

REPORT N° HE551511-WSP-GEN-M3J9PCF1-RP-PM-TAR01

M3 JUNCTION 9 IMPROVEMENT SCHEME

PCF STAGE 1

TECHNICAL APPRAISAL REPORT



NOVEMBER 2016

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EXECUTIVE SUMMARY

At the end of PCF¹ Stage 0 Strategy, Shaping and Prioritisation, five options to improve the M3 Junction 9 were put forward for the optioneering processes in PCF Stage 1. Two of the five options fully comply with the scheme objectives, two options partially comply and one option did not comply with the objectives described later in this summary and detailed within this report.

Following this initial transition of options from Stage 0 to Stage 1 the scheme options were refined. The five options reported and assessed in this TAR² are:

- **Option 11** - This option provides free-flow links between the A34 and M3 with the A34 southbound link passing under the M3 with a 120kph design speed. The A34 Northbound Link also has a 120kph design speed. Junction 9 would be rebuilt with a dumbbell roundabout layout.
- **Option 14** - This option provides free-flow links between the A34 and M3 with the A34 southbound link passing under the M3 with a 100kph design speed with a three-step relaxation on horizontal geometry. The A34 Northbound Link has a 120kph design speed. Junction 9 would be rebuilt with a dumbbell roundabout layout. This option was developed to provide a fully compliant option which minimises environmental effects while also providing higher VfM compared to Option 11.
- **Option 16A** - This option provides incremental delivery of Option 14. This provides a free-flow for the A34 southbound with a 100kph design speed with a three-step relaxation on horizontal geometry. The northbound A34 would still use the existing A34 through the Junction 9 roundabout. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS³.
- **Option 16B** - This option provides incremental delivery of Option 14. This provides a free-flow for the A34 northbound, which has a 120kph design speed. The southbound A34 would still use the existing A34 through the Junction 9 roundabout. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS1.
- **Option 18** - This option provides a through-about at M3 Junction 9 (do-minimum design) with a 70kph design speed. This option is developed, to consider a reduced cost option of converting the current Junction 9 roundabout to a through-about. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS1.

All five options proposed include improved layouts of the A33 diverge from the A34 northbound as well as improved NMU provision at Junction 9 which would close the gap in the existing National Cycle Network Route 23.

Structural impacts, operational, technology and maintenance assessments were also appraised for each option in their respective Chapters of this report.

A qualitative Environment Assessment was undertaken, which will be further developed with more surveys and quantitative data becoming available in future PCF⁴ Stages.

¹ PCF – Project Control Framework

² TAR – Technical Appraisal Report

³ RIS – Road Investment Strategy

⁴ PCF – Project Control Framework

This initial assessment reveals that Option 11 is likely to have the most significant adverse environmental effects of all options followed by Option 14. This is in general terms due to the footprint of these options which is greater than for the other options. Option 16A and 16B then have similar results with Option 16A having a marginally worse effects than Option 16B. Option 18 is likely to have the least significant adverse effects. Mitigation measures will be identified during PCF Stage 2 and 3, which will likely reduce the magnitude of any adverse effects due to the scheme for all options.

Cost consultants Benchmark provided a detailed breakdown of costs for each option in 2014 prices. Based on these costs (rebased to 2010 in line with WebTAG¹ requirements), Systra undertook an economic appraisal using TUBA², while the COBALT³, SIA⁴ and DIA⁵ was undertaken by Mouchel Consulting. The expected total scheme costs and the corresponding BCRs⁶ for all options are shown below.

OPTION	EXPECTED SCHEME COST IN 2014 PRICES (£)	BCR, WITH BENEFITS FROM ACCIDENT SAVINGS APPLIED	VFM CATEGORY
Option 11	186.8M	1.31	Low
Option 14	134.1M	1.88	Medium
Option 16A	59.4M	1.83	Medium
Option 16B	45.2M	2.54	High
Option 18	18.7M	2.00	High

¹ WebTAG – Transport Analysis Guidance
² TUBA – Transport User Benefit Analysis
³ COBALT - Cost Benefit Analysis – Light Touch
⁴ SIA - Social Impact Assessment
⁵ DIA - Distribution Impact Assessment
⁶ BCR – Benefit to Cost Ratio

FULLY COMPLIANT OPTIONS

Option 11 fully complies with the scheme objectives, however it has:

- the current highest estimated scheme cost
- the greatest adverse environmental effect
- the lowest BCR
- the lowest rated VfM¹.
- the highest standard of design of all the options

Due to the significant negative environmental effects and high cost for Option 11, Option 14 was developed to provide a fully compliant option which minimises environmental effects while also providing higher VfM compared to Option 11. As a result of the development of Option 14, it is therefore not recommended that Option 11 be taken forward to PCF Stage 2.

Option 14 fully complies with the scheme objectives and also:

- has fewer significant adverse environmental effects than Option 11.
- currently rated Medium VfM, with the likely potential that following further refinement at PCF Stage 2 it could achieve a high VfM rating.
- exceeds the current scheme budget.

It is recommended that this option is progressed in PCF Stage 2 as the preferred fully compliant option.

PARTIALLY COMPLIANT OPTIONS

Options 16A and 16B were taken forward in PCF Stage 1 in order to facilitate potential scheme capital costs within the affordable budgets of RIS1, while partially complying with the scheme objectives by supplying free flowing links in one direction. They provide an incremental delivery of the fully compliant Option 14 once both options have been built.

Option 16A partially complies with the scheme objectives by only providing a free flowing A34 link to the M3 in the southbound direction. It has:

- less significant adverse environmental effects than the fully compliant options as a result of its smaller footprint
- a current scheme budget which is within the affordable budgets of RIS1
- a medium VfM rating
- the second lowest BCR of all the options

Option 16B partially complies with the scheme objectives by only providing a free flowing A34 link to the M3 in the northbound direction. It has:

- less significant adverse environmental effects than the fully compliant options as a result of its smaller footprint

¹ VfM – Value for Money

- a current scheme budget which is within the affordable budgets of RIS1
- a high VfM rating
- the highest BCR of all the options

It is recommended that both options 16A and 16B are progressed in PCF Stage 2 as both would need to be developed further even if only one is chosen as the preferred option eventually. It is important that they develop together as an eventual fully compliant option equivalent to Option 14. Both options can be built within the current scheme budget and have either medium or high VfM¹ meaning either could be chosen as the preferred option at the end of PCF Stage 2.

NON COMPLIANT OPTIONS

Option 18 does not comply with the scheme objectives as it does not provide a free flowing A34 link to the M3 in either direction. The provision of free flow links is a key requirement of Highways England Operations. It has:

- less significant adverse environmental effects than the other options as a result of its smaller footprint
- a current scheme budget which is within the affordable budgets of RIS1
- a high VfM rating
- the second highest BCR of all the options.

Although overall it has the second highest BCR, the benefits are all driven by the improvements to the A34/A33 diverge and not the throughabout which would be over capacity and contributes a small disbenefit.

It is not recommended that this option be taken forward to PCF Stage 2 as it is not a compliant option and has a lower VfM rating than Option 16B which is at least partially compliant.

RECOMMENDATION

Based on the combination of the individual assessments above, the BCR's and the various options compliance with the scheme objectives, it was concluded that Options 14, 16A and 16B should be carried forward to PCF² Stage 2 for further development.

This report will now form a key input source to the Scheme Appraisal Report, which will be produced in PCF Stage 2.

¹ VfM – Value for Money

² PCF – Project Control Framework

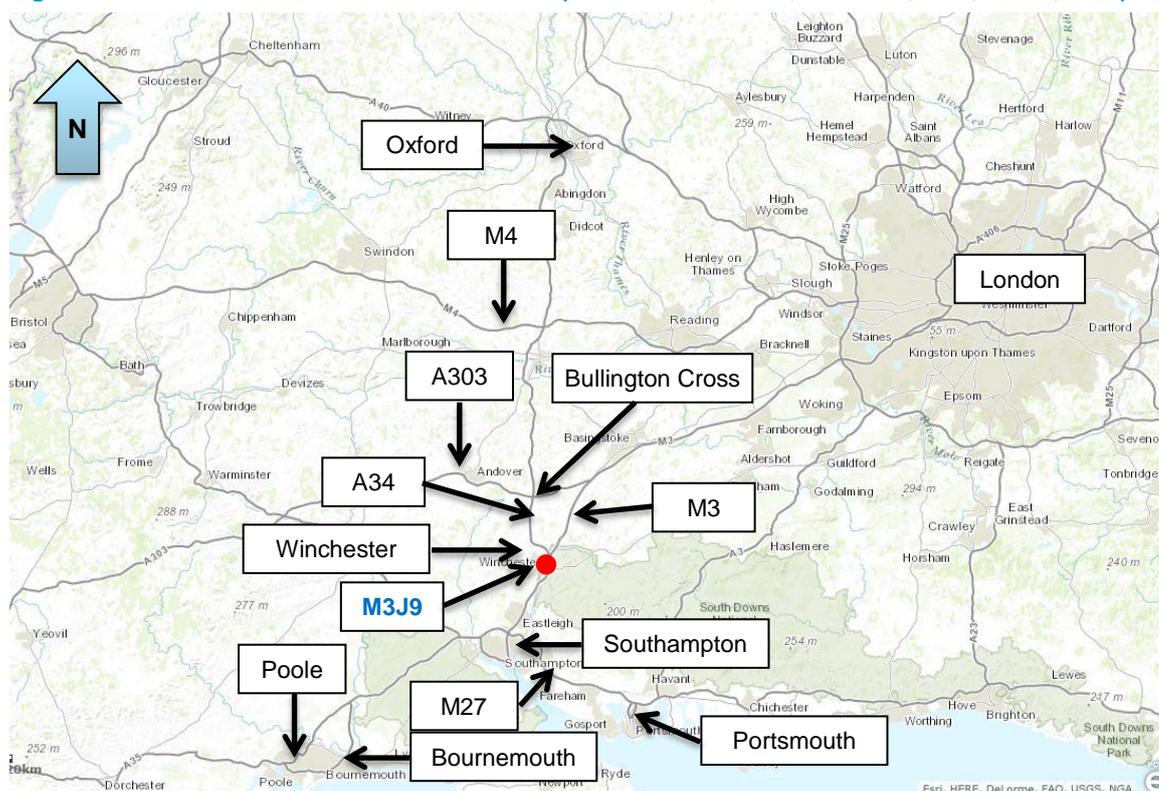
1 INTRODUCTION

1.1 BACKGROUND

1.1.1 M3 Junction 9 is a key strategic route interchange which connects South Hampshire and the ports of Southampton and Portsmouth with the wider sub region. It also connects the region to London and the north-west via the M3, and the Midlands and the North via the A34. The A34 also provides a connection to the principal east-west corridor of the A303.

1.1.2 The scheme location relative to the SRN¹ is illustrated in Figure 1-1.

Figure 1-1: Scheme location relative to the SRN (Source: Esri, HERE, DeLorme, FAO, USGS, NGA)



1.1.3 A significant volume of traffic currently uses this grade-separated, part signalled gyratory (approximately 6,000 vehicles per hour during the peak periods). The junction acts as a bottleneck on the local and strategic highways network and causes significant delay, especially during peak hours.

¹ SRN – Strategic Road Network

- 1.1.4 The northbound and southbound movements between the M3 and the A34 are particularly significant, with downstream queues on the northbound diverge (off-slip) of the M3 backing onto the mainline carriageway, often resulting in safety concerns during peak periods. There are further potential safety concerns on the A34 southbound due to significant queuing which also results in rat running traffic through Winchester between the A34 and A272 junction at Worthy Down (to the north of Junction 9) via the B3420 and the B3409 to M3 Junction 11 (to the south of Junction 9). To overcome queuing on the M3 Junction 9 northbound diverge, additional traffic signal green time is allocated, resulting in the development of lengthy queues on the A272 Spitfire Link and Easton Lane during the morning and evening peak periods respectively.

1.2 STRATEGIC CASE

- 1.2.1 In March 2015 the Department for Transport published the Road Investment Strategy (RIS) which sets out a list of improvement schemes that will be developed by Highways England over the period 2015-2020.
- 1.2.2 The RIS¹ outlines a long-term investment programme for England's strategic road network, with a package of committed funding available to provide:
- A long-term vision for the strategic road network, outlining how Highways England will create smooth, smart and sustainable roads.
 - A multi-year investment plan that will be used to improve the network and create better roads for users.
 - High-level objectives for the first roads period 2015 to 2020.
- 1.2.3 The 'Road Investment Strategy for the 2015/16 – 2019/20 Road Period' document announced M3 Junction 9 improvements with the intention to provide "upgrade to the junction to allow free movement from the A34 to the M3".
- 1.2.4 Highways England recently signalled the roundabout at Junction 9 as part of the national Pinch Point programme outlined during the Chancellor's Autumn Statement in November 2011 at a cost of £700,000. The works were intended to reduce congestion and journey times for commuters, while improving road safety.
- 1.2.5 Hampshire County Council has identified that infrastructure improvements are necessary to reduce congestion levels and assist with the strategic movement of traffic at a key arterial intersection in order to ensure that vehicular delay does not compromise the scale of potential future economic growth in the sub-region. It is believed that the introduction of free-flow movement between the M3 and the A34 will be critical to ensuring these goals.
- 1.2.6 The M25 to Solent and Solent to Midlands Route Strategy Evidence Report published in April 2014 noted that:
- The A34 is the main corridor between the Midlands and the North carrying freight traffic from Southampton and Portsmouth Docks.
 - This section of the route connects with the M25 to Solent at the M3 Junction 9 and the South West Peninsula at the A34/A303 junction.

¹ RIS – Road Investment Strategy

- Substantial development of the Southampton container port will increase Heavy Goods Vehicle (HGV) traffic on the A34 and M3 (which is expected to double between 2005 and 2020 with vehicular traffic increasing by 33%¹).
- There are plans to provide 2,000 dwellings (of the 4,000 planned in Winchester) in the Barton Farm area of Winchester adjacent to the M3 Junction 9 with the A34.

1.2.7 Additionally, the LEP² for the region, Enterprise M3, produced a Strategic Economic Plan which listed the M3 Junction 9 within their top 5 transport “Asks” of central government. These are seen as vital in providing the underpinning infrastructure that will facilitate the LEP to deliver its targets. A supporting letter for strategic improvements at this location was issued to Highways England on behalf of multiple LEP’s including EM3³/ Solent/ Dorset/ Thames Valley and Berkshire.

1.2.8 The purpose of this report is to collate and document all relevant factors necessary for a technical appraisal of the proposed schemes and to evaluate and compare them on engineering, traffic, environmental and economic grounds under the terms of reference set out in the planning brief and also to provide a basis for consultation with the general public.

1.3 PURPOSE OF THIS REPORT

1.3.1 This Technical Appraisal Report (TAR) brings together the traffic, economic, safety, operational, technical, maintenance and environmental assessments. In many cases, outcomes are based on other Project Control Framework 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:

- [Traffic Modelling Report](#)
- [Economic Assessment Report](#)
- [Appraisal Summary Table](#)
- [Appraisal Specification Report](#)
- [Screening Assessment of Implications on European Sites](#)
- [Environmental Study Report including Environmental Scoping Report](#)

1.3.2 Both this TAR and these assessments form the basis for deciding which scheme option(s) should be taken forward for further consideration in PCF⁴ Stage 2. This product is also a key input into the Scheme Assessment Report, to be produced at the next PCF Stage.

1.4 USE OF ACRONYMS AND FOOTNOTE

1.4.1 This report contains many technical terms, a long glossary table listing all acronyms used could make cross-referencing a cumbersome process to the reader. Instead, all abbreviations are expanded at the footnote on the same page where they appear. This improves both the readability of the report, and removes the need for a reader to remember an acronym’s definition after its first use.

¹ Solent to Midlands – Route Strategy Evidence Report/Technical Annex (April 2014)

² LEP – Local Enterprise Partnership

³ EM3 – Enterprise M3

⁴ PCF - Project Control Framework

2 PLANNING BRIEF

2.1 CLIENT SCHEME REQUIREMENTS

2.1.1 The Planning Brief for the M3 Junction 9 Improvement is as described in the Client Scheme Requirements at the following link:

→ [Client Scheme Requirements](#)

2.1.2 The Client Scheme Requirements provides an overview of the scheme. The high level scheme description states, 'Development of major infrastructure improvements at M3 Junction 9 to assist with the strategic movement and effective management of traffic utilising the existing intersection.'

2.1.3 The scheme would help achieve the following key strategic outcomes, as outlined in the Highways England Delivery Plan 2015-2020:

1. **Supporting economic growth** – Unlocked development capacity for job, business and housing creation
2. **A safe and serviceable network** – Safety improved as a result of a reduction in delays and queue lengths
3. **A more free flowing network** – Reduced the amount of congestion and increase journey time reliability
4. **An improved environment** – There is potential to reduce road traffic noise and vehicle emissions through reduced congestion. The scheme shall have no net loss to biodiversity by 2020, as required by the Highways England Delivery Plan ¹.
5. **A more accessible and integrated network** – Improvements at Junction 9 would also include improvements for non-motorised users. The scheme would connect the National Cycle Network route 23 which is severed by the current junction layout.

2.1.4 The options that have been identified for investigation and which meet the above criteria, are as listed in detail in Chapter 5.

