statutory landscape designations within the study areas surrounding the Sub-schemes (1km from Sub-schemes 1, 3 and 5 and 0.5km from Sub-scheme 2).

6.5.2 The study area lies within Natural England's NCA[131] 128 South Hampshire Lowlands. This is dominated by the city and port of Southampton and its adjoining towns and suburbs. In the more rural areas, it is a mixture of farmland and woodland. There is little intervisibility between the sub-schemes, which are located in a relatively urban area, and the surrounding rural landscape.

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

6.5.3 Filtered views of M27 Junction 8 and Windhover Roundabout are available from nearby commercial facilities, restaurant and hotel. Generally, views are screened by mature woodland planting that surrounds the junctions except where views of Windhover Roundabout are available from a small number of residential properties.

6.5.4 Townscape is characterised by large-scale commercial development, located within a setting comprising mature trees and shrubs similar to the planting at M27 Junction 8 and Windhover Roundabout. Further south the townscape is characterised by detached residential development with abundant tree planting. Further north and east the townscape comprises residential areas.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

6.5.5 Close views of the A3024 are widely available to adjacent residential properties and pedestrians using local facilities. In most areas housing faces on to the A3024.

6.5.6 The townscape character at the eastern end of the route at Thornhill comprises large areas of housing. A pedestrianised retail centre lies to the west at Bitterne. The main part of the centre is separated from the leisure centre, library and health clinic by the A3024. Extensive areas of residential development lie within the study area.

[131] NCA – National Character Area

SUB-SCHEME 3: NORTHAM RAILWAY BRIDGE REPLACEMENT

6.5.7 Views of Northam Rail Bridge are available from nearby commercial and industrial units, residential properties, and local shops. Solid parapets screen views from the elevated railway bridge that could overlook nearby residential properties.

6.5.8 The townscape is characterised by large-scale transport routes, the A3024 and railway, gas holders and St Mary's Stadium. Land uses adjacent to A3024 Northam Road to the east of the railway line include widely-spaced low rise commercial and industrial units. To the west the townscape comprises terraced housing with local shops interspersed with open spaces and mature trees. Away from the main road and older residential development, a small shopping area on Old Northam Road is characterised by a mix of ethnic minority shops, restaurants and student enterprises.

SUB-SCHEME 5: BITTERNE RAIL BRIDGE WIDENING

6.5.9 Views of Bitterne Rail Bridge are available from nearby two-storey and three-storey residential properties and local shops.

6.5.10 The sub-scheme lies within Bitterne, which comprises a pedestrianised retail centre. The recently widened A3024 separates the main part of the centre from the leisure centre, library and health clinic. Extensive areas of residential development lie within the study area and include predominantly terraced and semi-detached.

6.6 CULTURAL HERITAGE

6.6.1 There are no WHS[132] or sites included on the Tentative List of Future Nominations for WHS (July 2014), Registered Historic Parks and Gardens, Registered Battlefields, or Conservation Areas within 500m of the four Sub-schemes.

6.6.2 Listed Buildings and Scheduled Monuments have been identified in Section 5.

SUB-SCHEME 1 - M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

6.6.3 There are no known below-ground heritage assets within the inner 200m study area of Sub-scheme 1. Prehistoric activity has been identified in the wider area in the form of a Bronze Age barrow cemetery located 1km to the northwest. The site of Bitterne Roman station is approximately 4km to the northwest of the corridor. The Roman road between the Bitterne and Chichester is approximately 1km to the north of the Sub-scheme.

6.6.4 Located approximately 5km to the west of the Sub-scheme is the site of the Anglo-Saxon settlement of *Hamwic*. At Bitterne Manor is the site of a cemetery of the same period.

[132] WHS - World Heritage Sites

SUB-SCHEME 2 - A3024 EASTERN ACCESS CORRIDOR

6.6.5 There are five heritage assets extending into the maximum extent of the Sub-scheme. A number of below-ground heritage assets have also been identified in the surrounding 200m study area. The sub-scheme extends through four LAAPs[133] as follows:

- Bitterne Manor and Southern St Denys (LAAP 11);
- City Centre and Itchen Ferry (LAAP 8);
- Northam (LAAP 12); and
- The Rest of Southampton - Area of Potential Archaeological Importance (LAAP 16).

SUB-SCHEME 3 – NORTHAM RAIL BRIDGE REPLACEMENT

6.6.6 There are three heritage assets which extend into the maximum extent of the Sub-scheme. A number of below-ground heritage assets present in the 200m Study Area. The Sub-scheme is located within the City Centre and Itchen Ferry LAAP (LAAP 8).

SUB SCHEME 5 – BITTERNE BRIDGE WIDENING

6.6.7 There are two heritage assets within the sub-scheme boundary. A number of below-ground heritage assets have also been identified in the 200m study area largely associated with the settlement of Southampton in the Romano-British and Industrial Periods. The Sub-scheme boundary extends through Bitterne Manor and southern St Denys LAPP (LAAP 11) and The Rest of Southampton LAAP (LAAP 16).

[133] LAAP - Local Areas of Archaeological Potential

6.7 NATURE CONSERVATION

STATUTORY DESIGNATED SITES

6.7.1 For details of the statutory designated nature conservation sites, refer to Section 5.

HABITATS OF PRINCIPAL IMPORTANCE

6.7.2 Two HPI[134] were included in the records provided by Hampshire Biodiversity Information Centre within the survey area (envelope encompassing all the Sub-scheme options). Lowland mixed deciduous woodland was recorded within Sub-scheme 1 and 2, and a small area of dry heathland was recorded within the edge of Sub-scheme 2.

PHASE 1 HABITAT SURVEY

6.7.3 The Survey Area supported eleven habitat types. **Table 6-2** lists the habitats present in each Sub-scheme survey area.

Table 6-2: Phase 1 habitat types within each Sub-scheme (✓ = habitat present)

HABITAT TYPE	SUB-SCHEME			
	1	2	3	5
Semi-natural broadleaved and mixed woodland	✓	✓		✓
Plantation broadleaved woodland	✓			
Scattered trees/tree line (including TPO[135] Trees)	✓ (TPO)	✓ (TPO)	✓	✓ (TPO)
Dense/continuous scrub/scattered scrub	✓	✓	✓	✓
Ornamental shrubs	✓	✓	✓	
Poor semi-improved grassland		✓		
Improved grassland		✓	✓	✓
Arable (allotments)		✓		
Amenity grassland	✓	✓	✓	✓
Species-poor hedgerow	✓	✓		
Buildings		✓		

[134] HPI - Habitats of Principal Importance
[135] TPO – Tree Protection Order

PROTECTED/NOTABLE SPECIES

6.7.4 The Survey Area and adjacent habitats have the potential to support various protected and notable species. These are summarised in **Table 6-3**.

Table 6-3: Potential for presence of protected/notable species within or adjacent to each Sub-scheme (✓= potential for species to be present).

HABITAT TYPE	SUB-SCHEME			
	1	2	3	5
Badger	✓	✓		
Bats - roosting	✓	✓		✓
Bats - foraging	✓	✓	✓	✓
Breeding birds	✓	✓	✓	✓
Dormouse	✓	✓		
Great crested newt - foraging	✓	✓		
Hedgehog	✓	✓	✓	✓
Invertebrates		✓		
Reptiles	✓	✓	✓	✓
Non-native invasive plants	✓			✓

6.8 ROAD DRAINAGE AND THE WATER ENVIRONMENT

SURFACE WATER FEATURES

6.8.1 All sub-schemes are situated to the north of the River Test, which is known as Southampton Water in its downstream extents. The Sub-scheme options are located to the west and east of the River Itchen, which discharges to the River Test. The works closest to the River Itchen are Sub-scheme 3 located approximately 420m west, and Sub-scheme 5 located approximately 160m east. The River Hamble is located to the east of the Sub-scheme options, approximately 1.5km to the east of M27Junction 8.

6.8.2 The River Test, River Itchen and River Hamble are designated as main rivers under the jurisdiction of the EA[136]. Water quality within these rivers and Southampton Water is monitored against the objectives of the WFD[137]. Current ecological quality is assessed to be moderate and chemical quality is assessed to have failed.

6.8.3 The River Itchen, River Test and River Hamble and Southampton Water are also designated shellfish waters.

[136] EA - Environment Agency
[137] WFD - Water Framework Directive

6.8.4 A number of ordinary watercourses are also present within the Study Area (the Sub-scheme options and 500m area surrounding the maximum scheme extent).

SURFACE WATER ABSTRACTIONS:

6.8.5 There is one surface water abstraction licence 250m east from the A3024 Northam Bridge. An abstraction is located approximately 450m south of the A3024, closest to Sub-scheme 3 with water abstracted from the River Itchen. Review of the EA[138] information available indicates that the abstracted water is used for industrial and commercial purposes.

FLOOD RISK

6.8.6 Review of the EA Flood Map for Planning (Rivers and Sea) indicates that the vast majority of the study area, including all of Sub-Schemes 1 and 5, is located within the low risk Flood Zone 1. Land within Flood Zone 1 is assessed to have an annual probability of flooding from fluvial or tidal sources of less than 1 in 1000 (<0.1%).

6.8.7 Land within the vicinity of the proposed Sub-scheme 2 is indicated to be located within the high risk Flood Zone 3, including land immediately to the east of the River Itchen at the location of the A3024 Bitterne Road West (west of Hawkewood Road) and land immediately to the west of the River Itchen at the location of the A3024 Northam Road (east of the railway). Land within Flood Zone 3 is assessed to have a 1 in 100 or greater (>1%) annual probability of river flooding, or a 1 in 200 or greater (>0.5%) annual probability of flooding from the sea

6.8.8 Sub-scheme 3 is indicated to be partially located within the medium risk Flood Zone 2 where the road crosses the railway, however this risk appears to be associated with the railway that is located beneath the road at this located. Land located immediately to the east of Sub-Scheme 3 is indicated to be located within the high risk Flood Zone 3 as discussed above, although this is beyond the extent of the Scheme area. Land within Flood Zone 2 assessed to have between a 1 in 1000 (0.1%) and 1 in 100 (1%) annual probability of river flooding, or between a 1 in 1000 (0.1%) and 1 in 200 (0.5%) annual probability of flooding from the sea

GROUNDWATER

6.8.9 Review of the EA Groundwater map shows that there are no designated groundwater SPZ[139] within the sub-scheme study areas.

6.8.10 Groundwater in the sub-scheme study areas has been assessed against the objectives of the WFD[140]. The groundwater body underlying the sub-schemes has been found to be Central Hants Bracklesham Group with the current quantitative quality and chemical quality assessed as ‘Good’.

---

[138] EA – Environment Agency
[139] SPZ - source protection zones
[140] WFD - Water Framework Directive

6.9 PEOPLE AND COMMUNITIES

MOTORISED TRAVELLERS: VIEWS FROM THE ROAD

6.9.1 There are restricted views from the roads along the A3024 corridor, between M27 Junction 8 and the Six Dials junction, at many locations as a result of dense vegetation. Views are further restricted by residential properties.

MOTORISED TRAVELLERS: DRIVER STRESS

6.9.2 Road safety within Southampton has been steadily increasing since 2000. However, casualties are still seen at hot spots/bottlenecks. It is likely that the A3024 provides increased driver fear levels through the combination of the presence of pedestrian routes and variation of speeds.

6.9.3 There are a number of PRoWs[141] on, under and over the maximum scheme extent via footpaths, subways and footbridges. Therefore, pedestrians are near to the existing roads, which has the potential to create MT[142] fear while using the highway.

6.9.4 Bottlenecks along the A3024 at key junctions and restricted road bridges cause delays to MT[143] and increase frustration to users. It is thought due to the level of fear and frustration experienced by MT that the level of Driver Stress experienced is high.

NON-MOTORISED USERS: AMENITY AND JOURNEY LENGTH

6.9.5 There are no footways or PRoWs[144] between M27 Junction 8 and the Windhover Roundabout. There are existing footpaths on the roadside for the A27 exit and approach to the Windhover Roundabout.

6.9.6 There are pavements along the length of the A3024. On the Bursledon Road, there is also an off-road, shared cycle path with the pedestrian walk way, until the Junction with Botley Road.

6.9.7 The Itchen Way long distance path is approximately 45km in length, following the River Itchen from its source to Southampton Water. The Itchen Way path crosses the A3024 at Quayside Road.

6.9.8 There is a foot bridge over the railway which connects to the south east side of Northam Road Rail Bridge from Melbourne Street. A shared cycleway and footpath crosses under Northam Road Rail Bridge, accessible by the footbridge. There is also a pedestrian link from Northam Road to Northumberland Road and Derby Road.

---

[141] PRoW - public right of way
[142] MT - Motorised Traveller
[143] MT – Motorised Traveller
[144] PRoW - public right of way

COMMUNITY LAND

6.9.9 Scholing Common is registered as Common Land under the CRoW[145] Act 2000. Allotments are located adjacent either side of A3024 Bursledon Road at Muddy Bottom and Bitterne Road West[146]. There are a number of areas of public open space adjacent to the Scheme, including:

- Netley Common, adjacent to Windhover Roundabout and the A3024;
- Eastpoint, north of A3024 Bursledon Road;
- Shoreburs Greenway, south of A3024 Bursledon Road;
- Hum Hole Park, north of A3024 Maybray King Way; and
- Bitterne Manor Open Space.

TOURISM AND RECREATION

6.9.10 There are several tourist and recreational facilities located within Southampton which can be accessed either directly from the A3024 or its feeder roads.

PRIVATE ASSETS AND DEMOLITION OF PRIVATE PROPERTY

6.9.11 There are no private properties which would need to be demolished for the options under Sub-scheme 1. All works proposed for all options will be within the highway boundary. For Sub-scheme 2, where – subject to further assessment and design refinement – widening is required outside of the highway boundary, there will be a loss of private land. Sub-scheme 3 will require land take and demolition of private properties to the north of the existing bridge. In addition, Sub-scheme 5 may require some land take from vegetated areas.

SOCIAL PROFILE

6.9.12 According to the SCC Equalities Profile[147] in 2011 the residential population of Southampton was recorded as 236,900, with a 77.7% White British population, 7.4% other White population, 2.8% Indian and 8.4% Asian or British Asians.

6.9.13 HMRC[148] data (2010) shows that 26.1% of the city's children live in poverty. There are 3,863 households in the city, defined as deprived, very elderly, mainly single pensioners living in council owned, purpose built accommodation.

---

[145] CRoW – Countryside and Rights of Way Act
[146] Southampton City Council's online Interactive Map available at http://www.southampton.gov.uk/WhereILive/MapSouthampton.aspx
[147] Southampton City Council. 2013. Equalities Profile for Southampton
[148] HMRC – Her Majesty's Revenue and Customs

PHYSICAL FITNESS

6.9.14 The Health Profile for Southampton in 2015[149] shows that the health of people in Southampton is generally worse than the England average. This Health Profile reported deprivation higher than England average and life expectancy for both men and women is lower than the England average.

6.9.15 In Year 6, 21.8% of children are classified as obese, worse than the average for England. In 2012, 25.1% of adults are classified as obese.

6.10 GEOLOGY AND SOIL

MADE GROUND

6.10.1 The land within the Schemes footprint and up to 250m from the maximum scheme extent is predominantly urban in use. The BGS[150] maps a swathe of Made Ground in coastal regions of Southampton. There are also Sections of Made Ground at significant road junctions, including M27 Junction 8, likely to have been excavated and built up to attain stability and aid road developments.

SUPERFICIAL GEOLOGY

6.10.2 The predominant drift geologies in the area are tidal flat deposits consisting of clay and silt underlying the Northam Bridge Section (Sub-scheme 3) and coastal parts of the A3024 (Sub-scheme 2), and several generations of river terrace deposits consisting of gravels and sands. The alluvium and tidal flat deposits associated with the River Itchen have moderate compressibility and a low to moderate risk of running sands. Running sands are considered as a permeable and rapid pathway for contamination transferal.

SOLID GEOLOGY

6.10.3 Northam Rail Bridge (Sub-scheme 3), Windhover Roundabout (Sub-scheme 1) and Sections of the A3024 Corridor (Sub-scheme 2) overlie the Wittering Formation. Bitterne Bridge (Sub-scheme 5), M27 Junction 8 (Sub-scheme 1) and Sections of the A3024 Corridor (Sub-scheme 2) overlie London Clay. The London Clay Formation reaches thicknesses between 53 to 114m and is therefore unlikely to be encountered during excavations.

6.10.4 Published stratigraphy describes the clay of Wittering Formation to be firm with compact sands. The clay of the London Clay Formation is also described as firm but with a higher frequency of gravel clasts and fissuring.

[149] Public Health England, 2015. Southampton Health Profile 2015
[150] BGS - British Geological Survey

SOIL QUALITY

6.10.5 The study area is generally categorised as 'land predominantly in urban or non-agricultural use'. Land around the M27 Junction 8 (Sub-schemes 1 and eastern extent of Sub-scheme 2) is classified as Grade 4 (poor) agricultural land by the Agricultural Land Classification system. DEFRA identifies the whole of Southampton as a eutrophic NVZ[151]. However, its predominant function as urban land means the soils are considered to be of low value. Restrictions implemented on NVZs are unlikely to restrict road improvement works. The leaching potential of the soil ranges from low to high.

GROUNDWATER

6.10.6 There is high to very high permeability of the superficial deposits (intergranular River Terrace Deposits) in parts of the Sub-schemes 1, 2 and 5, classified by the EA as Secondary A Aquifers. These characteristics result in a high leaching potential and a rapid pathway for contamination transferal. The Wittering Formation is a Secondary A bedrock aquifer. The upper clay member of the London Clay is of very low permeability and acts as an aquiclude.

6.10.7 There are no groundwater SPZ or groundwater extraction points within the 250m radial study area surrounding the maximum extent of the four Sub-schemes.

SURFACE WATER

6.10.8 Surface water feature are identified within Sections 6.8.1 - 6.8.10.

6.11 HISTORICAL LAND USE

6.11.1 The western Section of the study area, including Sub-schemes 3, 5 and parts of Sub-scheme 2, traverses coastal sites historically used by heavy industries such as ship builders and foundries, also containing gasworks, railway land and rope walks.

6.11.2 The central and eastern Sections, including Sub-scheme 1 and parts of Sub-scheme 3 were, historically, much less developed, though brick works, gravel, sand and clay pits were common. These areas saw a progressive increase in the development of residential properties, associated with the expansion of the city of Southampton.

CURRENT LAND USE

6.11.3 The majority of transport links within the study area are located within residential or commercial urban land. Sub-scheme 1 is surrounded by agricultural land. The Bitterne and Northam Rail Bridges in Sub-schemes 3 and 5 cross over the Southampton to Portsmouth coastal railway line. There is a complex network of residential streets within the whole of the study area, connecting to the major roadways to be improved.

---

[151] NVZ - nitrate vulnerable zone

6.11.4 Data from the EA[152] shows two landfill sites containing household waste directly west of the Windhover Roundabout within Sub-scheme 1, which should be treated as of unknown compositions and potential sources of contamination.

6.11.5 There are three locations to the east of the Northam Bridge (Sub-scheme 3) Section which are active points of extraction for marine sands and gravels along with crushed rock.

POTENTIAL FOR LAND CONTAMINATION

6.11.6 Where land has been contaminated as a result of former industrial processes (such as around the Quayside areas west of Sub-schemes 5, including Sub-scheme 2), this has the potential to be a constraint on the Sub-scheme options. Consideration is also given to the potential for any post-construction impacts, due to the potential for remobilisation of contamination within ground disturbed by the construction processes.

6.11.7 The multitude of industrial processes which historically operated in the docklands area (near Sub-schemes 2 and 5) provides innumerable potential contaminants of concern. The Made Ground underlying the entire study area is assumed a potential source of contaminative substances.

6.11.8 The four fuel stations situated along the A3024 corridor (Sub-schemes 2 and 5) including the land surrounding to the south of Northam River Bridge also represent potential source areas. There is a potential for polluting discharges to have occurred from vehicles using the road and rail network.

6.11.9 Radcliffe Road Allotments (Sub-scheme 2) was determined as contaminated land in 2002. The significant contaminant linkage was associated with elevated concentrations of soil lead.

INVASIVE SPECIES

6.11.10 Japanese knotweed (*Fallopia japonica*) is a non-native Invasive Plant listed under Schedule 9 of the Wildlife and Countryside Act 1981, as amended. This has been identified within the maximum extent of Sub-schemes 1 and 5.

[152] EA – Environment Agency

6.12 MATERIALS

6.12.1 The Hampshire authorities aim to reuse, recycle and recover as much as possible of the estimated 2.35 million tonnes of CDE[153] waste that is generated each year[154]. This is mostly made up of inert material such as concrete, rubble or soils[155]. This CDE waste comprises about 49% of the total waste arisings (by weight) in Hampshire[156]. Other waste streams in the county of Hampshire include MSW[157], which contributes about 17% and C&I[158] waste, which contributes about 34% of the total waste arisings (by weight).

6.12.2 This is managed through a network of commercial waste transfer stations and materials recovery facilities, with the remainder going to landfill[159]. It is recognised that there is a shortage of strategic waste management facilities in the UK and an increase in waste management infrastructure is required. Overall the Hampshire Authorities administrative area currently has sufficient capacity to deal with its waste[160].

6.12.3 The Hampshire Authorities administrative area has local supplies of sand and gravel, silica sand, chalk, brick-making clay. A large part of the Hampshire Authorities administrative area is underlain by mineral deposits which may be required to meet the future needs for construction materials. Soft sand and silica sand resources are scarcer in Hampshire compared to sharp sand and gravel. Brick-making clay is important to maintain the productivity of Hampshire's brickworks.

6.12.4 The Hampshire Authorities administrative area has local supplies of sand and gravel, silica sand, chalk, brick-making clay[161]. A large part of the Hampshire Authorities administrative area is underlain by mineral deposits which may be required to meet the future needs for construction materials[162]. Soft sand and silica sand resources are scarcer in Hampshire compared to sharp sand and gravel[163]. Brick-making clay is important to maintain the productivity of Hampshire's brickworks[164].

---

[153] CDE - construction, demolition and excavation
[154] Environment Agency, 2012. *Hampshire Mineral & Waste Plan, Assessment of Need for Waste Management Facilities in Hampshire: Waste Data Summary Report*. [online]. Accessed: 12/09/2016.
[155] Hampshire County Council, 2013. *Hampshire Minerals and Waste Plan*, p. 110. [online]. Accessed: 14/09/2016.
[156] Environment Agency, 2012. *Hampshire Mineral & Waste Plan, Assessment of Need for Waste Management Facilities in Hampshire: Waste Data Summary Report*. [online]. Accessed 12/09/2016.
[157] MSW - municipal solid waste
[158] C&I - commercial and industrial
[159] Hampshire County Council, 2013. *Hampshire Minerals and Waste Plan*, p. 96. [online]. Accessed: 14/09/2016.
[160] Hampshire County Council, 2013. *Hampshire Minerals and Waste Plan*, p. 12. [online]. Accessed: 14/09/2016.
[161] Hampshire County Council, 2013. *Hampshire Minerals and Waste Plan*, p. 12. [online]. Accessed: 14/09/2016.
[162] Hampshire County Council, 2015. *Hampshire Minerals & Waste Plan, Minerals & Waste Safeguarding In Hampshire, Supplementary Planning Document*, p. 6. [online]. Accessed: 14/09/2016.
[163] Hampshire County Council, 2015. *Hampshire Minerals & Waste Plan, Minerals & Waste Safeguarding In Hampshire, Supplementary Planning Document*, p. 14. [online]. Accessed: 14/09/2016.
[164] Hampshire County Council, 2015. *Hampshire Minerals & Waste Plan, Minerals & Waste Safeguarding In Hampshire, Supplementary Planning Document*, p. 14. [online]. Accessed: 14/09/2016.

6.12.5 The Hampshire Authorities administrative area also has deposits of chalk, other non-brick-making clay, malmstone and clunch[165], but does not have hard rock or other specialist aggregates or minerals. These have to be imported into the county by sea

[165] Hampshire County Council, 2015. *Hampshire Minerals & Waste Plan, Minerals & Waste Safeguarding In Hampshire, Supplementary Planning Document*, p. 14. [online]. Accessed: 14/09/2016.

7 ACCESSIBILITY

7.1 OPTION VALUES

7.1.1 As the scheme extent covers a wide area, the transport options available to the public differ between different areas. Generally, in the more rural eastern end (near M27 Junction 8 and Windhover Roundabout) the options are more limited, with the trips based largely on private car use. There are some bus services available to local residents.

7.1.2 In the western end of the scheme extents, in the more urbanised areas from Bitterne Village into Southampton, more options are available, including rail services from Bitterne Rail station. Several bus services into Southampton are available to local residents from west of Botley Road.

7.1.3 More details on the existing bus services and NMU[166] facilities are included in the NMU Context Reports for M27 Junction 8 and Windhover Roundabout (Document number: HE551524-WSP-ENM-PCF1-RE-PM-NMUCR01) and A3024 Corridor (Document number: HE551524-WSP-ENM-PCF1-RE-PM-NMUCR02).

7.1.4 The proposed scheme and options considered may influence travel options available to members of the public, but these are not expected to be on a significant scale. The scheme may benefit bus services from the east of the M27 (Hedge End and surrounds) into Southampton if the increase in capacity allows for reduced bus journey times. This may lead to more services along the A3024 corridor which would benefit local residents along the corridor.

7.1.5 The increased capacity and reduced congestion along the A3024 corridor and at M27 Junction 8 and Windhover Roundabout will create a more attractive network for private car use.

7.2 SEVERANCE

7.2.1 The largest contributors to severance within the scheme extents are the railway (crossed at Northam Rail Bridge and Bitterne Rail Bridge) and the rivers (crossed at the Northam River Bridge).

7.2.2 The M27, M27 Junction 8 (which currently has no NMU facilities) and to a lesser degree Windhover Roundabout are causes severance. The M27 Junction 8 and Windhover Roundabout NMU Context Report (Document number: HE551524-WSP-ENM-PCF1-RE-PM-NMUCR01, Refer to Section 5.1.3) identifies measures which could be applied to reduce severance.

7.2.3 The dual carriageway sections of the A3024 through Bitterne Village and westwards to the Junction with Britannia Way cause severance between the local communities.

[166] NMU – Non-Motorised User

7.2.4 The Bitterne Gating System (congestion management system) along the A3024 corridor has an impact on severance. The significant queuing resulting from the implementation of the system during the AM peak reduces permeability of the A3024 and access across it during peak times.

7.2.5 The proposed scheme and sub-scheme options would have a positive impact on severance through improving (where practicable) the available NMU[167] facilities.

7.3 ACCESS TO TRANSPORT SYSTEMS

7.3.1 The area on the eastern end of the scheme extent currently has very good access to the local and national strategic road network via M27 Junctions 8 and the M27, although much of the network experiences congestion and is constrained at peak times.

7.3.2 At the western end of the scheme extent, the urban network provides a range of route choices but access to the regional and strategic road network is constrained by congestion during peak times.

7.3.3 Access to public transport is better at the western end of the scheme extent than the eastern end as highlighted in Section 5.1.1 of the A3024 Corridor NMU Context Report (Document number: HE551524-WSP-ENM-PCF1-RE-PM-NMUCR02, Section 5.1.1).

7.3.4 Southampton Airport is situated within 10km or less of all parts of the scheme extent, allowing for domestic and international air travel.

7.3.5 The proposed scheme and sub-scheme options are likely to create conditions which would positively influence access to both the wider road network and public transport systems. Access for NMU's would be increased through improved NMU facilities.

[167] NMU – Non-Motorised User

8 INTEGRATION

8.1 TRANSPORT INTERCHANGE

8.1.1 There are no significant public transport interchanges in close proximity to the scheme location, and the network within the scheme extents serves mainly to connect areas and the wider road network.

8.1.2 The A3024 is a high frequency bus corridor with a peak of over 25 buses per hour using the section west from Bitterne village to the city centre. These services are a combination of local, cross city and inter urban. The bus services benefit from the Bitterne bus priority gating scheme along Bursledon Road and Bitterne Road West, and the physical bus lanes on Northam Road. However, the physical constraints of the Northam and Bitterne Rail Bridges limit the impact of the bus priority measures along the corridor.