¹ This objective has been updated since the Client Scheme Requirements were approved to reflect Value Management Workshop action No. 3

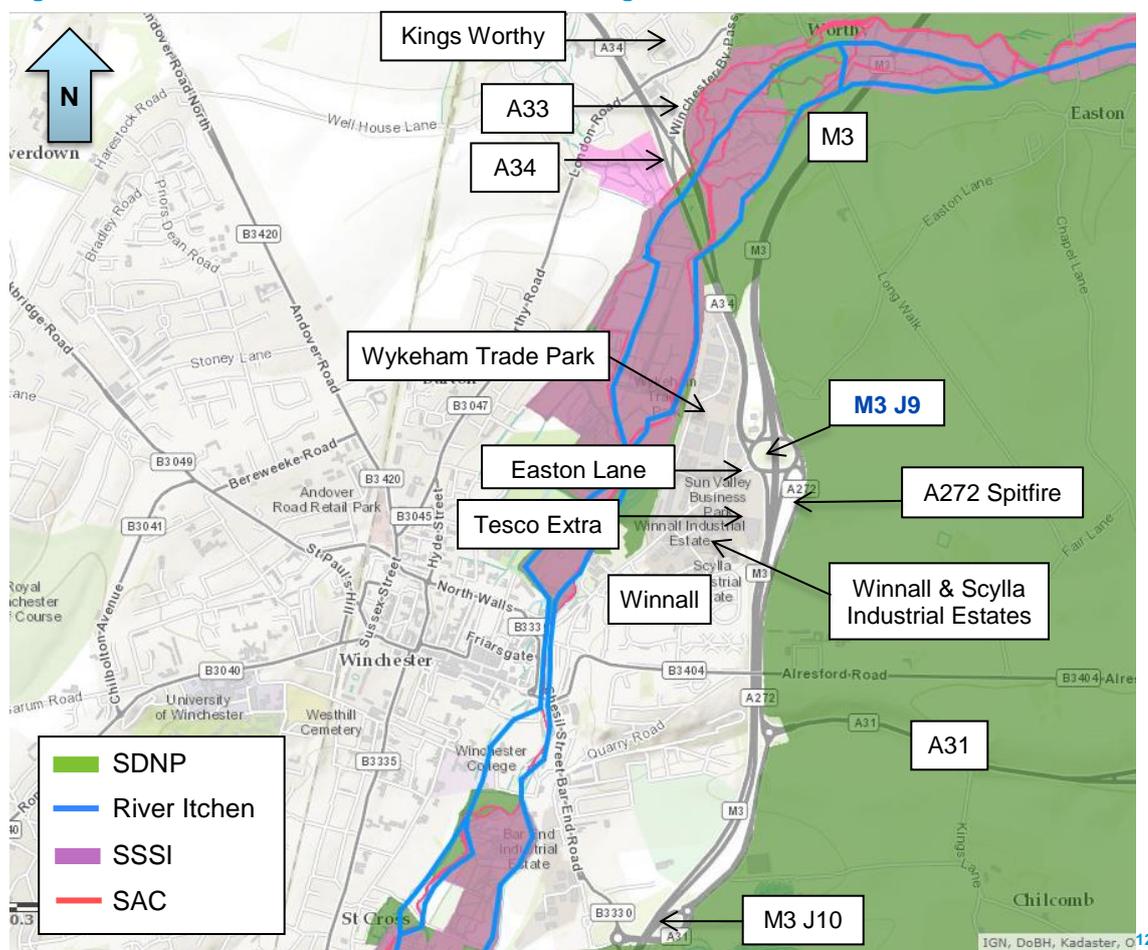
3 EXISTING CONDITIONS

3.1 DESCRIPTION OF LOCALITY

3.1.1 The scheme is located in South Hampshire, which is the second most densely populated region in the southeast of England, with a population of approximately 1,019,300 recorded during the 2011 census. The junction is located near to the ports of Southampton, Portsmouth and Poole, which attract substantial volumes of traffic (including heavy freight movement and holiday traffic) from across the country, with the local area acting as a gateway to mainland Europe, the Channel Islands and the Isle of Wight. In addition Bournemouth and Southampton International Airport generate additional vehicle trips, which further constrain the operation of the strategic road network, leading to road congestion and journey-time unreliability.

3.1.2 The location of the junction relative to the surrounding area and local highway networks is illustrated in Figure 3-1.

Figure 3-1 Scheme location relative to the surrounding area and local road network



Source: IGN, DoBH, Kadaster, OS, Esri, HERE, DeLorme, USGS, METI/NASA

¹ SDNP – South Downs National Park

² SSSI – Sites of Specific Scientific Interest

- 3.1.3 The M3 Junction 9 is located to the east of the City of Winchester which is the county town of Hampshire. As of the 2011 Census, the Winchester District including Alresford and Bishop's Waltham has a population of 116,800. Winchester is known for its architectural and historical interests with Winchester Cathedral being one of the largest in Europe.
- 3.1.4 M3 Junction 9 is located adjacent to the settlement of Winnall (to the east of Winchester). The surrounding area is urban to the west and northwest of the junction and primarily rural in all other directions with SDNP¹ located to the east and north of the junction.
- 3.1.5 The land immediately to the west of the junction is predominantly commercial/industrial with Wykeham Trade Park and a Highways England's maintenance depot located to the north-west of the junction. Developments to the south-west include Sun Valley Business Park, Tesco Extra Superstore, Winnall Industrial Estate and Scylla Industrial Estate.
- 3.1.6 The land to the east is generally greenfield primarily forming part of the SDNP, with the River Itchen and associated floodplain to the north of the scheme. The River Itchen SAC² and SSSI³ also extend to the north-east and south-west of the existing junction.

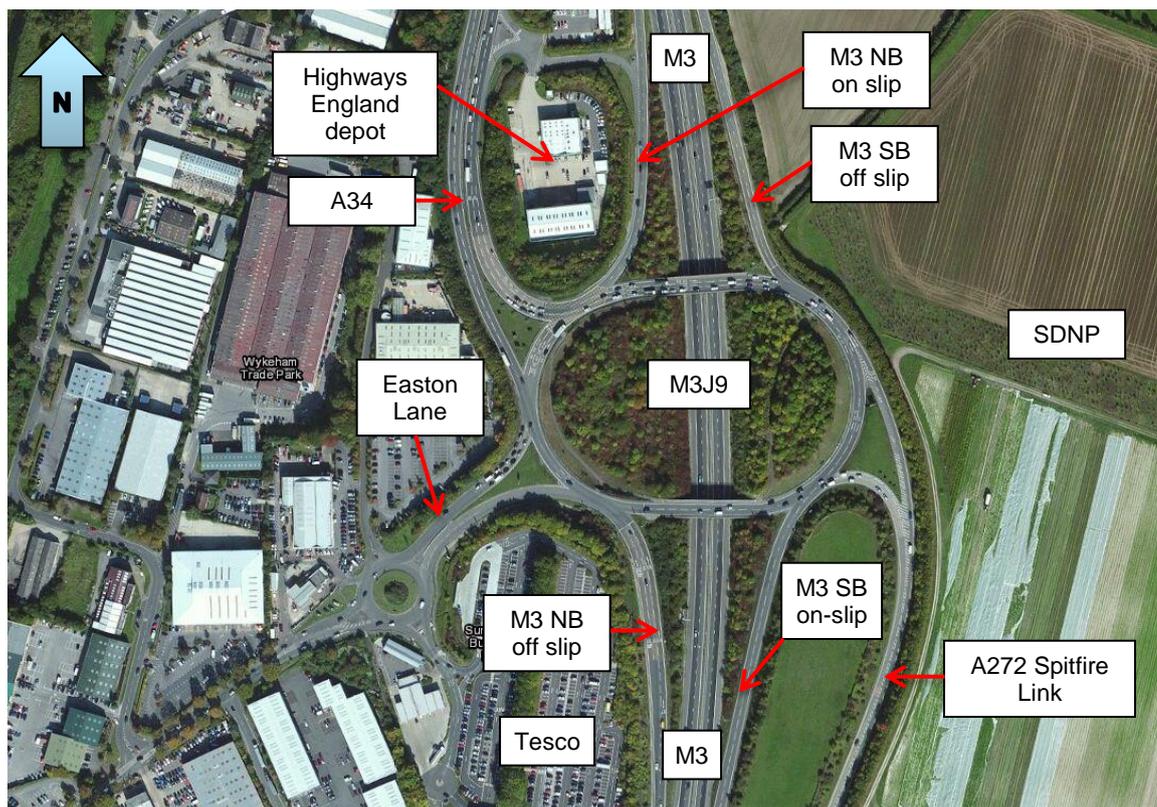
3.2 EXISTING HIGHWAY NETWORK

- 3.2.1 The existing junction forms a grade-separated, partially signal controlled roundabout arrangement between:
- M3 (which forms the principal route between Southampton and London)
 - A34 (which forms the principal route between Winchester and Oxford; this also links with the A33 to Basingstoke)
 - A272 Spitfire Link (non-signalised node, this forms the principal route between Winchester and Petersfield, this route also links to the A31)
 - Easton Lane (which provides the local access route between Winchester and the Strategic Road Network via M3 Junction 9).

The existing junction layout is shown in Figure 3-2.

¹ SDNP – South Downs National Park
² SAC – Special Areas of Conservation
³ SSSI – Sites of Special Scientific Interest

Figure 3-2 Existing junction layout



Source: DigitalGlobe, GeoEye, Microsoft | OS, Esri, HERE, DeLorme, iPC, NGA, USGS

- 3.2.2 The northbound carriageway of the M3 approaching Junction 9 is formed of a standard dual 3 lane motorway. The Junction 9 northbound diverge is a DMRB¹ TD22/06 Layout of Grade Separated Junctions Type 'D' (Option 2) Lane Drop with Parallel diverge. Diverge lanes are marked for the A34, with two lanes proceeding northbound through the junction for the M3 as a standard dual 2 lane motorway. A northbound slip road from Junction 9 joins the M3 mainline via a TD22/06 Type 'A' Taper merge.
- 3.2.3 North of the junction the southbound carriageway of the M3 forms part of the standard dual 2 lane motorway. A TD22/06 Type 'A' Taper diverge provides access to the Junction 9 roundabout via the southbound off slip road. The M3 continues through the junction as a standard dual 2 lane motorway. South of the junction a TD22/06 Type 'F' Lane Gain with Ghost Island Merge (Option 1) is provided after which the junction the M3 becomes a standard dual 3 lane motorway.
- 3.2.4 The A34 is a dual 2 lane all-purpose road. Approximately one kilometre north of the M3 Junction 9 the 2 lane northbound carriageway bifurcates. The nearside lane continues north-west as the A34, widening to two lanes just beyond the bifurcation. The offside lane continues to the north to become the A33. The existing A34 / A33 arrangement creates a bottleneck for the A34 traffic by effectively narrowing the A34 from two lanes to one prior to the diverge, before returning to two lanes after the diverge.
- 3.2.5 In the southbound direction the A33 southbound carriageway merges with the southbound A34 with a TD22/06 Type 'C' ghost island merge. Beyond the merge the A34 is 2 lanes towards the M3 Junction 9 roundabout.

¹ DMRB – Design Manual for Roads and Bridges

3.3 TRAFFIC

3.3.1 The existing traffic conditions on the approaches to the roundabout at the M3 Junction 9 are summarised in Table 3-1. Traffic counts have been taken from the traffic surveys undertaken in June 2015 by SkyHigh.

Table 3-1: Traffic counts on the approach and exits at the M3 Junction 9

ARM	AM PEAK HOUR FLOW (0800-0900)	% HGV	INTER-PEAK AVERAGE HOURLY FLOW (1000-1600)	% HGV	PM PEAK HOUR FLOW (1700-1800)	% HGV	AVERAGE ANNUAL WEEKDAY (AADT)	% HGV
M3 Northbound Merge (On-Slip)	229	9.7%	167	6.0%	228	4.0%	2614	5.7%
M3 Southbound Diverge (Off-Slip)	261	5.4%	171	8.9%	500	1.8%	3755	6.8%
A272 Exit	505	8.7%	402	9.4%	1312	2.6%	9248	7.7%
A272 Approach	394	9.1%	347	11.0%	375	6.1%	4723	9.1%
M3 Southbound Merge (On-Slip)	2080	14.8%	1647	17.1%	1963	9.0%	21696	14.8%
M3 Northbound Diverge (Off-Slip)	2370	12.6%	1730	17.5%	2043	10.3%	24891	14.8%
Easton Lane Exit	901	4.3%	606	6.3%	571	2.6%	7096	5.0%
Easton Lane Approach	627	7.5%	727	5.4%	1070	2.2%	8925	5.3%
A34 Northbound	2350	12.9%	2032	16.5%	2562	9.1%	28722	13.8%
A34 Southbound	2593	13.1%	1880	16.3%	2648	7.6%	27081	13.7%

3.3.2 Table 3-1 above shows the busiest arms at the roundabout are the M3 south facing slip roads and the A34 northbound and southbound, with the highest flow of 2,648 vehicles occurring in the PM peak hour on the A34 southbound approach. Flows in the inter-peak are lower than in the peak hours on all of the approaches and exits but still remain high.

3.3.3 The highest proportion of HGV¹ traffic is 17.5% during the inter-peak on the M3 northbound diverge (off-slip); the highest during either the AM or PM is 14.8% on the M3 southbound merge (on-slip). This difference is unlikely to be as a result of increased HGV flow during inter-peak, but rather due to the lower car/LGV² flow upon which the HGV proportion depends.

¹ HGV – Heavy Goods Vehicle

² LGV – Large Goods Vehicle

3.4 COLLISIONS AND JOURNEY TIME RELIABILITY

3.4.1 Collision data has been obtained from Hampshire Constabulary for a five year period from 1st March 2011 – 29th February 2016. The accident data covers the M3 Junction 9 roundabout including the slip roads, M3 mainline (approximately 800m north and south of the junction), as well as the section of the A34 up to the junction with the A33.

3.4.2 The data is based on personal injury collisions recorded by the police. The number of collisions is summarised in Table 3-2 below, and plots are included in Appendix A.

Table 3-2: Collisions by Severity

TYPE / YEAR	2011 (MAR – DEC)	2012 (FULL YEAR)	2013 (FULL YEAR)	2014 (FULL YEAR)	2015 (FULL YEAR)	2016 (JAN – FEB)	TOTAL
Fatal	0	0	0	0	0	0	0
Serious	1	1	1	2	1	0	6
Slight	17	8	22	12	16	1	76
Total	18	9	23	14	17	1	82

3.4.3 The severity ratio (number of serious and fatal collisions compared with the total) is 7.3%. 'Reported Road Casualties Great Britain 2014', indicates that the five year national average severity ratio for 50mph dual carriageways is 12.3% and for 70mph dual carriageways 15.5%. Given that traffic travelling through the M3 Junction 9 roundabout will be slower on average than that observed on 50/70mph roads, there would likely be a higher proportion of 'slight' shunts resulting in a lower severity ratio in comparison.

3.4.4 Compared to the other years reviewed, 2013 saw a particularly high number of collisions. In October – December of this year while the Pinch Point scheme on the Easton Lane approach was being constructed. Compared to other years this resulted in a larger number of collisions occurring in these months; 2 in both 2012 and 2014 compared to 8 in 2013.

ACCIDENT TRENDS

3.4.5 The collision data from Hampshire Constabulary has been analysed for the five year period above, during which a total of 82 accidents occurred; the data area shows approximately 50% occur on or on the approach to the roundabout. The remaining 50% of the collisions occur on the M3 slip roads or on the main line of the M3 and the A34.

3.4.6 The broad collision characteristics for the serious collisions that have occurred within the study area in the five year period are outlined in Table 3-3 below.

Table 3-3: Serious Collision Characteristics and Location

ACCIDENT DESCRIPTION	POSSIBLE ATTRIBUTOR		LOCATION OF ACCIDENTS		
	NUMBER OF ACCIDENTS	%	ACCIDENT LOCATION	NUMBER OF ACCIDENTS	%
Changing Lane	1	17%	Roundabout	4	66%
Loss of Control	1	17%	Not at a junction	1	17%
Rear Shunt	2	33%			
Driver error entering the roundabout	2	33%	Roundabout Approach	1	17%

3.4.7 There are only a few serious accidents that have occurred in the study area over the five year period therefore it is not possible to draw conclusions about trends or prevailing causes but of the 6 accidents, two thirds were as a result of driver error either entering the roundabout incorrectly or driving into the back of the car in front.

3.4.8 Over the five year review period, 76 slight accidents have occurred within the study area, 48 of these (63.2%) were attributable to rear shunts, and a further nine (11.8%) were caused by lane changes. A further 11 (14.5%) of the slight accidents were caused by a loss of control by drivers and the remaining eight due to driver error on the roundabout.

3.4.9 The police reporting of the accidents show the majority of all collisions reported are categorised as rear shunt, generally as a result of stationary traffic downstream and poor driver judgement. The effects of congestion and stop-start conditions at the roundabout are evident from the high number of rear shunt collisions.

JOURNEY TIME RELIABILITY

3.4.10 The Highways England journey time database has been examined for the route between the M3 Junction 9 northbound off-slip and the A34, just past the junction with the A33, in order to reveal the variability of journey times on different days of the week. All days within the neutral month of October 2015 have been included in this assessment.

JOURNEY TIME VARIABILITY THROUGH THE DAY

3.4.11 The journey times, reported for an average weekday, are shown for the AM, PM and IP¹ hours in Table 3-4 below for the section between south of the M3 Junction 9 and on the A34, north of the A33 diverge.

Table 3-4: Peak and Inter-peak Journey Times (Seconds), Average Weekday

SECTION	AM (0800-0900)	IP (1000-1600)	PM (1700-1800)
Northbound	111	121	119
Southbound	134	124	150
Difference compared to IP (%)			
Northbound	-10(-9%)		-2 (-2%)
Southbound	10 (8%)		26 (21%)

3.4.12 Error! Reference source not found. shows that the northbound route has journey times which are consistent between the AM, IP and PM peak of around two minutes. The percentage change in journey times between the three peaks is 9% equating to a range difference of 10 seconds.

3.4.13 In the southbound direction the PM peak journey time is longer than the AM and the IP journey time. The range difference in journey times in the southbound direction indicates an increase of 10 seconds (8%) in the AM and 26 seconds (21%) in the PM, compared to the IP.

3.4.14 Comparing the journey time variability between peak periods on an average weekday, the difference between travelling at different times of the day is considered to be low. The greatest difference (21%) can be seen on the southbound route between inter-peak and PM peak, which is expected to relate to the increase in traffic flows.

¹ IP – Inter-peak

JOURNEY TIME VARIABILITY THROUGH THE WEEK

3.4.15 While the journey time variability between peak periods of an average weekday has been presented, it is useful to also understand the change in journey times through the week. This section utilises the same dataset as in Table 3-4, breaking the data down further by day of the week in order to compare how journey times vary each day.

Network peak hours have been selected for these calculations; the same hours for which the traffic count data has been presented in Section 3-3. The journey time by direction and day of the week is shown in Figure 3-5.

Table 3-5: Average Peak Hour Journey Time (Seconds) by Weekday

JOURNEY TIME/ ROUTE SECTION	PEAK PERIOD	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
M3 to A34 (Northbound)	AM	119	104	111	111	111
	IP	123	105	107	109	163
	PM	126	111	116	121	119
A34 to M3 (Southbound)	AM	161	134	131	126	126
	IP	134	131	124	119	117
	PM	157	134	140	153	165

- 3.4.16 It can be seen that there is some variance in journey times when travelling on different days of the week. For northbound travel, the average mid-week journey generally takes less time in most peak periods than on a Monday or Friday. Furthermore, inter-peak journeys on a Friday are significantly longer than on a Monday, 163 seconds compared to 123.
- 3.4.17 Data for average weekday travel in the southbound direction indicates that journeys on a Monday are longer in all peak periods than mid-week journeys. Slower travel is also observed during the Friday PM peak, with average journeys taking up to 31 seconds longer than on mid-week days.
- 3.4.18 The average peak hour journey times presented in Table 3-5 provide an indication of usual travel times through the junction, while Table 3-6 summarises the minimum and maximum journey times in each direction/ peak period, for each day of the week observed in the October 2015 dataset. This gives a better indication of how augmented journey times can become, during times of congestion compared to periods of minimal delay through the junction.

Table 3-6: Min/Max Peak Hour Journey Times in October 2015 (Seconds)

JOURNEY TIME/ ROUTE SECTION	PEAK PERIOD	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
M3 to A34 (Northbound)	AM	93 / 238	87 / 128	91 / 131	94 / 142	81 / 182
	IP ¹	93 / 223	84 / 127	99 / 153	88 / 192	100 / 432
	PM	108 / 185	95 / 137	92 / 138	92 / 150	94 / 315
A34 to M3 (Southbound)	AM	117 / 197	99 / 178	100 / 177	105 / 164	99 / 170
	IP	110 / 190	111 / 222	86 / 157	101 / 141	93 / 135
	PM	108 / 194	111 / 186	99 / 201	102 / 194	108 / 201

- 3.4.19 Based on the lowest recorded northbound journey times, it can be assumed that a journey with minimal delay from traffic signals or congestion takes approximately 81 seconds, while in the southbound direction the lowest recorded journey time is 86 seconds.
- 3.4.20 The range between minimum and maximum journey times is further summarised in Table 3-7 for each direction and peak period.

¹ IP – Inter Peak

Table 3-7: Journey Time Range (Working Weekdays)

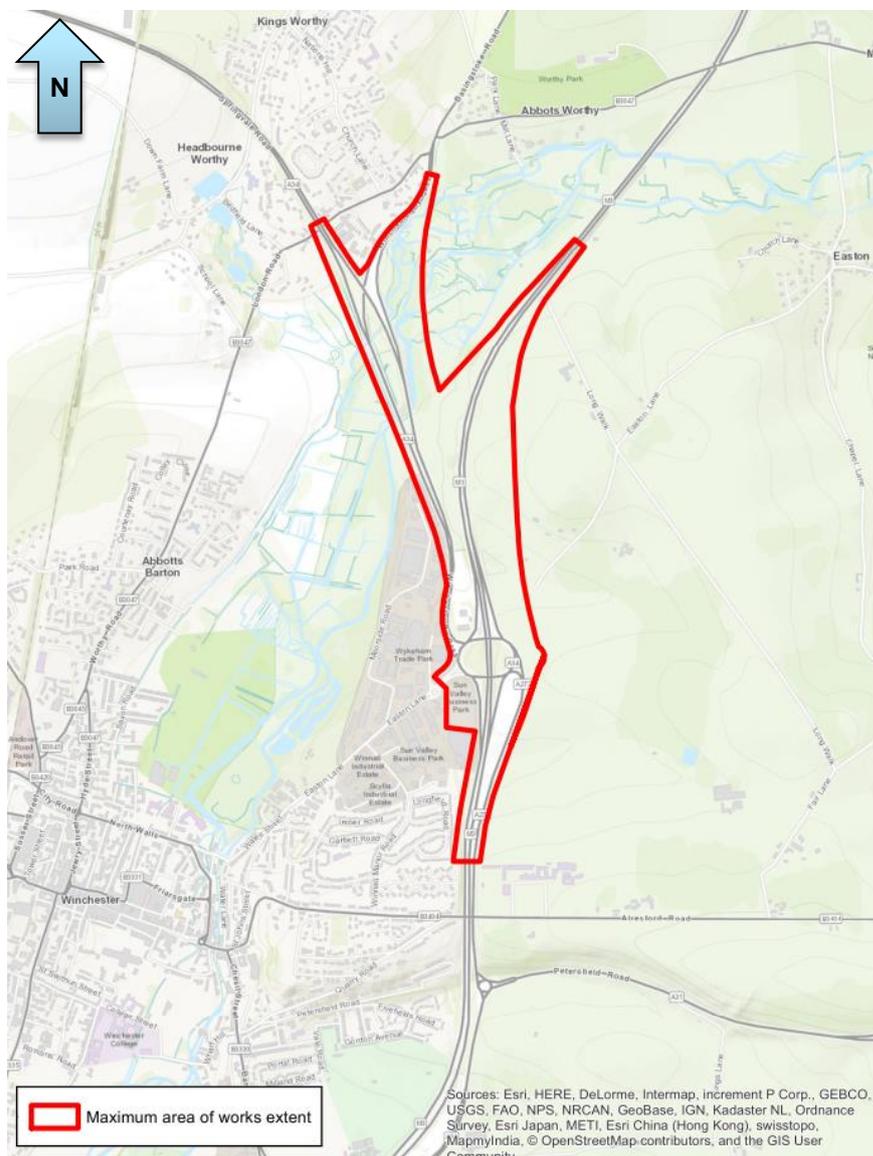
JOURNEY TIME/ ROUTE SECTION	PEAK PERIOD	MINIMUM	MAXIMUM	RANGE	RANGE/MIN%
M3 to A34 (Northbound)	AM	81	238	157	194%
	IP	84	432	348	414%
	PM	92	315	223	242%
A34 to M3 (Southbound)	AM	99	197	98	98%
	IP	86	222	136	158%
	PM	99	201	102	103%

- 3.4.21 It can be seen from an analysis of minimum and maximum journey times recorded in October 2015 that there is significant variability day to day, with maximum journey times more than double minimum journey times. Most notably, journeys in the northbound direction during the inter-peak varied from 84 to 432 seconds, equating to journey times more than five times longer (414%) than journeys that experienced minimal delay. This indicates that drivers can experience heavy congestion and delay travelling through the junction, suggesting a very poor level of journey time reliability. The measure of journey time variability is important to allow regular road users to make a prediction of their likely journey time. In doing so, road users are able to select a start time to minimise any adverse impact of unexpected delays. The perceived poor level of journey time reliability at this junction has been evidenced above. As a result regular users will seek alternative routes, avoiding the junction altogether.
- 3.4.22 Analysis of average journey time variability across the week indicates higher journey times in most peak periods on Mondays/Fridays compared to mid-week. Most regular travellers through this junction are likely to expect this which is as a result of higher traffic flows at these times.

3.5 SCHEME AREA

3.5.1 The anticipated maximum area of works extent (scheme area) is illustrated in Figure 3-3 and contains all the scheme options and is hereafter referred to as 'the scheme'. The scheme options are described in Chapter 5.

Figure 3-3 Maximum area of works extent (scheme area)



3.5.2 Different study areas have been used by the environmental technical disciplines due to the differing nature of the features being considered, and assessment requirements. The study areas that have been considered in the [Environmental Study Report](#) are presented in Table 3-8.

Table 3-8: Maximum study areas used within the technical topics

TECHNICAL TOPIC	STUDY AREA
Air Quality;	<ul style="list-style-type: none"> Scheme area and 200m from the road centre line
Noise & Vibration	<ul style="list-style-type: none"> Scheme area and a 300m area surrounding the scheme area
Geology and Soils	<ul style="list-style-type: none"> Scheme area and a 500m area surrounding the scheme area
Materials	<ul style="list-style-type: none"> Scheme area and waste management facilities in Hampshire
Cultural Heritage	<ul style="list-style-type: none"> Heritage assets - scheme area and 300m area surrounding the scheme area Setting assessment - scheme area and a 1km area surrounding the scheme area
Water Environment	<ul style="list-style-type: none"> Groundwater - scheme area and a 500m area surrounding the scheme area Surface water - scheme area and a 1km area surrounding the scheme area
Landscape	<ul style="list-style-type: none"> Arboriculture - scheme area Landscape receptors - scheme area and 500m area surrounding the scheme area Visual effects - scheme area and a 1km area surrounding the scheme area St Catherines Hill viewpoint has been assessed from 4km
People & Communities	<ul style="list-style-type: none"> Land use; community severance; community land; and Development land - the scheme area Tourism and recreation - scheme area and 500m area surrounding the scheme area Motorised and non-motorised travellers; community severance; and community land - scheme area and a 1km area surrounding the scheme area Local economy; and housing - Winchester City Council Administrative Area
Nature Conservation	<ul style="list-style-type: none"> Scheme area and a 2km area surrounding the scheme area

3.6 TOPOGRAPHY, LAND USE, PROPERTY AND INDUSTRY

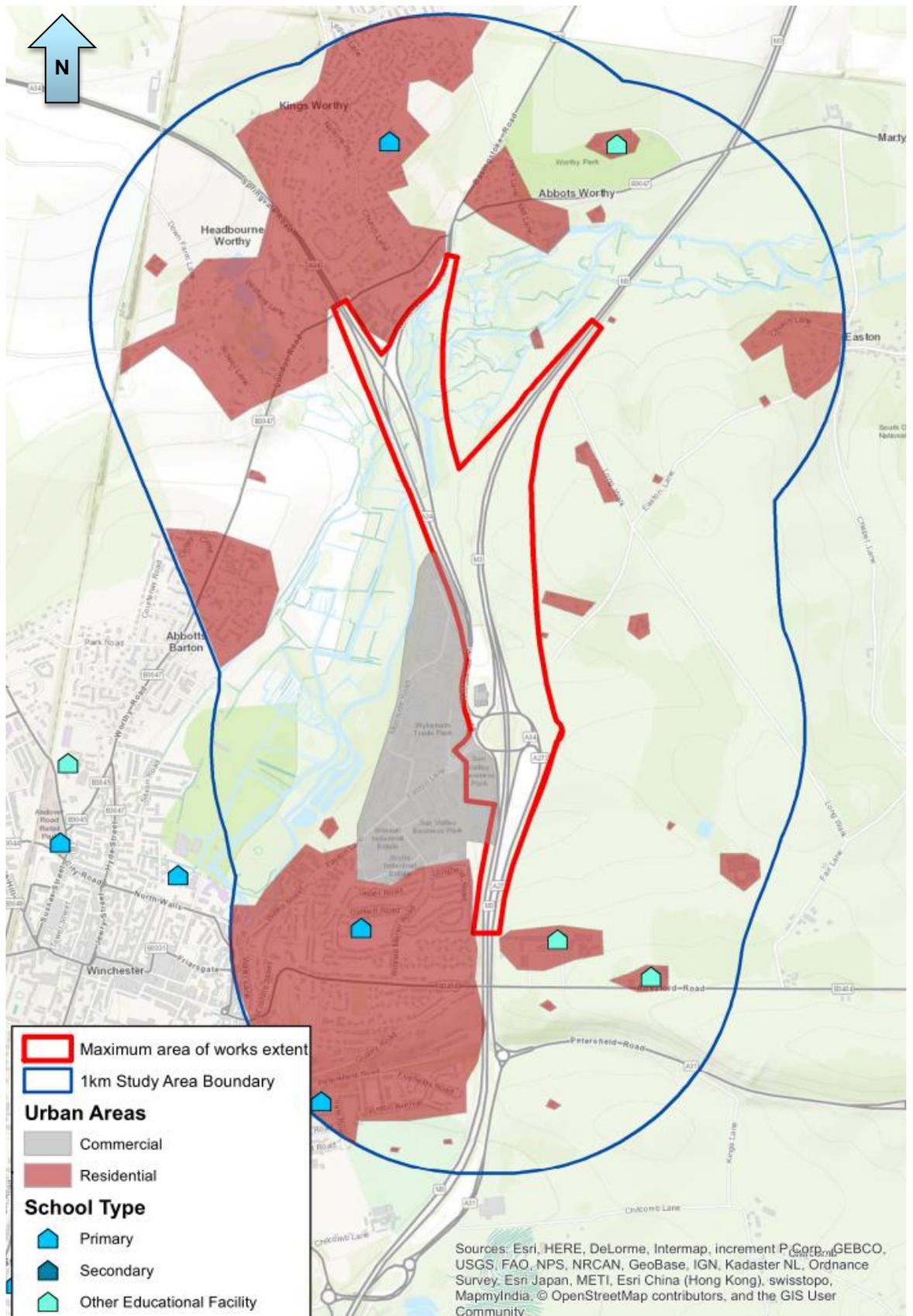
TOPOGRAPHY

- 3.6.1 The scheme lies along the River Itchen Valley with the base of the valley to the west of Junction 9 and running through the north-west of the scheme with the South Downs rising to the east of the scheme.
- 3.6.2 The Junction 9 roundabout and highway infrastructure to the south including slip roads and the A272 Spitfire Link are lower than the surrounding land. There is a 10m, almost vertical cut under the B3404 at the southern end of the scheme area, which is the most notable engineered landform.
- 3.6.3 The highways infrastructure of the A34 Winchester Bypass is slightly elevated in order to cross the River Itchen floodplain within the north-western part of the scheme area.
- 3.6.4 To the north of Junction 9, the M3 rises gradually at an even gradient to pass over Easton Down. This is achieved by embankments through a small combe/hollow near the Highways England depot and then cuttings on the higher ground.
- 3.6.5 There are numerous ditches, water bodies, streams and rivers in the area. The largest watercourse is the River Itchen and its tributaries, which run through the northern part of the scheme area, across a wide, flat floodplain (refer to Section 3.8).

LAND USE, PROPERTY AND INDUSTRY

- 3.6.6 Much of the scheme area is occupied by the highway corridors of the M3, including embankments, cuttings, bridges, slip roads, and accompanying infrastructure such as signage, fencing, traffic lights and occasional lighting. The south-western section of the scheme also contains built elements, including two-storey office and construction blocks and paved areas of hard standing used for car parking around the Highways England depot. The central and northern sections of the scheme contain areas of open farmland. Trees, hedgerows and wooded areas associated with highway planting are located on embankments and roundabouts of the existing M3 corridor.
- 3.6.7 The land use to the east, south-east and north-west of the scheme, which is part of the SDNP, is largely one of open farmland containing medium to large-sized rectangular fields intersected by access tracks and bounded by hedgerows.
- 3.6.8 To the south-west and west of the scheme is the built form of the City of Winchester, with retail parks adjacent to the M3 corridor. The land use in the vicinity of the scheme is detailed in Section 3.1.
- 3.6.9 To the north of the scheme is the village of Kings Worthy, which is separated from the built form of the City of Winchester by woodland and the A34. The land use to the north-east is dominated by the M3.
- 3.6.10 A large number of residential dwellings (approximately 260 are estimated to lie within 200m of the route alignment, primarily at the northern and southern extremes of the study area), six schools (including St Swithun's School north of the B3404 and east of the M3) and various commercial premises (immediately to the west of the scheme) all lie within 1km of the scheme. Most of the residential receptors lie close to the A34 to the north of the junction (in Headbourne Worthy, Kings Worthy and Abbots Worthy) or close to the M3 to the south west of the junction (on the eastern fringe of Winchester). A small number of farm holdings are located east of the scheme. Residential and commercial areas and schools are shown in Figure 3-4.

Figure 3-4 Residential/commercial areas and schools



3.7 CLIMATE

3.7.1 Climate figures were obtained from the Meteorological Office website for the nearest weather station to the scheme at Martyr Worthy, which is located approximately 2.5km north-east of the scheme. The figures are averaged over the years 1981-2010, and are, as follows:

- Average mean daily maximum temperature: 14.6°C
- Average mean daily minimum temperature: 5.8°C
- Annual average number of days with an air frost: 53.8 days
- Annual average number of hours with sunshine: 1564 hours
- Average annual rainfall: 746.5mm
- Annual average number of rainy days (≥ 1 mm): 116.2 days

3.8 DRAINAGE

WATERCOURSES

3.8.1 The River Itchen (Figure 3-5) flows in a south-westerly direction, comprising several tributaries and land drains that flow through the River Itchen SAC¹/SSSI² and the SDNP³ (Figure 3-3), in the northern section of the scheme. The existing A34 carriageways and A33 merge and diverge to the A34 cross the River Itchen to the south of Kings Worthy approximately 1km north-west of the existing Junction 9. The existing M3 motorway crosses the River Itchen to the east of Kings Worthy, approximately 2km north of the existing M3 Junction 9. To the south of the existing Junction 9 of the M3, the River Itchen continues to flow in a south-westerly direction to discharge to the Solent approximately 22km downstream of the scheme.