8.1.3 There is the potential for further development of the A3024 corridor as a public transport route linking the city to suburban areas (such as Hedge End and Botley). A park and ride service may form a part of a wider public transport strategy in the future. The local authorities are considering opening up the Botley Road bus link to provide more direct access for bus services from Hedge End and Botley onto the A3024 and A3025 without traversing Windhover Roundabout.

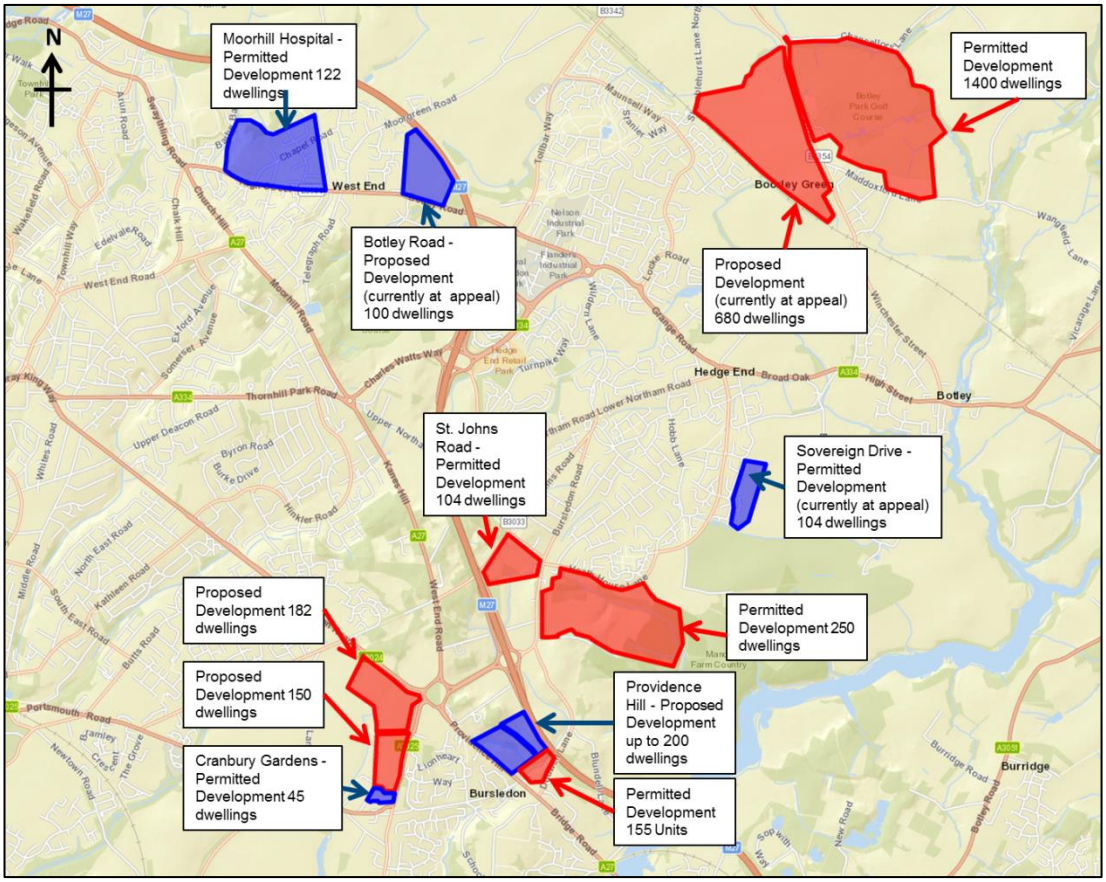
8.1.4 Bitterne Train Station is located adjacent to the A3024 at the Bullar Road/Athelstan Road Junction. The train station provides local transport links to Southampton Central, Portsmouth and Southsea.

8.2 LAND USE POLICY

8.2.1 The M27 serves as a strategic transport corridor for the south west region, nationally and internationally through linkages to Portsmouth and Southampton coastal ports and Bournemouth and Southampton International Airports. These represent key assets to the local economy, which act as significant traffic generators on the Strategic Road Network.

8.2.2 There is a large amount of planned local and regional development (as described in Section 3.2). The known committed developments adjacent to M27 Junctions 7 and 8 are shown in **Figure 8-1**. This reinforces the future increase in traffic demand that this area is likely to experience.

Figure 8-1 Committed Developments around M27 Junction 7 and Junction 8



Sources: IGN, DoBH, OS, Esri, HERE, DeLorme, INCREMENT P, USGS, METI/NASA

9 MAINTENANCE AND REPAIR STRATEGY STATEMENT

9.1.1 This Section describes the existing maintenance access points and laybys for each sub-scheme.

SUB-SCHEME 1 – M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT

9.1.2 Street furniture on the M27 Junction 8 Roundabout is difficult to access as the only maintenance layby is located on the northbound on-slip. This layby serves the adjacent signal control cabinets. Four stepped access paths are currently used for bridge inspections.

9.1.3 Most of the street furniture on Windhover Roundabout is accessible from the footways around the Roundabout and the maintenance access on the northern side. Traffic signals on the southern side of the central island are currently difficult to access as there are no maintenance access paths and the vegetation is dense.

9.1.4 **Table 9-1** below describes the location of the maintenance access points and laybys on M27 Junction 8 and Windhover Roundabout.

Table 9-1: Existing Maintenance Access Points and Laybys Sub-Scheme 1

Figure 9-1: Location A - Maintenance Access Point

Maintenance access on the northern side of Windhover Roundabout. Access from the circulatory carriageway over dropped kerbs.

Figure 9-2: Location B - Maintenance Layby

Maintenance layby located on the M27 northbound merge. Access from the slip road over dropped kerbs.

Figure 9-3: Location C - Stepped Access Path

Steps for bridge inspection located on the north-western site of the Roundabout.

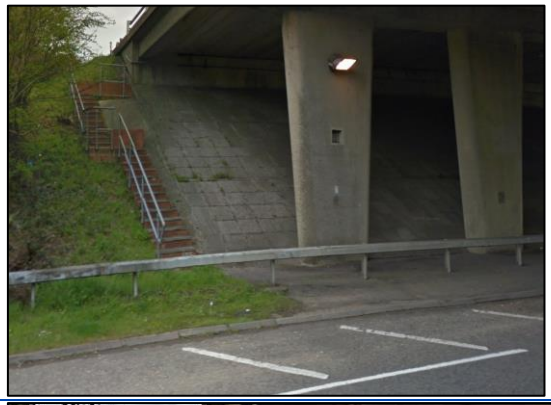


Figure 9-4: Location D - Stepped Access Path

Steps for bridge inspection located on the north-eastern site of the Roundabout.

Figure 9-5: Location E - Stepped Access Path

Steps for bridge inspection located on the south-eastern site of the Roundabout.

Figure 9-6: Location F - Stepped Access Path

Steps for bridge inspection located on the south-western site of the Roundabout.

SUB-SCHEME 2 – A3024 CORRIDOR

9.1.5 Maintenance is split between Southampton City and Hampshire County Councils.

9.1.6 There are no maintenance laybys or access points on the A3024 corridor. All of the street furniture within the highway boundary is accessible from the adjacent footways.

SUB-SCHEME 3 – NORTHAM RAIL BRIDGE

9.1.7 There are no designated maintenance access paths on Northam Rail Bridge. Visual walkover inspections and light maintenance work can be carried out using the 2m wide footways on either side of the bridge (Refer to **Figure 9-7**). Maintenance work can be undertaken during short non-disruptive possessions of the railway and/or localised lane closures of Northam Road.

Figure 9-7: Northam Rail Bridge

SUB-SCHEME 5 – BITTERNE BRIDGE

9.1.8 The methods and facilities used for maintenance and inspection of the existing structure are:

- Visual walkover inspections from the public footpaths; and
- Maintenance work being undertaken during short non-disruptive possessions of the railway and/or localised lane closures of Bitterne Road West.

10 PLANNING FACTORS

10.1.1 This Section considers a number of planning factors relevant to the scheme including local, strategic and national plans. The planning context includes:

- Housing and employment areas;
- Transport and connectivity;
- Transport technology;
- Programming;
- Environment;
- Statutory processes; and
- Interfaces with third parties.

10.2 HOUSING AND EMPLOYMENT

10.2.1 A very large amount of forecast housing and employment development is planned as set out in Section 3.2.

10.3 TRANSPORT AND CONNECTIVITY

10.3.1 In conjunction with its housing and employment development strategies Highways England (in conjuction with Southampton City Council) is considering other improvement schemes on the Strategic Road Network. This includes the M27 Smart Motorway Programme and the M271/A35 Redbridge Roundabout upgrade.

10.4 TRANSPORT TECHNOLOGY

10.4.1 Whilst it is not a main priority to deliver significant enhancements in transport technology as part of this scheme, considerations will be made to take account of any plans for improvements or major upgrades that may arise moving forward such as the M27 Smart Motorway Plans.

10.5 PROGRAMMING

10.5.1 There are two key constraints that will need to be considered:

- The construction phasing and resourcing in Highways England's supply chain as current delivery is expected to be the same time as a large number of national schemes in line with the current Delivery Plan[168].
- In addition, much coordination is required between this and other planned works in the area on both the Local and Strategic Road Network to minimise the extent

[168] Highways England Delivery Plan 2015-2020

of cumulative traffic impacts that may arise. This includes the M27 Smart Motorway Programme and M271/A35 Redbridge Roundabout upgrade.

10.6 ENVIRONMENTAL

10.6.1 Sections of the scheme are located within an existing Air Quality Management Area and a planned Southampton citywide “clean air zone” for 2019, this will be a key consideration as the scheme will need to ensure that it will not have an adverse effect on air quality. Further details are provided in Section 6 of this report.

10.6.2 There are a number of Local Nature Reserves, Noise Important Areas and Sites of Specific Scientific Interest within close proximity of the schemes, as outlined in Section 6. An Assessment of Implications on European Sites screening exercise has been undertaken, the implication on European sites is considered unlikely. This assessment will be updated with further details as the scheme design develops in consultation with Natural England.

10.6.3 There are a number of designated heritage assets located within 100 to 250m of the scheme including Grade II listed buildings and a Scheduled Monument site at Bitterne Roman Station. Impacts on setting these assets will need to be considered further at PCF[169] Stage 3 – Preliminary Design.

10.7 STATUTORY PROCESS

10.7.1 For programming purposes it has been assumed that the scheme will require environmental assessments, but a DCO[170] is not expected to be required due to the majority of the scheme being implemented on the Local Road Network. Local Planning Consents and Highways Act Orders will be required and will be led by the applicable local highways authority.

10.8 INTERFACE WITH THIRD PARTIES – UTILITIES

10.8.1 A key planning factor will be to ensure that the design and the subsequent construction work will be planned such that there would be minimal disruption and minimal need for diversion. This will contribute to reducing overall construction costs, and reducing disruptions to all road users.

[169] PCF – Project Control Framework
[170] DCO – Development Consent Order

11 DESCRIPTION OF ROUTE OPTIONS

11.1 INTRODUCTION

11.1.1 This Section of the report outlines the development of the route options throughout the PCF[171]:

- Key design considerations;
- Design options examined in PCF stage 0;
- Design options examined in PCF stage 1;
- Scenario options for consideration in economic, operational and environmental assessment;
- Sub-scheme options considered;
- Sub-scheme 1: M27 Junction 8 and Windhover Roundabout upgrades;
- Sub-scheme 2: A3024 eastern access corridor;
- Sub-scheme 3: Northam rail bridge replacement; and
- Sub-scheme 5: Bitterne bridge widening.

11.2 KEY DESIGN CONSIDERATIONS

11.2.1 The initial design options taken from the recommendations in PCF Stage 0 were examined in detail. During PCF Stage 1, a number of meetings and workshops were held with SCC[172], HCC[173], BBLP[174] and Highways England (in particular representatives from the Operations and PTS[175] team) to inform the development of the sub-schemes.

11.2.2 The key consideration of the scheme is to identify changes at M27 Junction 8, Windhover Roundabout and along the A3024 corridor in order to remove long-standing bottlenecks and increase capacity on the local network along the A3024 corridor. Thereby encouraging traffic destined for the Southampton city centre from east of M27 Junction 8 to use the A3024 corridor, rather than routing through M27 Junction 5 and the A335.

11.2.3 The designs considers options to provide additional capacity at M27 Junction 8 and Windhover Roundabout, improvements to the local road network between Windhover and the city centre (including Bitterne Rail Bridge), and widening of the Northam Rail Bridge.

---

[171] PCF - Project Control Framework
[172] SCC – Southampton City Council
[173] HCC – Hampshire County Council
[174] BBLP – Balfour Beatty Living Places
[175] PTS – Professional Technical Services

11.3 DESIGN OPTIONS EXAMINED IN PCF STAGE 0

11.3.1 PCF[176] Stage 0 identified the following sub-schemes for consideration (for the purpose of assessment and simplicity, the scheme has been sub-divided into sub-schemes):

- **Sub-scheme 1:** Capacity upgrades to M27 Junction 8 and the Windhover Roundabout (A27/A3024/A3025);
- **Sub-scheme 2:** A3024 Eastern Corridor:
- **Sub-scheme 3:** A3024 Northam Rail Bridge Replacement; and
- **Sub-scheme 4:** Wide Lane Bridge Widening.

11.4 DESIGN OPTIONS EXAMINED IN PCF STAGE 1

11.4.1 During PCF Stage 0, Bitterne Bridge widening was considered as part of the A3024 Eastern Corridor (Sub-scheme 2). At an early point in PCF Stage 1, following a joint site visit by the project team, Highways England and SCC[177] it was identified as a potential traffic flow pinch point which needed to be addressed as part of Stage 1.

11.4.2 Bitterne Bridge widening was separated out into Sub-scheme 5 in order to allow specific alternative options for this pinch-point to be developed and costed.

11.4.3 In September 2016, Highways England made the decision to remove Sub-scheme 4: Wide Lane Bridge from the scope of assessment. The decision followed a review of the current problems that Sub-scheme 4 may address, and the likely benefits that could be achieved from the approximate £20m sub-scheme cost (based on the "most likely" Stage 0 cost estimate). The reasons for the recommended removal centred on:

- There do not appear to be existing problems with the current diversion route;
- Full closures (resulting in the use of the diversion route) occur less than once per annum;
- The new route that would be facilitated by the scheme is generally more congested during normal operation, and hence represents a worse route than the existing route; and
- There would be no benefits to the day-to-day operation of the local road network.

11.4.4 This TAR[178] therefore considers four sub-schemes and their respective sub-options which are described in this Section.

[176] PCF - Project Control Framework
[177] SCC – Southampton City Council
[178] TAR – Technical Appraisal Report

11.5 SCENARIO OPTIONS FOR CONSIDERATION IN ECONOMIC, OPERATIONAL AND ENVIRONMENTAL ASSESSMENT

11.5.1 The economic, operational and environmental impacts of sub-scheme options have been assessed individually (i.e. on a sub-scheme level), and in addition a number of combinations of sub-schemes have been assessed as scenario options. These scenario options represent, for the purposes of the environmental, operational and economic assessments, the Do Something options, and have been compared to the Do Minimum. It has been assumed that the Do Minimum includes the Smart Motorways Programme between M27 Junction 4 and 11.

11.5.2 The combinations of sub-scheme options assumed in the Do Something scenario options are as given below. The combination of options assessed in order to identify the "preferred option" will need to be reviewed during PCF[179] Stage 2. During PCF Stage 1 it was not feasible to assess all the potential combinations of options, but the focus was rather to identify and assess a limited number that were considered would provide a representative range of the likely viable, best performing scenario options.

11.5.3 **Do Something 1**: represents the combination of sub-scheme options that would be most likely to achieve the scheme objectives, whilst minimising land take and minimising environmental impacts (based on qualitative information available at the mid-point of PCF Stage 1). These combinations had to be decided upon prior to all the assessments as input to the strategic modelling.

- Do Something 1 includes for localised widening at M27 Junction 8 and Windhover Roundabout (Sub-scheme 1 - Option 1), and for the dualling of the A3024 corridor (Sub-scheme 2 - Level 3). It includes for the replacement of Northam Rail Bridge (Sub-scheme 3 - Option 3A), and assumes that that the tidal flow system is implemented at Bitterne Bridge, i.e. the bridge is not widened (Sub-scheme 5 - Option 1).
- Option 1 was included for Sub-scheme 1 on the basis of it being the most likely design to be implemented, having been developed in some detail by HCC[180] (and shown to represent high value for money) prior to inclusion in the M27 Southampton Junctions Scheme. Individual sub-scheme options for Sub-scheme 1 may represent a worse environmental impact (e.g. Option 5, which includes for tunnelling under Windhover Roundabout), and these are assessed in detail at a sub-scheme level.
- This scenario option would - based on preliminary traffic modelling evidence - represent the largest increase in traffic flows along the A3024 corridor, and was used to represent the "worst case" in environmental terms based on the risks regarding air quality and noise impacts identified during PCF Stage 0.

[179] PCF – Project Control Framework
[180] HCC – Hampshire County Council

11.5.4 **Do Something 2**: represents the combination of sub-schemes that minimises land take along the A3024 corridor (with the exception of Northam Rail Bridge).

- → Do Something 2 is the same as Do Something 1 with the exception that the A3024 corridor would not be dualled, and only minimal intervention in terms of traffic signal control implemented (Sub-scheme 2 - Level 1).
- → This option represents a lower cost option that, subject to traffic modelling assessment, may provide a similar benefit to Do Something 1, and allows for comparison of the benefits / value for money between DS1 and DS2.

11.5.5 **Do Something 3**: represents a reduced scope scheme including only for Sub-scheme 1, based on historic evidence of this sub-scheme's viability. This option would have an impact on the rest of the A3024 corridor as it would address existing congestion issues at M27 Junction 8 and Windhover Roundabout.

11.5.6 A high level assessment has therefore been made based on combinations of the sub-scheme options (Do Minimum, Do Something 1, Do Something 2, Do Something 3) shown in **Table 11-1** below.

Table 11-1: Do Minimum/Do Something Scenarios Considered

SUB SCHEME	OPTION CONSIDERED FOR SCENARIO
Do Minimum - Smart Motorways without Scheme	
Sub-scheme 1	N/A
Sub-scheme 2	N/A
Sub-scheme 3	N/A
Sub-scheme 5	N/A
Do Something 1 - Dualling of A3024 Corridor	
Sub-scheme 1	Option 1
Sub-scheme 2	Level 3
Sub-scheme 3	Option 3A
Sub-scheme 5	Option 1
Do Something 2 - Signalised Junction Improvements of A3024 Corridor	
Sub-scheme 1	Option 1
Sub-scheme 2	Level 1
Sub-scheme 3	Option 3A
Sub-scheme 5	Option 1

SUB SCHEME	OPTION CONSIDERED FOR SCENARIO
Do Something 3 - Sub-scheme 1 Only	
Sub-scheme 1	Option 1
Sub-scheme 2	N/A
Sub-scheme 3	N/A
Sub-scheme 5	N/A

11.5.7 The scheme appraisal assumes that the M27 Smart Motorway Scheme (Junction 4 to Junction 11) will be in place between Junctions 8 and 5 of the M27 prior to the implementation of any elements of the M27 Southampton Junctions Scheme.

11.6 SUB-SCHEME OPTIONS CONSIDERED

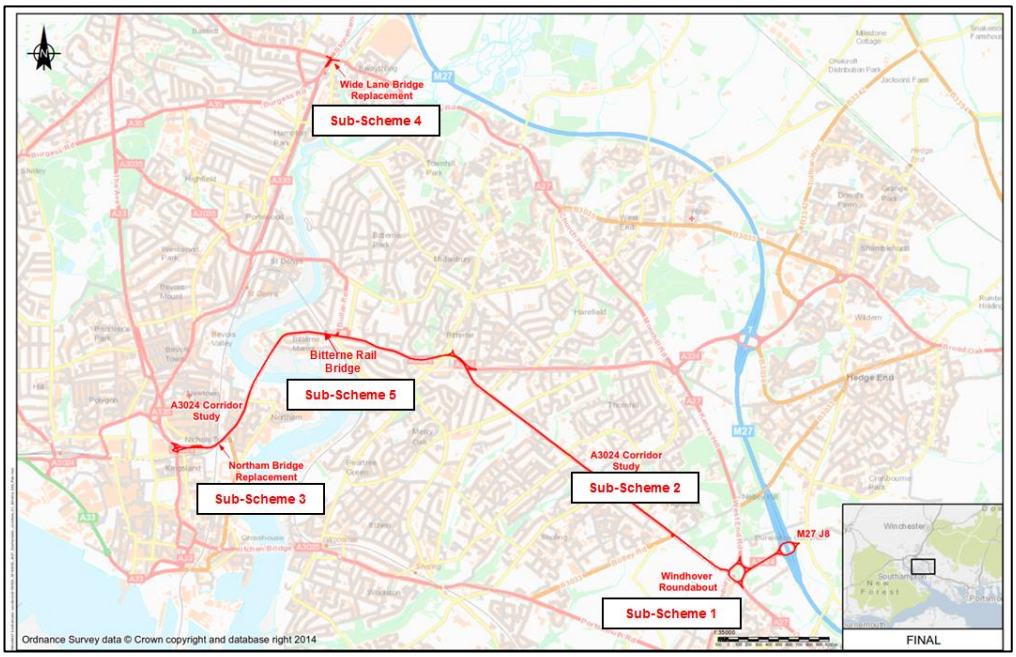
11.6.1 As set out in Section 11.3, for the purpose of assessment and simplicity, the scheme has been sub-divided into five sub-schemes. The regional location of these sub-schemes is shown in **Figure 11-1**. The five sub-schemes comprised:

- **Sub-scheme 1**: Capacity upgrades to M27 Junction 8 and the Windhover Roundabout (A27/A3024/A3025);
- **Sub-scheme 2**: Highway network improvements aimed at enhancing traffic movements and capacity for all travel modes along the A3024 Eastern Access Corridor;
- **Sub-scheme 3**: Replacement of the existing A3024 Northam Rail Bridge over the railway in order to widen it from 2 to 4 lanes and increase its structural capacity;
- **Sub-scheme 4**: Widening the existing Wide Lane Bridge under the railway line, located to the north of Swaythling Station, to allow two-way traffic under the bridge and allow right-turn movements onto the A335 Stoneham Way (towards M27 Junction 5) during diversions; and
- **Sub-scheme 5**: Capacity upgrades to the existing Bitterne Rail Bridge to allow a minimum of two full lanes of traffic in the peak direction over the bridge.

11.6.2 As noted previously, Sub-scheme 4 was removed from the scope of the scheme as of September 2016.

11.6.3 The sub-scheme options investigated during PCF[181] Stage 1 are set out in detail below.

Figure 11-1: Sub-Scheme Locations Relative to the Local Highway Network



11.7 SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

OVERVIEW OF OPTIONS

11.7.1 The M27 Junction 8 and Windhover Roundabout options aim to increase the capacity of the junctions. The Sub-scheme 1 options developed during Stage 1 are:

- → Option 1: Localised Junction Widening
  - **M27 Junction 8:** Signalisation and localised widening on all approaches to the Junction (including the merge and diverge) and implementation of Non-Motorised Users facilities (including under M27 Junction 8).
  - **Windhover Roundabout:** Signalisation and localised widening at Windhover Roundabout, and implementation of Non-Motorised Users facilities.
- → Option 2: Hamburger to A3024 Bursledon
  - **M27 Junction 8:** Signalisation and localised widening on all approaches to the Junction (including the merge and diverge) and implementation of Non-Motorised Users facilities (including under M27 Junction 8).

[181] PCF – Project Control Framework

- **Windhover Roundabout:** Through-about lane across Windhover Roundabout linking A3024 Bursledon Road to A3024 Bert Betts Way and implementation of Non-Motorised Users facilities.

→ Option 3: Free-flow Left-turn Slip Lanes at M27Junction 8

- **M27 Junction 8:** Dedicated left turning slip-lanes on all approaches.
- **Windhover Roundabout:** Signalisation and localised widening at Windhover Roundabout, and implementation of Non-Motorised Users facilities.

→ Option 4: Hamburger to A3025 Hamble Lane

- **M27 Junction 8:** Signalisation and localised widening on all approaches to the Junction (including the merge and diverge) and implementation of Non-Motorised Users facilities (including under M27 Junction 8).
- **Windhover Roundabout:** Hamburger / through-about lane across Windhover Roundabout linking A3025 Hamble Lane to A3024 Bert Betts Way and implementation of Non-Motorised Users facilities.

→ Option 5: Tunnel Under Windhover Roundabout

- **M27 Junction 8:** Signalisation and localised widening on all approaches to the Junction (including the merge and diverge) and implementation of Non-Motorised Users facilities (including under M27 Junction 8).
- **Windhover Roundabout:** Tunnel under Windhover Roundabout linking A3024 Bursledon Road to A3024 Bert Betts Way and implementation of Non-Motorised Users facilities.

11.7.2 Drawings of the SS1 options are included in Appendix D-1.

DEVELOPMENT OF OPTIONS

11.7.3 Various historic studies have been undertaken looking at option for M27 Junction 8 and Windhover Roundabout, including a study by Mott Gifford in 2010[182] and investigation by Enterprise Mouchel in 2012 which fed into a Highways Agency PAR[183]. HCC[184] then took the preferred option from the PAR forward for further development between 2012 and 2015, before the Junction improvement options became part of the M27 Southampton Junctions Scheme. However, there is very limited evidence available from these studies, and HCC did not complete a feasibility report setting out their findings.

11.7.4 A list of options considered during past studies is included in **Appendix D-2**.

11.7.5 During PCF[185] Stage 1, it was identified that taking a single design option for Sub-scheme 1 into PCF Stage 2 could represent a risk. This risk is amplified by the lack of evidence on options from the historic studies.

---

[182] M27 Parallel Study Report 2010
[183] PAR - Project Appraisal Report
[184] HCC – Hampshire County Council
[185] PCF – Project Control Framework

11.7.6 Hence, WSP | Parsons Brinckerhoff were instructed to investigate further options alongside the historic preferred HCC option during PCF Stage 1 (Option 1 below). These options included “hamburger” layouts, grade separation at Windhover Roundabout and left-turn slip-lanes at M27 Junction 8 (proposed in the Motts study in 2010).

11.7.7 The following components are considered for all options:

- Adoption of NMU[186] facilities throughout to create safer and easier pedestrian movement;
- Increased traffic signalisation on both M27 Junction 8 and Windhover Roundabout; and
- Areas of local carriageway widening.

11.7.8 The options considered and their implications are set out in further detail below.

OPTION 1 – LOCALISED JUNCTION WIDENING

11.7.9 This option proposes local widening on the circulatory carriageway, approaches and exits of the two roundabouts, as well as the signalisation of all conflict points at the junctions.

11.7.10 The option includes for the enhancement of existing NMU facilities by widening the existing shared footpath/cycleway to 3m, where feasible, and provides a link between Windhover Roundabout and M27 Junction 8.

11.7.11 In particular the main amendments are:

- M27 Junction 8:
  - Widening of the circulatory carriageway to allow for an extra lane.
  - Widening of Dodwell Lane and M27 North slip approaches to allow for a third lane.
  - Widening of the A3024 and M27 South slip approaches to allow for two extra lanes.
  - Introduction of a shared footpath/cycleway under the south bridge and two signalised pedestrian crossings on the south slip roads.
  - Introduction of a retaining wall on the northeast side of M27 Junction 8 in order to stay within the highway boundary
- Windhover Roundabout:
  - Introduction of 10 signalised pedestrian crossings around the Roundabout.
  - Widening of the circulatory carriageway on the north and south side to allow for an extra lane.
  - Widening of the Hamble Lane approach to increase the stacking capacity.

[186] NMU – Non-Motorised User

- Widening of the West End, Providence Hill and A3024 approaches to allow for a third lane.
- Widening of the existing NMU[187] facilities to allow for 3m shared cycle/footpaths.
- Introduction of a gabion wall south of the A3024 approach in order to stay within the highway boundary.
- A3024 Link (Bert Betts Way):
- Addition of a shared footpath/cycleway on the south side of the link to connect the two roundabouts.