3.8.2 The scheme is also located near Nun's Walk Stream (Figure 3-5), a tributary of the River Itchen and a main river which flows in a southerly direction approximately 250m to the west of the scheme. To the south of the scheme, the Nun's Walk Stream continues to flow in a southerly direction before it joins the River Itchen approximately 1.25km to the south-west of the scheme.

3.8.3 The River Itchen and a number of its tributaries (including the Nun's Walk Stream) are classed as a main river, by the EA⁴, due to their strategic importance.

GROUNDWATER

3.8.4 British Geological Survey mapping indicates that the scheme is primarily underlain by the Seaford Chalk Formation. A small outcrop of the Newhaven Chalk Formation may be present on the eastern boundary of the scheme. The Lewes Nodular Chalk Formation underlies the Seaford Chalk Formation immediately south of the scheme.

¹ SAC - Special Areas of Conservation
² SSSI - Sites of Special Scientific Interest
³ SDNP - South Downs National Park
⁴ EA - Environment Agency

- 3.8.5 The EA classifies the Seaford Chalk and the Lewes Chalk strata as Principal Aquifers. These layers of rock or drift deposits are described as having the potential to support water supply and/or river base flow on a strategic scale. Review of the EA Water Abstraction Licences map indicates the presence of several groundwater abstraction licences within the vicinity of the scheme. It is also considered likely that the River Itchen and its tributaries are supported by groundwater base flow from the Chalk bedrock.
- 3.8.6 The majority of the scheme is not underlain by superficial deposits. However, superficial Alluvium, River Terrace and Head Deposits comprising clay, silt, sand and gravel within the extent of the river floodplain and adjacent river banks, are present within close proximity to the River Itchen.
- 3.8.7 The Alluvium and River Terrace Deposits are classified as Secondary 'A' Aquifer by the EA¹. A Secondary 'A' Aquifer is defined as permeable layers of rock capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. The Head Deposits are classified as Secondary Aquifer (undifferentiated). Peat deposits have also been noted from a number of BGS² boreholes located in the near vicinity of the existing Junction 9 area.
- 3.8.8 The northern section of the scheme falls mostly within an area classified as a Groundwater Source Protection Zone 1 (inner zone). These zones indicate where groundwater is typically used to support public drinking water supplies and therefore the protection of groundwater quality and quantity within these areas is important. Zone 1 is the most sensitive of these protective areas and indicates the zone in which contamination released to the ground could reach the point of abstraction within 50 days. Review of the EA's Water Abstraction Licences map indicates an abstraction by Southern Water within this area. The presence of the Source Protection Zone will be taken into consideration when designing new surface water drainage and spill response systems to ensure protection of groundwater resources.

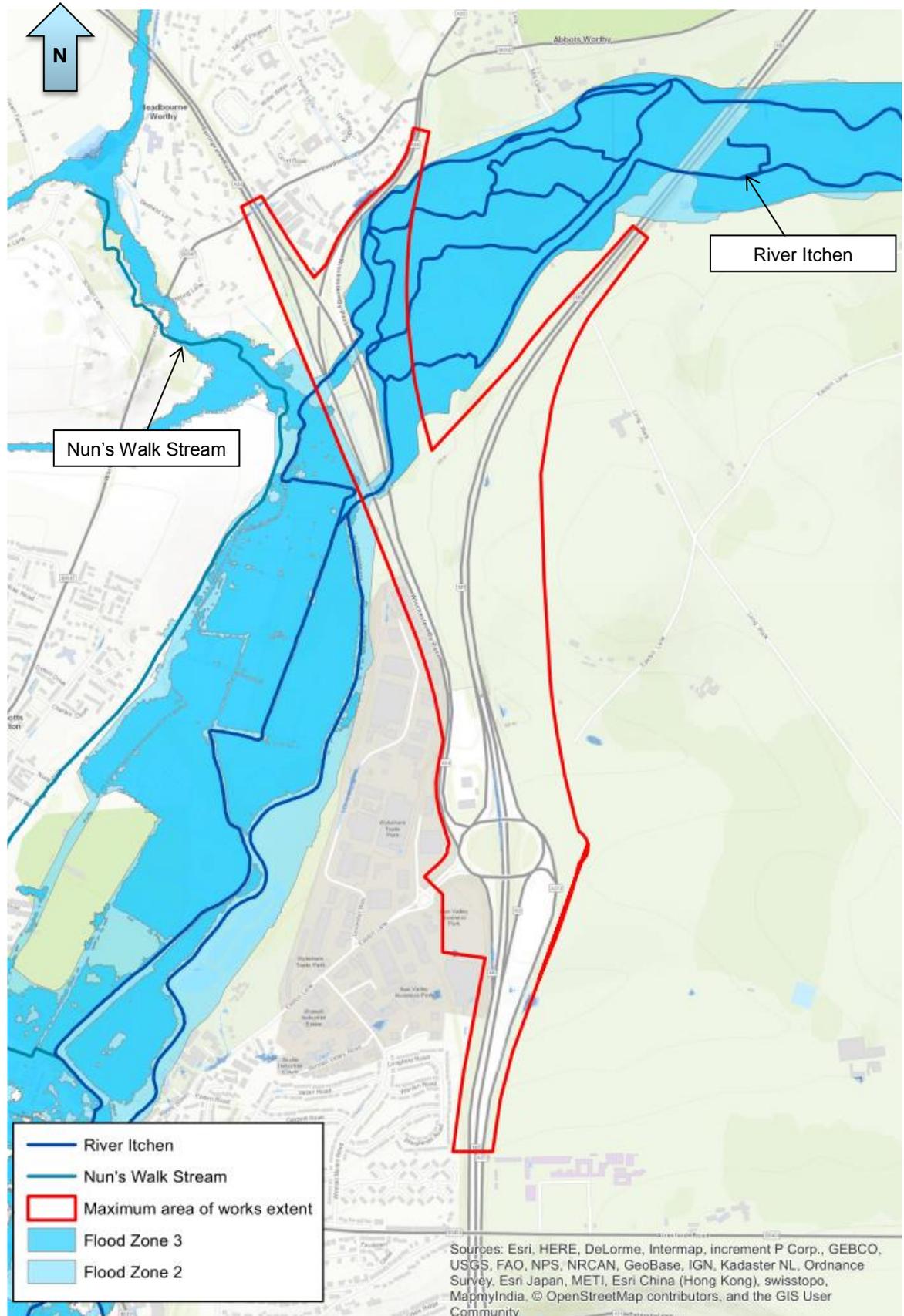
FLOODING

- 3.8.9 The EA Flood Map for Planning (Rivers and Sea) indicates that the northern section of the scheme is within Flood Zone 3 (high risk). Flood Zone 3 covers a large area between the existing A34 and M3 alignments, associated with the River Itchen and its tributaries (draining from the north-east). The northern section of the scheme is also located within the Flood Zone 2 (medium risk). The remainder of the scheme is located in the Flood Zone 1 (low risk). Flood Zone 2 and 3 are illustrated in Figure 3-5. Flood Zone 1 is the area that is not classed as either Flood Zone 2 or 3. The River Itchen flooded in the northern area of the scheme during the winter of 2013/14.

¹ EA – Environment Agency

² BGS – British Geological Survey

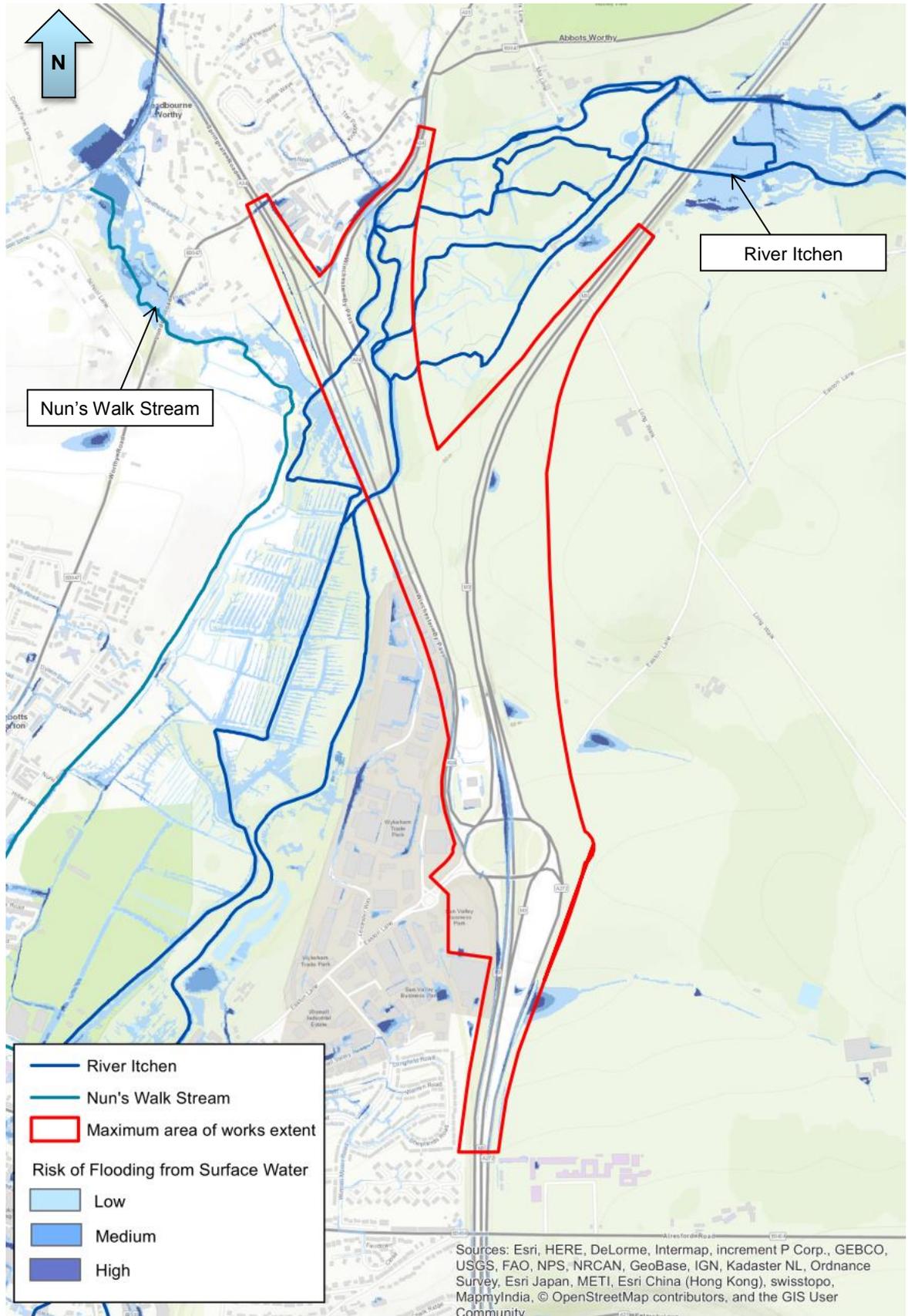
Figure 3-5 Flood Zones



- 3.8.10 The River Itchen and Nun's Walk Stream floodplain protect properties downstream from flooding. Residential, school and commercial receptors are described in Section 3.6.10. Parts of the areas of Kings Worthy and Winchester are only elevated approximately 5m higher than the level of the floodplain. Given the proximity of these areas to the River Itchen and the level of the floodplain and adjacent built development, it is anticipated that the River Itchen and Nun's Walk Stream floodplain protect in excess of 100 properties from flooding.
- 3.8.11 The EA¹ 'Risk of Flooding from Surface Water' map shown in Figure 3-6, classes most of the areas affected by the scheme as, being at 'very low risk' of flooding from surface water. However, there are some small isolated areas with a 'low risk' and 'medium risk' of surface water flooding, which are located where roads cross the River Itchen. Isolated areas at 'high risk' of surface water flooding are as follows:
- On the B3047 at the point where it passes beneath the A34 at the north-west limit of works
 - To the east of the M3 in the north of the scheme area
 - On the M3 at Junction 9
 - On and to the west of the A272
 - The Junction 9 north-bound on slip.
- 3.8.12 Figure 3-6 shows areas of Winnall, immediately west of the scheme, to be at 'low', 'medium' and 'high' risk of surface water flooding. Surface water flooding is predicted to occur at low points in the local topography where surface water runoff is modelled to collect during heavy rainfall. Two overland flow routes are also indicated within the vicinity of the scheme. The first is shown to flow through Kings Worthy, to the north of the scheme, and is indicated to have a 'high risk' of surface water flooding. The second is associated with the Nun's Walk Stream tributary of the River Itchen which passes through Headbourne Worthy to the north-west of the scheme. The areas alongside the watercourse are indicated to be at 'low', 'medium' and 'high risk' of surface water flooding.

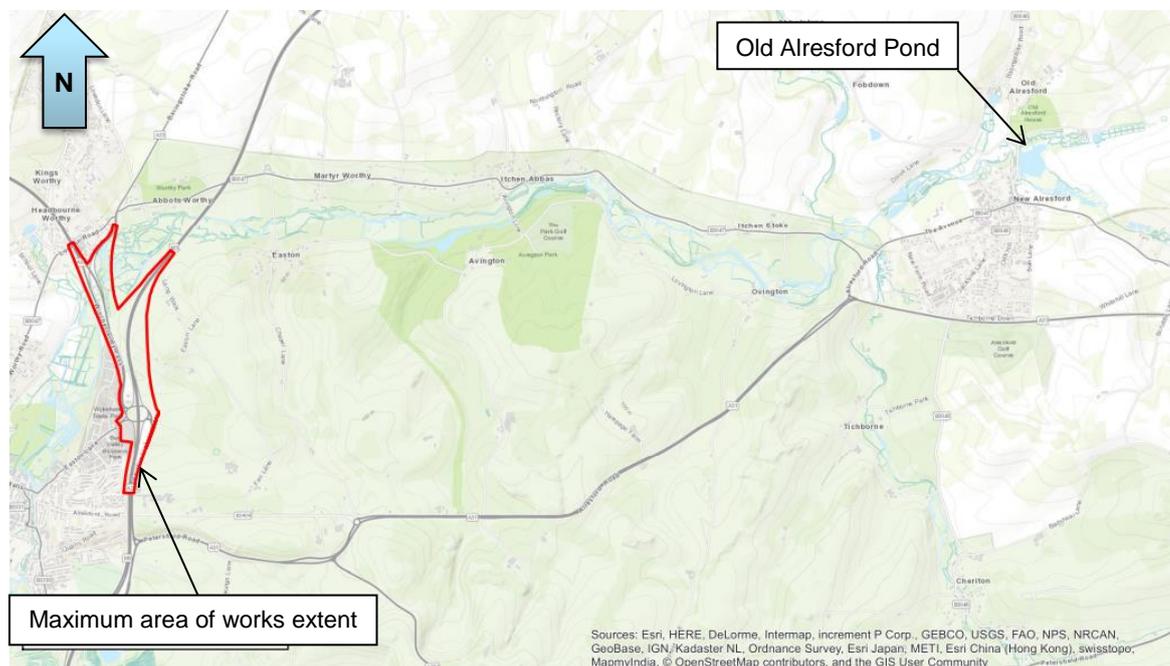
¹ EA – Environment Agency

Figure 3-6 Risk of flooding from surface water



- 3.8.13 The scheme is also at risk from reservoir flooding in the event of a failure of the Old Alresford Pond as illustrated in Figure 3-7 below. Quantified risk data for reservoir flooding has not yet been made available from the EA¹ but will be requested again for PCF² Stage 2.

Figure 3-7 Location of Old Alresford Pond



- 3.8.14 The EA Flood Risk Assessments: Climate Change Allowances³ (March 2016) states that within the South East River Basin District peak river flow is expected to increase between 10% and 25% within the next 25 years, rising to between 20% and 50% within the next 65 years. Within the next 100 years peak river flow is expected to increase between 35% and 105% within the South East River Basin District. The EA Guidance also provides the anticipated changes in extreme rainfall intensity for across the country. Over the next 100 years, the increase in extreme rainfall intensity is expected to be between 20% and 40%.
- 3.8.15 While present day flood extents are used to establish the flood zones at the study area, it is essential to consider the possible change in flood risk over the lifetime of the proposed scheme as a result of climate change. The likely increase in flow and rainfall intensity over the lifetime of the development will be assessed proportionally to the guidance provided by the Environment Agency as outlined above as part of PCF Stage 2 and 3. As part of these works, all surface water drainage features will be designed so as to provide adequate drainage for the proposed scheme for the appropriate climate change allowances.

¹ EA – Environment Agency

² PCF – Project Control Framework

³ Environment Agency (2016) Flood Risk Assessments: Climate Change Allowances, available online at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>, accessed August 2016

EXISTING ROAD DRAINAGE

- 3.8.16 HADDMS¹ identifies a number of outfalls within the scheme, from the Highways England network to the River Itchen and Nun's Walk Stream.
- 3.8.17 Review of HADDMS indicates that there are 15 Priority Outfalls within the study area. These are outfalls that Highways England has identified as being at risk of polluting the surface watercourses that they flow into. Two of the Priority Outfalls are designated as 'High' risk of pollution, nine as 'Moderate' risk of pollution, one as 'Low' risk of pollution and three as Risk Addressed, meaning they no longer present a pollution risk. Further details on the Priority Outfalls will be determined as part of PCF² Stage 2.
- 3.8.18 HADDMS does not specifically identify what type of drainage is present, however site observations indicate the drainage is likely to comprise a number of filter drains in the verges and in the central reserve of the M3.
- 3.8.19 The existing A34 to the north of Junction 9 appears to comprise kerb and gullies in the verges with filter drains in the central reservation, with a series of catch pits.
- 3.8.20 The existing Junction 9 Roundabout appears to be served by kerb and gullies on the bridges and approaches, with filter drains on the remaining circulatory carriageway. A number of soakaways are indicated by HADDMS as part of the junction highway drainage, located in the north-east and north-west areas of the junction. It is assumed that these convey surface water runoff to ground. HADDMS illustrates that runoff is discharged from this network to the River Itchen and Nun's Walk Stream. Further details on the existing drainage regime will be determined as part of PCF Stage 2.

3.9 GEOLOGY

- 3.9.1 The baseline conditions of the scheme have been assessed with reference to the following sources of information:
- Site walkover in April 2016
 - Envirocheck Report, Landmark, reference 85178192_1_1 dated April 2016 (Technical Appendix 9-1)
 - British Geological Survey (BGS) 1:50,000 Series Geological Map Sheet No. 299 'Winchester' (Solid and Drift ed.), 2002
 - British Geology Survey online 'Geology of Britain' Viewer (<http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer/>)
 - British Geological Survey web-hosted Onshore Geoindex (<http://www.bgs.co.uk/geoindex/>)
 - Environment Agency, What's in your Backyard? (<http://apps.environment-agency.gov.uk/wiyby/default.aspx>)
 - Hampshire County Council - Minerals and Waste Planning Policy in Hampshire, (<http://www3.hants.gov.uk/mineralsandwaste/planning-policy-home.htm>)
 - MAGIC map geographic information about the natural environment (<http://www.magic.gov.uk/home.htm>)

¹ HADDMS – Highways Agency Drainage Data Management System

² PCF – Project Control Framework

→ HAGDMS, Highways England, Geotechnical Data Management System, <http://www.hagdms.co.uk>.

GENERAL GROUND CONDITIONS

MADE GROUND / ARTIFICIAL DEPOSITS

- 3.9.2 While Made Ground is not indicated as being located on site on BGS¹ mapping, it is likely to be present along the alignment of the existing A34 and M3 associated with former road construction.
- 3.9.3 Made Ground is indicated to the north between the M3 and the A34 Winchester Bypass (landfill adjacent to the River Itchen) and in the southern part of the scheme, beneath the existing M3 Junction 9 (Spitfire Link Landfill) associated with previous landfilling activities, which are discussed further below.

SUPERFICIAL DEPOSITS

- 3.9.4 Superficial deposits are limited across the scheme. Alluvium overlies the chalk strata in the north/north-east and north-west of the scheme in the vicinity of the River Itchen. Two bands of superficial head deposits run perpendicular across the M3, A34, A272 in a west-east direction, located to the north and south of the existing M3 Junction 9 respectively.
- 3.9.5 River Terrace Gravel (sand and gravel) deposits and head deposits may also encroach onto the north-west and northern extents of the scheme associated with the River Itchen.
- 3.9.6 In addition to the above, peat deposits are also recorded in BGS borehole logs in the vicinity of the M3 Junction 9.

BEDROCK

- 3.9.7 The scheme is underlain by the Seaford Chalk Formation described as firm white chalk with nodular and tabular flint seams. A small outcrop of the Newhaven Chalk Formation may be present on the western boundary of the scheme.
- 3.9.8 The Lewes Nodular Chalk Formation underlays the Seaford Chalk Formation which is likely to thin towards the southern extent of the study area.
- 3.9.9 The geological map suggests that the Seaford Chalk is approximately 40-65m thick in this area and dipping 5°–10° towards the north.
- 3.9.10 BGS borehole records have been reviewed (see Appendix B) from along the existing alignment of the M3. These indicate that Chalk strata have been proven up to at least 45.72m below ground level (maximum drilled depth).
- 3.9.11 The Seaford Chalk which is located near the ground level is weathered and described as 'structureless clayey chalk with occasional presence of flints'. It is possible that the head deposits described in the borehole logs as 'brown clay with scattered flints' (Borehole record ref: SU43SE55) may constitute weathered Seaford Chalk deposits.

¹ BGS – British Geological Survey

HAGDMS¹

- 3.9.12 Table 3-9 below summarises the details of the historical information relevant to the scheme derived from HAGDMS website. A full review should be undertaken at PCF Stage 2 when a Preliminary Sources Study Report should be produced.

Table 3-9: Summary of Geotechnical Reports available on HAGDMS

Report Number	SCHEME TITLE	REPORT TITLE	AUTHOR	Date	Comments
28471	Smart Motorway Programme - South Coast M3 J9-14	Smart Motorway Programme British Geological Survey Exploratory Holes M3 Junction 9 to Junction 14	Kier Highways Ltd	May 2015	Available online
3215	Bridget's Lane to Bar End – Contract No.2.	Soil Survey Report	Mott MacDonald	1982	Available online
19191	Hampshire NMIS MBU Improvements Phase 3 M3 Junction 9 to 14	Geotechnical Report	Card Geotechnics Ltd	April 2005	Available online

EXISTING EARTHWORKS

- 3.9.13 Appendix C summarises the earthwork details that make up the M3 Junction 9 and the associated A34 interchange.

GROUND STABILITY

- 3.9.14 Potential stability hazards at the site as described in the Envirocheck Report are presented in Table 3-10 below.

Table 3-10: Stability Hazards

TYPE OF INSTABILITY	RISK (RANGE)
Collapsible Ground	No Hazard - Very Low
Compressible Ground	No Hazard – Moderate
Ground Dissolution	Very Low - Moderate
Landslide	No Hazard - Low
Running Sand	No Hazard – Low
Shrinking or swelling clay	No Hazard - Very Low

- 3.9.15 Multiple solution features are recorded approximately 190m north-west of the study area associated with the underlying chalk strata.

¹ HAGDMS – Highways England Geotechnical Data Management System

RADON

- 3.9.16 The site is located within a lower probability area for radon, as less than 1% of homes are above the action level.

3.10 MINING

- 3.10.1 Mineral resources comprising sharp sand and gravel are located in the vicinity of the River Itchen in the northern part of the study area, identified by Hampshire County Council's Mineral and Waste Plan. Mineral resources identified through the Plan are subject to potential safeguarding under Policy 15.
- 3.10.2 A concrete manufacturing plant (Easton Lane depot) is located immediately adjacent to the eastern boundary at the southern extent of the study area. This is considered to be a safeguarded site under Hampshire County Council's Minerals and Waste Plan.
- 3.10.3 The nearest BGS¹ recorded mineral site, as described in the Envirocheck Report, is a historic opencast chalk mine located approximately 15m-85m east of the north-eastern boundary of the scheme extent.

CONTAMINATED LAND

- 3.10.4 Where land has been contaminated as a result of former industrial or agricultural processes, this has the potential to be a constraint on all design options. Consideration must be given to the potential for any post construction impacts, due to the potential for remobilisation of contamination within ground disturbed by the construction processes.

LANDFILL SITES

- 3.10.5 Two recorded landfills are present within the scheme extent boundary. They are located in the north between the M3 and the A34 Winchester Bypass (landfill adjacent to the River Itchen) and in the southern part of the scheme, beneath the existing M3Junction 9 (Spitfire Link Landfill). Land between the M3 and A34 Winchester Bypass was subject to waste deposition between 1967 and 1968 and was recorded to comprise inert waste. No information is available for the Spitfire Link landfill site.

3.11 PUBLIC UTILITIES

Major statutory undertakers were contacted with a NRSWA² C2 Enquiry on 3 September 2015 to ascertain whether or not this scheme will impact upon their utilities. As of July 2016, the status of responses received from statutory undertakers with equipment potentially affected by the scheme are summarised in Table 3-11.

¹ BGS – British Geological Survey

² NRSWA - New Roads and Streetworks Act

Table 3-11: Affected Utilities

UTILITY COMPANY	TYPE	COMMENT
GeneSYS - [National Roads Telecommunications Services (NRTS)]	Telecoms	Apparatus has been identified in the M3 in both directions as well as on the Junction 9 roundabout and therefore will be affected by the scheme.
GTC	Gas, electric and water	GTC have identified assets in the area. However, it is only one location and it is unlikely to be within scheme area.
Openreach – [British Telecommunications]	Telecoms	BT has identified apparatus to be present in the immediate vicinity of the scheme. Specifically there is apparatus which runs along Easton Lane on either side of Junction 9 connecting through Junction 9 alongside the existing footpath
SGN – (Southern Gas Network)	Gas	SGN highlighted presence of underground services. Specifically there is a low pressure main crossing M3 on the south of side of Junction 9 within the scheme area.
Southern Water	Water	Presence of utilities within the vicinity of the scheme has been highlighted. There are mains running alongside the M3 and would be affected from the proposed works.
SSE - (Southern Electric Power Distribution)	Electricity	SSE has identified apparatus within the vicinity of proposed works.
Vodafone	Telecoms	Vodafone confirmed they have apparatus within the vicinity of proposed works on the north side of A33.

- 3.11.1 As of July 2016, CityFibre have not responded however CityFibre acquired KCOM Group in this region and therefore we believe it is unlikely that they have apparatus and which is why no response has been received.
- 3.11.2 The following utility companies have responded to indicate that their apparatus will not be affected by the scheme proposals:
- C.A. Telecom UK – [Colt Technology Services]
 - Cofely
 - Energetics
 - Fulcrum Pipelines
 - Instalcom
 - KCOM Group
 - Linesearch before you dig
 - McNicholas - [KPN International]
 - McNicholas - [TATA Communications]
 - Network Rail
 - Plancast
 - Redcentric
 - Sky Telecommunications Services LTD
 - Trafficmaster
 - Verizon
 - Virgin Media

3.12 ENVIRONMENT

3.12.1 This chapter sets out the existing environmental information. The outcome of environmental scoping and assessment work carried out to date is reported in Chapter 9. More detail on the existing environmental information is presented in the [Environmental Study Report](#).

NOISE

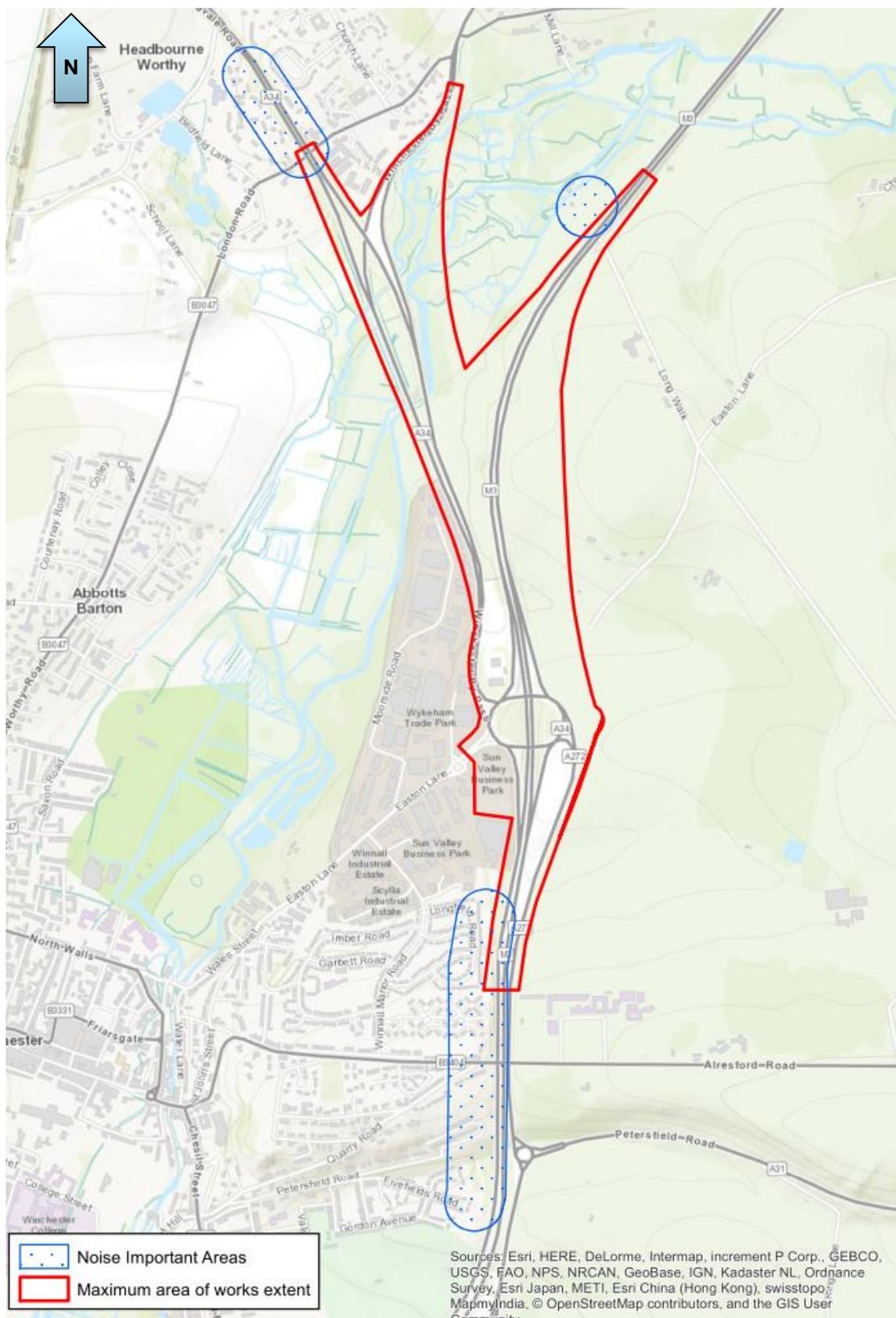
3.12.2 Residential, school and commercial receptors are described in Section 3.6.10.

3.12.3 The scheme is located within three NIA¹s, as designated by DEFRA². The first NIA, covers the M3 south of Junction 9 extending to a point south of Petersfield Road and extends westwards to include the residential areas of east Winchester. The second covers the M3 at the scheme's north-east extent, north of Long Walk. The third NIA covers the north-western extent of the scheme. These NIAs are illustrated in Figure 3-8.

¹ Noise Important Area

² DEFRA – Department for Environment, Food and Rural Affairs

Figure 3-8 Noise Important Areas



- 3.12.4 The scheme and surrounds is dominated by road traffic noise, predominantly from the M3, but to a lesser extent from the A34, A272 and the A31.

LOCAL AIR QUALITY

- 3.12.5 The area around Winchester, the scheme extent and the study area is located within a DEFRA zone of non-compliance with EU limit values for annual mean NO₂ (40µg/m³) and compliance with all other limit values (South East Zone UK0031, DEFRA, 2014). The evidence base regarding compliance is provided by UK statutory monitoring networks, and supplemented by Pollution Climate Mapping (PCM) modelling. PCM¹ modelling data for 2014 indicate roadside annual mean NO₂ concentrations for the M3 to the north and south of Junction 9 in the range 40-50µg/m³ (exceeding the EU limit value).
- 3.12.6 The nearest WCC² monitoring site to the M3 is at the roadside on the B3404 Alresford Road. This is approximately 60m to the west of the M3 central reserve just before the Alresford Road Spitfire Bridge. The annual mean NO₂ concentration in 2014 at this site was 39.7µg/m³, slightly below the EU limit value.
- 3.12.7 Although the PCM data indicate non-compliance with the EU limit value along the M3 the scheme itself does not fall within an AQMA³.
- 3.12.8 The nearest AQMA is approximately 630m west in Winchester City Centre. This has been declared by WCC due to exceedances of the objective for annual mean NO₂ as determined by monitoring. WCC is currently considering the declaration of an additional AQMA within the city centre due to likely exceedances of the objective for 1-hour mean NO₂. There are no PCM model road links within the AQMA.
- 3.12.9 Residential, school and commercial receptors are all air quality sensitive receptors, and are described in Section 3.6.10. The River Itchen SSSI and SAC⁴ includes ecological features that are sensitive to ambient annual mean oxides of nitrogen and nitrogen deposition, the level of deposition is influenced by emissions from road traffic.

GREENHOUSE GASES

- 3.12.10 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 impact of a road scheme on climate change, the gas of interest is carbon dioxide.
- 3.12.11 Consideration will be given to construction and operational approaches to minimise the effect of greenhouse gases, at PCF⁵ Stage 3.

¹ PCM - Pollution Climate Mapping

² WCC - Winchester City Council

³ AQMA - Air Quality Management Area. An AQMA is declared by the local authority where there is non-compliance with UK air quality objectives (unlike EU limit values, compliance is not mandatory).

⁴ SAC - Special Areas of Conservation

⁵ PCF – Project Control Framework

LANDSCAPE AND TOWNSCAPE

- 3.12.12 Approximately 50% of the scheme is situated within the SDNP principally around its northern and eastern sections. The SDNP¹ also extends outside of the scheme to the north, east, south and partially the west. Further details on the land use of the scheme are included in the 'Land use, property and industry' in Section 3.6.
- 3.12.13 The scheme is located within the South Downs Integrated Landscape Assessment Character Area A: Open Downs, and Sub-Area A5: East Winchester Open Downs; and Character Area E: Open Downs and Sub-Area E4: Itchen Valley. The scheme falls partly within Character Area 3c: Itchen Valley, of the Hampshire County Council Integrated Landscape Character Assessment. There are no Areas of Outstanding Natural Beauty within 1km of the scheme.
- 3.12.14 There are numerous ditches, water bodies, streams and rivers in the area. The largest watercourse is the River Itchen and its tributaries, which run through the northern section of the scheme across a wide, flat floodplain. The surrounding landscape contains numerous copses and blocks of trees, allowing infrastructure and built form to be surprisingly well screened in the landscape.
- 3.12.15 There is a significant viewpoint at St Catherine's Hill approximately 4km south of the scheme. This is outside the zone of visual influence and the intervening landform and vegetation screen the works from this viewpoint.