11.7.12 All the widening and earthworks are within the highway boundary, although there may be some temporary impacts on land outside the highway boundary during construction.

OPTION 2 – HAMBURGER TO A3024 BURSLEDON ROAD

11.7.13 This option is the same as Option 1 for all aspects at M27 Junction 8, and in terms of the provision of new NMU facilities between the two junctions.

11.7.14 The option would introduce a through-about link (hamburger) in both directions linking across Windhover Roundabout from the A3024 Bert Betts Way to the A3024 (Bursledon Road).

11.7.15 The option includes for further minor design amendments to Windhover Roundabout to accommodate the hamburger layout, including signalisation of all the approaches.

OPTION 3 – FREE-FLOW LEFT-TURN SLIP LANES AT M27 JUNCTION 8

11.7.16 This option is the same as Option 1 for all aspects at Windhover Roundabout, and in terms of the provision of new NMU[188] facilities between the two junctions.

11.7.17 Option 3 includes for segregated free-flow left-turn lanes on all four arms of the Roundabout at M27 Junction 8, as well as the full signalisation of the approaches to the Roundabout. Full NMU facilities at M27 Junction 8 have been included as per Option 1.

11.7.18 The design includes for an additional lane to the A3024 Bert Betts Way between M27 Junction 8 and Windhover Roundabout to facilitate the merge between the free-flow slip from the M27 with Bert Betts Way.

OPTION 4 – HAMBURGER TO A3025 HAMBLE LANE

11.7.19 This option is the same as Option 1 for all aspects at M27 Junction 8, and in terms of the provision of new NMU facilities between the two junctions.

---

[187] NMU – Non-Motorised User
[188] NMU – Non-Motorised User

11.7.20 The option would introduce a through-about link (hamburger) in both directions linking across Windhover Roundabout from the A3024 Bert Betts Way to the A3025 (Hamble Lane).

11.7.21 The option includes for further minor design amendments to Windhover Roundabout to accommodate the hamburger layout, including signalisation of all the approaches.

OPTION 5 – TUNNEL UNDER WINDHOVER ROUNDABOUT

11.7.22 This option is the same as Option 1 for all aspects at M27 Junction 8, and in terms of the provision of new NMU[189] facilities between the two junctions.

11.7.23 The option would introduce a tunnel under Windhover Roundabout linking the A3024 Bert Betts Way to the A3024 (Bursledon Road).

11.7.24 The option includes for further minor design amendments to Windhover Roundabout, A3024 Bert Betts Way and A3024 Bursledon Road to accommodate the tunnel portals.

11.8 SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

OVERVIEW OF OPTIONS

11.8.1 The Section of the A3024 corridor within sub-scheme 2 extends from Windhover Roundabout to just east of the Six Dials Junction (Refer to **Appendix B-1**) in Southampton. Whilst this extent includes Northam Rail Bridge (Sub-scheme 3) and Bitterne Bridge (Sub-scheme 5), these Sections are considered separately under those Sub-schemes.

11.8.2 Sub-scheme 2 options developed during PCF[190] Stage 1 are:

- Level 1: Signal Control Improvements
  - UTC[191] and traffic signal controller reconfiguration at signalised junctions to enable ‘gap out’ to eliminate running side roads for longer green times than required. Existing kerb lines and traffic signal infrastructure to be retained. No changes to kerblines are proposed, and no land take is required.
  - Removal of existing bus lanes between Windhover Roundabout and Six Dials.
- Level 2: Junction and Signal Improvements
  - Introduction of Urban Traffic Management Control Microprocessor Optimised Vehicle Actuation signal control at signalised junctions with ability to switch to UTC control if conditions require. Minor changes to kerblines at junctions (introducing flares and turning pockets) to improve localised stop-line capacity. Small amounts of localised land take may be required.
  - Removal of existing bus lanes between Windhover Roundabout and Six Dials.

[189] NMU – Non-Motorised User
[190] PCF – Project Control Framework
[191] UTC – Urban Traffic Control

- Level 3: Dualling full A3024 Corridor
  - As per Level 2, including changes to kerblines and carriageway widening to ensure 2 lanes per direction along the entire A3024 corridor from Windhover Roundabout in the east to Six Dials Junction in the west. Subject to further assessment and design refinement, land take would be required to facilitate carriageway and junction widening.
  - Removal of existing bus lanes between Windhover Roundabout and Six Dials.

11.8.3 The existing bus lanes have been removed with the intention that the proposed options in combination with the replacement of Northam Rail Bridge (Sub-scheme 3) will improve journey times for all modes, including buses.

11.8.4 Further variations may be incorporated as the options are further refined through future stages such as bus priority and/or other measures.

11.8.5 Drawings of the Sub-scheme 2 options are included in Appendix D-3.

DEVELOPMENT OF OPTIONS

11.8.6 The Sub-scheme 2 options were developed by a combination of the following:

- inputs from SCC[192] on their past proposals
- an assessment of the junctions along the route and options to improve their capacity; and
- identification of the changes required in order to provide two lanes per direction along the length of the A3024 corridor.

11.9 SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

OVERVIEW OF OPTIONS

11.9.1 Sub-scheme 3 proposes the replacement of the existing A3024 Northam Rail Bridge with two bridges, upgrading the current single carriageway, single lane per direction crossing with a dual carriageway, two lanes per direction crossing. Previous options for the bridge replacement were developed by Capita Symonds on behalf of SCC in 2010.

11.9.2 Northam Rail Bridge represents a major highway bottleneck on the A3024 due to the road narrowing down from two lanes in each direction to one lane in each direction. As a consequence the flow of traffic westbound along the A3024 corridor is gated during the morning peak via the Bitterne Gating System. The gating system limits the flow of traffic across the bridge (in a westbound direction) to within the capacity of the single lane.

[192] SCC – Southampton City Council

11.9.3 The following options have been developed in Stage 1:

- Option 1 – New bridge / Refurbish Existing Bridge
  - Construct a new two lane bridge and shared footpath/cycleway on the north side of the existing bridge and strengthen the existing bridge to accept two lanes of unrestricted westbound traffic loading. (The headroom below the existing bridge does not meet current design standards and would not be addressed in this option).
- Option 2 – New Bridge / Raise and Refurbish Existing Bridge
  - Construct a new two lane bridge and shared footpath/cycleway on the north side of the existing bridge and strengthen the existing bridge to accept two lanes of unrestricted westbound traffic loading. The existing bridge is also to be raised to increase headroom above the tracks below.
- Option 3 – New Bridge / New Bridge
  - Construct a new two lane bridge and shared footpath/cycleway on the north side of the existing bridge and demolish and replace the existing structure with a new two lane bridge, including a shared footpath/cycleway on the south side of the replacement structure. Two variations for this option have been developed:
    - Option 3A New Bridge / Demolish and Replace Existing / Close Subway: removing the subway on eastern side of the bridge and relocating the surface level crossing at the Junction of the A3024 Northam Road and Britannia Road. This would require National Cycle Route 23 to be diverted onto the shared footpath/cycleway on the south of Northam Road and across Northam Road at the relocated surface level crossing.
    - Option 3B New Bridge / Demolish and Replace Existing / Retain Subway: – retaining and extending the existing subway on the eastern side of bridge, leaving the route for National Cycle Route 23 unaffected.

11.9.4 The options and the supporting structural investigation are described in the Stage 1 Structures Options Report for Northam Rail Bridge (Document number: HE551514-WSP-SGN-PCF1-RP-S-00001-SOR-NORTHAM).

11.9.5 Drawings of the Sub-scheme 3 options are included in Appendix D-4.

OPTION 1 - NEW BRIDGE / REFURBISH EXISTING BRIDGE

11.9.6 This option would retain the existing bridge, but would refurbish the existing structure to increase its loading capacity. The design includes a slight kerb realignment to provide a 2.5m shared footpath/cycleway facility on the south side of the bridge, and a small maintenance gap on the north side of the bridge.

11.9.7 The new proposed bridge is situated to the north of the existing bridge. The proposed bridge will have a higher headroom clearance over the railway lines to align with Network Rail requirements. The design includes for a 3m wide shared footpath/cycleway facility on the north side of and a small maintenance gap on the south side.

OPTION 2 – NEW BRIDGE / RAISE AND REFURBISH EXISTING BRIDGE

11.9.8 Option 2 is similar to Option 1 but in addition to the existing bridge being refurbished it would also be raised to meet current Network Rail requirements. The adjoining road network would need to be amended accordingly to link to the raised bridge.

11.9.9 The footbridge that runs from the west end of Northam Rail Bridge over the railway lines to the Southampton football stadium (St Mary's Stadium), has a widened ramped entrance on the north-western end. In order to retain this footbridge, the design includes a change in the kerb alignment on the west side of Northam Rail Bridge in order to accommodate a new ramped entry to the footbridge and the shared footpath/cycleway facility that crosses over Northam Rail Bridge.

OPTION 3A – NEW BRIDGE / DEMOLISH AND REPLACE EXISTING / CLOSE SUBWAY

11.9.10 This option would include remove the existing bridge completely and install two new bridges with an increased headroom clearance that meets current Network Rail requirements. Due to this the gradient of the carriageways at either side of both bridges would increase but remain within standards.

11.9.11 Both new bridges are of the same in design and layout with 3m wide shared footpath/cycleway facilities on the outer (north and south) edge of the bridges, and with a 0.8m maintenance walkway on the inner side to the bridges.

11.9.12 The footbridge that runs from the west end of Northam Rail Bridge over the railway lines to the Southampton football stadium (St Mary's Stadium), has a widened ramped entrance on the north-western end. In order to retain this footbridge, the design includes a change in the kerb alignment on the west side of Northam Rail Bridge in order to accommodate a new ramped entry to the footbridge and the shared footpath/cycleway facility that crosses over Northam Rail Bridge.

11.9.13 Option 3A includes the closure of the subway that passes under the eastern end of the existing Northam Rail Bridge. The staggered surface crossing at the Junction of Northam Road (A3024) / Britannia Road (B3038) would need to be relocated to the western approach to the Junction, and would require a large central island.

11.9.14 Removing the subway would require National Cycle Route 23 to be diverted onto the shared footpath/cycleway on the south of Northam Road and across Northam Road at the relocated surface level crossing at the Junction of Northam Road / Britannia Road.

OPTION 3B – NEW BRIDGE / DEMOLISH AND REPLACE EXISTING / RETAIN SUBWAY

11.9.15 Option 3B has the all the same alignment and bridge design as Option 3A.

11.9.16 However, Option 3B would preserve the existing subway and extend it to pass under both bridges. This would leave NCN23[193] unaffected. The Junction of Northam Road and Britannia Road would not require alteration, and means that during peak periods of pedestrian movement (such as football matchdays) pedestrians can move across Northam Rail Bridge without any interaction with live traffic on Northam road.

11.9.17 The length of the extended subway (which would include a kink) would mean that the subway needs to be lit (requiring additional maintenance), and may be unattractive to users as either end of the subway would not be visible at the same time.

DEVELOPMENT OF OPTIONS

11.9.18 The development of the Sub-scheme 3 options was informed by work previously undertaken by SCC[194] in 2008 and 2010. This work is detailed in the Northam Rail Bridge Structures Options Report (Document number: HE551514-WSP-SGN-PCF1-RP-S-00001-SOR-NORTHAM).

11.10 SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

SUB-SCHEME 5 – OVERVIEW OF OPTIONS

11.10.1 The proposed sub-scheme is to provide a minimum of 2 lanes per peak direction across the bridge, which is currently narrow and operates as a single wide lane per direction.

11.10.2 The options are as follows:

- **Option 1 – Tidal Flow Gantry System** - This option would install a tidal flow (lane control) system using traffic signals mounted on gantries over the road, and would require no road or bridge widening and no land take. The two current wide lanes would be converted to three standard width lanes, and the lane control system would control the distribution of lanes to provide two lanes inbound (westbound) during the morning peak, and the reverse during the afternoon peak.
- **Option 2 – Widening of the Existing Bridge** - This option would widen the existing bridge to provide two full lanes of traffic per direction. The widening is proposed to the north only (minimising land take impact) by means of replacing the edge beams and adding on a widened Section to the existing deck. Details are included under Option 1 included in the PCF Stage 1 Structures Options Report for Bitterne Bridge, document reference HE551514-WSP-SGN-PCF1-RP-S-00003-SOR.
- **Option 3 – Replacement (Widening) of the Existing Deck** - This option would widen the existing bridge to provide two full lanes of traffic per direction. However, the option would replace the existing deck, replacing it with a new steel composite deck. The widening would occur to the north only (minimising land take impact). Details are included under Option 2 included in the PCF Stage 1 Structures

[193] NCN23 – National Cycle Network Route 23
[194] SCC – Southampton City Council

Options Report for Bitterne Bridge, document reference HE551514-WSP-SGN-PCF1-RP-S-00003-SOR.

11.10.3 There is no difference in terms of highways alignment and land take impacts/requirements between Option 2 and Option 3.

11.10.4 The options and the supporting structural investigation are described in the Structures Options Report for Bitterne Rail Bridge (Document number: HE551514-WSP-SGN-PCF1-RP-S-00003-SOR_BITTERNE).

11.10.5 Drawings of the Sub-scheme 5 options are included in Appendix D-5.

DEVELOPMENT OF OPTIONS

11.10.6 The development of the Sub-scheme 5 options was informed by records from Network Rail as there were no (identified) options developed previously by the local authorities.

12 STREET LIGHTING ASSESSMENT

12.1.1 An overview of the existing condition of street lighting is presented in Section 4.11.

12.1.2 The Section of the report outlines the Street lighting assessment which applies to all sub-schemes and sub-scheme options.

12.2 APPLICABLE TO ALL SUB-SCHEMES

PROPOSED LIGHTING OPTIONS

12.2.1 There are three potential options available for the street lighting, these are as follows:

- Option 1 - Do Minimum
  - The do minimal option for this installation would be to keep in situ all of the existing columns that are unaffected by the proposed alignment works and relocate all of the existing columns which are impacted. All of the existing lanterns would remain so that the existing lighting levels are maintained in accordance with BS5489-1:2003[195] or 2013 subject to confirmation of the asset installation date.
- Option 2 - Do Something
  - This option for the installation would be to keep in situ all of the existing columns that are unaffected by the proposed alignment works and replace all of the existing lighting columns which are impacted with new units. All of the existing lanterns would be replaced with LED[196] technology providing lighting levels in accordance with BS5489-1:2013. Alternatively the lanterns would be replaced in accordance with requirements of Southampton City Council (Southampton City Council Street Lighting PFI's[197] specification) and Hampshire County Council.
- Option 3 – Do Maximum
  - This option for the installation would be to replace all of the existing columns within the scheme boundary that are affected by the proposed highways works with new units. All of the existing lanterns would be replaced with LED technology providing lighting levels in accordance with BS5489-1:2013. Alternatively the lanterns would be replaced in accordance with in accordance with requirements of Southampton City Council (Southampton City Council Street Lighting PFI's specification) and Hampshire County Council. This would be considered as a full re-design.

---

[195] BS5489-1:2013 Code of Practise for the Design of Road Lighting
[196] LED – Light Emitting Diode
[197] PFI – Private Finance Initiative

RECOMMENDATIONS

12.2.2 The proposed lighting options have been reviewed and the recommendations are as follows:

- Option 1 is not recommended as there are potential structural issues with relocating existing equipment, whilst re-using old lanterns can be difficult as photometric data may be un-available for calculating lighting levels. It should be noted that it might not be feasible to achieve the required lighting levels with this option.
- Option 2 offers a reduced risk over Option 1 as new columns are proposed where existing columns are affected by the works and are being removed. Whilst all the lanterns throughout the scheme are being replaced to achieve the required lighting levels. However, it should be noted that the existing columns that are to remain could be approaching life expiry and the structural integrity of these columns may not be satisfactory for accommodating the weight of a new lantern. Should this option be taken forward an agreement would have to be reached with the asset owner to re-use their existing columns or a structural assessment would have to be undertaken to prove the suitability of the equipment.
- Option 3 provides a design compliant with BS5489-1:2013[198] whilst ensuring the longest feasible design life for the columns. It is also recommended that liaison with Southampton City Council, their PFI[199] Service Provider and Hampshire County Council is undertaken regarding undertaking a passive safe lighting assessment and if required to establish a specification for the passively safe lighting unit/s.

POTENTIAL ISSUES

12.2.3 The following potential issues have been identified:

- Existing columns that are being proposed for re-use may not be fit for purpose despite a visual inspection detailing that the columns are in a “good condition”. This is because the columns have a planted base which is underground, whilst above the ground the columns have been painted; both of which could hide structural issues.
- The electrical installation within the lighting columns may not meet the requirements of BS 7671:2008[200] including secondary isolation and the use of double pole isolators.
- The electrical installation to the lighting columns may not meet the requirements of BS 7671:2008, including earth loop impedance and volt drop.
- If required, proposed columns types will need to be determined through a passive safe risk assessment in accordance with BS EN 12767:2007, whilst a passive safe disconnection system may be required as part of the revised design.

---

[198] BS5489-1:2013 Code of Practise for the Design of Road Lighting
[199] PFI – Private Finance Initiative
[200] BS7671:2008 - Requirements for Electrical Installations)

- Determining the source of electricity supplies to street lighting and illuminated street furniture.
- The re-use of any existing ducts will be subject to proving by the Contractor for the works.
- Illuminated traffic signs / bollards affected by the works will need to be reviewed in accordance with the TSRGD[201] 2016 illumination requirements.
- Environmental issues may be identified within the environmental report that affect the street lighting design, therefore the production of a lighting contour plan or similar may be required to show the lighting impact.

FUTURE ACTIONS

12.2.4 The following future actions are recommended:

- Further liaison with the Southampton City Council, their PFI[202] provider and Hampshire County Council to determine existing lighting inventory details and to agree the proposed equipment specification.
- Undertake a passively safe risk assessment in accordance with BS EN 12767:2007[203] if required.
- Review of the environmental assessment report to establish the presence of wildlife potentially affected by the proposed lighting installation.
- Confirm all services and Statutory Undertaker's information applicable to the area.
- Undertake the lighting and electrical infrastructure design inclusive of supplies to illuminated signs and bollard to meet the preference of the Highways England, Southampton City Council and Hampshire County Council.

[201] TSRGD - Traffic Sign Regulations and General Directions
[202] PFI – Private Finance Initiative
[203] BS EN 12767:2007 - Passive safety of support structures for road equipment

13 DRAINAGE ASSESSMENT

13.1.1 This section provides an overview of key issues that will need to be taken into account when the drainage design for the scheme is developed in future PCF[204] Stages.

13.1.2 The principle objective of the drainage is to provide a surface and sub-surface water collection system, so the highway asset is not aged prematurely by a lack of a drainage provision.

13.1.3 Highway surface water runoff will require a positive drainage system; this could be kerbs and gullies, combined drainage kerb, filter drain or a surface water channel. Given the urban nature of much of the A3024 corridor, a surface water channel system seems unlikely to be feasible option for this scheme.

13.1.4 A sub-surface system is required to drain the formation layers, deeper groundwater falls outside this drainage scope, this could be a filter drain, ditch, narrow filter drain or fin drain.

13.1.5 At PCF Stage1, it is considered that the drainage strategy for the scheme should include for:

- → The existing drainage systems to be re-used, where feasible;
- → Attenuation to be included within each drainage network, where required to reduce the outfall rate to match the existing rate, if the discharge rates cannot be increased.

13.1.6 The condition, capacity, outfall locations and ownership of all the existing surface water drainage should be assessed and confirmed.

13.1.7 Where possible the existing drainage should be re-used, and if no records are found to exist, a full asset detailed defect surveys should be conducted in accordance with clauses 2.4.3 of Interim Advice Note 147/12[205] of the DMRB[206]. Drainage with moderate to severe structural and serviceability defects should be refurbished or renewed; these defects are classed as Cat 3 to 5 defects in HD43/04[207] of the DMRB.

13.1.8 Consultation with the Local Highway Authority (Hampshire County Council for sub scheme 1 and Southampton City Council for sub scheme 2, 3 and 5) should be undertaken to identify any existing drainage issues.

---

[204] PCF Project Control Framework
[205] IAN 147/12 Drainage Surveys and Data
[206] DMRB Design Manual for Roads and Bridges
[207] HD43/04 Drainage Data Management System for Highways

13.1.9 Consultation with the Lead Local Flood Authority (Hampshire County Council for sub scheme 1 and Southampton City Council for sub scheme 2, 3 and 5) and the Environment Agency should be undertaken to discuss the drainage strategy for the scheme and in particular discharge rates and attenuation. The study area is near the mouth of a tidal watercourse and therefore increasing the discharge rate may not increase the flood risk and so should be investigated.

14 TRAFFIC ANALYSIS

14.1 TRAFFIC ANALYSIS APPROACH

14.1.1 The assessment approach, and review of available models, is set out in Section 3 of the Appraisal Specification Report (Document number: HE551514-WSP-GEN-M27JCTSPCF1-RE-PM-ASR02). The process undertaken and the results of the forecast modelling are set out in the Traffic Forecasting Report (Document number: HE551514-WSP-GEN-PCF1-RP-T-00002_TFR).

14.1.2 Following consultation with TAME[208], it was agreed that a number of scenario options (formed of a combination of sub-schemes) would be tested in the strategic model SRTM[209]:

- Do Minimum (Smart Motorways in place)
- Do Something 1 (full scheme with maximum intervention along the A3024 corridor, including full dualling)
- Do Something 2 (full scheme with minimum intervention along the A3024 corridor)
- Do Something 3 (Sub-scheme 1 only)

14.1.3 These are set out in Chapter 11 and are the primary scenario options for assessment of the traffic, economic and environmental impacts of the scheme as a whole.

14.1.4 The following provides an overview of the traffic modelling approach which supported the economic and operational assessment.

14.2 TRAFFIC MODELS APPLIED

- The Solent (Transport for South Hampshire) Sub-Regional Transport Model (SRTM), which is maintained by Systra. This model formed the main source for traffic flow and route choice information applied in the assessment of the scheme.
  - The SRTM outputs provided an evidence base of the number of trips that could re-route from the M27 onto the A3024 corridor within the base and forecast years, and the implications for journey times along the M27.
  - The SRTM allows for the assessment of the inter-dependency with the M27 Smart Motorways scheme by assuming the smart motorways is in place, and by the inclusion of sensitivity tests to assess the scheme performance without smart motorways.
- A Linsig[210] 3.2 model of Sub-scheme 1 (M27 Junction 8 and Windhover Roundabout);

---

[208] TAME - Traffic Appraisal Modelling and Economics
[209] SRTM – Sub-Regional Transport Model (Solent Transport)

- The Linsig 3.2 model of Sub-scheme 1 was used to supplement the economic assessment resulting from the SRTM[211] as it was identified that the highway assignment module of the SRTM (using SATURN[212]) was over-estimating the peak period delays at the M27 Junction 8 and Windhover Roundabout resulting from the scheme options. This is due to the SATURN model being incapable of representing vehicle-actuated traffic signals, and hence over-estimating delays at signalised Junction approaches during periods of low demand.

→ A VISSIM[213] microsimulation model of the A3024 corridor between Windhover Roundabout and Six Dials Junction in Southampton, which was used for operational tests and to understand the interaction of the 20+ signalised junctions along the A3024 corridor, and the impact of the options at Bitterne and Northam rail bridges on the downstream and upstream network.

TRAFFIC MODELLING DATA - SRTM

14.2.1 Model years of 2019 (approximating the scheme opening year) and 2036 (scheme forecast year) were run for weekday AM peak, inter-peak and PM peak time periods.

14.2.2 The latest SRTM 'Core Forecast' (controlled to TEMPRO[214] version 6.2) was used in the modelling of the scheme options. This allowed an estimate of both background traffic growth and individual committed developments to be included. Any committed schemes within the local area on the highway networks of HCC[215] and SCC[216] were included in the network, with the SRTM model applied being identical to that used for the M271 / A35 Redbridge Roundabout scheme.

14.2.3 The SRTM model represented the following time periods:

→ AM peak: busiest hour between 0700 and 1000;

→ Inter-peak: average of 1000 to 1600 hours; and

→ PM peak: busiest hour between 1600 and 1900.

14.2.4 The modelling outputs from the SRTM were produced in two phases:

→ Phase 1 – initial outputs

- Dataset 1 – Base SRTM (2010);
- Dataset 2 – forecast reference case (without Smart Motorway scheme);
- Dataset 3 - Full scheme with Smart Motorways;

---

[210] LinSig - A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks used widely throughout the UK. Developed by JCT Consultancy
[211] SRTM – Sub Regional Transport Model (Solent Transport)
[212] SATURN - Simulation and Assignment of Traffic to Urban Road Networks
[213] VISSIM - microscopic multi-modal traffic flow simulation software package developed by PTV
[214] TEMPRO – Trip End Model Presentation Program
[215] HCC – Hampshire County Council
[216] SCC – Southampton City Council

- Dataset 4 – Scheme test model including Park and Ride at M27 Junction 8;
- Dataset 5 – Reduced A3024 Corridor Improvements (2012 test);
- Dataset 7 - Sub-scheme 1 only without Smart Motorways;
- Dataset 8 - Sub-scheme 1 only with Smart Motorways; and
- Dataset 9 - Full scheme without Smart Motorways.

→ Phase 2 – refined outputs

- Run 1 - Do Minimum (with Smart Motorways);
- Run 2 - Do Something 1;
- Run 3 - Do Something 2;
- Run 4 - Do Something 3 (sub-scheme 1 only with scheme coding refined);
- Run 5 - Do Something 1 without Smart Motorways (sensitivity test);
- Run 6 - Sub-scheme 3 only (replacement of Northam Rail Bridge);
- Run 7 - Do Minimum with closure of Northam Rail Bridge; and
- Run 9 - Sub-scheme 2 only (A3024 corridor improvements).

14.2.5 Output flows from SRTM were then used to derive input flows for further modelling tests using Linsig[217] and VISSIM[218]. It informed both the operational performance and the economic appraisal of the scheme options.

14.2.6 The Traffic Forecasting Report (Document number: HE551514-WSP-GEN-PCF1-RP-T-00002_TFR) includes a description of the validation of the SRTM in the M27 Southampton Junctions Scheme study area, as well as the original model validation reports.

TRAFFIC MODELLING DATA - LINSIG

14.2.7 A traffic model of M27 Junction 8 and Windhover Roundabout was previously developed by Mouchel and HCC[219] in the LinSig modelling software. This model was refined by WSP | PB during Stage 0 and Stage 1, and was used to assess the performance of options for Sub-scheme 1.

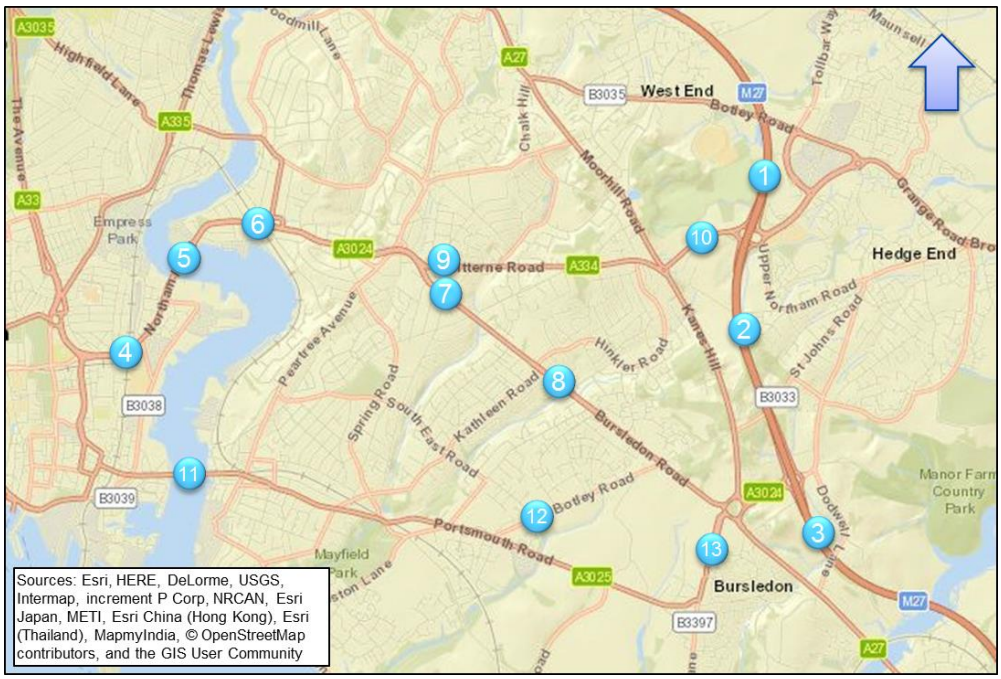
14.2.8 The LinSig 3.2 model covers both junctions and is linked so that the interaction (and associated stacking space) between the junctions can be assessed. The model was validated to 2013 traffic counts and queue surveys collected by HCC in December 2015. The base matrices for the AM and PM peaks was based on the counts in 2013, whilst the interpeak matrix was synthesised from the 2013 AM and PM and 2015 peak period counts.