HERITAGE AND HISTORIC RESOURCES

- 3.12.16 There are no Listed Buildings or Scheduled Monuments within the scheme area.
- 3.12.17 Numerous Listed Buildings are within 1km of the scheme area, primarily to the north in the Kings Worthy area. The closest of these is the Church of Saint Mary (Grade II*) approximately 60m from the northern extent. There are four Scheduled Monuments within 1km of the scheme area. The closest Scheduled Monument is approximately 400m south east at Round Barrow Cemetery on Magdalen Hill Down. There is a very high potential for previously unrecorded below ground heritage assets throughout the scheme area where the ground has not been previously disturbed by the development of the existing road network.
- 3.12.18 There are no registered Parks and Gardens or World Heritage Sites within 1km of the scheme.

¹ SDNP – South Downs National Park

BIODIVERSITY

- 3.12.19 The River Itchen SAC¹ and SSSI² are present within the northern part of the scheme, as well as to the north east and south west. Mottisfont Bats SAC is located approximately 16 km to the west of the scheme, and is designated primarily for bats. Although there is habitat near to the scheme extent which provides suitable foraging habitat for Barbastelle bats, (this species is recorded throughout Hampshire), it is unlikely to be used as a core foraging area by the Mottisfont colony because this species tends to primarily forage within approximately 6km of their roost sites.
- 3.12.20 The Initial AIES³ concluded that further detail regarding scheme designs is required to determine whether the scheme is likely to result in significant effects upon the River Itchen SAC⁴ and SSSI.
- 3.12.21 The non-statutory designated sites that are present within 2km of the maximum scheme extent consist of seven SINC⁵ one RVEI⁶, and one site that is both a SINC and RVEI. Two of these sites lie in very close proximity to the Scheme extent and are called Easton Down SINC and Easton Lane RVEI as illustrated in Figure 3-9. All other non-statutory sites lie over 250m from the Scheme area.

¹ SAC - Special Areas of Conservation
² SSSI - Sites of Specific Scientific Interest
³ AIES - Assessment of Implications upon European Sites
⁴ SAC - Special Areas of Conservation
⁵ SINC – Sites of Importance for Nature Conservation
⁶ RVEI – Road Verge of Ecological Importance

Figure 3-9 Non-statutory designated sites



- 3.12.22 Habitats within the scheme area consist of calcareous grassland; floodplain grassland; deciduous woodland, lowland fen, lowland meadow and reedbed.
- 3.12.23 There are no Special Protection Areas; Ancient Woodlands, Local Nature Reserves or National Nature Reserves within 1 km of the scheme.

WATER ENVIRONMENT

- 3.12.24 The River Itchen is assessed as having 'Good' ecological and chemical status and the Nun's Walk Stream is assessed as having 'Moderate' ecological status and 'Good' chemical status.
- 3.12.25 Further details of the water environment are included in the Drainage Section 3.8.

PHYSICAL FITNESS, PEOPLE AND COMMUNITIES

- 3.12.26 There are a number of opportunities for physical exercise in the vicinity of the scheme which includes several PROW¹ which the scheme crosses. A bridleway (Sustrans Route 23) is present heading east from Junction 9. The long distance paths of the St Swithun's Way and the Itchen Way cross the scheme near the northern end. The South Downs Way (a National Trail) crosses over the M3 approximately 700m south of the scheme.
- 3.12.27 Winchester is located immediately west of the scheme, and Kings Worthy is located immediately to the north. In general, the views from the road for motorised travellers on the surrounding road network provide a positive experience. Although the level of driver stress currently experienced is considered to be high due to congestion on and around the M3 Junction 9 as detailed in Journey Time Reliability Section 3.4.
- 3.12.28 The majority of the scheme is classified as ALC² Grade 3 (good to moderate) with non-agricultural land and ALC Grade 4 (poor) to the west and south of the scheme area.
- 3.12.29 Further details on the People and Communities existing conditions are presented in the [Environmental Study Report](#).

3.13 ACCESSIBILITY

OPTION VALUES

- 3.13.1 The immediate local area has limited options in terms of transport, with private car use dominant. Public transport options are limited to local bus services and long distance coaches.
- 3.13.2 The proposed scheme is likely to create conditions which would influence the travel options available to the public. Journey times are likely to be significantly improved, creating conditions on the A34 and M3 with less congestion and therefore opening up car / bus / coach travel as an option to people who currently perceive this as a barrier to journey making. The improved journey times will also improve reliability for both local and national public transport services making these services a more realistic travel option for all users.
- 3.13.3 Currently NMU facilities at the junction are limited and substandard. Improvements to these facilities as part of the proposed scheme will also mean journeys on foot and bicycle are options for those with local origins and destinations.

¹ PROW - Public Rights of Way

² ALC - Agricultural Land Classification

SEVERANCE

- 3.13.4 The M3 in the Winchester area has been in existence for over 25 years and as such the land uses in the immediate vicinity have developed in the context of an existing physical barrier. North of Junction 9 a number of minor roads cross on bridges above or underpasses below the M3.
- 3.13.5 The initial severance effects of the M3 in this location will have been adapted over time by the local population through changed travel habits, and through development patterns which take account of the existence of the M3. The provision of an enhanced link between the M3 and the A34 at this location is not expected to detrimentally affect the levels of physical severance created by the road. Indeed, the proposed improvements will reduce severance for NMUs.

ACCESS TO TRANSPORT SYSTEM

- 3.13.6 The local area currently has good access to the local and national strategic road network, although congestion is a constraint at busy times. Access to public transport via the local and national rail network is not available in the immediate locality, although the M3 and A34 and its junctions can be used for access to national rail services from Winchester and further afield.
- 3.13.7 There are inter-regional National Express coach services that travel both along the mainline through Junction 9, and join and leave the M3 at the junction to access Winchester City Centre. One daily service remains on the mainline in each direction, while three daily services use the roundabout to travel between the mainline and Broadway Guildhall in the centre.
- 3.13.8 The proposed scheme is unlikely to create conditions which would influence access to the public transport system.

3.14 INTEGRATION

TRANSPORT INTERCHANGE

- 3.14.1 There are no significant public transport interchanges in close proximity to the scheme location, although some journeys to access the national rail network will make use of the M3 Junction 9. The existing public transport networks mainly run into Winchester from the edge of the city instead of travelling from the A34 or M3 as these are performing a different role in terms of travel movements, limiting potential for modal shift.

LAND USE POLICY

- 3.14.2 The intention of the scheme is to improve vehicle movements from the M3 to the A34 to reduce delays on a currently constrained junction as a result of capacity constraints and subsequent congestion experienced at the M3 Junction 9.
- 3.14.3 The Winchester Local Plan part 1 covering the period from 2011 to 2031 was adopted in March 2013. The plan aims to provide 4,000 new homes in the City of Winchester as well as employment and retail land uses. Development is focused north of the city centre in Barton Farm where 2,000 of the 4,000 homes will be built with the potential that a number of trips from the development will use the M3 Junction 9.

OTHER GOVERNMENT POLICIES

NATIONAL POLICIES

- 3.14.4 There are several national policies and strategies which link to the rationale and context for promoting the M3 Junction 9 Improvement scheme. These include:

NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

- 3.14.5 The Government's National Planning Policy Framework (NPPF, 2012) emphasises the importance of rebalancing the transport system in favour of sustainable transport modes, while encouraging local authorities to plan proactively for the transport infrastructure necessary to support the growth of major generators of travel demand.
- 3.14.6 The scheme is fundamental to relieving pressure on Junction 9 of the M3. The scheme would contribute towards delivering a resilient transport network that is fit for supporting the planned commercial development areas that are directly or indirectly served by the M3 Junction 9.

LOCAL TRANSPORT WHITE PAPER: 'CREATING GROWTH, CUTTING CARBON: MAKING SUSTAINABLE LOCAL TRANSPORT HAPPEN' (JANUARY 2011)

- 3.14.7 The Government's priorities set out in this document are to:
- Help create growth in the economy
 - Tackle climate change by cutting carbon emissions.
- 3.14.8 Consistent with the priorities set out in this document, the proposed scheme aims to unlock the bottleneck experienced at M3 Junction 9 and enhance overall capacity.

CLIMATE CHANGE ACT (2008)

- 3.14.9 The Climate Change Act (2008) established a long-term framework to reduce the UK's greenhouse gas emissions by at least 80%, compared to the 1990 baseline, by 2050. In accordance with the 2011 Carbon Plan, the Government has enabled funds, through incentives such as the Local Sustainable Transport Fund, to support the development of sustainable infrastructure in order to reduce carbon emissions and promote economic growth.
- 3.14.10 The scheme aims to facilitate the efficient movement of traffic at the junction at a speed that is closer to the optimum speed for fuel economy and could therefore potentially reduce greenhouse gas emissions.

LOCAL AND REGIONAL POLICIES

- 3.14.11 The key local spatial planning and transport policy documents that guide the decisions on transport infrastructure investment priorities are:
- Hampshire Local Plan (2011-2031)
 - Policy Core Strategy 18
 - Transport for South Hampshire (TfSH) Transport Delivery Plan (2012-2026)
 - South Hampshire Growth Point Status.

HAMPSHIRE LOCAL TRANSPORT PLAN (2011-2031) (LTP 3)

- 3.14.12 Hampshire's LTP covers the period 2011-2031 and sets out the County Council's transport strategy to help the Council to make progress on its corporate priorities of:
- 3.14.13 *"Developing and supporting stronger safer communities, maximising well-being and enhancing quality of place, and on its Sustainable Community Strategy. It also helps to realise the Council's vision of "safe, efficient and reliable ways to get around a prospering and sustainable Hampshire"*
- 3.14.14 The Plan identifies three main priorities:

- Priority 1: To support economic growth by ensuring the safety, soundness and efficiency of the transport network in Hampshire.
- Priority 2: Provide a safe, well-maintained, and more resilient road network in Hampshire as the basic transport infrastructure of the county on which all forms of transport directly or indirectly depend, and the key to continued casualty reduction.
- Priority 3: Manage traffic to maximise the efficiency of existing network capacity, improving journey time reliability and reducing emissions, thereby supporting the efficient and sustainable movement of people and goods.

3.14.15 All three priorities outlined above demonstrate that the scheme objectives align very well with the key objectives set out within Hampshire County Council's LTP3.

3.14.16 The LTP separately identifies that improvements are necessary to reduce congestion at the grade separated, partial signal controlled roundabout arrangement which currently forms Junction 9 of the M3.

TRANSPORT FOR SOUTH HAMPSHIRE (TFSH) TRANSPORT DELIVERY PLAN (TDP) (2012-2026)

3.14.17 The TDP contains 5 key objectives, 3 of which are met by the scheme and wider schemes, which will:

- Enable higher levels of economic growth by improving local employment opportunities; improve sustainable access linking people to jobs and key facilities.
- Reduce emissions by reducing the need to travel by car.
- Reduce unemployment in areas of high deprivation through improved sustainable access to employment centres.

3.14.18 The TDP emphasises that there is a need for transport intervention to support sustainable economic growth and states that in the absence of transport intervention, transport will act as a constraint on sustainable economic growth.

3.14.19 Overall, there is a high degree of fit between this scheme and the TDP, considering that one of the key objectives of the scheme is to promote economic growth, by removing the barriers to travel, by way of reduced congestion and improved journey times.

SOUTH-HAMPSHIRE GROWTH POINT

3.14.20 The Sub-Region of South Hampshire, through the Partnership for Urban South Hampshire (PUSH), was selected as a New Growth Point Area in October 2006. Key growth elements include 55,600 dwellings by 2026 and 15,500 additional jobs by 2020.

3.14.21 Achieving these economic growth ambitions will depend on a range of public and private funding programmes. From the public perspective, the Government is committed to working with local partners to achieve sustainable growth and maximise the return on investment and to help overcome obstacles to delivery. Upgrading the junction could help this part of Hampshire to overcome one of these obstacles through improved journey time reliability and reduced congestion.

3.15 MAINTENANCE AND REPAIR STATEMENT

- 3.15.1 The MRSS¹ is a PCF² Stage 2 product that outlines key strategic design assumptions and decisions taken during the design and construction of the scheme. These relate to how the maintenance of assets within the scheme limits can be carried out efficiently during its lifetime, and how risks to road workers are kept as low as reasonably practicable. It should detail the likely impact on network availability, identify any specific resource requirements and highlight any safety issues for road users and operatives.
- 3.15.2 The aim is to provide a high level strategic document demonstrating that a design for maintenance approach has been taken during the design and construction of roads, roadside assets, and associated technology. This is to enable maintenance to be carried out safely and cost effectively whilst ensuring that any future maintenance interventions which expose road workers to risk are minimised.
- 3.15.3 The MRSS is not intended to provide a detailed statement describing how the maintenance is to be undertaken. It is the responsibility of the maintenance service provider to identify and implement appropriate methods of work for the required maintenance activities.

3.16 EXISTING MAINTENANCE ACCESS

- 3.16.1 The Area 3 ASC³ Contractor has responsibility for routine inspection, maintenance and operation for the M3, Junction 9 and the A34.
- 3.16.2 The operation of any required temporary traffic management is influenced by:
- Working Window - The high volume of vehicles per day per carriageway means that TTM⁴ can usually only be implemented during the night time off peak traffic periods when the traffic demand can be accommodated within fewer lanes than normally required or in exceptional circumstances the A34 or M3 can be closed completely. Time period of operations is usually 21:00 to 05:00 hours dependent upon the actual traffic volume experienced. Implementation of lane closures during other times would result in significant congestion with potentially high costs.
 - Junction arrangements – Any TTM implemented within the extent of the Junction 9 roundabout and its close proximity will have extensive impacts on the operation of the on and off slips linking the M3 and A34.
 - Potential closure of slip roads necessitating the use of diversion routes (tactical diversion routes) as may be deemed necessary by the Area 3 ASC Contractor.
 - Typical access arrangements to undertake maintenance activities include:
 - Repair and replacement of steel VRS⁵ – On the A33, A34 and M3 carriageways, the maintenance of steel VRS in the central reserve normally requires the closure of outer lanes both sides of the central reserve
 - M3 Junction 9 bridge – Access to the underside of these structures is by application of TTM on the M3.

¹ MRSS - Maintenance and Repair Strategy Statement

² PCF – Project Control Framework

³ ASC – Asset Support Contract

⁴ TTM - Temporary Traffic Management

⁵ VRS - Vehicle Restraint System

- Verge and pavement maintenance - Access to verges for such operations as detailed inspections, routine maintenance of drainage, existing technology, signs, grass cutting and litter picking will all require lane closures.

3.17 OTHER RELEVANT FACTORS

STREET LIGHTING

- 3.17.1 The M3 and A34 are currently unlit. The only street lighting within the limit of works is Hampshire County Council owned in the central reserve of Easton Lane to the west of Junction 9.

TECHNOLOGY

- 3.17.2 The technology assets at the M3 Junction 9, include CCTVs¹, variable message signs to provide information to customers, traffic signals and emergency telephones. These will be investigated further during PCF Stage 3.
- 3.17.3 There is a committed scheme to implement Smart Motorway technology on the M3 between Junctions 2-4a, with plans to provide a similar scheme between Junctions 9-14 to enhance the strategic road network between Winchester and Southampton by offering features such as:
- Variable speed limits
 - Speed enforcement
 - Permanent hard shoulder usage as a running lane
 - Emergency refuge areas with emergency telephones
 - Lane specific speed signals at certain locations.
- 3.17.4 The Motorway Incident Detection and Automated Signalling system is currently operational on the M3 between Junctions 3-4a and 9-14, which is used to detect traffic incidents using inductive loops and automatically set appropriate messages via VMS² technology (including advisory maximum speed limits).
- 3.17.5 Emergency telephones are available on the M3 carriageway, between two bridges of the junction 9 gyratory (on the northbound and southbound carriageways) and also approximately half a mile either side of the junction (also on the northbound and southbound carriageways).

EXPRESSWAY

- 3.17.6 A technical note was issued in March 2016 which documented the high level core requirements which shall be present for a route to be designated an "Expressway". This technical note is due to be formalised as an Interim Advice Note during 2016.
- 3.17.7 This technical note identified the A34 as part of the Highways England Expressway network and would require the addition of VMS's, emergency telephones and CCTV's to the A34 with associated emergency laybys, signing and roadmarkings. These will be investigated further during PCF³ Stage 3.

¹ CCTV – Closed Circuit Television

² VMS – Variable Message Signs

³ PCF – Project Control Framework

4 PLANNING FACTORS

4.1.1 This section considers a number planning factors in terms of local, strategic and national plans under contexts summarised by the following:

- Housing and Employment
- Transport and Connectivity
- Transport Technology
- Programming
- Environmental
- Statutory Process
- Interface with Third Parties

4.2 HOUSING AND EMPLOYMENT

4.2.1 As described in section 3.14.3 of this report, the Winchester Local Plan part 1 covering the period from 2011 to 2031 aims to provide 4,000 dwellings in the City of Winchester as well as employment.

4.3 TRANSPORT AND CONNECTIVITY

4.3.1 Highways England is considering other improvement schemes on the Strategic Road Network. Schemes in the region that may directly impact the M3 Junction 9 Improvement include the M3 Smart Motorway programme, M27 Smart Motorway Programme, M27 Southampton Junctions and M271 Redbridge Roundabout.

4.3.2 As detailed in section 1.2 of this report, substantial development of the Southampton container port will increase HGV¹ traffic on the A34 and M3.

4.4 TRANSPORT TECHNOLOGY

4.4.1 While 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.

4.5 PROGRAMMING

4.5.1 There are three key constraints that will need to be considered as part of the programming of the scheme:

- The construction phasing and resourcing in Highways England's supply chain, as current delivery is expected to be at the same time as a large number of national schemes.
- Highways England resource availability especially in respect of timing of Public Consultation exercises

¹ HGV – Heavy Goods Vehicle

- Specifically, considerable coordination will be required between this and the Smart Motorway scheme between M3 Junctions 9 and 14 as well as general maintenance work.

4.6 ENVIRONMENTAL

4.6.1 There are a number of environmental constraints and designations associated with the scheme that will be given further consideration in PCF Stage 2. These include:

- The River Itchen (SSSI¹, SAC², Flood Zone 3)
- Three Noise Important Areas
- South Downs National Park
- Groundwater Source Protection Zone 1 (inner zone)
- Historic Landfills within the scheme area
- Agricultural Land Class Grade 3 and 4
- Potentially buried heritage assets and designated sites within 1km of the scheme
- PROW³ that cross the scheme

4.6.2 Further details on these designations and other environmental information is provided in chapter 3.

4.7 STATUTORY PROCESS

4.7.1 For programming purposes it has been assumed that the scheme will require environmental assessments and a Development Consent Order.

4.8 INTERFACE WITH THIRD PARTIES - UTILITIES

4.8.1 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.

¹ SSSI - Sites of Specific Scientific Interest

² SAC - Special Areas of Conservation

³ PROW – Public Right of Way

5 DESCRIPTION OF ROUTE OPTIONS

5.1 OPTION HISTORY

- 5.1.1 Hampshire County Council originally commissioned Atkins to prepare an 'M3 Junction 9 Feasibility Study – Initial Options Summary Report' (November 2013) to examine the strategic case and provide an estimation of the anticipated performance of potential improvement schemes. The report proposed and assessed nine options and recommended that Package 3 (Direct free-flow links from M3 to A34 and Junction 9 remodelled) is most likely to ease congestion while minimising land-take.
- 5.1.2 Area 3's ASC¹ Contractor reviewed Package 3 in more detail and further developed this package into three options as below:
- Option 1 – 70 mph (120kph) speed limit (A34 free-flow link below M3, but could also be considered over M3);
 - Option 2 – 50 mph (80kph) speed limit (A34 free-flow link below M3, but could also be considered over M3);
 - Option 3 – 40 mph (65kph) speed limit (A34 free-flow link below M3, but could also be considered over M3);
- 5.1.3 In June 2015 WSP | Parsons Brinckerhoff were commissioned by Highways England to complete PCF² Stage 0, Strategy, Shaping and Prioritisation. The Stage 0 report identified journey time savings through the coarse journey time analysis undertaken. In particular, Option 1 in the report, which proposes free flow links with 120 kph design speed (A34 free-flow link below or above M3), has the potential to deliver significant journey time benefits, while relieving congestion at the junction itself. Following discussions with Highways England during the Stage 0 process, it was agreed that Option 3 would not be considered further during Stage 0 as both the 70mph and 50 mph speed limit options are more likely to maintain the current speed profile on existing links.
- 5.1.4 During Stage 0, WSP | Parsons Brinckerhoff further developed Option 1 into a further alternative, Option 4, which makes more use of existing infrastructure while delivering broadly similar journey time benefits.

5.2 PCF STAGE 1 OPTIONS

- 5.2.1 The M3 Junction 9 Improvement scheme has now progressed into PCF Stage 1, Option Identification. During the early part of PCF Stage 1, five options were then shortlisted for further consideration. Drawings of these options are shown in Appendix D. These options are:
- Option 11 - A development of Atkins Package 3 and Area 3's ASC Contractor Option 1 to include south facing Junction 9 slip roads; retain Highways England depot; and remove sweeping A33 southbound link to retain existing merge. This option provides free-flow links between A34 and M3 with the A34 southbound link passing under the M3 with a 120kph design speed. The A34 Northbound Link also has a 120kph design speed. Junction 9 would be rebuilt with a dumbbell roundabout layout

¹ ASC – Asset Support Contract

² PCF – Project Control Framework

- Option 14 - A variant of WSP | Parsons Brinckerhoff Option 4 (as per PCF Stage 0 report), providing free-flow links between A34 and M3 with the A34 southbound link passing under the M3 with a 100kph design speed with a three-step relaxation on horizontal geometry. The A34 Northbound Link has a 120kph design speed. Junction 9 would be rebuilt with a dumbbell roundabout layout
- Option 16A - A variant of WSP | Parsons Brinckerhoff Option 4 (as per PCF¹ Stage 0 report) providing incremental delivery of Option 14. This provides a free-flow for the A34 southbound with a 100kph design speed with a three-step relaxation on horizontal geometry. The northbound A34 would still use the existing A34 through the Junction 9 roundabout. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS².
- Option 16B - A variant of WSP | Parsons Brinckerhoff Option 4 (as per PCF Stage 0 report) providing incremental delivery of Option 14. This provides a free-flow for the A34 northbound, which has a 120kph design speed. The southbound A34 would still use the existing A34 through the Junction 9 roundabout. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS¹.
- Option 18 - A variant of Atkins Package 7 provides a through-about at M3 Junction 9 (do-minimum design) with a 70kph design speed. This option is developed, to consider a reduced cost option of converting the current Junction 9 roundabout to a through-about. This option is considered to facilitate potential scheme capital costs within the affordable budgets of RIS¹.

5.2.2 Assessment of economics for Option 14 and 16A are based on an 85kph design speed for the A34 Southbound with a two step relaxation. Subsequent to the economics work being undertaken the design speed was adjusted to 100kph with a three step relaxation following discussion with Highways England PTS³. The economics will be adjusted during stage 2 to reflect the change in design speed

5.3 REJECTED OPTIONS

5.3.1 The following options were considered but ultimately rejected for further consideration due to land take, visual impact, cost issues and environmental issues. Drawings of these options are shown in Appendix E:

- Option 12 – This option provided free-flow links between A34 and M3 with the A34 Southbound Link passing under the M3 with a 120kph design speed with a two-step relaxation on horizontal geometry. The A34 Northbound Link has a 120kph design speed.
- Option 13 – This option provided free-flow links between A34 and M3 with the A34 Southbound Link passing over the M3 with a 120kph design speed. The A34 Northbound Link also has a 120kph design speed.
- Option 15 – This option provided free-flow links between A34 and M3 with the A34 southbound link passing over the M3 with an 85kph design speed with a two-step relaxation on horizontal geometry. The A34 Northbound Link has a 120kph design speed.
- Option 17 – This option provided free-flowing links with a 75m loop for the A34 Southbound Link under the M3. The A34 Northbound Link also has a 120kph design speed.

¹ PCF – Project Control Framework

² RIS – Road Investment Strategy

³ PTS – Professional Technical Services

5.4 ADDITIONAL IMPROVEMENTS IN THIS STUDY

- 5.4.1 The scheme has also considered possible improvements to the A33/A34 northbound diverge for all options as traffic can back up from this diverge to the M3 Junction 9 circulatory roundabout which in turn causes further congestion to the M3 mainline.

5.5 MAINTENANCE DEPOT STRATEGY

- 5.5.1 The five options have been developed to avoid the Highways England maintenance depot located immediately north-west of the junction. This approach:

- avoids the environmental impacts arising from the potential need to relocate this facility;
- maintains the operational regimes currently in place for the M3 and A34; and
- avoids the increased costs associated with the potential demolition of this existing facility as well as development and provision of a replacement facility elsewhere.

- 5.5.2 Access to the depot will be maintained from Junction 9 for all options, however some modifications to the internal road layout of the depot may be required. Such modifications will be considered further during PCF¹ Stage 2 and Stage 3.

5.6 INTERFACE WITH OTHER SRN IMPROVEMENTS

- 5.6.1 The merge and diverge layout types for this scheme are dependent on the decision regarding the M3 south of Junction 9 to Junction 14. Independent of this scheme, options are being considered for a SMART motorway from Junction 9 to 14. The layout types are subject to change and this will be finalised once a decision on Junction 9 to 14 has been made, however it is considered that each of the potential M3 options can be accommodated within the Junction 9 scheme.

5.7 DEPARTURES FROM STANDARD

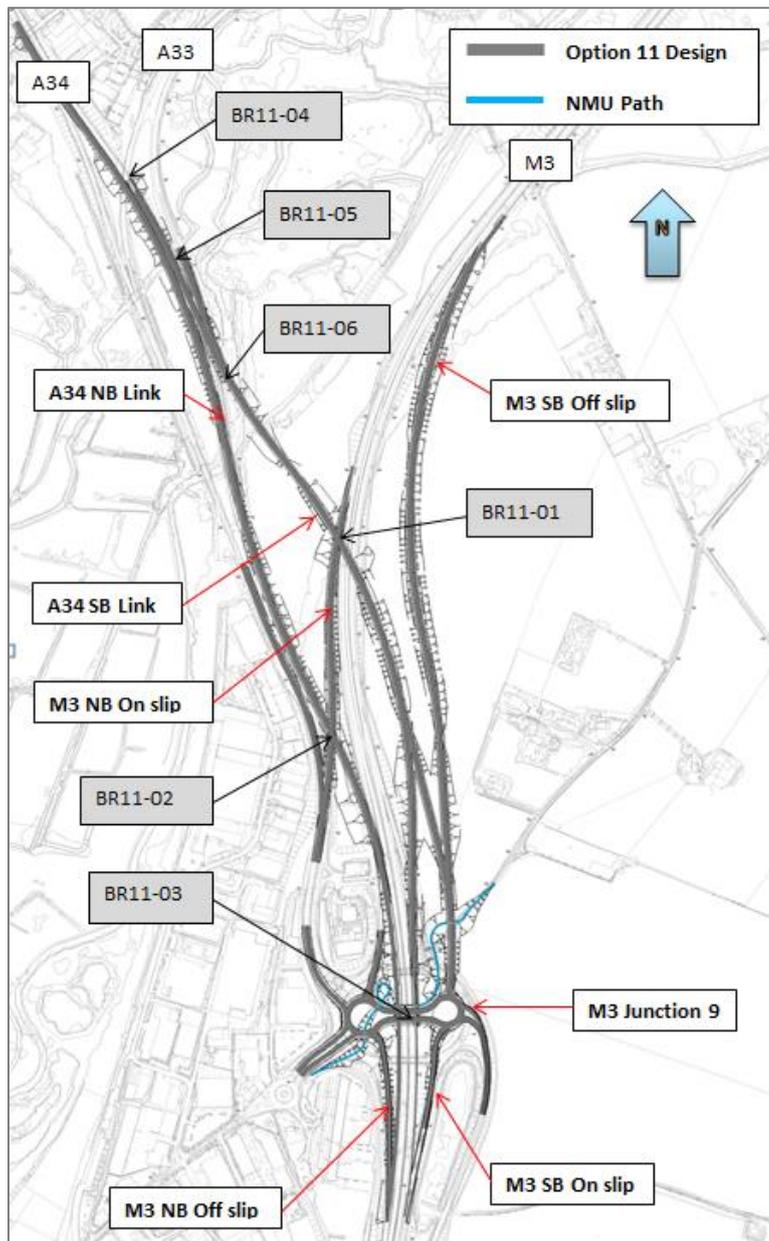
- 5.7.1 Departures from Standard have been identified for all options and are detailed in the [Departures from Standard Checklist](#)

¹ PCF – Project Control Framework

5.8 OPTION 11

5.8.1 Option 11 is shown on drawing HE551511-WSP-HGN-M3J9PCF1-DR-D-50001 in Appendix D. The basic layout is shown in Figure 5-1 below.

Figure 5-1 Option 11 Layout



¹ NMU – Non-Motorised User

M3 TO A34 NORTHBOUND

- 5.8.2 As noted in section 5.6, if the SMART motorway scheme is implemented this would likely result in the M3 south of Junction 9 being converted from dual 3 lane motorway plus hard shoulder into a dual 4 lane all running motorway. South of Junction 9, in the northbound direction, the two nearside lanes will be signed and line marked for the A34 and the two offside lanes for the M3. Access to Junction 9 will be provided via a reconstructed northbound off slip with a TD22/06 Type A taper diverge. This slip road is currently proposed to be two lanes, potentially widening to three lanes on the approach to the new roundabout arrangement, subject to detailed traffic modelling.
- 5.8.3 The two proposed northbound A34 lanes will pass under Junction 9 alongside the two M3 lanes, after which they bifurcate with a TD22/06 Type E – 2 lane drop diverge from the M3 to form the new A34 northbound link with the remaining two offside lanes continuing north as the M3. The new A34 northbound link will utilise the existing A34 southbound River Itchen crossing and then tie in with the existing two lane A34 alignment after passing over the A33.

A34 SOUTHBOUND TO M3

- 5.8.4 In the southbound direction the A34 will be realigned to the east from the A33 merge onward and will require the realignment of the A33/A34 merge and a new bridge over the River Itchen. The alignment of the A34 southbound link in this area will impact the River Itchen flood plain and therefore require flood compensation measures to be implemented. The A34 will pass under the M3 in order to reduce the visual impact on the SDNP¹ and the surrounding area.
- 5.8.5 Beyond the M3 underpass a TD22/06 Type A diverge would lead to a slip road joining the revised Junction 9 roundabout junction. The two traffic lanes of the A34 southbound link road would proceed and join the M3 mainline southbound carriageway to the north of the revised Junction 9 layout via a TD22/06 Type G – 2 lane gain with ghost island merge. This then ties in to the proposed SMART motorway scheme just south of the realigned M3 southbound on slip.

M3 JUNCTION 9

- 5.8.6 Option 11 proposes the replacement of the M3 Junction 9 two bridge roundabout with a new single bridge dumbbell layout. This is required as the current Junction 9 bridges do not provide sufficient space for the increased number of lanes within the clear spans beneath. The new layout is designed so that it can be built off-line within the existing circulatory carriageway which will reduce traffic management impacts during construction compared with online replacement of the existing bridges. All existing roads connecting to the roundabout would require realignment to the new dumbbell layout.

SLIP ROADS

- 5.8.7 The existing M3 northbound on slip will be relocated to accommodate the new free-flowing A34 northbound link. The M3 northbound onslip will pass under the new A34 northbound link and over the new A34 southbound link before merging with the M3 approximately 500m downstream of the existing northbound on slip. The existing northbound A34 carriageway will be reused as a link from the Junction 9 roundabout to the A34 northbound and the A33 northbound, with a new northbound on slip to the M3 diverging from this link, 400m north of Junction 9.
- 5.8.8 The existing M3 southbound off slip will be removed and replaced with a new off slip located approximately 1km upstream. The new southbound M3 off slip will then merge with the new A34 to roundabout link to maintain its access to Junction 9.

¹ SDNP – South Downs National Park

BRIDGES

5.8.9 Option 11 has six new bridges as follows:

- BR11-01 – This bridge carries the M3 mainline and realigned M3 northbound merge over the new A34 southbound link. Construction would likely be undertaken using a “top down” methodology which would require lane diversions under traffic management of the M3 carriageways north of the existing M3 Junction 9. The abutments would likely be formed of a contiguous reinforced concrete pile wall, while the deck may be of in-situ reinforced concrete slab. A box jack would be a possible alternative method of construction for consideration within the design development.
- BR11-02 – This bridge carries the new A34 northbound link over the realigned M3 northbound merge. The structural type would likely to be an integral bridge structure comprising of precast pre-stressed concrete beams with in-situ concrete slab.
- BR11-03 – This bridge carries the revised M3 Junction 9 gyratory over the M3 mainline carriageway and would likely be a 2 span precast, pre-stressed concrete beam deck with in-situ concrete slab. The foundation would comprise a leaf pier in the central reserve, and abutments at either side of the M3. Construction may be done by lifting of the beams during night-time closure of the M3 with traffic diverted around the junction via the on and off slip roads in each direction.
- BR11-04 – This bridge carries the new A34 northbound link over the A33 northbound carriageway and is likely to be a 3 span precast, pre-stressed concrete beam deck with in-situ concrete slab. It may be possible to join the new bridge deck to the existing Kings Worthy Flyover bridge deck. Architecturally, it would be desirable to match the existing bridge.
- BR11-05 – This bridge carries the new A34 northbound link over the northern channel of the River Itchen. The bridge would preferably be a single clear span over the river with abutments set back from the river. The bridge deck would likely comprise precast, pre-stressed concrete deck beams with an in-situ concrete slab.
- BR11-06 - This bridge carries the new A34 southbound link over the southern channels of the River Itchen and would likely be three spans of steel beams composite with a concrete slab, each approx. 55m long. The intermediate piers would be placed on the river islands and therefore work would be required in the River Itchen. Should a single span option be preferred due to ecological constraints, then the structure would need to be a cable-stayed bridge in order to span the approximate 100m length.

NON MOTORISED USERS

5.8.10 Due to the removal of the existing Junction 9 bridges and the associated Non-Motorised User Path, a new NMU¹ Path would be reprovided to current cycle standards which would close the gap in the existing National Cycle Network Route 23. This path would continue to be available for other NMUs as well and has been designed to accommodate disabled users. On the western side of Junction 9, the NMU path would cross from Easton Lane under the western dumbbell roundabout via subways, before looping up to cross over the M3 alongside the northern side of the Junction 9 carriageway. On the eastern side of the M3 the path descends to pass under the M3 southbound off slip via a subway following which it ties into the existing Easton Lane NMU path on the eastern side of Junction 9. During stage 2 further consultation on the design of the NMU route will take place with relevant stakeholders to ensure the route is suitable for all likely user groups.