[217] LinSig - A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks used widely throughout the UK. Developed by JCT Consultancy
[218] VISSIM - microscopic multi-modal traffic flow simulation software package developed by PTV
[219] HCC – Hampshire County Council

14.2.9 The model was used to assess the relative performance of the Sub-scheme options using outputs from the SRTM[220] for 2019 and 2036, with growth applied relative to the 2013 counts based on the difference in flows from the SRTM between 2014 and 2019/2036.

14.2.10 Forecast Traffic Flows from the SRTM are shown in Table 14-1 and Table 14-2 against the count locations shown in Figure 14-1.

Figure 14-1: Locations for Traffic Flows extracted from SRTM



TRAFFIC MODELLING DATA – A3024 CORRIDOR VISSIM MODEL

14.2.11 An operational model was prepared using the PTV VISSIM[221] micro-simulation software suite, which is a widely used tool within the industry. The micro-simulation model extended from Windhover Roundabout along the A3024 corridor to the east of Six Dials Junction (A3024/A33) in Southampton.

14.2.12 The model was developed using traffic survey data collected in April 2016, which included ATC[222], MCC[223], ANPR[224], traffic signal and public transport data surveys.

14.2.13 The development and validation of the A3024 corridor model is described in detail in the Local Model Validation Report (Document number: HE551514-WSP-GEN-PCF1-RP-T-00001-LMVR) and Traffic Data Collection Report (Document number: HE551514-WSP-VTR-PCF1-RP-D-00001-M27SJ_TDCR).

---

[220] SRTM - Sub-Regional Transport Model (Solent Transport)
[221] VISSIM - microscopic multi-modal traffic flow simulation software package developed by PTV
[222] ATC – Automatic Traffic Count
[223] MCC – Manual Classified Counts
[224] ANPR - Automatic Number Plate Recognition

Table 14-1: Flows Extracted from SRTM (2019)

LINK	DIRECTION	DO MINIMUM 2019			DO SOMETHING 1 2019			DO SOMETHING 2 2019			DO SOMETHING 3 2019		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
M27													
1 M27 - North of Junction 7	Northbound	6534	5245	6021	6475	5203	5958	0	0	0	6676	5294	6095
	Southbound	6777	5338	7471	6751	5324	7473	43	39	103	6838	5415	7466
2 M27 - Junction 7 to Junction 8	Northbound	6807	5202	6298	6636	5102	6177	5799	4551	5542	6836	5181	6322
	Southbound	6622	5071	7109	6504	5081	7066	7028	4941	6760	6542	5128	7082
3 M27 - South of Junction 9	Northbound	6366	5104	6489	6454	5098	6476	0	0	0	6492	5132	6508
	Southbound	6955	4938	6727	7020	4927	6782	7028	4941	6760	7028	4942	6744
A3024													
4 A3024 - Kingsway to B3038	Eastbound	637	686	1011	691	699	941	676	663	994	639	681	1003
	Westbound	915	381	461	1010	401	488	1028	411	481	923	384	468
5 A3024 - Northam Bridge	Eastbound	989	1194	1584	1031	1207	1590	1007	1150	1636	988	1169	1578
	Westbound	1751	1115	953	2010	1158	1087	2033	1169	1059	1804	1122	966
6 A3024 - Bitterne Road West	Eastbound	1033	1353	1829	1075	1364	1834	1037	1294	1867	1031	1328	1824
	Westbound	1965	1281	1132	2226	1321	1268	2232	1323	1226	2016	1288	1145
7 A3024 - Maybray King Way	Eastbound	481	530	668	494	575	936	516	562	885	507	570	778
	Westbound	912	405	446	1211	453	654	1022	410	502	934	402	458
8 A3024 - Bursledon Road	Eastbound	573	237	339	413	275	576	652	271	527	624	256	460
	Westbound	444	297	362	702	315	559	558	285	418	473	276	361
Other Roads													
9 A334 Bitterne Road East	Eastbound	455	659	865	413	605	607	417	578	761	414	594	752
	Westbound	326	513	584	300	539	556	315	530	569	317	526	585
10 Charles Watts Way	Eastbound	1066	831	719	999	952	750	254	161	332	1084	963	782
	Westbound	821	817	723	865	865	811	358	378	316	845	872	795
11 A3025 Central Bridge	Eastbound	718	820	1383	720	828	1404	723	836	1387	738	831	1401
	Westbound	1421	747	784	1349	725	729	1392	733	775	1434	744	788
12 Botley Road	Eastbound	206	208	215	360	343	347	214	204	213	210	204	203
	Westbound	346	265	360	427	326	446	345	285	403	325	270	390
13 Hamble Lane	Northbound	1262	1050	1112	1215	921	985	0	0	0	1223	1077	1088
	Southbound	1106	1024	1073	962	857	892	562	424	472	1056	899	942

Table 14-2: Flows Extracted from SRTM (2036)

LINK	DIRECTION	DO MINIMUM			DO SOMETHING 1			DO SOMETHING 2			DO SOMETHING 3		
		2019			2019			2019			2019		
		AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
M27													
1 M27 - North of Junction 7	Northbound	7002	6167	6633	6955	6111	6547	0	0	0	6987	6120	6566
	Southbound	7409	6660	8101	7414	6633	8097	109	68	130	7390	6648	8111
2 M27 - Junction 7 to Junction 8	Northbound	7320	6505	7139	7196	6351	6984	6182	5569	6157	7257	6390	7017
	Southbound	7239	6535	7769	7128	6479	7784	7754	6463	7625	7116	6486	7795
3 M27 - South of Junction 9	Northbound	7110	6500	7482	7158	6538	7491	0	0	0	7136	6535	7478
	Southbound	7691	6429	7590	7759	6472	7640	7754	6463	7625	7751	6465	7624
A3024													
4 A3024 - Kingsway to B3038	Eastbound	845	811	1150	858	831	1088	847	816	1185	833	814	1140
	Westbound	1062	528	553	1178	571	631	1145	584	618	1053	530	568
5 A3024 - Northam Bridge	Eastbound	1239	1421	1800	1278	1492	1833	1253	1454	1925	1230	1426	1787
	Westbound	1958	1392	1212	2311	1447	1369	2247	1480	1356	1939	1390	1222
6 A3024 - Bitterne Road West	Eastbound	1279	1610	2073	1320	1680	2108	1282	1625	2153	1270	1615	2061
	Westbound	2201	1587	1400	2564	1640	1562	2476	1662	1502	2183	1585	1411
7 A3024 - Maybray King Way	Eastbound	525	587	729	563	679	1016	597	666	953	547	644	808
	Westbound	991	418	490	1396	528	824	1095	459	554	966	433	512
8 A3024 - Bursledon Road	Eastbound	689	301	475	611	309	651	779	349	691	731	336	628
	Westbound	438	277	345	834	365	688	528	318	425	403	291	380
Other Roads													
9 A334 Bitterne Road East	Eastbound	472	776	911	450	704	629	473	724	829	457	722	801
	Westbound	338	607	717	313	586	585	332	601	667	336	607	672
10 Charles Watts Way	Eastbound	1221	977	666	1181	1060	750	364	197	462	1213	1018	702
	Westbound	799	800	695	822	839	781	305	341	263	815	844	748
11 A3025 Central Bridge	Eastbound	794	906	1503	813	901	1554	816	900	1482	821	909	1536
	Westbound	1514	863	794	1390	834	742	1469	849	795	1549	880	815
12 Botley Road	Eastbound	196	231	216	392	350	335	207	230	220	196	229	211
	Westbound	320	348	370	355	344	460	355	298	420	344	283	346
13 Hamble Lane	Northbound	1282	1225	1170	1265	1169	1066	0	0	0	1293	1252	1088
	Southbound	1200	1215	1079	1150	1128	1012	714	528	647	1195	1160	1114

14.3 TRAFFIC MODELLING INPUTS TO ENVIRONMENTAL ASSESSMENT

14.3.1 The SRTM provided the base and forecast year flows (and vehicle mix) along the M27 and the A3024 corridor (and surrounding impacted network) used to inform the initial noise and air quality quantitative impact assessments of the scheme scenario options (described in Chapter 20).

14.3.2 Due to time constraints, outputs from the first phase of SRTM model runs (delivered in May/June 2016) were used to inform the environmental assessment. The “without Smart Motorways Programme” scenarios were applied for the noise and air quality assessments as these represented the “worst case” of the environmental impacts, and because the Do Minimum with Smart Motorways model was not available in time for the environmental assessments.

14.3.3 The following SRTM datasets (from Phase 1) were applied:

- Do Minimum = Dataset 2;
- Do Something 1 = Dataset 9 plus 150 trips in the peak direction (representing a proxy of the full scheme implementation along the A3024 corridor);
- Do Something 2 = Dataset 9;
- Do Something 3 = Dataset 7.

14.3.4 The environmental impact of the scheme scenario options is described in the Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002).

14.4 TRAFFIC ANALYSIS – OPERATIONAL ASSESSMENT OF SUB-SCHEMES

14.4.1 For each of the sub-schemes forming the scheme, options were developed and assessed to identify the best performing option for each sub-scheme. The assessment of the individual sub-scheme options (see Section 11) was undertaken using operational assessments as follows:

- **Sub-scheme 1:** Linsig[225] 3.0 modelling of M27 Junction 8 and A27 Windhover Roundabout.
- **Sub-scheme 2:** VISSIM[226] micro-simulation modelling. The operational assessment was begun in PCF[227] Stage 1 and will be continued and further refined during future PCF Stages.
- **Sub-scheme 3:** Stand-alone operational assessment was not undertaken as the sub-scheme options do not differ in terms of highway capacity provided.

---

[225] LinSig - A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks used widely throughout the UK. Developed by JCT Consultancy
[226] VISSIM - microscopic multi-modal traffic flow simulation software package developed by PTV
[227] PCF – Project Control Framework

- **Sub-scheme 4:** Not applicable – *this sub-scheme was removed from the scope of the M27 Southampton Junctions Scheme in September 2016*.
- **Sub-scheme 5:** Stand-alone operational assessment was not undertaken as the sub-scheme options do not differ in terms of highway capacity provided. The option to include tidal flow (lane control) operation was included as part of Sub-scheme 2 operational tests.

TRAFFIC ANALYSIS – OPERATIONAL ASSESSMENT OF SUB-SCHEME 2

14.4.2 The development of Sub-scheme 1 options was informed by isolated junction modelling assessments using LinSig 3.0. The model was adapted from that used by HCC[228]in their assessment in 2014, and refined to improve the validation to observed counts and queuing.

14.4.3 Traffic demand flows were taken from the SRTM[229]for the Do Something 1, 2 and 3 scenario options to inform the LinSig modelling assessments.

14.4.4 The operational assessment results of this modelling are set out in

14.4.5 **Table** 14-3 and are summarised in the supporting Technical Note included in **Appendix E-1.**

14.4.6 The results indicate that the proposed options would provide additional capacity at the junctions and reduce the delays during all three peak periods.

TRAFFIC ANALYSIS – OPERATIONAL ASSESSMENT OF SUB-SCHEME 2

14.4.7 The development of Sub-scheme 2 options was informed by two levels of operational assessment.

14.4.8 Initially, isolated junction assessment using LinSig was undertaken as part of the exploration and development of intervention options along the A3024 corridor. Details of this modelling and the assessment of junction improvement options along the A3024 corridor are included in detail in the supporting Technical Note included in **Appendix E-2.**

14.4.9 Further operational assessment of the sub-scheme options was undertaken using the VISSIM microsimulation model of the A3024 corridor. The operational assessment results of this modelling are set out in **Figure 14-2**, **Figure 14-3**, **Figure 14-4** and **Figure 14-5.**

14.4.10 The assessment results indicate that there are a number of pinch points that would remain along the A3024 corridor after the Level 3 option for Sub-scheme 2 is implemented.

---

[228] HCC – Hampshire County Council
[229] SRTM - Sub-Regional Transport Model (Solent Transport)

Table 14-3: Sub-scheme 1 operational modelling results from LinSig

SUB-SCHEME 1 OPTION		TOTAL DELAY	DEGREE OF SATURATION (DOS)	
		(PCU-HRS)	M27 Junction 8	Windhover Roundabout
2019				
Existing Layout	**AM**	**212.2**	**121.20%**	**113.90%**
	IP	64.1	94.60%	101.70%
	PM	43.7	93.80%	73.40%
Option 1	**AM**	**102.8**	**70.60%**	**93.50%**
	IP	59.1	52.40%	63.80%
	PM	72.7	64.00%	69.40%
Option 2	**AM**	**89.1**	**74.4%**	**85.1%**
	IP	52.5	45.6%	64.5%
	PM	62.0	52.8%	70.7%
Option 3	**AM**	**84.4**	**72.8%**	**78.4%**
	IP	51.1	47.6%	62.6%
	PM	63.3	54.4%	71.2%
Option 4	**AM**	**117.5**	**74.0%**	**91.5%**
	IP	56.2	61.9%	69.3%
	PM	70.8	68.4%	84.8%
Option 5	**AM**	**67.4**	**69.4%**	**80.3%**
	IP	44.6	58.7%	64.8%
	PM	45.7	56.6%	71.7%
2036				
Existing Layout	**AM**	**TBC**	**TBC**	**TBC**
	IP	**TBC**	**TBC**	**TBC**
	PM	**TBC**	**TBC**	**TBC**
Option 1	**AM**	**136.4**	**79.30%**	**97.00%**
	IP	86.4	64.30%	77.70%
	PM	95.9	71.00%	83.10%
Option 2	**AM**	**111.8**	**71.2%**	**90.1%**
	IP	70.2	53.7%	80.1%
	PM	84.4	61.2%	82.3%
Option 3	**AM**	**104.0**	**80.2%**	**84.2%**
	IP	73.0	60.1%	70.1%
	PM	72.7	72.0%	77.6%
Option 4	**AM**	**260.3**	**81.7%**	**116.4%**
	IP	82.9	72.5%	79.7%
	PM	106.5	81.6%	94.6%
Option 5	**AM**	**91.9**	**83.4%**	**92.8%**
	IP	58.0	59.1%	71.1%
	PM	60.9	69.4%	85.9%

Figure 14-2: Journey times along A3024 Corridor – Base Model (2016)

TBC

Figure 14-3: Journey times along A3024 Corridor – Forecast Do Minimum Model (2019)

TBC

Figure 14-4: Journey times along A3024 Corridor – Forecast Do Minimum Model (2036)

TBC

Figure 14-5: Journey times along A3024 Corridor – SS2 Level 3 (Do Something 1) (2036)

TBC

14.5 ROAD LAYOUT AND STANDARDS

14.5.1 The three “combined” options – as well as the sub-scheme options – assessed during PCF[230] Stage 1 are presented in Chapter 11.

14.5.2 The scheme options do not propose any new elements of highways network, and represent extensions to the existing highway network. Proposed modifications to the road layout have been assessed against the relevant design standards, taking existing constraints into account. No departures from standards have been identified at Stage 1.

14.5.3 As a result, the Stage 1 product, Departures from Standards Report, was not produced.

14.6 CONCLUSIONS

14.6.1 The traffic analysis of the scheme included for both strategic modelling and local modelling using microsimulation and isolated junction modelling.

14.6.2 The conclusion from the assessments is that the scheme would provide additional capacity through M27 Junction 8, Windhover Roundabout, and along the A3024 corridor up to Six Dials Junction.

14.6.3 The strategic modelling indicates that the flows along the A3024 will increase, and that the scheme would attract traffic currently using M27 Junction 5 and the A335 onto the A3024 corridor.

14.6.4 The operational assessment of the scheme indicates that the options would address a number of the key pinch points along the A3024 corridor, but that a couple of pinch points would remain.

[230] PCF – Project Control Framework

15 ECONOMIC ASSESSMENT

15.1 EXISTING KNOWLEDGE AND DATA

15.1.1 No previous reliable economic assessment of the scheme exists from PCF[231] Stage 0 or prior studies.

15.2 TRANSPORT MODELS APPLIED

15.2.1 Inputs to the economic assessment were generated from a number of models/tool, as described in Section 14:

- The SRTM[232] – which formed the main source for traffic flow and route choice information applied in the assessment;
- A Linsig[233] 3.2 model of Sub-scheme 1 (M27 Junction 8 and Windhover Roundabout);
- A VISSIM[234] microsimulation model of the A3024 corridor between Windhover Roundabout and Six Dials Junction in Southampton, which was used for operational tests.

15.2.2 Outputs from the transport models were extracted for the purpose of estimating overall benefits in journey time, vehicle operating costs, indirect tax revenues, accidents, and journey time reliability. The outputs were applied to standard economic assessment software (TUBA[235] and SAR6.5d[236]).

15.2.3 The modelled outputs were factored to represent the annual benefits as follows:

- AM peak (0700 to 1000) A = 3 hours x 252 days = 756
- Inter peak (1000 to 1600) A = 6 hours x 252 days = 1512
- PM peak (1600 to 1900) A = 3 hours x 252 days = 756

15.2.4 The economic assessment was based on model outputs representing 2019 and 2036, with only the core growth scenario assessed (controlled to TEMPRO[237] version 6.2).

15.2.5 The economic impact of construction and maintenance were not calculated during this stage as the programming of works has not yet been determined.

---

[231] PCF – Project Control Framework
[232] SRTM – Sub Regional Transport Model
[233] LinSig - A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks used widely throughout the UK. Developed by JCT Consultancy.
[234] VISSIM - microscopic multi-modal traffic flow simulation software package developed by PTV
[235] TUBA – Transport User Benefit Appraisal (version 1.9.7)
[236] SAR6.5d – Scheme Appraisal Report version 6.5d
[237] TEMPRO – Trip End Model Presentation Program

15.2.6 The appraisal provides a comparison between the total benefits and total costs of each option over the 60 year period.

15.3 ECONOMIC ASSESSMENT APPROACH

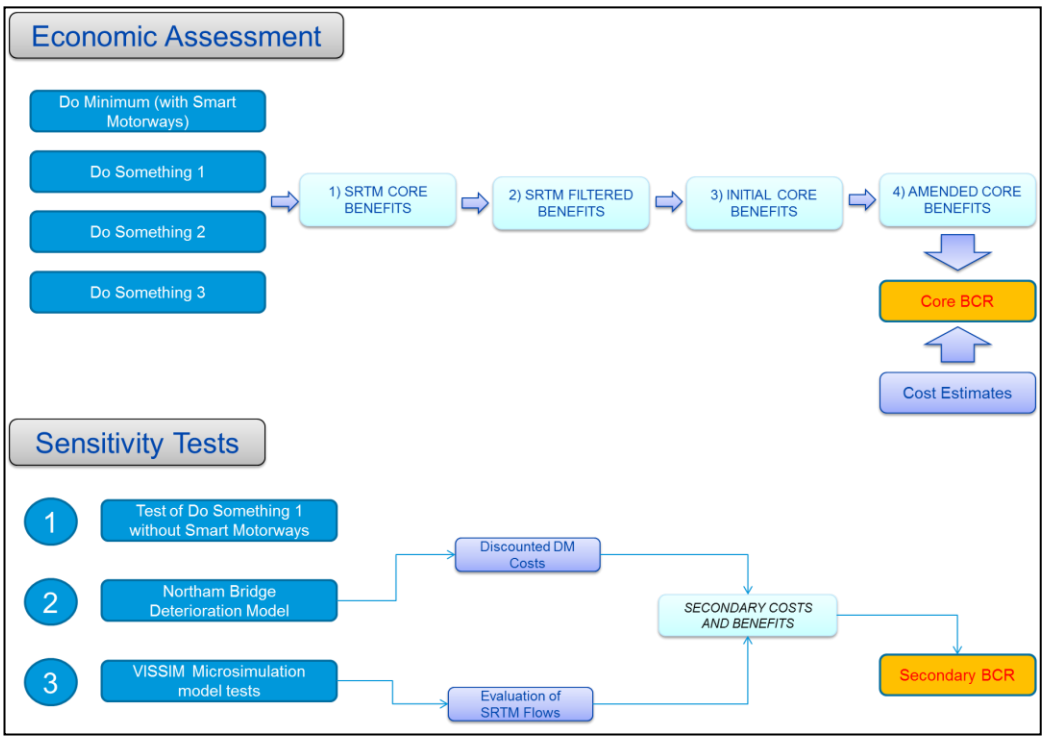
15.3.1 "Whole scheme" scenario options – representing sub-scheme combinations (as described in Section 11) – were considered in the economic assessment:

- **DM - Do Minimum (Smart Motorways in place)**
- **DS1 - Do Something 1 (Dualling of A3024 corridor)**, including:
  - SS1[238]: Option 1, SS2 (Level 3), SS3: Option 3A, SS5: Option 1
- **DS2 - Do Something 2 (Signalised Junction Improvements of A3024 Corridor)**
  - SS1: Option 1, SS2 (Level 1), SS3: Option 3A, SS5: Option 1
- **DS3 - Do Something 3 (Sub-scheme 1 only)**

15.3.2

15.3.3 Figure 15-1 shows an overview of the assessment approach.

Figure 15-1: Overview of Assessment Approach



[238] SS – Sub-Scheme

15.3.4 The steps included in the Economic Assessment are described in more detail below:

1) SRTM[239] Core Benefits

- The benefits calculated by TUBA[240] for the whole of the SRTM model have been applied;

2) SRTM Filtered Benefits

- The benefits calculated by TUBA have been filtered to include only those sectors likely to be impacted by the scheme;

3) Initial Core Benefits

- The disbenefits calculated by TUBA for the Do Something 3 scenario (representing Sub-Scheme 1 only) have been subtracted from the filtered benefits calculated for each of the scenarios;
- This is to compensate for the unrepresentative delays suggested from the SRTM modelling of Sub-scheme 1.

4) Amended Core Benefits

- The benefits calculated in SAR6.5d[241] for Sub-scheme 1 (using flows from the SRTM[242] and modelling in Linsig[243]) have been added to the scheme scenario option benefits;
- The resulting total benefits have been compared to the present value costs to generate BCRs[244] for each of the scenario options.

15.3.5 During the early stages of PCF[245] Stage 1 it was agreed with TAME[246] that a sensitivity test of the Do Something 1 scenario without Smart Motorways would be undertaken. To this, two additional sensitivity tests were added, based on the impact of the deterioration of Northam Rail Bridge and operational tests using the A3024 corridor VISSIM microsimulation model.

15.4 DISCUSSION OF COBA RESULTS

15.4.1 COBALT[247] Analysis was undertaken for the scheme scenario options to determine economic benefits resulting from accident savings. The results of the assessment are set out in **Table 15-1**.

---

[239] SRTM – Sub Regional Transport Model
[240] TUBA – Transport User Benefit Appraisal (version 1.9.7)
[241] SAR6.5d – Scheme Appraisal Report version 6.5d
[242] SRTM – Sub Regional Transport Model
[243] LinSig - A Design and Assessment Tool for Traffic Signal Junctions and Urban Networks used widely throughout the UK. Developed by JCT Consultancy.
[244] BCR – Benefit to Cost Ratio
[245] PCF – Project Control Framework
[246] Transport Appraisal, Modelling and Economics (TAME) group within Highways England
[247] COBALT – Cost and Benefit to Accidents – Light Touch

Table 15-1: COBALT Analysis Results

SCENARIO	CASUALTY REDUCTION			60-YEAR ACCIDENT COST (£000S)		
	Fatal	Serious	Slight	DM[248]	DS[249]	Benefit
Do Something 1	0.0	27.3	125.2	873,284.4	866,423.7	6,860.7
Do Something 2	0.2	10.1	66.1	873,284.4	870,048.0	3,236.4
Do Something 3	0.7	17.1	146.7	873,284.4	866,802.3	6,482.1

15.5 ECONOMIC OUTPUTS

15.5.1 Scheme costs for the options have been supplied by the Highways England Commercial Team in early November 2016. The economic outputs issued, based on the sum of the sub-schemes included in each Do Something option, are shown in **Table 15-2**. In total 2010 factor prices along with the resulting present value costs, discounted to 2010, in 2010 market prices.

Table 15-2 Scheme Economic Outputs and Present Value Costs

OPTION	DS1[250]	DS2	DS3
Preparation	£16,015,154	£12,670,620	£1,900,145
Supervision	£2,784,337	£2,321,260	£497,132
Works	£64,442,164	£42,127,938	£8,632,380
Land	£14,117,510	£5,318,891	£126,061
Total	£97,359,165	£62,438,709	£11,155,718
Present Value of Scheme	**82,702,917**	**53,066,541**	**9,494,106**

[248] DM – Do Minimum
[249] DS – Do Something
[250] DS – Do Something

Costs *(2010 market prices)*

15.6 DISCUSSION OF ECONOMIC RESULTS

15.6.1 The economic results indicate that the basic unfiltered outputs from the SRTM show the scheme scenario options as having a very low or negative BCR. The application of a series of logical "steps" as outlined in Section 15.3 results in a significant increase in the calculated benefits.

15.6.2 The results indicate that the Do Something 1 and Do Something 2 options represent a "low" VfM category. Do Something 3 represents a "very high" VfM.

15.6.3 **Table 15-3** provides a summary of the PVB[251] and PVC[252] resulting from the assessment process based on the "stepped" approach described in Section 15.3.

Table 15-3 Summary of Monetised Costs and Benefits - £000s

TYPE	DS1[253]	DS2	DS3
Present Value of Costs	**84,685**	**53,631**	**6,734**
Assessed PVBs and BCR[254] through "steps" included in assessment			
PVB - 1) SRTM[255] Core Benefits / [BCR]	38,789 [0.46]	5,464 [0.10]	-30,136 [-4.69]
PVB - 2) SRTM Filtered Benefits / [BCR]	51,414 [0.61]	7,254 [0.14]	-17,521 [-2.60]
PVB - 3) Initial Core Benefits / [BCR]	75,646 [0.89]	31,486 [0.59]	6,711 [1.00]
Final Assessed Benefits and Costs			
PVB **-** 4) Amended Core Benefits	113,415	87,457	58,176
Net Present Value	28,730	33,826	51,442
BCR	**1.34**	**1.63**	**8.64**

[251] Present Value Benefits (PVB) are the sum of modelled savings on travel time, vehicle operating costs, accidents, greenhouse gas, operator revenue and indirect taxation
[252] Present Value Costs (PVC) include scheme costs and calculated costs to the network (e.g. tolls)
[253] DS – Do Something
[254] BCR – Benefit to Cost Ratio
[255] SRTM – Sub-Regional Transport Model

15.7 DISCUSSION OF ECONOMIC RESULTS

15.7.1 The economic results indicate that the basic unfiltered outputs from the SRTM[256] show the scheme scenario options as having a very low or negative BCR[257]. The application of a series of logical "steps" as outlined in Section 15.3 results in a significant increase in the calculated benefits.

15.7.2 The results indicate that the Do Something 1 and Do Something 2 options represent a "low" VfM[258] category. Do Something 3 represents a "very high" VfM.

15.8 DISCUSSION OF RELIABILITY BENEFITS

15.8.1 Reliability benefits were not calculated as part of PCF[259] Stage 1 and could be considered in future stages.

15.8.2 However, a high level assessment was undertaken of the impacts of the scheme on flows along the M27 (based on outputs from the SRTM) which indicated a negligible impact in the order of less than 50 vehicles/hour change on any link.

15.9 SENSITIVITY TESTS UNDERTAKEN

DO SOMETHING 1 WITHOUT SMART MOTORWAYS

15.9.1 A test of the Do Something 1 scheme option without Smart Motorways in place along the M27 between Junction 4 and 11 yields a "SRTM Filtered" BCR of 0.50, as compared to the "with Smart Motorways" BCR of 0.61.

15.9.2 The results of the sensitivity test indicate that the presence of the Smart Motorways scheme appear to positively impact on the Do Something 1 benefits. This is perhaps counter-intuitive, as the Smart Motorways scheme adds capacity to the M27 between Junctions 8 and 5 and reduces the "push" for traffic to use the local road network.

NORTHAM BRIDGE DETERIORATION MODEL

15.9.3 A simple deterioration model for Northam Rail Bridge was developed to represent the additional costs (due to travel time delays) that may be incurred in the Do Minimum scenario if the bridge is not replaced and further deteriorates.

15.9.4 The model developed using outputs from the cordoned SRTM for the Do Minimum (Run 1) and Run7 modelled scenarios) considered two options for the deterioration of the bridge from its current status: a "rapid" deterioration and a "slow" deterioration.

15.9.5 Both the slow and rapid deterioration models indicate a disbenefit resulting from not replacing the Northam Rail Bridge that could be equivalent to more than £50m in Present Value Benefits.

---

[256] SRTM – Sub-Regional Transport Model
[257] BCR – Benefit to Cost Ratio
[258] VFM - Value for Money
[259] PCF – Project Control Framework

15.9.6 As a simplified reference, the bus ban equates to £1.5m in disbenefits per annum, the one-way working equates to £1.57m in disbenefits per annum and full closure of the bridge equates to £2.37m in disbenefits per annum.

15.9.7 If the circa £50m in present value disbenefits were added to the Do Minimum scenario (therefore the equivalent of a Present Value Cost) then the result BCRs[260] of the scheme scenario options would be significantly improved.

- → Do Something 1 BCR = increase from 1.34 to 1.93 – "medium" VfM[261]
- → Do Something 2 BCR = increase from 1.63 to 2.56 – "high" VfM
- → Do Something 3 BCR = decrease from 8.64 to 1.21 as the option does not include for the replacement of Northam Rail Bridge

15.10 DISCUSSION OF OVERALL RESULTS

15.10.1 A summary of the Present Value Benefits and Present Value Costs resulting from the assessment process is included in **Table 15-4**.

Table 15-4: Summary of Monetised Costs and Benefits - £000s

TYPE	DS1[262]	DS2	DS3
Present Value of Costs	84,685	53,631	6,734
Present Value of Benefits (PVB) - 4) Amended Core Benefits	113,415	87,457	58,176
Net Present Value	28,730	33,826	51,442
BCR[263]	**1.34**	**1.63**	**8.64**
Sensitivity Tests – resultant BCRs			
DS1 without Smart Motorways	1.23	N/A	N/A
Northam Bridge Deterioration	1.93	2.22	-0.82
Scheme cost reduction identified by VISSIM tests (Refer to Section 2)	1.75	N/A	N/A

[260] BCR – Benefit to Cost Ratio
[261] VfM – Value for Money
[262] DS – Do Something
[263] BCR – Benefit to Cost Ratio

15.10.2 Whilst the amended core BCR's indicate that the Do Something 1 and Do Something 2 options represent a "low" VfM[264] category. Do Something 3 represents a "very high" VfM, the sensitivity tests indicate that there could potentially be influences not forming part of the formal economic benefits calculation that may increase the value for money of the scheme options.

15.11 FURTHER WORK TO IMPROVE BCR IN PCF STAGE 2

15.11.1 During PCF Stage 1 it was not feasible to assess all the potential combinations of options, but the focus was rather to identify and assess a limited number that were considered would provide a representative range of the likely viable, best performing scenario options. The Do Something scenario options identified in Stage 1 need to be reviewed in Stage2, especially regarding Sub-scheme 2 (as the three levels assessed in Stage 1 were intended to be a mechanism to obtain an indication / range of possible options), and further traffic assessment will be required.

15.11.2 The further assessment should include operational testing using the VISSIM microsimulation of the A3024 Corridor. Tests of the Do Something 1 option may provide a refined indication of the key pinchpoints and constraints along the corridor, and how these interact to influence the capacity of the corridor. These tests would result in a refinement of the proposed carriageway widening included in the Do Something 1 scenario option, and could inform the reduction or removal of the widening without compromising the forecast capacity of the A3024 corridor.

15.11.3 The VISSIM model tests may indicate that the pinchpoints / constraints along the corridor lie in the western ends of the corridor and that – based on a review of the journey time profiles – the carriageway widening proposed as part of the Do Something 1 scenario option could be reduced or removed without compromising on the capacity of the A3024 corridor.

15.11.4 This could result in a significant reduction in the scheme (and land take) costs. By example, if a simplified estimate is applied that the scheme costs for Sub-scheme 2 (the A3024 Corridor) forming part of the Do Something 1 option could be reduced by £20m, then the BCR[265] would increase from 1.34 to 1.75.

[264] VfM - Value for Money
[265] BCR - Benefit to Cost Ratio

16 SAFETY ASSESSMENT

16.1 INTRODUCTION

16.1.1 This safety assessment of the scheme outlines the safety aspects for each sub-scheme option in terms of:

- Improving safety conditions;
- Effective construction management; and
- Initial safety reviews for some of the options.

16.1.2 The M27 Southampton Junctions Improvement scheme will be deemed to have satisfied the road user safety objective, if it is demonstrated for a period of three years after becoming fully operational that:

- The average number of FWI[266] casualties per year is no more than the safety baseline.
- The rate of FWIs per billion vehicle miles per annum is no more than the safety baseline.

16.1.3 These two key indicators are defined in the Information for Managing Safety on the Highways England Network, which is designed to help Highways England to monitor progress towards improving road safety. The two indicators will provide a measure of safety performance both in terms of actual numbers of casualties but also, by including a measure of exposure, the safety risk.

16.1.4 FWI is defined as:

(No of fatalities) + 0.1 x (No of serious casualties) + 0.01 x (No of slight casualties)

16.1.5 This definition reflects the approximate ratios between the costs of fatal, serious, and slight casualties given in DfT's[267] WebTAG A4.1.[268]

16.1.6 The use of FWI, rather than the numbers of KSI[269] allows for the use of a larger data set, leading to more accurate and stable results. DfT's Strategic Framework for Road Safety[270] acknowledges that at the local level the number of road deaths is small and subject to fluctuation. Therefore, in place of the key indicator of the number of road deaths (and the rate per billion vehicle miles), it proposes the following two key indicators for use at local level: the number of KSIs and the rate of KSIs per billion vehicle miles. Although all external reporting of safety performance of projects and the

---

[266] FWI - Fatal Weighted Injury
[267] DfT - Department for Transport
[268] WebTAG: TAG unit A4-1 social impact appraisal, November 2014 - Publications - GOV.UK
[269] KSI - Killed or Seriously Injured
[270] Strategic Framework for Road Safety

programme will comply with the framework, FWI numbers and rates will be used for internal monitoring of safety performance.

16.1.7 For each trafficked route of the scheme, no population (e.g. car drivers, pedestrians, HGV drivers and motorcyclists) is disproportionately adversely affected in terms of safety and risk to each population remains tolerable.

16.1.8 There is no numerical objective or target for road worker accidents for major schemes and the risk must be managed in accordance with the "So Far As Is Reasonably Practicable" principle. This is a legal requirement. The Highways England's Health and Safety Plan[271] sets out the requirement that no one should come to harm using or working on the Highways England network. This aim is furthered by Highways England "Aiming for Zero" strategy that must be applied for further positive actions to reduce the risk to road workers during maintenance and operation. One part of the strategy aims to eliminate all fatalities and serious injuries to road workers maintaining the Highways England road network.

16.1.9 It is likely that the M27 Southampton Junctions Improvement scheme will be categorised under IAN 139[272] Table 2-1, as a scheme requiring a Type A Safety Management System.

16.1.10 The scheme is designed to increase capacity and traffic flow and improve NMU[273] facilities; thereby reducing delays and improving safety performance as a result. This is likely to lead to a reduction in accidents, improvement in journey times and reliability.

SUB-SCHEME 1 – M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

16.1.11 Notable features that could improve the safety performance include are discussed further below.

→ **All Options:**

- Adoption of NMU[274] facilities throughout to create safer easier pedestrian movement.
- Provide new traffic signalisation at M27 Junction 8 and increased traffic signalisation on Windhover Roundabout to increase capacity.
- Areas of local carriageway widening to alleviate existing queuing problems.

[271] Highways England's Health and Safety Plan
[272] IAN 139/11 Managed Motorways Safety Risk Work Instructions
[273] NMU – Non – Motorised User

- **Options 2 and 4 – Through-about links At Windhover Roundabout**
  - Provide through-about links at Windhover Roundabout, which segregate some of the traffic movements and reduce the volume of traffic using the circulatory carriageway.
- **Option 3 –Free-flow Left-turn Slip Lanes at M27 J8:**
  - Increasing capacity at M27 Junction 8 with segregated left turn lanes on all four arms of the gyratory. Gyratory to be fully signalised with additional areas of local widening.

SUB-SCHEME 2 – A3024 CORRIDOR

16.1.12 Notable features that could improve the safety performance include highway network improvements aimed at enhancing traffic movements and capacity for all travel modes along the A3024 eastern access corridor.

SUB-SCHEME 3 – NORTHAM RAIL BRIDGE

16.1.13 Notable features that could improve the safety performance include the replacement of the existing A3024 Northam Rail Bridge over the railway in order to widen it from 2 to 4 lanes and increase its structural capacity.

SUB-SCHEME 5 – BITTERNE RAIL BRIDGE

16.1.14 Notable features that could improve the safety performance include highway network improvements aimed at enhancing traffic capacity and improving NMU[275] access.

16.2 EFFECTIVE CONSTRUCTION MANAGEMENT

DURING CONSTRUCTION

16.2.1 The objective of the CDM[276] 2015 regulations is to ensure the systematic management of schemes from conception through to completion with hazards identified and eliminated where feasible and where remaining, reduced and controlled.

16.2.2 The following measures would need to be considered to ensure a robust management of all hazards during construction including:

- The use of additional speed enforcement to protect the workforce and road user during periods of TTM[277].
- The use of suitable TTM to ensure that sufficient working space is available to enable works to be constructed safely, and to provide a safe passage for general traffic.
- Provide diversion routes for NMU[278]s to maintain existing NMU access routes.

---

[275] NMU – Non-Motorised User
[276] CDM – Construction Design and Management
[277] TTM - Temporary Traffic Management

- The use of narrow lanes to ensure that sufficient working space is available to enable works to be constructed safely whilst also providing adequate through traffic capability. This is considered an appropriate measure on all roads feeding into the works areas of the M27 Southampton Junctions Scheme.
- The use of temporary vehicle restraint systems to prevent incursions into the works area by errant vehicles, thus providing protection to the construction work force.
- Lane closures and traffic diversions (where required) to generally be carried out during off-peak periods. Consideration to be given for closures and diversions to be done over weekends, where considered appropriate, to maximise the time available for specific construction work activities. Strong consideration to also be given as to whether certain construction activities should take place over public holiday weekends and/or during the school summer holiday period. Careful consideration would need to be given to the timing of any such closures.
- All Network Rail safety requirements to be complied with.

CONSTRUCTION ASPECTS SPECIFIC TO SUB-SCHEME 1

16.2.3 The majority of the Sub-scheme 1 options would be carried out using similar processes. These would include for local widening being done with minimal impact to commuting traffic, which would more importantly reduce the amount of risk for workers.

16.2.4 Options 2 and 4 both include a section of off-line works through the central island, which could be constructed with minimal disruption to traffic and be a safe working area. The off-line construction could be carried out during peak hours, without any compromise to safety or traffic disruption. Lane closures, or complete closures of Windhover Roundabout, may be necessary to tie in the off-line sections to the existing circulatory carriageway. Delivery of materials and plant could generally be carried out during off peak periods, as road closures may be required to ensure this could be done, safely and without risk.

16.2.5 In order to construct Option 3, in particular the east bound slip lane off M27 Junction 8 where a new 2 lane segregated left turn is being proposed including a retaining wall, occasional complete closure of the slip road may be required.

16.2.6 Option 5 would require the most extensive temporary works of the Sub-scheme 1 options, in order to have sufficient working area to construct the tunnel and associated retaining walls, and to tie the tunnel carriageways into the existing A3024 Bert Betts Way and A3024 Bursledon Road. Lane closures, or complete closures of Windhover Roundabout, Bert Betts Way and sections of A3024 Bursledon Road, may be necessary.

[278] NMU – Non-motorised Users

CONSTRUCTION ASPECTS SPECIFIC TO SUB-SCHEME 2

16.2.7 For the Sub-scheme 2 Level 3 proposals, TTM[279] would be key to ensuring the works are carried out safely and effectively. Reducing traffic down to a single running lane, by restricting the movement of traffic to alternate one-way operation controlled by traffic signals, and the use of off peak periods and week-ends for complete closures would be key to minimising risk and disruption.

CONSTRUCTION ASPECTS SPECIFIC TO SUB-SCHEME 3

16.2.8 Sub-scheme 3 includes for improvements to a road-over-rail bridge. Rail possessions would therefore be required during the construction period, which would need to be planned and booked in advance of the start of construction. At this stage of the scheme it is considered that a number of rail possessions would be required, which would include possessions over Christmas and Easter periods.

16.2.9 All of the Sub-scheme 3 options include for a new bridge to be constructed to the north of the existing Northam Rail Bridge. This new bridge would be off-line from the A3024 Northam Road and could be constructed with minimal disruption to road traffic. Once this new bridge was in place road traffic could be moved onto it allowing the exiting bridge to be closed. In this way the construction works relating to the existing bridge, for all Sub-scheme 3 options, could take place without having to accommodate live carriageway traffic on the bridge.

16.2.10 The A3024 Northam Road would therefore, generally not need to be closed or re-routed during the construction period. However, it cannot be ruled out at the stage of the scheme that some, discrete road closures may be necessary. An example of this may be road closures to coincide with the rail possessions, to optimise the work that could be undertaken during these periods. Details relating to this would need to be looked at as the scheme progresses.

CONSTRUCTION ASPECTS SPECIFIC TO SUB-SCHEME 5

16.2.11 Sub-scheme 5 Options 2 and 3, similarly to the Northam Rail Bridge sub-scheme, also include for improvements to a road-over-rail bridge. Rail possessions would therefore be required for these two options during the construction period, which would need to be planned and booked in advance of the start of construction. At this stage of the scheme it is considered that a number of rail possessions could be required, which may include possessions over Christmas and Easter periods.

16.2.12 Option 2 would require full closure of the A3024 Bitterne Road West for a period of time during construction, with the A3024 traffic having to be re-routed. Details of appropriate diversion routes, and the timings for such closure(s), would need to be discussed and agreed with key stakeholders as the scheme progresses and in advance of the start of construction.

---

[279] TTM - Temporary Traffic Management

DURING OPERATIONS

16.2.13 The options being considered in this Technical Appraisal Report would have similar operations and maintenance requirements to those currently experienced on the existing road layout; with roads connecting to and from all of the following: the motorway network; major A roads; and local roads. The exception to this would be Sub-scheme 1 Option 5, which includes for a section of tunnel taking the A3024 under the Windhover Roundabout. Should this option be implemented existing formal operations and maintenance arrangements would need to be reviewed and revised.

16.2.14 The provision of the following would enable the operations and maintenance requirements to be optimised:

- Existing formal access arrangements to the existing road layout to be replicated, dependent on the options carried forward.
- Existing access arrangements to the verges and central reservations are to be maintained or relocated dependent on the options carried forward.
- Existing access arrangements to the footways and cycleways to be maintained or improved dependent on the options carried forward.
- Off network access to be considered to enable assets to be maintained, reducing the need to implement TTM[280] as the reduction in the amount of TTM required has a significant impact on reducing road worker risk exposure.

16.3 INITIAL ROAD SAFETY REVIEWS

16.3.1 Initial Road Safety Reviews were undertaken for Sub-Scheme 1 (Options 1 to 5) and Sub-Scheme 5 (Option 1). These Road Safety Reviews were conducted to identify whether there were any major safety concerns or inherent design flaws identified within these options, based on the information available during PCF Stage 1. It was not considered necessary to undertake such Road Safety Reviews for all sub-scheme options.

16.3.2 It should be noted that the process followed in undertaken these reviews does not comply with a formal RSA[281] process, in accordance with HD19/15 of the DMRB[282]. Compliance with the DMRB Road Safety Audit process is a requirement for all schemes affecting the Strategic Road Network, unless formally exempted by Highways England, and will be undertaken for the scheme in future PCF Stages. These initial Road Safety Reviews are, therefore, not intended to replace any aspect of the formal RSA process but rather to supplement the process.

[280] TTM – Temporary Traffic Management
[281] RSA – Road Safety Audit
[282] DMBR – Design Manual for Roads and Bridges

16.3.3 The safety reviews informed the design process during PCF[283] Stage 1 and should be considered during further design refinement in PCF Stage 2. Refer to **Appendix F** for the full reviews documents.

[283] PCF – Project Control Framework

17 OPERATIONAL ASSESSMENT

17.1 INTRODUCTION

17.1.1 This operational assessment section outlines the road characteristics and option design implications for the:

- Scheme's Operating Regime; and
- Driver Compliance.

17.1.2 The scheme option's operational performance (in terms of traffic flows, delays and network operation) is described in Section 14.

17.2 SCHEME'S OPERATING REGIME

17.2.1 The scheme's existing maintenance access has been outlined in Section 9 of this report, with the maintenance and repair strategy statement provided in Section 19, and a detailed description of the proposed options, including specific dimensions, in Section 11.

17.2.2 As documented in the Route Strategy Evidence Report for Solent to Midlands[284], incident management on the M27 is covered by Level of Service A. This means a Do-Maximum arrangement where the following services are provided:

17.2.3 From the NTOC[285]:

- Customer information – for example through Smart phone apps, Traffic England website;
- Incident detection (virtual patrolling);
- NTOC overview, Strategic Traffic Operations, and event planning and coordination;

From the South East RCC[286] in Godstone:

- Coordination of incident management resource (Police / contractors / TOS[287] etc.)
- Control of on-road technology including ERTs[288], CCTV[289]

---

[284] Solent to Midlands Route Strategy 2015
[285] NTOC – National Traffic Operations Centre
[286] RCC – Regional Control Centre
[287] TOS – Traffic Officer Service
[288] ERT – Emergency Roadside Telephone
[289] CCTV – Closed Circuit Television

On road:

- NVRS[290];
- Full TOS[291] on-road response capability with dedicated resource.

17.2.4 It is not currently envisaged that the options proposed would alter the current operating regime, or that they would have any effects on resource needs, whether at the NTOC[292], the RCC[293], or the TOS.

17.2.5 Highways England, HCC[294] and SCC[295] are the local highway authorities and their maintenance contractors (Kier, BBLP[296] and Amey respectively) are responsible for the routine inspection, maintenance and operation of the network along the A3024 corridor. It is not currently envisaged that the proposed options would alter the routine inspection, maintenance and operation of the network. The exception to this may be Sub-scheme 1 Option 5, which includes for a tunnel under the Windhover Roundabout, which may have additional specialist inspection, maintenance and operation requirements.

17.2.6 Common to all Options is the removal of the bus lanes along the A3024 corridor between Windhover Roundabout and the Six Dials Junctions. The corresponding bus stage at the traffic signals impacted would need to be modified, as well as the signal control strategy for the corridor.

17.2.7 Once the changes to the layouts and traffic signal operations are in place, it is not envisaged that the scheme proposals would result in additional resource needs to maintain the altered network operation, barring any exception relating to Sub-scheme 1 Option 5 as mentioned above. However, the current incident response strategy should be updated to recognise how incidents should be managed in future. For example, in the event of an accident, or a broken down vehicle on the new bridge forming part of the Northam Rail Bridge (Sub-scheme 3), or an incident on Bitterne Bridge impacting on the proposed tidal flow gantry system (Sub-scheme 5 – Option 1), or an incident in the proposed tunnel forming part of Sub-scheme 1 Option 5.

17.2.8 SCC has an existing network management control room which manages the signalised junctions along the A3024 corridor. As part of the Sub-scheme 2 options development in future stages, SCC would need to review the communications systems along the corridor and the systems in the control room to ensure compatibility.

17.3 DRIVER COMPLIANCE

17.3.1 With all options, driver compliance will centre around strict lane disciplines, observance of the road markings and compliance with signage.

---

[290] NVRS – National Vehicle Recovery Service
[291] TOS – Traffic Officer Service
[292] NTOC – National Traffic Operations Centre
[293] RCC – Regional Control Centre
[294] HCC – Hampshire County Council
[295] SCC – Southampton City Council
[296] BBLP – Balfour Beatty Living Places

17.3.2 None of the options create a significant change from the current driver compliance requirements, with the possible exception of the proposed tidal flow gantry system (Sub-scheme 5 - Option 1) across Bitterne Bridge.

18 TECHNOLOGY ASSESSMENT

18.1 INTRODUCTION

18.1.1 The Technology Assessment outlines the option design implications for the utilisation of technology in terms of:

- → Impact to existing technology assets; and
- → Provision of new technology assets.

18.1.2 A description of the existing technology has been provided in Section 4 of this report.

18.1.3 Section 19 describes the feasible changes to the maintenance and repair strategy for roadside technology, as a result of the scheme.

18.2 OPTION DESIGN IMPLICATIONS ON EXISTING TECHNOLOGY

18.2.1 The options considered for sub-schemes 1 and 2 include changes to existing traffic signal operations at Windhover Roundabout and at multiple signalised junctions along the A3024 corridor. The changes required to the SCC[297] network management control room are discussed in Section 17.

18.2.2 The majority of the sub-scheme proposals considered in this report are not dependent on additional technology, and would have no operational effect on the existing ITS[298] / RCC[299] systems or communication network. Nevertheless, there remains an opportunity to explore potential improvements to these facilities, should it become a preference, a requirement, or otherwise beneficial for Highways England, HCC[300] or SCC to incorporate as part of the scheme's requirements. These would be revisited in subsequent PCF[301] Stages.

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT

18.2.3 The new traffic signals introduced at M27 Junction 8 and Windhover Roundabout (sub-scheme 1) are standard traffic signals which would comply with Highways England and HCC[302] standards.

18.2.4 The existing Highways England Motorway Matrix Signals (Motorway Signals 1) and their cabinets on the M27 southbound merge will require relocation to the new verge for all options considered for sub-scheme 1 due to the proposed carriageway widening.

---

[297] SCC – Southampton City Council
[298] ITS – Intelligent Transport Systems
[299] RCC – Regional Control Centre
[300] HCC – Hampshire County Council
[301] PCF - Project Control Framework
[302] HCC – Hampshire County Council

18.2.5 The existing Highways England Motorway Matrix Signals (Motorway Signals 1) and their cabinets on the M27 northbound merge will require relocation to the new verge for Option 3 due to the proposed carriageway widening. The Matrix Signals and cabinets will be unaffected by Option 1 and 2.

18.2.6 The existing CCTV[303] mast located on Windhover Roundabout will require relocation for Option 2 (Through-about) of sub-scheme 1. The CCTV mast will be unaffected by Options 1 and 3.

SUB-SCHEME 2: A3024 CORRIDOR

18.2.7 For Level 1 and 2, changes to the 20 existing traffic signals along the A3024 corridor (described in Section 11) would be the introduction of Urban Traffic Management Control Microprocessor Optimised Vehicle Actuation signal control at signalised junctions with ability to switch to UTC control if conditions require.

18.2.8 This would facilitate linking between junctions and the provision of upgraded UTMC[304] Outstation Transmission Units to maximise capacity and minimise delays. The new OTU's[305] allow the mode of traffic signal control to be varied, either automatically or manually, to ensure the optimum settings for the prevailing traffic conditions. The units also allow for 'strategies' to be implemented that tie-in the operation of signals with variable message signing on street. The strategies can be triggered by either levels of traffic, air quality, incident detection or manual intervention. The new OTU's will also allow for optimised MOVA[306] control to be operated as and when it is deemed appropriate. The costs of the associated slot cutting, cabling and duct repairs/ extensions have been included for in the scheme cost estimates. It has been assumed that most of the existing infrastructure (signal poles, etc.) could be re-used.

18.2.9 For level 3 (A3024 Dualling), a number of traffic signals, CCTV masts, street lighting columns and cabinets will require relocation due to the widened carriageway.

SUB-SCHEME 3 AND 5

18.2.10 There are no existing technology assets on Northam and Bitterne Rail Bridges.

18.3 PROVISION OF NEW TECHNOLOGY ASSETS

18.3.1 There are no proposed technology assets for sub-schemes 1, 2 and 3. The options for sub-scheme 5 include for the introduction of new traffic signal technology to introduce a tidal flow "lane control" system (Option 1).

[303] CCTV – Closed Circuit Television
[304] UTMC – Urban Traffic Management Control
[305] OTU – Outstation Transmission Unit
[306] MOVA - Microprocessor Optimised Vehicle Actuation

SUB-SCHEME 5: TIDAL FLOW GANTRY SYSTEM (OVER BITTERNE BRIDGE)

18.3.2 The proposed scheme under Option1 is to convert the existing two wide lanes across the bridge into three standard lanes, and to use traffic signals mounted on overhead gantries to control the direction of the middle lane, thereby providing two lanes in the peak flow direction without widening the carriageway.

18.3.3 These types of arrangements are used in other cities but they are not that common. There are sites in Cardiff, Birmingham and Sheffield.

18.3.4 **Figure 18-1** and **Figure 18-2** are from a system on Queens Road in Sheffield that is approximately 400m in length. They have opted to highlight the shared lane in red asphalt although this isn't a technical requirement in TSRGD[307].

Figure 18-1: Example of Tidal Flow arrangement in Sheffield (#1)

Imagery ©2016 Infoterra Ltd and Bluesky, Google, Getmapping plc, Map data ©2016 Google

18.3.5 The traffic signals installed on the gantries would need to be linked into the SCC[308] network controlled from their network management control room.

[307] TSRGD – Traffic Signs Regulations and General Directions
[308] SCC – Southampton City Council

Figure 18-2: Example of Tidal Flow arrangement in Sheffield (#2)

Imagery ©2016 Infoterra Ltd and Bluesky, Google, Getmapping plc, Map data ©2016 Google

19 MAINTENANCE ASSESSMENT

19.1.1 The maintenance assessment outlines the design implication for the maintenance and repair of:

- Civil infrastructure; and
- Roadside technology.

19.1.2 M27 Junction 8 is owned by Highways England and is maintained by Kier. The highway network owned by HCC[309] is maintained by Amey and the network owned by SCC[310] is maintained by Balfour Beatty Living Places. SCC and HCC have a joint 25 year PFI[311] concession in place for the upkeep of street lighting assets.

19.2 MAINTENANCE AND REPAIR STRATEGY FOR CIVILS INFRASTRUCTURE

19.2.1 A description of the existing maintenance accesses is provided in Section 9. The Maintenance and Repair Assessment will be produced in PCF[312] Stage 2 where requirements will be considered in more detail.

SUB-SCHEME 1

19.2.2 Maintenance needs for Sub-Scheme 1 are anticipated to change as a result of the proposed options. The introduction of retaining walls, additional footways and pedestrian crossings at M27 Junction 8 and Windhover Roundabout will increase the maintenance requirements. This will be more pertinent to Option 5 where the introduction of the tunnel will add to the current infrastructure maintenance costs significantly.

19.2.3 Gabion walls, instead of retaining walls, will be used where feasible in order to reduce maintenance needs and frequencies.

19.2.4 Although the M27 Junction 8 flyover will be unaffected by this scheme, all existing maintenance provisions for the structure will be retained, and enhanced where it would be beneficial to do so, such that the structural elements can be inspected and maintained whilst minimising TTM[313] requirements.

SUB-SCHEME 2

19.2.5 Sub-Scheme 2 is unlikely to significantly increase maintenance needs, as the proposed works mainly include the widening of the existing carriageway and footways.

---

[309] HCC – Hampshire County Council
[310] SCC – Southampton City Council
[311] PFI – Private Finance Initiative
[312] PCF - Project Control Framework
[313] TTM - Temporary Traffic Management

SUB-SCHEME 3

19.2.6 Maintenance needs for Northam Rail Bridge are expected to change as a result of the proposed works. The replacement of the bridge deck will require additional abutments, parapets and retaining walls, which will increase maintenance needs. Option 3B will also enhance the subway under the bridge. As part of the modification and enhancement works, low maintenance materials would be considered and adopted whether feasible to both prolong the initial maintenance free period, and reduce the frequencies thereafter. The replacement of the existing (old) bridge should result in an overall reduction in maintenance requirements.

19.2.7 For Option 3B (which extends the subway, introducing a bend) there may be an additional maintenance requirement due to security infrastructure (lighting/CCTV).

19.2.8 The methods and facilities used for maintenance and inspection of the existing structure are: visual walkover inspections from the railway cess and public footpaths; and maintenance work being undertaken during short non-disruptive possessions of the railway and/or localised lane closures of the A3024 Northam Road. The replacement bridge would operate under a similar operation.

19.2.9 However, there is the potential to improve the future maintenance access through the design of the new bridges in future stages.

SUB-SCHEME 5

19.2.10 Option 1 (Tidal Flow Gantry System) will result in additional maintenance requirements due to the additional traffic signals required.

19.2.11 For the Bitterne Rail Bridge, Options 2 and 3 (widening or replacement of the bridge deck) will increase maintenance needs.

19.2.12 The methods and facilities used for maintenance and inspection of the existing structure are visual walkover inspections from the railway cess and public footpaths, with maintenance work being undertaken during short non-disruptive possessions of the railway and/or localised lane closures of Bitterne Road West. The replacement bridge would operate under the same operation.

APPLICABLE TO ALL SUB-SCHEMES

19.2.13 The design of all sub-schemes will take the opportunity of making maintenance access easier and hence reduce the need for implementing TTM[314] where feasible. Any new or refreshed assets should also achieve a specified maintenance-free period after construction. This approach will reduce the risk exposure of traffic management operative and other road workers.

19.2.14 Landscape maintenance could also be reduced using low maintenance, low growth grass and planting, avoiding close proximity to visibility splays. This would reduce the

[314] TTM – Temporary Traffic Management

frequency of maintenance workers exposed to hazards and risks when undertaking their duties.

19.2.15 Other potential opportunities to make maintenance easier include:

- Utilising a mechanical system to sweep drainage channels and gullies, thereby eliminating the need for manual attendance.
- Providing paint systems with extended maintenance periods so as to achieve a very long design life with minimal maintenance treatments. This could be particularly relevant for bridges and guardrails.
- Use self-cleaning facings for any new or replacements traffic signs so as to reduce cleaning requirements.
- Combine cyclic maintenance activities to minimise the frequency when traffic management is implemented, thereby reducing risk exposure to traffic management operatives.

19.3 MAINTENANCE AND REPAIR STRATEGY FOR ROADSIDE TECHNOLOGY

19.3.1 This Section describes the implication of the scheme on the maintenance and repair of the roadside technology.

SUB-SCHEME 1

19.3.2 Maintenance and repair requirements for road side technology at M27 Junction 8 and Windhover Roundabout are likely to change for all options, as the full signalisation of the two junctions will increase maintenance needs. The current maintenance laybys are not adequate to cover the increased needs; therefore additional maintenance access points will need to be identified through the future stage design refinement.

19.3.3 The existing Highways England Motorway Matrix Signals and the cabinets on the M27 southbound merge (Refer to **The existing** Highways England Motorway Matrix Signals and the cabinets on the M27 northbound merge (Refer to **Figure 19-2**) will remain unaffected for Options 1 and 2. However, the proposals for Option 3 will require repositioning these assets. The maintenance layby will also need to be repositioned at the edge of the widened carriageway.

19.3.4 For Option 4 and 5 the Matrix Signs will be the same as for Option 1 and will be relocated on the new verge for the needs of the widened carriageway for all options. Safe maintenance assess points will be identified

19.3.5 The existing Highways England Motorway Matrix Signals and the cabinets on the M27 northbound merge (Refer to **Figure 19-2**) will remain unaffected for Options 1 and 2. However, the proposals for Option 3 will require repositioning these assets. The maintenance layby will also need to be repositioned at the edge of the widened carriageway.

19.3.6 For Option 4 and 5 the Matrix Signs will be the same as for Option 1.

Figure 19-1: M27 Southbound Roadside Technology

Figure 19-2: M27 Northbound Roadside Technology

19.3.7 The existing CCTV[315] camera on Windhover Roundabout (Refer to **Figure 19-3**), opposite the A3024 Bursledon Road approach, will remain unaffected for Options 1 and 3. Therefore, the maintenance needs are unlikely to change. For Option 2 the introduction of a dual carriageway through the Roundabout will require the reposition of the CCTV camera. New maintenance access points will be identified for this option.

19.3.8 For Option 4 the CCTV mast will need to be relocated.

19.3.9 For Option 5 the CCTV mast will not be impacted, but additional equipment may need to be installed and maintained to monitor the tunnel as part of traffic management and possibly air quality management.

[315] CCTV – Closed Circuit Television

Figure 19-3: Windhover Roundabout Roadside Technology

SUB-SCHEME 2

19.3.10 The affected traffic signals, cameras, street lighting and cabinets on the A3024 corridor will need to be relocated on the new verge. The maintenance requirements for signal equipment are not anticipated to increase because of the new equipment. New maintenance access points will need to be identified for these assets.

SUB-SCHEME 3

19.3.11 There are no technology assets on Northam Rail Bridge and no proposed technology assets. This applies to all options.

SUB-SCHEME 5

19.3.12 There are no existing technology assets on Bitterne Bridge and no proposed technology assets for Options 2 and 3.

19.3.13 Maintenance needs for Option 1 will change as the introduction of Lane Control Signal Gantries will increase maintenance needs. The gantry design should be in accordance with IAN 193/16. For Option 1 the maintenance cost would increase, in relation to the proposed gantries and related signage, the routine maintenance budget since any maintenance work will require TTM possibly at night time.

19.3.14 Maintenance needs for Option 1 will change as the introduction of Lane Control Signal Gantries will increase maintenance needs. The gantry design should be in accordance with IAN 193/16[316].

[316] IAN - Interim Advice Note 193/16 Requirements for the provision of access arrangements on gantries

20 ENVIRONMENTAL ASSESSMENT

20.1 INTRODUCTION

20.1.1 The following Sections present a summary of the findings of largely qualitative technical assessments which have been carried out based on professional judgement. Each sub-scheme has been assessed according to its effect on:

- Noise and Vibration;
- Air Quality;
- Greenhouse Gases;
- Landscape and Townscape;
- Cultural Heritage;
- Nature Conservation;
- Road Drainage and the Water Environment;
- People and Communities;
- Geology and Soil;
- Historical Land Use; and
- Materials.

20.1.2 The impacts and effects have been identified having taken likely mitigation measures into account (where mitigation measures are known at this stage). A more detailed Scheme description, anticipated programme for construction and operation, and the baseline conditions, assessment methodologies and likely mitigation provisions for each of the Sub-scheme options are contained within the Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002) which has been produced for PCF[317] Stage 1.

20.2 NOISE AND VIBRATION

TEMPORARY CONSTRUCTION IMPACTS

20.2.1 The following are qualitative comments on the likely magnitude of impacts for each sub-scheme and alternatives within each sub-scheme.

20.2.2 It should be noted that these comments are not based on any objective, quantitative analysis, but are subjective and rely on professional judgement.

[317] PCF – Project Control Framework

SUB-SCHEME 1 - M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.2.3 Mostly negligible and minor adverse impacts of a temporary nature are anticipated for all options, primarily on the basis that there are relatively few properties close to either Junction.

20.2.4 Some potential for moderate adverse impacts in the short term at the nearest receptors, for example those in Windmill Lane and West End Road. Options 2, 4 and 5 which would necessarily entail more extensive works to construct through-about (Options 2 and 4) or the tunnel (Option 5).

20.2.5 However, as there are no NSRs[318] that are close to the heart of the Junction and on the basis that road traffic will still need to circumnavigate the Junction (resulting in a relatively high ambient noise level being generated), temporary impacts are still likely to be no higher than moderate adverse at the nearest locations, with negligible and minor adverse impacts elsewhere.

SUB-SCHEME 2 - A3024 EASTERN ACCESS CORRIDOR

20.2.6 For Level 1 only negligible impacts are anticipated as construction works would be limited.

20.2.7 For Level 2 the restricted nature of the works would result in mostly negligible and minor adverse impacts, although some localised moderate adverse impacts might be experienced occasionally in the vicinity of some Junction improvements works.

20.2.8 For Level 3, the proximity of receptors to the line of the A3024 and the works necessary to widen the A3024 corridor means that moderate and major adverse impacts could be experienced, particularly at NSRs located close to where widening is proposed.

SUB-SCHEME 3 - NORTHAM RAIL BRIDGE REPLACEMENT

20.2.9 All options require a new bridge Section to be constructed to the north of the existing bridge, with the difference between options principally depending on how the southern bridge Section is improved.

20.2.10 The need to construct retaining walls and bridge abutments, allied with working over the railway (requiring track possessions, most likely during night time hours), means that for all options major adverse impacts are anticipated at the closest receptors such as those located in Wolverton Road a short distance to the north-east.

20.2.11 Moderate and major adverse impacts are also anticipated to the south-west at properties in Northam Road.

[318] NSR - Noise Sensitive Receptor

20.2.12 Properties to the north-east in Radcliffe Road are largely screened by other buildings and oriented in such a way that negligible or minor adverse impacts are more likely at this location.

SUB-SCHEME 5 - BITTERNE BRIDGE WIDENING

20.2.13 The nearest receptors are located within a few metres of the A3024. Therefore, even under Option 1, which would involve fairly limited construction works, minor and occasionally moderate adverse impacts could be experienced in the short term.

20.2.14 The more substantial construction works associated with Options 2 and 3 are likely to result in moderate and major adverse impacts, particularly since work over the railway is likely to require track possessions, most likely during night time hours. Properties most likely to be adversely affected are those located on the approaches to the bridge on its southern side.

PERMANENT OPERATIONAL IMPACTS

20.2.15 Qualitative comments (which are subjective and based on experience), on the likely impacts arising from the road realignments for each alternative within each sub-scheme, are included below.

SUB-SCHEME 1 - M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.2.16 All options are anticipated to have negligible impacts.

SUB-SCHEME 2 - A3024 EASTERN ACCESS CORRIDOR

20.2.17 Level 1 is anticipated to have negligible impacts.

20.2.18 Level 2 is anticipated to have negligible and minor impacts.

20.2.19 Level 3 is anticipated to have mostly negligible and minor adverse impacts, but moderate adverse impacts could arise where properties are currently located very close to road and realignments are sizeable (for example properties on the south side of Bursledon Road just to the east of North East Road).

20.2.20 Furthermore, a number of properties in A3024 Bursledon Road either side of Bath Road may be demolished as part of proposals to widen the carriageway. The removal of these properties could result in moderate or major adverse impacts for properties located behind and currently screened from the A3024.

SUB-SCHEME 3 - NORTHAM RAIL BRIDGE REPLACEMENT

20.2.21 All options are anticipated to have minor and moderate adverse impacts especially at properties in Wolverton Road on the north side of the bridge.

SUB-SCHEME 5 - BITTERNE BRIDGE WIDENING

20.2.22 Option 1 is anticipated to have negligible impacts.

20.2.23 Options 2 and 3 are anticipated to have minor adverse impacts, especially at properties on the south side.

20.3 AIR QUALITY

CONSTRUCTION PHASE

20.3.1 The air quality impacts of construction are generally expected to be restricted to the duration of the construction works. They relate to particulate matter emissions and any loss of amenity as a result of the construction.

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.3.2 Impacts for Sub-scheme 1 (all options) are expected to be negligible/minor adverse. This is due to the relatively low number of receptors close to the sub-scheme and the distance of the receptors to the Sub-scheme.

20.3.3 The closest residential properties lie within 80m of the sub-scheme. Most of the residential properties are located to the south and south east of Sub-scheme 1 along Windmill Lane and between the A3025 and A27 to the south. A small number of properties lie to the north of the sub-scheme along of the A27.

20.3.4 The least impact will be from Option 1, with Option 3 having a slightly larger impact due to the construction of a new slip lane.

20.3.5 Option 2 and 4 involve construction of through-about lanes across the Roundabout. These will involve more construction work as the works would be of a longer duration and additional construction sites.

20.3.6 The tunnel proposed in Option 5 would involve the greatest construction work, and therefore have the greatest impact, as there would considerable excavation and associated works adjacent to the sub-scheme.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.3.7 Impacts for Sub-scheme 2 (all options) are all predicted to be negligible during construction.

20.3.8 A large number of residential properties exist along the whole extent of Sub-scheme 2 with some < 10m from the roadside. Bitterne Junior School and Springwell School are also located within 200m of the Sub-scheme.

20.3.9 Level 1 - There are no anticipated impacts from construction as Level 1 predominantly comprises signalling changes.

20.3.10 Level 2 - The impact of construction phase activities is likely to be negligible due to the small scale of construction.

20.3.11 Level 3 - The impact of construction phase activities is likely to be negligible, providing appropriate mitigation is implemented.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.3.12 Impacts for Sub-scheme 3 (all options) are likely to be minor adverse in construction.

20.3.13 Where there are minor adverse impacts, there is currently no mitigation suggested, since there is insufficient information surrounding the construction methodology at this stage.

20.3.14 The impact of the construction phase activities is likely to be marginally larger for Option 3A and Option 3B due to the demolition work on the existing bridge. There is little differentiation between Options 1 and 2 at this stage.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.3.15 Impacts for Sub-scheme 5 (all options) are expected to be negligible/minor adverse.

20.3.16 Proposed construction likely to be relatively contained within the constraints of the available land and given the potential for using precast segments for the bridge.

20.3.17 The impact of the construction phase activities is likely to be largest for Option 3, with Option 1 the smallest impact.

OPERATIONAL PHASE

20.3.18 With the assessment being at an early stage the limited available traffic data can only be used as an indication of predicted impacts. The assessment identified all links which are predicted to trigger the DMRB[319] criteria.

20.3.19 It is not possible to quantify the predicted impacts on residential receptors at this time. However, the assessment considers the impacts at sensitive areas, namely at AQMAs[320] and PCM[321] links predicted to exceed the EU[322] limit value in 2020.

20.3.20 A qualitative assessment has therefore undertaken, based on a comparison of the sub-scheme options.

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.3.21 The air quality impacts in the operational phase are expected to be minor adverse for all options (Options 1 to 5).

20.3.22 The increase in capacity provided by the design will allow more traffic to flow through the Junction during the peak periods.

---

[319] DMRB – Design Manual for Roads and Bridges
[320] AQMA – Air Quality Management Area
[321] PCM – Pollution Control Mapping
[322] EU – European Union

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.3.23 The air quality impacts in the operational phase are expected to be major adverse for all options (Levels 1 to 3).

20.3.24 Sub-scheme 2 is located within the Bitterne Road AQMA[323]. Changes to traffic signal equipment at junctions will have less of an impact on flows than Levels 2 and 3, but will result in an increase in traffic flow along the A3024 corridor.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.3.25 The air quality impacts in the operational phase are expected to be minor adverse for all options (Options 1, 2, 3A and 3B).

20.3.26 All options would provide the same amount of additional capacity and would result in the same increase in flows.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.3.27 The air quality impacts in the operational phase are expected to be major adverse for all options (Options 1 to 3).

20.3.28 Sub-scheme 5 is located within the Bitterne Road AQMA. The Option 1 tidal flow control system would provide increased capacity in the peak direction and would result in an increase in traffic flows across the bridge. Options 2 and 3 involve widening of the bridge which would allow for two full lanes per direction, increasing the capacity and resulting in an increase in flows which would likely be larger than the increase for Option 1.

20.4 GREENHOUSE GASES

20.4.1 The Scheme aims to facilitate the efficient movement of traffic through the Windhover and M27 Junction 8 Roundabouts and along the A3024 at a more constant speed that is closer to the optimum speed for fuel economy by improving conditions at, and ultimately reducing, congested pinch points along the M27 Southampton Junctions Scheme length. In addition, the M27 Southampton Junctions Scheme aims to reduce transport related emissions on the corridor by encouraging, where appropriate, modal shift away from the car on to more sustainable forms of transport such as cycling, walking and buses.

20.4.2 This may have the effect of contributing to a reduction in greenhouse gas emissions. However, to fully assess the impact of the M27 Southampton Junctions Scheme on greenhouses gases, detailed traffic modelling information would be required, as it is dependent on the combination of changes to flow, vehicle speeds and impact on surrounding road links. Quantitative modelling will be undertaken at PCF[324] Stage 2 Once the data is available assessment will be undertaken to determine the Scheme's effect on Greenhouse Gas emissions.

---

[323] AQMA – Air Quality Management Area
[324] PCF – Project Control Framework

20.5 LANDSCAPE, TOWNSCAPE AND VISUAL

20.5.1 Because landscape mitigation (screen planting) has not been included at this early design stage, potential effects are assessed without mitigation and the possible additional effects of mitigation are noted.

20.5.2 Landscape and visual effects associated with Sub-scheme 1 would vary according to the extent of the new infrastructure and loss of mature woodland planting within the highway boundary. Potential impacts would be greatest from Options 2 and 5 due to new infrastructure within Windhover Roundabout which would leave limited areas for new screen planting.

20.5.3 Permanent landscape and visual effects would arise from Sub-scheme Level 3 only; Level 1 and 2 would be barely distinguishable at operation. Under Level 3 road widening would increase the scale of the road which would have a direct landscape and visual impact on several residential properties.

20.5.4 Landscape and visual impact associated with Sub-schemes 3 and 5 would be broadly similar. Whilst there would be potential adverse visual impacts for a small number of residential properties from all of the options, it is likely that the options proposing new structures could have an overall beneficial effect. With good design a new bridge would be more aesthetically pleasing and would contribute to the wider regeneration of the surrounding area.

20.5.5 The effects of the Sub-scheme options in construction and operation are summarised in **Table 20-1**.

Table 20-1 Overall Summary of Effects

SUB-SCHEMES	OPTIONS	CONSTRUCTION IMPACTS	OPERATION IMPACTS
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout Upgrades	Option 1: Localised Junction Widening	Landscape: Slight Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Slight Adverse
	Option 2: Through-about to A3024 Bursledon	Landscape: Moderate Adverse	Landscape: Moderate Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
	Option 3: Free-flow left-turn slip lanes at M27 Junction 8	Landscape: Slight Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Slight Adverse
	Option 4: Through-about to A3025 Hamble Lane	Landscape: Moderate Adverse	Landscape: Moderate Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
	Option 5: Tunnel under Windhover Roundabout	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
Sub-scheme 2: A3024 Eastern Access Corridor	Level 1: Signal control improvements	Landscape: Slight Adverse	Landscape: Neutral
		Visual: Slight Adverse	Visual: Neutral

SUB-SCHEMES	OPTIONS	CONSTRUCTION IMPACTS	OPERATION IMPACTS
	Level 2: Junction and signal improvements	Landscape: Slight Adverse	Landscape: Neutral
		Visual: Slight Adverse	Visual: Neutral
	Level 3: Dualling full A3024 corridor	Landscape: Moderate Adverse	Landscape: Moderate Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
Sub-scheme 3: Northam Rail Bridge Replacement	Option 1: New bridge / Refurbish existing	Landscape: Slight Adverse	Landscape: Slight Adverse
		Visual: Slight Adverse	Visual: Moderate Adverse
	Option 2: New bridge / Raise and refurbish existing	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
	Option 3A: New bridge / Demolish and replace existing - close subway	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
	Option 3B: New bridge / Demolish and replace existing - retain subway	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
Sub-scheme 5: Bitterne Bridge Widening	Option 1: Tidal flow gantry system	Landscape: Slight Adverse	Landscape: Neutral
		Visual: Slight Adverse	Visual: Neutral
	Option 2: Widening of existing bridge	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse
	Option 3: Replacement (widening) of existing deck	Landscape: Moderate Adverse	Landscape: Slight Adverse
		Visual: Moderate Adverse	Visual: Moderate Adverse

20.6 CULTURAL HERITAGE

CONSTRUCTION PHASE

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.6.1 For Sub-scheme 1 (all options), the significance of effects on the settings of the listed buildings in the area surrounding Sub-scheme 1 is expected to be negligible since activities causing increases in visual, lighting and acoustic intrusion will be confined to the highway boundary.

20.6.2 For Sub-scheme 1 (Options 1 and 3), the significance of effects on archaeology are expected to be negligible since all construction works will take place within the highways boundary, and within which the potential for undisturbed below-ground archaeological remains to be present is considered to be low.

20.6.3 For Sub-scheme 1 (Options 2, 4 and 5), the significance of effects on archaeology are expected to be moderate to large adverse. It is unlikely that earthmoving activities within the existing highway boundaries will cause harm to below-ground remains, as the likelihood of preservation within these previously disturbed areas is considered to be low. There is, however, potential for unknown archaeological remains to survive within the centre of Windhover Roundabout and groundworks including topsoil stripping, excavations, drainage etc. have the potential to disturb or cause the loss of these potential remains. The excavation of a tunnel (Option 5) also has the potential to disturb below-ground remains which survive within this area of previously undisturbed ground.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.6.4 For Sub-scheme 2 (all Options), the significance of effects on the settings of the listed buildings in the area surrounding Sub-scheme 2 is expected to be negligible since where activities causing increases in visual, lighting and acoustic intrusion occur (Level 3 only) they will be confined to the highway boundary.

20.6.5 Sub-scheme 2, Level 3 improvements include carriageway widening which would – subject to further assessment and design refinement – result in land take and land clearance. Any earthmoving activity within previously undisturbed land has the potential to cause the loss and disturbance of known and potential buried and surface archaeological remains. This option has the potential to cause moderate/large adverse construction effects on archaeological remains.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.6.6 For Sub-scheme 3 (Options 1, 2 3A and 3B), the significance of effects on the settings of the listed buildings in the area surrounding Sub-scheme 3 is expected to be negligible since no Scheduled Monuments, listed or locally listed buildings exist in the immediate vicinity of Northam Rail Bridge.

20.6.7 For Sub-scheme 3 (Options 1, 2 3A and 3B), the significance of effects on archaeology are expected to be moderate/large adverse since these options all require some additional land take of mainly vegetated areas. Any earthmoving activity

within areas of land take that has not been subject to any previous disturbance has the potential to cause the loss and disturbance of known and potential buried/surface archaeological remains.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.6.8 For Sub-scheme 5 (Option 1), no impacts upon cultural heritage are envisaged for as no or limited external constructions works are proposed.

20.6.9 For Sub-scheme 5 (Options 2 and 3), have the potential to cause large to very large adverse construction effects on archaeological remains and a moderate to large adverse effect upon the setting of Bitterne (Clausentum) Roman station (SM1005538).

20.6.10 It is likely that there will be an increase in visual, lighting and acoustic intrusion due to the activities and plant during construction which could have a detrimental effect upon the setting of SM1005538. The experience and appreciation of the asset may be compromised as a result of these activities.

20.6.11 Localised widening to the north of Bitterne Road Rail Bridge will result in land take. Amendments or realignments to the existing road network would be required. This would involve realignment of the existing carriageway and some additional land take (mainly areas of vegetation).

20.6.12 Part of the Scheduled Monument of Bitterne (Clausentum) Roman station (SM1005538) borders the southern edge of the Sub-scheme's maximum extent. Therefore, there is potential for this site to be physically harmed during earthmoving activity within areas of land take. The loss and disturbance of known and potential non-designated buried or surface archaeological remains is also likely.

OPERATIONAL PHASE

20.6.13 Due to the proposed scale of the Scheme, its proximity to the existing highways boundary and the location of designated heritage assets in relation to it, it is considered there will no significant effects upon the setting of designed assets during the operational phase with the exception of Bitterne (Clausentum) Roman station (SM1005538) which lies on the southern border of Sub-scheme 5.

20.6.14 This option has the potential to cause large to very large adverse operational effects on archaeological remains and a moderate to large adverse effect upon the setting of Bitterne (Clausentum) Roman station (SM1005538).

20.7 NATURE CONSERVATION

20.7.1 The assessment of effects in the absence of mitigation is presented in the Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002) and is organised by IEF[325] which includes the following features.

- Designated Sites;
- Habitats;
- Protected Species;
- Non-Native Invasive Species; and
- Tree Preservation Orders.

20.7.2 Likely mitigation measures are also detailed in the Environmental Study Report. In summary:

- The Scheme has the potential to affect some protected and notable species through damage or loss of habitat, reduced connectivity and harm to individuals during construction in the absences of mitigation. This includes badgers, bats, birds, dormouse, reptiles, hedgehog and invertebrates. Following mitigation, no residual effect on protected and notable species is expected.
- In the short-term, loss of semi-natural broad-leaved woodland and species poor hedgerow habitat as a result of construction may result in a significant short-term residual effect at the local to site levels. This residual effect would result, under Sub-schemes 1 and Sub-scheme 2 Level 3, in a maximum loss of c.0.4 ha of woodland, and c.600m of hedgerow. Sub-scheme 5 Option 3 would result in a maximum loss of c.0.05ha Semi-natural broadleaved woodland.
- Sub-schemes may also result in damage to ecologically designated sites. Sub-scheme 2 Level 3 would result in the largest number of sites being affected, having an impact on improved grassland, poor semi-improved grassland and woodland within Sholing Common SINC[326], Windhover (Netley Common South) SINC and Shoreburs Greenway SINC. Widening of a slip road under Sub-scheme 1 Option 3 would result in temporary damage to the edge of Oakleigh Meadow SINC. Sub-schemes 3 and 5 would result in no residual impact on ecologically designated sites.
- Short-term effects would become negligible once the compensatory habitat creation or enhancement reached maturation, subject to appropriate monitoring and maintenance to achieve its intended purpose.

20.7.3 **Table 20-2** identifies construction and operation phase impacts that may affect IEFs under each Sub-scheme option, and states the likely geographical level of the effect

20.7.4 The options within each Sub-scheme are ranked in the table in terms of the geographical level of significance of the overall ecological effects, with red showing

[325] IEF - Important Ecological Features
[326] SINC – Site of Nature Conservation Interest

the options under each Sub-scheme with the most significant effect, orange intermediate, and green the least significant effect. Where the residual effects of two options under a sub-scheme were similar, the geographical significance level of pre-mitigation effects was used to rank the options according to level of ecological effect.

Table 20-2 Summary of Geographical Level of Adverse Residual Effects

SUB-SCHEMES	OPTIONS	CONSTRUCTION IMPACTS	OPERATIONAL IMPACTS
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout Upgrades	Option 1 : Localised Junction Widening	Semi-natural broadleaved woodland: (Site) Intact species poor hedgerow: (Site)	No significant effect
	Option 2 : Through-about to A3024 Bursledon	Semi-natural broadleaved woodland: (Local) Intact species poor hedgerow: (Site)	No significant effect
	Option 3 : Free-flow left-turn slip lanes at M27 Junction 8	Oakleigh Meadow SINC: (Local) Semi-natural broadleaved woodland: (Site) Intact species poor hedgerow: (Site)	No significant effect
	Option 4 : Through-about to A3025 Hamble Lane	Semi-natural broadleaved woodland: (Local) Intact species poor hedgerow: (Site)	No significant effect
	Option 5 : Tunnel under Windhover Roundabout	Semi-natural broadleaved woodland: (Local) Intact species poor hedgerow: (Site)	No significant effect
Sub-scheme 2: A3024 Eastern Access Corridor	Level 1: Signal control improvements	No significant effect	No significant effect
	Level 2: Junction and signal improvements	No significant effect	No significant effect
	Level 3: Dualling full A3024 corridor	Sholing Common SINC[327] : (Local) Windhover (Netley Common South) SINC: (Local) Shoreburs Greenway SINC: (Local) Semi-natural broad-leaved woodland: (Local) Intact species poor hedgerow: (Site) (TPO[328] trees: loss)	No significant effect

[327] SINC – Site of Nature Conservation Interest
[328] TPO - Tree Preservation Order

SUB-SCHEMES	OPTIONS	CONSTRUCTION IMPACTS	OPERATIONAL IMPACTS
Sub-scheme 3: Northam Rail Bridge Replacement	Option 1: New bridge / Refurbish existing	No significant effect	No significant effect
	Option 2: New bridge / Raise and refurbish existing	No significant effect	No significant effect
	Option 3A: New bridge / Demolish and replace existing - close subway	No significant effect	No significant effect
	Option 3B: New bridge / Demolish and replace existing - retain subway	No significant effect	No significant effect
Sub-scheme 5: Bitterne Bridge Widening	Option 1: Tidal flow gantry system	No significant effect	No significant effect
	Option 2: Widening of existing bridge	No significant effect	No significant effect
	Option 3: Replacement (widening) of existing deck	Semi-natural broad-leaved woodland: (Site) (TPO[329] trees: loss)	No significant effect

20.8 ROAD DRAINAGE AND THE WATER ENVIRONMENT

CONSTRUCTION PHASE

20.8.1 The most notable potential impact during the construction stage comprises an increase in spillages of fuels, lubricants, hydraulic fluids and cements, and the mobilisation of suspended solids. These impacts can be largely mitigated through the implementation of a robust CEMP[330]. A residual risk to surface water features, most notably the ordinary watercourses that pass beneath Sub-scheme 2, will remain given the proximity of the works to these features.

OPERATIONAL PHASE

20.8.2 The most notable potential impact during operation comprises a potential increase in flood risk associated with surface water runoff from new areas of hard-standing (All Sub-schemes). It is anticipated that this will be mitigated through the provision of an appropriate drainage system that will be developed during the detailed design stage.

20.8.3 The potential impacts of the sub-scheme Options on the water environment are summarised in **Table 20-3** below.

[329] TPO – Tree Protection Order
[330] CEMP - Construction Environmental Management Plan

Table 20-3 Summary of Effects

SUB-SCHEMES	OPTIONS	CONSTRUCTION IMPACTS	OPERATION IMPACTS
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout Upgrades	Option 1 : Localised Junction Widening	Slight Adverse	Slight Adverse
	Option 2 : Through-about to A3024 Bursledon	Slight Adverse	Slight Adverse
	Option 3 : Free-flow left-turn slip lanes at M27 Junction 8	Slight Adverse	Slight Adverse
	Option 4 : Through-about to A3025 Hamble Lane	Slight Adverse	Slight Adverse
	Option 5 : Tunnel under Windhover Roundabout	Slight Adverse	Slight Adverse
Sub-scheme 2: A3024 Eastern Access Corridor	Level 1: Signal control improvements	Neutral	Neutral
	Level 2: Junction and signal improvements	Neutral	Neutral
	Level 3: Dualling full A3024 corridor	Slight Adverse	Slight Adverse
Sub-scheme 3: Northam Rail Bridge Replacement	Option 1: New bridge / Refurbish existing	Slight Adverse	Slight Adverse
	Option 2: New bridge / Raise and refurbish existing	Slight Adverse	Slight Adverse
	Option 3A: New bridge / Demolish and replace existing - close subway	Slight Adverse	Slight Adverse
	Option 3B: New bridge / Demolish and replace existing - retain subway	Slight Adverse	Slight Adverse
Sub-scheme 5: Bitterne Bridge Widening	Option 1: Tidal flow gantry system	Neutral	Neutral
	Option 2: Widening of existing bridge	Slight Adverse	Slight Adverse
	Option 3: Replacement (widening) of existing deck	Slight Adverse	Slight Adverse

20.9 PEOPLE AND COMMUNITIES

20.9.1 The most notable impacts during construction are moderate adverse impacts on all travellers for Sub-scheme 1 Options 2, 4 and 5, since some temporary disruption to NMU[331] journeys and a reduction in amenity during construction could potentially result in temporary moderate adverse impacts.

20.9.2 The final extent of all land take (including land take requirements for construction compounds) is not known at the current stage of design and will be dependent on the ultimate preferred option chosen. The majority of land that would be required for the options is within public ownership of key stakeholders (within the SCC[332] or HCC[333] highways boundaries or on Network Rail controlled land). The potential land take

[331] NMU – Non-Motorised User
[332] SCC – Southampton City Council
[333] HCC – Hampshire County Council

requirements, based on information available at PCF Stage 1 are outlined below for each of the sub-schemes.

20.9.3 All other impacts in construction and operation range from beneficial to minor adverse.

20.9.4 It is unclear at this stage of assessment how the changes in traffic flows will impact upon air quality until detailed assessment is carried out (at PCF Stage 2). It is anticipated at this stage that due to the decrease in congestion but likely increase in traffic flows, the impact on air quality will be at best neutral and at worst minor adverse for all Sub-schemes.

20.9.5 Impacts for each Sub-scheme during construction and operation are summarised in the tables below.

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.9.6 The impacts of Sub-scheme 1 are summarised in **Table 20-4** below.

Effects on All Travellers

20.9.7 Sub-scheme 1 construction works will take place within the highways boundary and therefore will not change views from the road for motorised users.

20.9.8 Sub-scheme 1 may temporarily increase Driver Stress as a result of construction works and associated traffic issues but as levels of driver stress are already assumed to be high, there will be no change.

20.9.9 It is expected that all Sub-scheme 1 will improve traffic flows and reduce congestion locally, resulting in a more effective network and an overall decrease in driver stress during operation.

20.9.10 Sub-scheme 1 proposes new and improved NMU[334] facilities for cyclists and pedestrians. These will improve connectivity and amenity for users during the operational phase, providing a slight beneficial effect.

20.9.11 Sub-scheme 1 options may result in some temporary disruption to NMU journeys and a reduction in amenity during construction, resulting in adverse effects. Furthermore, Sub-scheme 1 Option 2 proposes an additional road crossing for NMUs over the new Section of carriageway across Windhover Roundabout which will reduce amenity for users and provide an adverse impact.

[334] NMU – Non-Motorised User

Table 20-4 Sub-scheme 1 Summary of Impacts

SUB-SCHEME	OPTIONS	IMPACT					
		ALL TRAVELLERS		COMMUNITIES		PEOPLE	
		CONSTRUCTION	OPERATION	CONSTRUCTION	OPERATION	CONSTRUCTION	OPERATION
Sub-scheme 1: M27 Junction 8 and Windhover Roundabout Upgrades	Option 1 : Localised Junction Widening	No change to temporary adverse	Slight beneficial	No change	No change	Slight beneficial	Slight beneficial to minor adverse
	Option 2 : Through-about to A3024 Bursledon	No change - moderate adverse	Beneficial to adverse impact	No change	No change	TBA	Slight beneficial to minor adverse
	Option 3 : Free-flow left-turn slip lanes at M27 Junction 8	No change to temporary adverse	Slight beneficial	No change	No change	Slight beneficial	Slight beneficial to minor adverse
	Option 4 : Through-about to A3025 Hamble Lane	No change - moderate adverse	Beneficial to adverse impact	No change	Beneficial to adverse impact	TBA	Slight beneficial to minor adverse
	Option 5 : Tunnel under Windhover Roundabout	No change to moderate adverse	Slight beneficial impact	No change	No change	Slight beneficial	Slight beneficial to minor adverse

Effects on Communities

20.9.12 Sub-scheme 1 is not expected to sever existing communities and will not directly affect any tourism or recreational facilities or adversely affect future housing development.

20.9.13 Sub-scheme 1 may result in some temporary disruption to those accessing tourism and leisure facilities during construction, causing a temporary adverse effect.

20.9.14 Sub-scheme 1 (all options) may require permanent or temporary land take in order to accommodate localised widening and retaining walls. Some of the options may require land take as mitigation for impacts on environmental assets.

Effects on People

20.9.15 The construction works of Sub-scheme 1 will cause a temporary increase in employment and increase of spend in the local economy, resulting in a temporary beneficial effect.

20.9.16 Sub-scheme 1 will have a slight beneficial effect on MTs[335] commuting and accessing Southampton City Centre. It is not likely that there will be any direct impacts on areas of strategic growth and employment land allocations within Southampton.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.9.17 The impacts of Sub-scheme 2 are summarised in **Table 20-5** below.

Table 20-5 Sub-scheme 2 Summary of Impacts

SUB-SCHEME	OPTIONS	IMPACT					
		All Travellers		Communities		People	
		Construction	Operation	Construction	Operation	Construction	Operation
Sub-scheme 2: A3024 Eastern Access Corridor	Level 1: Signal control improvements	No change	Beneficial	No change	No change	Beneficial to minor adverse	TBA
	Level 2: Junction and signal improvements	No change	Beneficial	No change	No change	Beneficial to minor adverse	TBA
	Level 3: Dualling full A3024 corridor	No change to Minor adverse	Slight beneficial to Minor adverse	Significant adverse to adverse	No change	Beneficial	Beneficial to minor adverse

[335] MT - Motorised Traveller

Effects on All Travellers

20.9.18 Sub-scheme 2 construction works will entail widening and realignment of the existing route, mostly within the highway boundary, and therefore will not change views from the road for motorised users.

20.9.19 For Sub-scheme 2, where widening is required, existing vegetation may need to be removed causing a potential view change of minor significance as a worst case.

20.9.20 For Sub-scheme 2 (Level 3) it is anticipated that due to the increase in the number of lanes and the removal of street furniture and vegetation, there may be some reduction in amenity causing a slight permanent adverse effect. However, the widening of NMU[336] facilities will be beneficial for wheelchair users and cyclists.

20.9.21 It is expected that all Sub-scheme 2 will improve traffic flows and reduce congestion locally, resulting in a more effective network and an overall decrease in driver stress during operation.

20.9.22 Journey lengths may be permanently increased by Sub-scheme 2 (Level 3) for some NMU during operation, due to the location of new pedestrian crossings and the increase in number of lanes, but are not anticipated to be more then slightly affected.

Effects on Communities

20.9.23 Where widening is required outside of the highway boundary there will be loss of private land.

20.9.24 Subject to more detailed assessment and design of the carriageway widening options forming part of Sub-scheme 2, land take may be required which may impact on a number of properties. This may result in a significant permanent adverse effect to residents and community land assets at Eastpoint, Muddy Bottom South and Scholing Common.

Effects on People

20.9.25 Provision and improvement of off-road NMU[337] facilities associated with Sub-scheme 2 is likely to encourage NMU travel modes for short journeys, providing a permanent beneficial effect.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.9.26 The impacts of Sub-scheme 3 are summarised in **Table 20-6** below.

[336] NMU – Non-Motorised User
[337] NMU – Non-Motorised User

Table 20-6 Sub-scheme 3 Summary of Impacts

SUB-SCHEME	OPTIONS	IMPACT					
		All Travellers		Communities		People	
		Construction	Operation	Construction	Operation	Construction	Operation
Sub-scheme 3: Northam Rail Bridge Replacement	Option 1: New bridge / Refurbish existing	No change to minor adverse	Slight beneficial	Adverse	No change	Beneficial	Beneficial to minor adverse
	Option 2: New bridge / Raise and refurbish existing	No change to minor adverse	Slight beneficial	Adverse	No change	Beneficial	Beneficial to minor adverse
	Option 3A: New bridge / Demolish and replace existing - close subway	No change to minor adverse	Slight beneficial	Adverse	No change	Beneficial	Beneficial to minor adverse
	Option 3B: New bridge / Demolish and replace existing - retain subway	No change to minor adverse	Slight beneficial	Adverse	No change	Beneficial	Beneficial to minor adverse

Effects on All Travellers

20.9.27 Sub-scheme 3 options are expected to maintain the currently restricted views from the road over Northam Rail Bridge or be reduced to no view, and therefore will only be subject to a change of minor significance.

20.9.28 Sub-scheme 3 may temporarily increase Driver Stress as a result of construction works and associated traffic issues but as levels of driver stress are already assumed to be high, there will be no change.

20.9.29 It is expected that all Sub-scheme 3 options will improve traffic flows and reduce congestion locally, resulting in a more effective network and an overall decrease in driver stress during operation.

20.9.30 Sub-scheme 3 proposes new and improved NMU[338] facilities for cyclists and pedestrians. These will improve connectivity and amenity for users during the operational phase, providing a slight beneficial effect. These options may result in some temporary disruption to NMU journeys and a reduction in amenity during construction, resulting in adverse effects.

[338] NMU – Non-Motorised User

20.9.31 For Sub-scheme 3 Option 3A, NMUs may experience a slight increase in journey time if an 'at surface level crossing' is provided instead of the existing subway.

Effects on Communities

20.9.32 Sub-scheme 3 is not expected to sever existing communities and will not directly affect any tourism or recreational facilities or adversely affect future housing development.

20.9.33 Sub-scheme 3 may result in some temporary disruption to those accessing tourism and leisure facilities during construction, causing a temporary adverse effect.

20.9.34 Land take to the north side of Northam Rail Bridge is required under all options considered. Where widening is required outside of the highway boundary and land owned by Network Rail, there will be loss of private land which will cause a permanent adverse effect to residents.

Effects on People

20.9.35 The construction works of Sub-scheme 3 will cause a temporary increase in employment and increase of spend in the local economy, resulting in a temporary beneficial effect.

20.9.36 For Sub-scheme 3, it is not likely that there will be any direct impacts on areas of strategic growth and employment land allocations within Southampton.

20.9.37 Provision and improvement of off-road NMU facilities associated with Sub-scheme 3 is likely to encourage NMU travel modes for short journeys, providing a permanent beneficial effect.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.9.38 The impacts of Sub-scheme 5 are summarised in **Table 20-7** below.

Table 20-7 Sub-scheme 5 Summary of Impacts

SUB-SCHEME	OPTIONS	IMPACT					
		All Travellers		Communities		People	
		Construction	Operation	Construction	Operation	Construction	Operation
Sub-scheme 5: Bitterne Bridge Widening	Option 1: Tidal flow gantry system	No change	Beneficial	No change	Beneficial	No change	Beneficial
	Option 2: Widening of existing bridge	No change	Slight beneficial	No change to adverse	No change to adverse	Beneficial	Beneficial - minor adverse
	Option 3: Replacement (widening) of existing deck	No change	Slight beneficial	No change to adverse	No change to adverse	Beneficial	Beneficial - minor adverse

Effects on All Travellers

20.9.39 Sub-scheme 5 will maintain the currently restricted view from the road over Bitterne Bridge.

20.9.40 Sub Scheme 5 (Options 2 and 3) may temporarily increase Driver Stress as a result of construction works and associated traffic issues but as levels of driver stress are already assumed to be high, there will be no change.

20.9.41 Sub-scheme 5 options will improve traffic flows and reduce congestion locally, resulting in a more effective network and an overall decrease in driver stress during operation.

20.9.42 Sub-scheme 5 (Options 2 and 3) propose new and improved NMU[339] facilities for cyclists and pedestrians. These will improve connectivity and amenity for users during the operational phase, providing a slight beneficial effect. These options may result in some temporary disruption to NMU journeys and a reduction in amenity during construction, resulting in adverse effects.

Effects on Communities

20.9.43 Sub-scheme 5 (Option 2 and 3) are not expected to sever existing communities and will not directly affect any tourism or recreational facilities or adversely affect future housing development.

20.9.44 Sub-scheme 5 Option 1 does not require the demolition of any existing housing and no private assets, community land or development will be directly impacted upon as all improvements will be within the highways boundary.

20.9.45 There may be some private land outside of the highway boundary required to accommodate Option 2 and 3. However, it is likely that this will be limited to vegetated land and no demolitions will be required.

Effects on People

20.9.46 The construction works of Sub-scheme 5 (Option 2 and 3) will cause a temporary increase in employment and increase of spend in the local economy, resulting in a temporary beneficial effect.

20.9.47 For Sub-scheme 5 (Option 2 and 3), it is not likely that there will be any direct impacts on areas of strategic growth and employment land allocations within Southampton.

20.9.48 Provision and improvement of off-road NMU[340] facilities associated with Sub-scheme 5 (Option 2 and 3) is likely to encourage NMU travel modes for short journeys, providing a permanent beneficial effect.

---

[339] NMU – Non-Motorised User
[340] NMU – Non-Motorised User

20.10 GEOLOGY AND SOIL

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.10.1 Sub-scheme 1 Option 1 would involve a small amount of topsoil stripping with no land take. It is therefore expected to have a Neutral or Slight Adverse effect on soil, groundwater and surface waters during the construction phase and a Neutral effect on geology and geomorphology, the built environment, construction workers and end users.

20.10.2 Sub-scheme 1 Options 2 and 4 involve the construction of new roads through the wooded centre of the Roundabout and would significantly alter the land use and entail notable stripping of topsoil. These two options are expected to have a Neutral or Slight Adverse effect on soil, groundwater and surface waters during the construction phase and a Neutral effect on geology and geomorphology, the built environment, construction workers and end users.

20.10.3 The construction work for Option 3 is considered similar to that for Option 1, and the impacts of Option 3 have been assessed to be the same as those for Option 1. Although Sub-scheme 1 Option 5 would involve significant alteration of land use and notable stripping of topsoil, the effects have been assessed to be the same as those for Option 1.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.10.4 Sub-scheme 2 Level 3 involves slight construction work potentially requiring land take of residential property and community allotment land. Effects are anticipated to be Neutral or Slight Adverse to soils and Neutral to all remaining attributes.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.10.5 Sub-scheme 3 options involve demolition and construction. There are likely to be Neutral or Slight Adverse effects on groundwater and surface waters during the construction phase, and Neutral effects to all remaining attributes.

20.10.6 For all options suggested for Sub-scheme 3, there are no anticipated adverse impacts to geology or soils, due to the ‘low quality’ of these attributes at this location. It is recommended that a piling risk assessment is undertaken, in order to assess the potential for the creation of preferential migratory pathways between contamination sources in the Made Ground and the underlying groundwater resource.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.10.7 Sub-scheme 5 Option 1 involves no widening of the bridge and would therefore have Neutral effects on all attributes. All other Sub-scheme options (Options 2 and 3) involve widening of the existing structure and would have Neutral or Slight Adverse effects on groundwater and surface waters during the construction phase, and Neutral effects to all remaining attributes.

20.11 MATERIALS

SUB-SCHEME 1: M27 JUNCTION 8 AND WINDHOVER ROUNDABOUT UPGRADES

20.11.1 The material requirements of Sub-scheme 1 Option 1 is expected to be less than other options which form part of Sub-scheme 1 as a result of the exclusion of large area of new offline carriageway. Carriageway widening would result in the production of waste material through clearance and excavation of predominantly vegetated areas within the existing highway boundary. New material will be required to construct the widened carriageway, NMU[341] facilities, and to provide new signalling. This option is considered to have a Neutral or Slight Adverse impact on materials. Sub-scheme Options 2 and 3 involve more significant construction (through-about and dedicated left turning slip-lanes) and are considered to have a Slight Adverse impact on materials. Sub-scheme 1 Option 4 is similar to Option 2 (construction of a through-about) would have the same overall level of impact as Option 2 (Slight Adverse impact).

20.11.2 Sub-scheme 1 Option 5 involves carriageway widening and tunnelling under Windhover Roundabout, which would produce greater amounts of surplus material and greatly increase the material requirements of the option. Therefore, the option is considered to have a Moderate Adverse impact on materials.

SUB-SCHEME 2: A3024 EASTERN ACCESS CORRIDOR

20.11.3 Sub-scheme 2 Level 3 improvements comprises upgrading signalised junctions and carriageway widening. The carriageway widening would result – subject to further assessment and design refinement - in land take and land clearance (vegetation and developed land), resulting in large amounts of waste material which would have a negative impact on local waste management infrastructure. The sections of offline construction would require large quantities of material resources. This option is considered to have a Slight or Moderate Adverse impact on materials.

SUB-SCHEME 3: NORTHAM RAIL BRIDGE REPLACEMENT

20.11.4 Land take to the north side of Northam Rail Bridge is required to accommodate the new bridge structure under all options considered. Where widening is required outside of the highway boundary and land owned by Network Rail, there will be loss of private land which will cause a permanent adverse effect to residents.

20.11.5 All Sub-scheme 3 options include the same amendments to the existing bridge approach carriageway in terms of horizontal alignment. Options 2, 3A and 3B would also require changes in terms of vertical alignment. These alignment changes which would involve some demolition of the existing carriageway and land take of mainly vegetated areas. Any surplus materials not required would become waste, having potential adverse impacts. Furthermore, considerable amounts of materials would be required for these options.

[341] NMU – Non-Motorised User

20.11.6 Sub-scheme 3 Option 1 is considered likely to have a Slight or Moderate Adverse impact on materials. The impact associated with Sub-scheme 3 Option 2 would be similar to those identified for Sub-scheme 3 Option 1. This option would require further material input in order to raise the headroom of the existing bridge and is predicted to have a Moderate Adverse impact on materials. Similarly, Options 3A and 3B are considered likely to have a Moderate Adverse impact on materials.

SUB-SCHEME 5: BITTERNE BRIDGE WIDENING

20.11.7 Sub-scheme 5 Option 1 involves new signalisation. The material requirements and waste arisings for this option are expected to be minimal, and therefore it is considered to have a Neutral impact on materials.

20.11.8 Sub-scheme 5 Option 2 involves the widening of the existing bridge and realignment of the carriageway which will require new material and will produce waste. The material requirements and waste production of this option are expected to be greater than Option 1 and it is considered likely to have a Slight or Moderate Adverse impact on materials.

20.11.9 Sub-scheme 5 Option 3 involves the replacing of the existing desk with a new steel composite deck and realignment of the carriageway, which will require new material and will produce waste. The material requirements and waste production of this option are expected to be greater the Option 1 and it is considered likely to have a Slight or Moderate Adverse impact on materials.

20.12 ENVIRONMENTAL IMPACT COMPARISON

20.12.1 Key constraints (i.e. constraints identified as having Large or Major Adverse effects) associated with the scheme are shown in **Table 20-8**:

Table 20-8 Key Constraints

Construction	Operational
→ Sub-scheme 1 ▪ Option 2, 4 and 5 ▪ Archaeology → Sub-scheme 2 ▪ Level 3 ▪ Archaeology ▪ Communities → Sub-scheme 3 ▪ All Options ▪ Archaeology ▪ Noise → Sub-scheme 5 ▪ Options 2 and 3 ▪ Archaeology ▪ Setting of Built Heritage ▪ Materials ▪ Noise	→ Sub-scheme 2 ▪ All Options ▪ Air Quality ▪ Level 3 ▪ Noise → Sub-scheme 5 ▪ All Options ▪ Air Quality ▪ Options 2 and 3 ▪ Archaeology ▪ Setting of Built Heritage

20.13 SUMMARY OF THE POTENTIAL EFFECTS ASSOCIATED WITH EACH OPTION

20.13.1 A summary of Construction and Operational phase constraints is included in **Table 20-9 and Table 20-10**.

Table 20-9 Summary of Construction Impacts

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
SS1	Opt1	Negligible	Archaeology – Negligible Setting of Build Heritage - Negligible	Landscape - Slight Adverse Visual - Moderate Adverse	Semi-natural broadleaved woodland in Windhover Roundabout and by M27 Junction 8 - significant at Site level (ST), No significant effect (LT) Intact species poor hedgerow by M27 Junction 8 and Windhover Roundabout - significant at Site level (ST), No significant effect (LT) No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog • Japanese knotweed • Trees subject to TPO[342]	Soil etc. (1) - Neutral or Slight Adverse Geology etc. (2) - Neutral	Neutral or Slight Adverse	Negligible and Moderate Adverse	Effects on All Travellers – No Change to Temporary Adverse Effects on Communities – No Change Effects on People – Slight Beneficial	Neutral to Slight Adverse

[342] TPO - Tree Preservation Order

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt2	Negligible	Archaeology - Moderate/Large Adverse Setting of Built Heritage - Negligible	Landscape - Moderate Adverse Visual - Moderate Adverse	Semi-natural broadleaved woodland in Windhover Roundabout and by M27 M27 Junction 8 - significant at Site level, no significant effect Intact species poor hedgerow by M27 Junction 8 and Windhover Roundabout - significant at Site level (ST), No significant effect (LT) No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog • Japanese knotweed • Trees subject to TPO[343]	Soil etc. (1) - Neutral or Slight Adverse Geology etc. (2) - Neutral	Slight Adverse	Negligible and Moderate Adverse	Effects on All Travellers – No Change - Moderate Adverse Effects on Communities – No Change Effects on People – TBA	Neutral to Slight Adverse

[343] TPO - Tree Preservation Order

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt3	Negligible	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape - Slight Adverse Visual - Moderate Adverse	Semi-natural broadleaved woodland in Windhover Roundabout and by M27 Junction 8 - significant at Site level, no significant effect Intact species poor hedgerow by M27 Junction 8 and Windhover Roundabout - significant at Site level, no significant effect No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog • Japanese knotweed • Trees subject to TPO[344]	Soil etc. (1) - Neutral or Slight Adverse Geology etc. (2) - Neutral	Slight Adverse	Negligible and Moderate Adverse	Effects on All Travellers – no change to Temporary Adverse Effects on Communities – No Change Effects on People – Slight Beneficial	Neutral to Slight Adverse

[344] Tree Preservation Order

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt4	Negligible	Archaeology – Moderate/Large Adverse Setting of Built Heritage - Negligible	Landscape - Moderate Adverse Visual - Moderate Adverse	Semi-natural broadleaved woodland in Windhover Roundabout and by M27 Junction 8 - significant at Site level (ST), No significant effect (LT) Intact species poor hedgerow by M27 Junction 8 and Windhover Roundabout - significant at Site level (ST), No significant effect (LT) No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog • Japanese knotweed • Trees subject to TPO[345]	Soil etc. (1) - Neutral or Slight Adverse Geology etc. (2) - Neutral	Slight Adverse	Negligible and Moderate Adverse	Effects on All Travellers – No Change - Moderate Adverse Effects on Communities – No Change Effects on People – TBA	Neutral to Slight Adverse

[345] TPO - Tree Preservation Order

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt5	Minor Adverse	Archaeology – Moderate/Large Adverse Setting of Built Heritage - Negligible	Landscape - Moderate Adverse Visual - Moderate Adverse	Oakleigh Meadow SINC - Significant at Local level (ST), No significant effect (LT) Semi-natural broadleaved woodland in Windhover Roundabout and by M27 Junction 8 - significant at Site level, no significant effect Intact species poor hedgerow by M27 Junction 8 and Windhover Roundabout - significant at Site level (ST), No significant effect (LT) No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog	Soil etc. (1) - Neutral or Slight Adverse Geology etc. (2) - Neutral	Moderate Adverse	Negligible and Moderate Adverse	Effects on All Travellers – No Change to Moderate Adverse Effects on Communities – No Change Effects on People – Slight Beneficial	Neutral to Slight Adverse

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
					• Japanese knotweed • Trees subject to TPO[346]					
SS2	Lv1	Negligible	Negligible	Landscape: Slight Visual: Slight Adverse	Solent and Southampton Water SPA[347] and Ramsar - No significant effect Millers Pond LNR[348] - No significant effect	NA	Neutral	Negligible	Effects on All Travellers – No Change Effects on Communities – No Change Effects on People – Beneficial Effect to Minor Adverse	Neutral
	Lv2	Negligible	Negligible	Landscape: Slight Visual: Slight Adverse	Solent and Southampton Water SPA and Ramsar -No significant effect Millers Pond LNR - No significant effect Sholing Common SINC[349] - significant at Local level (ST), No significant effect (LT)	NA	Neutral	Negligible and Moderate Adverse	Effects on All Travellers – No Change Effects on Communities – No Change Effects on People – beneficial effect to minor advers	Neutral

[346] TPO - Tree Preservation Order
[347] SPA - Special Protection Areas
[348] LNR - Local Nature Reserve
[349] SINC – Site of Nature Conservation Interest

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Lv3	Negligible	Archaeology – Moderate/Large Adverse Setting of Built Heritage - Negligible	Landscape – Moderate Adverse Visual - Moderate Adverse	Solent and Southampton Water SPA[350] and Ramsar -No significant effect Millers Pond LNR[351] - No significant effect Sholing Common SINC[352] - significant at Local level (ST), No significant effect (LT) Windhover (Netley Common South) SINC - significant at Local level (ST), No significant effect (LT) Shoreburs Greenway SINC - significant at Local level (ST), No significant effect (LT) Semi-natural broadleaved woodland - significant at Local level (ST), No significant effect (LT) Intact species poor hedgerow - significant at Local level (ST), No significant effect (LT)	Soil - Neutral or Slight Adverse Remaining attributes (3) - Neutral	Slight or Moderate Adverse	Negligible and Moderate Adverse	Effects on All Travellers –no change to Minor Adverse Effects on Communities – Significant Adverse to Adverse Effects on People – Beneficial	Neutral to Slight Adverse

[350] SPA - Special Protection Areas
[351] LNR - Local Nature Reserve
[352] SINC – Site of Nature Conservation Interest

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
					No significant effect on the following: • Invertebrates • Badger • Dormouse • Bats roosting • Bats foraging • Breeding birds • Great crested newt • Reptiles • Hedgehog • Trees subject to TPO[353]					
SS3	Opt1	Minor Adverse	Archaeology - Moderate/Large Adverse Setting of Built Heritage – Negligible	Landscape – Slight Adverse Visual - Slight Adverse	No significant effect on the following: • Bats roosting • Bats foraging • Breeding birds • Reptiles • Hedgehog	Groundwater and surface waters - Neutral or Slight Adverse Remaining attributes (4) - Neutral	Slight or Moderate Adverse	Negligible to Major Adverse	Effects on All Travellers – No Change to Minor Adverse Effects on Communities – Adverse effects Effects on People – Beneficial	Neutral to Slight Adverse

[353] TPO - Tree Preservation Order

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt2	Minor Adverse	Archaeology - Moderate/Large Adverse Setting of Built Heritage – Negligible	Landscape – Moderate Adverse Visual – Moderate Adverse	No significant effect on the following: • Bats roosting • Bats foraging • Breeding birds • Reptiles • Hedgehog	Groundwater and surface waters - Neutral or Slight Adverse Remaining attributes (4) - Neutral	Moderate Adverse	Negligible to Major Adverse	Effects on All Travellers – No Change to Minor Adverse Effects on Communities – Adverse Effects Effects on People – Beneficial	Neutral to Slight Adverse
	Opt3A	Minor Adverse	Archaeology - Moderate/Large Adverse Setting – Negligible	Landscape – Moderate Adverse Visual – Moderate Adverse	No significant effect on the following: • Bats roosting • Bats foraging • Breeding birds • Reptiles • Hedgehog	Groundwater and surface waters - Neutral or Slight Adverse Remaining attributes (4) - Neutral	Moderate Adverse	Negligible to Major Adverse	Effects on All Travellers – No Change to Minor Adverse Effects on Communities – Adverse effects Effects on People – beneficial	Neutral to Slight Adverse
	Opt3B	Minor Adverse	Archaeology - Moderate/Large Adverse Setting – Negligible	Landscape – Moderate Adverse Visual – Moderate Adverse	No significant effect on the following: • Bats roosting • Bats foraging • Breeding birds • Reptiles	Groundwater and surface waters - Neutral or Slight Adverse	Moderate Adverse	Negligible to Major Adverse	Effects on All Travellers – No Change to Minor Adverse Effects on Communities – Adverse effects	Neutral to Slight Adverse

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
					• Hedgehog	Remaining attributes (4) - Neutral			Effects on People – Beneficial	
SS5	Opt1	Negligible	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape – Slight Adverse Visual - Slight Adverse	Chessel Bay LNR[354] - No significant effect No significant effect on the following: • Bats roosting • Bats foraging • Reptiles • Breeding birds • Hedgehog • Japanese knotweed	All attributes (4) - Neutral	Neutral	Minor to Moderate Adverse	No change	Neutral
	Opt2	Negligible	Archaeology - Large/Very Large Adverse Setting of Built Heritage – Moderate/Large Adverse	Landscape – Moderate Adverse Visual – Moderate Adverse	Chessel Bay LNR - No significant effect No significant effect on the following: • Bats roosting • Bats foraging • Reptiles • Breeding birds • Hedgehog • Japanese knotweed	Groundwater and surface waters - Neutral or Slight Adverse Remaining attributes (4) - Neutral	Slight or Moderate Adverse	Moderate and Major Adverse	Effects on All Travellers – No Change Effects on Communities – No Change to Adverse effects Effects on People – Beneficial	Neutral to Slight Adverse

[354] LNR - Local Nature Reserve

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
	Opt3	Negligible	Archaeology - Large/Very Large Adverse Setting of Built Heritage - Moderate/Large Adverse	Landscape – Moderate Adverse Visual – Moderate Adverse	Chessel Bay LNR[355] - No significant effect Semi-natural broadleaved woodland - significant at Site level (ST), No significant effect (LT) No significant effect on the following: • Bats roosting • Bats foraging • Reptiles • Breeding birds • Hedgehog • Trees subject to TPO[356] • Japanese knotweed	Groundwater and surface waters - Neutral or Slight Adverse Remaining attributes (4) - Neutral	Slight or Moderate Adverse	Moderate and Major Adverse	Effects on All Travellers – No Change Effects on Communities – No Change to Adverse effects Effects on People – Beneficial	Neutral to Slight Adverse

Notes
(M) Assessed to Magnitude
(S) Assessed to Significance
(ST) Short Term
(LT) Long Term
(1) Soil groundwater and surface waters
(2) Geology and geomorphology, the built environment, construction workers and end users
(3) Groundwater, surface waters, geology and geomorphology, the built environment, construction workers and end users
(4) Soil, geology and geomorphology, the built environment, construction workers and end users

[355] LNR - Local Nature Reserve
[356] TPO - Tree Preservation Order

Table 20-10 Summary of Operational Impacts

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
SS1	Opt1	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Slight Adverse Visual: Slight Adverse	No significant effect	NA	NA	Negligible	Effects on All Travellers – Slight Beneficial Effects on Communities – No Change Effects on People – Slight Beneficial to Minor Adverse	Neutral to Slight Adverse
	Opt2	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Moderate Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Negligible	Effects on All Travellers – Beneficial to Adverse impact Effects on Communities – No Change Effects on People – Slight Beneficial to Minor Adverse	Neutral to Slight Adverse
	Opt3	Minor Adverse	Archaeology – Negligible Setting of Built	Landscape: Slight Adverse Visual: Slight	No significant effect	NA	NA	Negligible	Effects on All Travellers – Slight Beneficial	Neutral to Slight Adverse

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
			Heritage - Negligible	Adverse					Effects on Communities – No Change Effects on People – Slight Beneficial to Minor Adverse	
	Opt4	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Moderate Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Negligible	Effects on All Travellers – Beneficial to Adverse impact Effects on Communities – No Change Effects on People – Slight Beneficial to Minor Adverse	Neutral to Slight Adverse
	Opt5	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Negligible	Effects on All Travellers –Slight Beneficial Effects on Communities – No Change Effects on People – Slight Beneficial to Minor Adverse	Neutral to Slight Adverse
SS2	Lv1	Major Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Neutral Visual: Neutral	No significant effect	NA	NA	Negligible	Effects on All Travellers – Beneficial Effects on	Negligible

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
									Communities – No Change	
	Lv2	Major Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Neutral Visual: Neutral	No significant effect	NA	NA	Negligible and Minor Adverse	Effects on All Travellers – Beneficial Effects on Communities – No Change	Negligible
	Lv3	Major Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Moderate Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Negligible to Major Adverse	Effects on All Travellers – slight beneficial to Minor Adverse Effects on Communities – No Change Effects on People – Beneficial to Minor Adverse	Neutral to Slight Adverse
SS3	Opt1	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Minor and Moderate Adverse	Effects on All Travellers – Slight Beneficial Effects on Communities – No Change Effects on People – Beneficial to Minor Adverse	Neutral to Slight Adverse
	Opt2	Minor Adverse	Archaeology – Negligible	Landscape: Slight Adverse	No significant effect	NA	NA	Minor and Moderate Adverse	Effects on All Travellers – Slight Beneficial	Neutral to Slight Adverse

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
			Setting of Built Heritage - Negligible	Visual: Moderate Adverse					Effects on Communities – No Change Effects on People – Beneficial to Minor Adverse	
	Opt3A	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Minor and moderate adverse	Effects on All Travellers – slight beneficial Effects on Communities – No change Effects on People – beneficial to minor adverse	Neutral to Slight Adverse
	Opt3B	Minor Adverse	Archaeology – Negligible Setting of Built Heritage - Negligible	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Minor and Moderate Adverse	Effects on All Travellers – Slight Beneficial Effects on Communities – No Change Effects on People – Beneficial to Minor Adverse	Neutral to Slight Adverse
SS5	Opt1	Major Adverse	Archaeology - Negligible	Landscape: Neutral	No significant effect	NA	NA	Negligible	Beneficial	Neutral

SUB SCHEME	OPTION OR LEVEL	AIR QUALITY (M)	CULTURAL HERITAGE (S)	LANDSCAPE AND TOWNSCAPE (S)	NATURE CONSERVATION (S)	GEOLOGY AND SOIL (S)	MATERIALS (S)	NOISE (M)	PEOPLE AND COMMUNITIES (S)	ROAD DRAINAGE AND WATER (S)
			Setting Of Built Heritage - Negligible	Visual: Neutral						
	Opt2	Major Adverse	Archaeology - Large/Very Large Adverse Setting of Built Heritage - Moderate/Large Adverse	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Minor Adverse Impacts	Effects on All Travellers – Slight Beneficial Effects on Communities – No Change to Adverse Effects on People – Beneficial - Minor Adverse	Neutral to Slight Adverse
	Opt3	Major Adverse	Archaeology - Large/Very Large Adverse Setting of Built Heritage - Moderate/Large Adverse	Landscape: Slight Adverse Visual: Moderate Adverse	No significant effect	NA	NA	Minor Adverse impacts	Effects on All Travellers – Slight Beneficial Effects on Communities – No Change to Adverse Effects on People – Beneficial - Minor Adverse	Neutral to Slight Adverse

Notes
(M) Assessed to Magnitude
(S) Assessed to Significance

20.14 NEXT STEPS

ENVIRONMENTAL IMPACT ASSESSMENT

20.14.1 At this stage, an Environmental Study Report (Document number: HE551514-WSP-GEN-PCF1-RP-EN-00002) has been prepared to help inform the options identification process for the M27 Southampton Junctions Scheme. It forms part of the requirements of PCF[357] Stage 1. The preferred option will be selected during PCF Stage 2, and if the selected option requires a Statutory EIAR[358], it will be prepared during PCF Stage 3.

ASSESSMENT OF IMPLICATIONS ON EUROPEAN SITES

20.14.2 A preliminary Assessment of Implications on European Sites (Document number: HE551514-WSP-GEN-PCF1-RP-PM-00009) screening exercise has been undertaken to consider the implications of all of the Sub-scheme options on the nature conservation interests of European protected sites. This assessment has been undertaken for the following sites:

- Briddlesford Copses SAC[359];
- Mottisfont Bats SAC;
- River Itchen SAC;
- Solent and Southampton Water Ramsar;
- Solent and Southampton Water SPA[360]; and
- Solent Maritime SAC.

20.14.3 The AIES[361] screening exercise identified that it is unlikely that any of the M27 Southampton Junctions sub-schemes would result in significant effect on the any European protected site. The AIES screening assessment will be updated as more detailed design information becomes available at PCF Stages 2 and 3.

ENVIRONMENTAL SURVEYS

20.14.4 The following environmental surveys were undertaken at PCF[362] Stage 1:

- Landscape/Townscape/Visual - A high level desk study and site analysis of the physical landscape and townscape, and its spatial components (e.g. scale, key views), was undertaken to identify key landscape and townscape characteristics and features, key visual receptors, as well as broad site constraints and opportunities to be considered in the selection of options.

---

[357] PCF - Project Control Framework
[358] EIAR - Environmental Impact Assessment Report
[359] SAC - Special Area of Conservation
[360] SPA - Special Protection Area
[361] AIES – Assessment of Implications on European Sites
[362] PCF – Project Control Framework

- Ecology - An Extended Phase 1 Habitat Survey was undertaken where options proposed construction works outside of the existing kerbline. A brief walk-through or drive-through was undertaken where no works were proposed outside of the kerblines, to confirm that no habitats were present within the kerbline. The Phase 1 Habitat Survey followed standard methodology published by the JNCC[363].
- Noise - a noise survey was undertaken on to establish the current noise climate close to the A3024 eastern access corridor (Sub-scheme 2). The survey methodology followed the shortened measurement procedure described in the Calculation of Road Traffic Noise at four locations over three consecutive hours between 10:00 and 17:00 hours on a typical weekday.

20.14.5 The following surveys are intended to be completed in PCF Stages 2 and 3:

- Air Quality - monitoring will be undertaken at PCF Stage 2 to determine annual mean NO_2 concentrations in the vicinity of the four M27 Sub-schemes to inform the air quality assessment at subsequent PCF stages;
- Ecology – target species surveys will be undertaken at PCF Stage 2 and 3 to confirm presence or likely absence as follows;
  - Sub-schemes 1 and 2: Badger, Bats (roosting and foraging), Breeding Birds, Dormouse, Great crested newt (foraging), Hedgehog, Invertebrates, Reptiles, Non-native invasive plants.
  - Sub-scheme 3: Bats (foraging), Breeding Birds, Hedgehog, Reptiles.
  - Sub-scheme 5: Bats (roosting and foraging), Breeding Birds, (foraging), Hedgehog, Reptiles, Non-native invasive plants.
- Cultural Heritage - site walkover survey and setting assessment will be undertaken at PCF Stage 2 to assess potential effects on buried and surface archaeological remains (earthworks). If the potential for buried remains is identified, intrusive fieldwork will also be undertaken at PCF Stage 2 and 3.
- Road Drainage and Water - a drainage survey will be undertaken to gain further information about the current surface water drainage at PCF Stage 3.

20.14.6 The following future studies are likely to be required as part of the consent process:

- Flood Risk Assessment - a flood risk assessment will be undertaken once the preferred option has been selected.
- Landscape/Townscape/Visual - when more design information is available a detailed and/or visual impact assessment should be undertaken.

[363] Joint Nature Conservation Committee (JNCC),2010. *Handbook for Phase 1 habitat survey: a technique for environmental audit*. JNCC: Peterborough.

21 APPRAISAL SUMMARY

21.1 APPRAISAL SUMMARY TABLES (ASTS)

21.1.1 Please refer to **Appendix G.**

22 PROGRAMME

22.1 PCF STAGES, RISKS AND MILESTONES

22.1.1 Two detailed programmes are presented below, which illustrate the anticipated development and delivery of the M27 Southampton Junctions Scheme. The first is based upon the stated desire to achieve a start of construction before April 2020 and will require a flexible approach to the Highways England PCF[364] process. The PCF duration is based upon envisaged timescales if the current Highways England PCF approach is adopted without modification. A risk register associated with the first programme is presented within product 5 of the interim Strategic Outline Business Case.

22.1.2 The duration of the PCF stages are the same for all five sub-schemes, however for the construction period (Stages 6 and 7) it starts to differ. This variation can be seen for Stage 6 in **Table 22-1** with the time period shown in months.

22.1.3 **Table 22-2** presents the expected Stage Gate Assessment Review dates and key milestones associated with the aspirational programme.

22.1.4 All information presented below will be subject to on-going reviews and amendments in subsequent PCF stages, as confidence and certainty of what the scheme may require, both from a detailed scope and a timescale perspective.

[364] PCF – Project Control Framework

Table 22-1 Programme Summary

PCF STAGE	FROM	TO	PCF STAGE DURATION	
0	June 2015	November 2015	6 Months	
1	January 2016	December 2016	12 Months	
2	January 2017	November 2017	11 Months	
3	December 2017	July 2018	8 Months	
4	August 2018	October 2019	15 Months	
5	January 2019	March 2020	15 Months	
6	March 2020	Varies for each Sub-scheme. See PCF Stage Duration	SS1[365]	9 Months
			SS2	24 Months
			SS3	27 Months
			SS4	12 Months
			SS5	9 Months
7	Varies	Varies	3 Months	

[365] SS – Sub-scheme

Table 22-2 Key milestones

KEY MILESTONE	TARGET COMPLETION DATE
SGAR1[366]	December-2016
SGAR2	October-2017
SGAR3	June-2018
SGAR4	October-2019
SGAR5	March-2020
SGAR6	Varies (See **Table 22-1**)
SGAR7	Varies (See **Table 22-1**)
Start of Works	*March 2020*

[366] SGAR – Stage Gate Assessment Review

23 SCHEME COST ESTIMATE

23.1 OPTION COST COMPARISON

23.1.1 **Table 23-1** provides a summary of the detailed cost estimate for each option. The option estimates are provided by the Highways England Commercial team.

23.1.2 Cost estimates for the scheme will be subject to change in future PCF[367] Stages, when more detailed assessments and design developments are undertaken.

Table 23-1: Option Cost Estimate

SCHEME ELEMENT	OPTION	MOST LIKELY COSTS IN 2014 PRICES (£000S)
Sub-Scheme 1	Option 1	£13,457
	Option 2	TBC
	Option 3	TBC
	Option 4	NOT COSTED
	Option 5	NOT COSTED
Sub-Scheme 2	Level 1	£9,331
	Level 2	NOT COSTED
	Level 3	£51,367
Sub-Scheme 3	Option 1	£47,310
	Option 2	£55,659
	Option 3A	£52,943
	Option 3B	£52,943
Sub-Scheme 5	Option 1	NOT COSTED – INCLUDED UNDER SUB-SCHEME 2
	Option 2	£13,342
	Option 3	£15,151
Scheme Scenario Options*	**Do Something 1**	**£117,767**
	Do Something 2	**£75,731**
	Do Something 3	**£13,457**

** Based upon the sum of the costs for each of the individual sub-schemes that form the Do Something scheme scenario options. This may represent a slight overestimation of the costs as there would likely be efficiency savings if all the sub-schemes are considered together as a combined scheme.*

[367] PCF – Project Control Framework

24 CONCLUSION AND RECOMMENDATIONS

24.1 OPTIONS SUMMARY

SUB-SCHEMES OPTIONS CONSIDERED

24.1.1 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 during PCF[368] Stage 1. These are set out in **Table 24-1.**

24.1.2 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.

SCHEME SCENARIO OPTIONS (SUB-SCHEME COMBINATIONS) CONSIDERED

24.1.3 In addition, for the purpose of economic, operational and environmental assessment, combinations of sub-schemes were assessed as “scheme scenario options”. These scenario options represent the Do Something options, and have been compared to the Do Minimum. It has been assumed that the Do Minimum forecast growth in the study area, all committed schemes, includes the Smart Motorways Programme between M27 Junction 4 and 11.

24.1.4 The scheme scenario options assessed are:

- **Do Minimum** (M27 Junctions 4 to 11 Smart Motorway Scheme in place)
- **Do Something 1** (Dualling of A3024 Corridor)
  - Sub-scheme 1 - Option 1
  - Sub-scheme 2 - Level 3
  - Sub-scheme 3 - Option 3A
  - Sub-scheme 5 - Option 1
- **Do Something 2** (Signalised Junction Improvements of A3024 Corridor)
  - Sub-scheme 1 - Option 1
  - Sub-scheme 2 - Level 1
  - Sub-scheme 3 - Option 3A
  - Sub-scheme 5 - Option 1
- **Do Something 3** (Sub-scheme 1 only)

Table 24-1 Sub-Scheme Options

SUB-SCHEME	OPTIONS

[368] Project Control Framework

SUB-SCHEME	OPTIONS
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
	Option 2 : Through-about to A3024 Bursledon
	Option 3 : Free-flow Left-turn Slip Lanes at M27J8
	Option 4 : Through-about to A3025 Hamble Lane
	Option 5 : Tunnel under Windhover Roundabout
Sub-scheme 2: A3024 Eastern Access Corridor - *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 3: Dualling Full A3024 Corridor
Sub-scheme 3: Northam Rail Bridge Replacement - *Replacement of the existing A3024 Northam Rail Bridge over the railway in order to widen it from 2 to 4 lanes and increase its structural capacity*	Option 1: New bridge / Refurbish Existing
	Option 2: New Bridge / Raise and Refurbish Existing
	Option 3A: New Bridge / Demolish and Replace Existing / Close Subway
	Option 3B: New Bridge / Demolish and Replace Existing / Retain 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*
Sub-scheme 5: Bittern Bridge Widening - *Capacity upgrades to the existing Bitterne Rail Bridge to allow a minimum of two full lanes of traffic in the peak direction over the bridge*	Option 1: Tidal Flow Gantry System
	Option 2: Widening of Existing Bridge
	Option 3: Replacement (Widening) of Existing Deck

24.2 ASSESSMENT OF OPTIONS

24.2.1 Safety, technology and maintenance assessments were undertaken on each of the sub-scheme options. The operational assessment considered the scheme scenario options as the traffic flows are influenced by the combination of sub-scheme options rather than individual sub-scheme options.

24.2.2 The scheme Options Estimate was developed by the Highways England Commercial team. The cost estimates for the sub-scheme options and scenario options are set out in **Table 24-2.**

Table 24-2 Scheme Cost Estimates

SCHEME ELEMENT	OPTION	MOST LIKELY COSTS IN 2014 PRICES (£000S)
Sub-Scheme 1	Option 1	£13,457
	Option 2	TBC
	Option 3	TBC
	Option 4	NOT COSTED
	Option 5	NOT COSTED
Sub-Scheme 2	Level 1	£9,331
	Level 2	NOT COSTED
	Level 3	£51,367
Sub-Scheme 3	Option 1	£47,310
	Option 2	£55,659
	Option 3A	£52,943
	Option 3B	£52,943
Sub-Scheme 5	Option 1	NOT COSTED – INCLUDED UNDER SUB-SCHEME 2
	Option 2	£13,342
	Option 3	£15,151
Scheme Scenario Options*	**Do Something 1**	**£117,767**
	Do Something 2	**£75,731**
	Do Something 3	**£13,457**

** Based upon the sum of the costs for each of the individual sub-schemes that form the Do Something scheme scenario options. This may represent a slight overestimation of the costs as there would likely be efficiency savings if all the sub-schemes are considered together as a combined scheme.*

24.2.3 An economic assessment was undertaken against the scheme scenario options. This was combined with the scheme costs to determine the benefit-cost ratio for the options, and the results are set out in **Table 24-3**.

Table 24-3 Economic Assessment Results

TYPE	DS1[369]	DS2	DS3
Present Value of Costs	84,685	53,631	6,734
Present Value of Benefits	113,415	87,457	58,176
Net Present Value	28,730	33,826	51,442
BCR[370]	**1.34**	**1.63**	**8.64**
Sensitivity Tests – resultant BCRs			
DS1 without Smart Motorways	1.23	N/A	N/A
Northam Bridge Deterioration[371]	1.93	2.56	1.21

24.2.4 A qualitative Environment Assessment was undertaken which will be further updated when more surveys and quantitative data become available in future PCF stages.

24.2.5 This initial environmental assessment indicated that there are a number of key constraints associated with the scheme during construction and operation, with regards to air quality, noise, archaeology and the setting of built heritage that may result in large or major adverse effects. Key constraints and potentially significant effects associated with any of the proposed options would require further investigation during future stages, and are shown in **Table 24-4**.

Table 24-4 Environmental Key Constraints

Construction	Operational
→ Sub-scheme 1 ▪ Option 2, 4 and 5 - Archaeology → Sub-scheme 2 ▪ Level 3 – Archaeology, Communities → Sub-scheme 3 ▪ All Options – Archaeology, Noise → Sub-scheme 5 ▪ Options 2 and 3 – Archaeology, Setting of Built Heritage, Materials, Noise	→ Sub-scheme 2 ▪ All Levels– Air Quality ▪ Level 3 - Noise → Sub-scheme 5 ▪ All Options – Air Quality ▪ Options 2 and 3 – Archaeology, Setting of Built Heritage

[369] DS – Do Something
[370] BCR – Benefit to Cost Ratio
[371] A simple deterioration model for Northam Rail Bridge was developed to represent the additional costs (due to travel time delays) that may be incurred in the Do Minimum scenario if the bridge is not replaced and further deteriorates, resulting in bus bans, one-way working and eventually full closure.

24.3 FURTHER ASSESSMENT WORK REQUIRED IN PCF STAGE 2

24.3.1 During PCF[372] Stage 1 it was not feasible to assess all the potential combinations of options, but the focus was rather to identify and assess a limited number that were considered would provide a representative range of the likely viable, best performing scenario options. The Do Something scenario options identified in Stage 1 need to be reviewed in Stage2, especially regarding Sub-scheme 2 (as the three levels assessed in Stage 1 were intended to be a mechanism to obtain an indication / range of possible options), and further traffic assessment will be required.

24.3.2 The further assessment should include operational testing using the VISSIM microsimulation of the A3024 Corridor. Tests of the Do Something 1 option may provide a refined indication of the key pinchpoints and constraints along the corridor, and how these interact to influence the capacity of the corridor. These tests would result in a refinement of the proposed carriageway widening included in the Do Something 1 scenario option, and could inform the reduction or removal of the widening without compromising the forecast capacity of the A3024 corridor.

24.3.3 This could result in a significant reduction in the scheme (and land take) costs. By example, if a simplified estimate is applied that the scheme costs for Sub-scheme 2 (the A3024 Corridor) forming part of the Do Something 1 option could be reduced by £20m, then the BCR would increase from 1.34 to 1.75.

24.4 OPTIONS TO BE TAKEN TO PUBLIC CONSULTATION

24.4.1 Taking into account the assessments undertaken in PSCF Stage 1 the recommendation is to take the Do Something scenario options and sub-scheme options given below to public consultation in PCF Stage 2. This will be subject to the outcomes of the proposed further assessments discussed above.

- **Do Something 1** scenario option, comprising:
  - Sub-scheme 1 - Option 1 Localised Junction Widening
  - Sub-scheme 2 - Level 3 Dualling Full A3024 Corridor
  - Sub-scheme 3 - Option 3A New Bridge / New Bridge and Close Subway
  - Sub-scheme 5 - Option 1 Tidal Flow Gantry System
- **Do Something 3** scenario option, comprising:
  - Sub-scheme 1 - Option 1 Localised Junction Widening
- **Additionally, alternative options for the following should be taken forward:**
  - Sub-scheme 1 - Option 2 Through-about to A3024 Bursledon
    - Option 3 Left-turn Slip Lanes at M27 Junction 8

[372] PCF – Project Control Framework

- Sub-scheme 3 - Option 3B: New Bridge / New Bridge and Refurbish Subway (i.e. retain subway on eastern side of bridge)
- Sub-scheme 5 - Option 2: Widen the existing bridge to the north.

24.5 OPTIONS REJECTED PRIOR TO PUBLIC CONSULTATION

24.5.1 The PCF[373] Stage 1 assessments have resulted in the following option being rejected and not recommended for PCF Stage 2:

→ **Sub-scheme 1:**

- Option 4: Through-about to A3025 Hamble Lane. Rejected on the basis that the option does not comply with the scheme objectives, in particular those relating to increasing highway and sustainable travel capacity along the A3024 eastern access corridor. Furthermore historic assessment of this option raised concerns about the impact of this option on the operation of A3025 Hamble Lane and the access to the Tesco superstore
- Option 5: Tunnel under Windhover Roundabout. Rejected on the basis that it was considered it would have a significantly higher cost in comparison with the other sub-scheme options, without providing proportionately higher benefits.

→ **Sub-scheme 2:**

- No options rejected at this stage, subject to further review of operational traffic assessment to refine the proposed options.

→ **Sub-scheme 3:**

- Option 1: New Bridge / Refurbish Existing Bridge. Rejected on the basis that there would be a significant risk that Network Rail would not consent to the proposed design as it would not comply with their current requirements regarding headroom clearance.
- Option 2: New Bridge / Refurbish and Raise Existing Bridge. Rejected on the basis that this option has a higher cost than replacing the existing bridge with a new bridge, and as such represents an avoidable future maintenance burden.

→ **Sub-scheme 5:**

- Option 3: Replacement (Widening) of Existing Deck. Rejected on the basis that it has a higher cost than Option 2 and would require full closure of the A3024 Bitterne Road West for discrete period(s) of time during construction, thereby resulting in significant travel time delays along the A3024.

[373] PCF – Project Control Framework

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