¹ NMU – Non-Motorised User

ENVIRONMENTAL EFFECTS, MITIGATION AND ENHANCEMENT MEASURES

5.8.11 The potential environmental effects of this option are considered in Chapter 12. Mitigation and enhancement measures will include the following:

- A Construction Environmental Management Plan
- Minimising congestion through design with potential to reduce air quality effects
- Minimising the spatial extent over which impacts are likely to occur within the designated sites
- High quality design to avoid adverse effects on heritage assets
- Advance planting and preservation of existing planting to reduce visual and landscape effects
- Sensitive drainage strategy that minimises effects upon local hydrological processes fundamental to the River Itchen
- Appropriate landscaping and re-planting to benefit species known to be present in the area
- Where possible ecological enhancements such as the creation of lowland calcareous grassland and lowland mixed deciduous woodland
- Minimising the export and import of fill materials
- Ensuring the route avoids sensitive receptors, keeping the route low where possible to minimise noise effects and where appropriate using low road noise surfaces and environmental barriers to reduce noise effects
- Retaining or improving the existing public rights of way
- Minimising the amount of best and versatile agricultural land that will be acquired for the scheme

SITE COMPOUNDS

- 5.8.12 For land cost purposes there is currently an allowance made for a construction site compound to be located in land to the east of Junction 9 and the A272 Spitfire Link as well as a secondary compound in the land between the M3 and the A272 Spitfire Link. These locations will be considered further during PCF¹ Stage 2 and Stage 3, as they are located within the SDNP².

SERVICE DIVERSIONS

- 5.8.13 Following the NRSWA³ C2 Enquiry the following services have been identified as being impacted by the proposed design:

Table 5-1: Utilities affected by Option 11

Location	Service	Length of diversion(m)	Comments
M3 SB OFF SLIP	GeneSYS (GE)	272	Permanent Diversion
M3	GeneSYS (GE)	365	Permanent Diversion
M3	GeneSYS (GE)	170	Temporary Diversion during construction
M3	GeneSYS (GE)	317	Permanent Diversion
A34 NB LINK	GeneSYS (GE)	367	Permanent Diversion
A34 SB LINK	GeneSYS (GE)	539	Permanent Diversion
M3 SB ON SLIP	GeneSYS (GE)	293	Permanent Diversion
M3 NB OFF SLIP	GeneSYS (GE)	12	Permanent Diversion, Sleeved
M3 NB ON SLIP	Southern Gas Networks (SGN LP)	17	Permanent Diversion, Sleeved
A34 NB LINK	Southern Gas Networks (SGN LP)	14	Permanent Diversion, Sleeved
A34 SB LINK	Southern Gas Networks (SGN LP)	7	Permanent Diversion, Sleeved
JUNCTION 9 ROUNDABOUT	BT Openreach Underground	429	Permanent Diversion
A34 SB LINK	Scottish and Southern Electric Low Voltage (SSE LV)	355	Permanent Diversion, Sleeved
A34 SB LINK	Scottish and Southern Electric High Voltage	61	Permanent Diversion, Sleeved

¹ PCF – Project Control Framework

² SDNP – South Downs National Park

³ NRSWA – New Roads and Streetworks Act

Location	Service	Length of diversion(m)	Comments
	(SSE HV)		
A34 NB LINK	Scottish and Southern Electric High Voltage (SSE HV)	12	Permanent Diversion, Sleeved
M3 NB ON SLIP	Scottish and Southern Electric High Voltage (SSE HV)	16	Permanent Diversion, Sleeved
M3	Southern Water (SW)	565	Permanent Diversion
HIGHWAYS ENGLAND DEPOT ACCESS ROAD	Southern Water (SW)	21	Permanent Diversion, Sleeved
M3 NB ON SLIP	Southern Water (SW)	15	Permanent Diversion, Sleeved

POTENTIAL COST SAVINGS

5.8.14

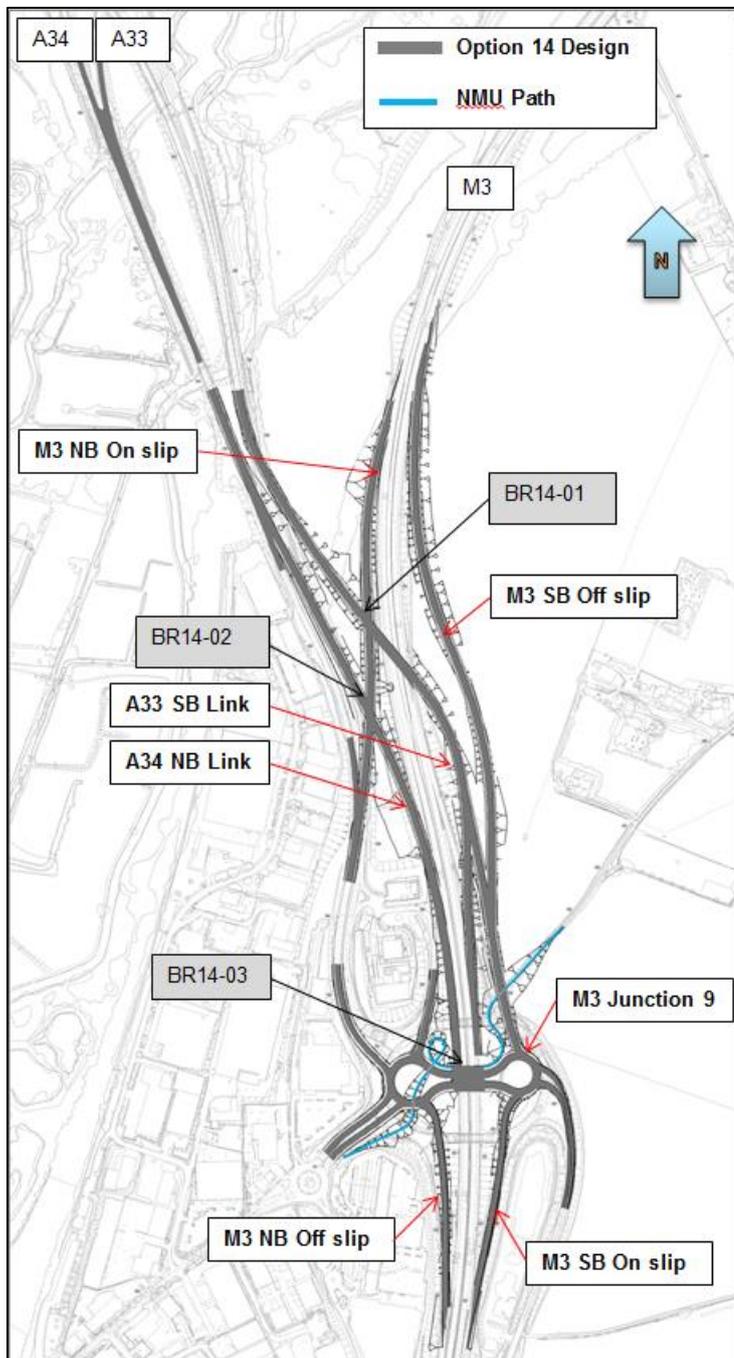
If Option 11 were to progress to PCF Stage 2, further work could be investigated to reduce the overall cost of the option and hence increase the BCR such as:

- Reducing the land acquisition estimate to reflect the recent change to the batter treatments - The batters have been steepened in areas of cut and therefore the scheme footprint has been reduced as a result. The existing land acquisition estimate is based on the original batter treatment.
- Refining the link cross-sections - Due to the high level nature of the design at PCF Stage 1, refinements to lane arrangements and cross-sections may be possible at PCF Stage 2 to reduce the overall scheme footprint and therefore the cost. An example of this is using the predicted traffic flows to determine whether some of the links can be reduced from two lanes to one lane, in particular the on and off slips to/from the M3.
- Reducing the A34 merge and diverge provision with the M3 – depending on the traffic flows it may be possible to get a departure to reduce the provision to a single lane merge or diverge.
- Consider realigning the A34 northbound link and A33 diverge to be similar to Option 14, therefore removing the need for the bridge over the A33.
- Consider removing the northbound onslip to the M3 – this will remove the need for the A34 Northbound bridge over the northbound M3 onslip as well as narrowing the A34 southbound bridge under the M3 due to the removal of the northbound onslip over it. This would considerably reduce the cost of the scheme, but is likely to also reduce the benefits.

5.9 OPTION 14

5.9.1 Option 14 is shown on drawing HE551511-WSP-HGN-M3J9PCF1-DR-D-50004 in Appendix D. The basic layout is shown in Figure 5-2 below.

Figure 5-2 Option 14 Layout



¹ NMU – Non-Motorised User

M3 TO A34 NORTHBOUND

- 5.9.2 As noted in section 5.6, if the SMART motorway scheme is implemented this would likely result in the M3 south of Junction 9 being converted from dual 3 lane motorway plus hard shoulder into a dual 4 lane all running motorway. South of Junction 9, in the northbound direction, the two nearside lanes will be signed and line marked for the A34 and the two offside lanes for the M3. Access to Junction 9 will be provided via a reconstructed northbound off slip with a TD22/06 Type A taper diverge. This slip road is currently proposed to be two lanes, potentially widening to three lanes on the approach to the new roundabout arrangement, subject to detailed traffic modelling.
- 5.9.3 The two proposed northbound A34 lanes will pass under Junction 9 alongside the two M3 lanes, after which they bifurcate with a TD22/06 Type E – 2 lane drop diverge from the M3 to form the new A34 northbound link with the remaining two offside lanes continuing north as the M3.
- 5.9.4 After the bifurcation the A34 continues north, passing over the proposed M3 Northbound on slip before descending to tie into the existing A34 north bound carriageway prior to the existing River Itchen Bridge.
- 5.9.5 North of the existing River Itchen Bridge the existing A34/A33 diverge will be widened to allow two lanes to run continuously on the A34 with a non-recommended offside type A taper diverge to the A33. TD22 states that an offside diverge is not recommended due to safety reasons, however, this is unavoidable in this case without significant construction work similar to Option 11. As a potential alternative the existing A34 northbound carriageway could be widened to three lanes in the vicinity of the tie in of the new A34 northbound link with the existing to provide a length of three lane carriageway which allows two lanes to proceed for A34 northbound and the offside lane to proceed to A33.

A34 SOUTHBOUND TO M3

- 5.9.6 The A34 southbound link will diverge from the existing A34 alignment after the River Itchen Bridge. Option 14 has been specifically designed to avoid any impact on the River Itchen flood plain thus avoiding the requirement for flood compensation and potential increased environmental mitigation. The A34 will then pass under the M3 in order to reduce the visual impact on the SDNP¹ and the surrounding area.
- 5.9.7 Beyond the M3 underpass a TD22/06 Type A diverge would lead to a slip road joining the revised Junction 9 roundabout junction. The two traffic lanes of the A34 southbound link road would proceed and join the M3 mainline southbound carriageway to the north of the revised Junction 9 layout via a TD22/06 Type G – 2 lane gain with ghost island merge. This then ties in to the proposed SMART motorway scheme just south of the realigned M3 southbound on slip.

M3 JUNCTION 9

- 5.9.8 Similar to Option 11, the Junction 9 circulatory roundabout will be replaced with an offline dumbbell roundabout; all link roads that access the roundabout will require realignment to this new layout.

¹ SDNP – South Downs National Park

SLIP ROADS

- 5.9.9 The existing M3 northbound on slip will be relocated to accommodate the new free-flowing A34 northbound link. The M3 northbound on slip will pass under the new A34 northbound link and over the new A34 southbound link before merging with the M3 approximately 500m downstream of the existing northbound on slip. The existing northbound A34 carriageway will be reused as a link from the Junction 9 roundabout merging with the A34 northbound with a TD22/06 Type A taper merge just to the south of the River Itchen Bridge.
- 5.9.10 The existing M3 southbound off slip will be removed and replaced with a new off slip located approximately 0.6km upstream. The new southbound M3 off slip will then merge with the new A34 to roundabout link to maintain its access to Junction 9.

BRIDGES

- 5.9.11 Option 14 has three new bridges as follows:
- BR14-01 – This bridge carries the M3 mainline and realigned M3 northbound merge over the new A34 southbound link. Construction would likely be undertaken using a “top down” methodology which would require lane diversions under traffic management of the M3 carriageways north of the existing M3 Junction 9. The abutments would likely be formed of a contiguous reinforced concrete pile wall, while the deck may be of in-situ reinforced concrete slab. A box jack would be a possible alternative method of construction for consideration within the design development.
 - BR14-02 – This bridge carries the new A34 northbound link over the realigned M3 northbound merge. The structural type would likely to be an integral bridge structure comprising of precast pre-stressed concrete beams with in-situ concrete slab.
 - BR14-03 – This bridge carries the revised M3 Junction 9 gyratory over the M3 mainline carriageway and would likely be a 2 span precast, pre-stressed concrete beam deck with in-situ concrete slab. The foundation would comprise a leaf pier in the central reserve, and abutments at either side of the M3. Construction may be done by lifting of the beams during night-time closure of the M3 with traffic diverted around the junction via the on and off slip roads in each direction.
- 5.9.12 The existing bridge where the A34/A33 diverge crosses the western channel of the River Itchen may need up to a 2m widening to allow for the revised diverge arrangement. This will be considered further during PCF¹ Stage 2 and Stage 3 and reduced where possible.

¹ PCF – Project Control Framework

NON MOTORISED USERS

- 5.9.13 Due to the removal of the existing Junction 9 bridges and the associated NMU¹ Path, a new NMU Path would be reprovided to current cycle standards which would close the gap in the existing National Cycle Network Route 23. This path would continue to be available for other NMUs as well and has been designed to accommodate disabled users. On the western side of Junction 9, the path would cross from Easton Lane under the western dumbbell roundabout via subways, before looping up to cross over the M3 alongside the northern side of the Junction 9 carriageway. On the eastern side of the M3 the path descends to pass under the M3 southbound off slip via a subway following which it ties into the existing Easton Lane NMU path on the eastern side of Junction 9. During stage 2 further consultation on the design of the NMU route will take place with relevant stakeholders to ensure the route is suitable for all likely user groups.

SITE COMPOUNDS

- 5.9.14 For land cost purposes there is currently an allowance made for a construction site compound to be located in land to the east of Junction 9 and the A272 Spitfire Link as well as a secondary compound in the land between the M3 and the A272 Spitfire Link. These locations will be considered further during PCF Stage 2 and Stage 3, as they are located within the SDNP².

SERVICE DIVERSIONS

- 5.9.15 Following the NRSWA³ C2 Enquiry the following services have been identified as being impacted by the proposed design:

Table 5-2: Utilities affected by Option 14

Location	Service	Approximate Length of diversion(m)	Comments
M3 SB OFF SLIP	GeneSYS (GE)	222	Permanent Diversion
M3	GeneSYS (GE)	156	Permanent Diversion
M3	GeneSYS (GE)	51	Temporary Diversion during construction
M3	GeneSYS (GE)	59	Temporary Diversion during construction
A34 NB LINK	GeneSYS (GE)	408	Permanent Diversion
A34 SB LINK	GeneSYS (GE)	568	Permanent Diversion
M3 SB ON SLIP	GeneSYS (GE)	182	Permanent Diversion
M3 NB OFF SLIP	GeneSYS (GE)	12	Permanent Diversion, Sleeved
A34 SB LINK	Scottish and Southern Electric Low Voltage (SSE LV)	355	Permanent Diversion, Sleeved

¹ NMU – Non Motorised User

² SDNP – South Downs National Park

³ NRSWA – New Roads and Streetworks Act

Location	Service	Approximate Length of diversion(m)	Comments
A34 SB LINK	Scottish and Southern Electric High Voltage (SSE HV)	70	Permanent Diversion, Sleeved
M3 NB ON SLIP	Scottish and Southern Electric High Voltage (SSE HV)	16	Permanent Diversion, Sleeved
A34 NB LINK	Scottish and Southern Electric High Voltage (SSE HV)	12	Permanent Diversion, Sleeved
JUNCTION 9 ROUNDABOUT	BT Openreach Underground	429	Permanent Diversion
M3 NB LINK TO A34	Southern Gas Networks (SGN LP)	14	Permanent Diversion, Sleeved
ROUNDABOUT TO A34 NB LINK TO M3 NB LINK	Southern Gas Networks (SGN LP)	11	Permanent Diversion, Sleeved
A34 SB LINK	Southern Gas Networks (SGN LP)	17	Permanent Diversion, Sleeved
M3 NB ON SLIP	Southern Water (SW)	545	Permanent Diversion
M3 NB ON SLIP	Southern Water (SW)	15	Permanent Diversion, Sleeved
HIGHWAYS ENGLAND DEPOT ACCESS ROAD	Southern Water (SW)	21	Permanent Diversion, Sleeved

POTENTIAL COST SAVINGS

5.9.16 Some areas where the scheme cost could be reduced or benefits increased include:

- Reducing the land acquisition estimate to reflect the recent change to the batter treatments – similar to the further considerations proposed in Option 11 above.
- Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.
- Consider removing the northbound onslip to the M3 – similar to the further considerations proposed in Option 11 above.
- Reducing the A34 merge and diverge provision with the M3 – depending on the traffic flows it may be possible to get a departure to reduce the provision to a single lane merge or diverge.

- Consider reducing the A33 diverge cross-section – it may be possible to reduce the lane widths at the A33 diverge to reduce the works required at this localised location. Any proposed reductions in cross-section would be discussed and agreed with PTS¹ during PCF Stage 2 and 3.
- The design speed used on the A34 Southbound has increased from 85kph to 100kph since the economics were assessed during PCF Stage 1, following discussion with Highways England PTS. This should be updated in future traffic and economic modelling and is likely to increase the benefits for Option 14.

ENVIRONMENTAL EFFECTS, MITIGATION AND ENHANCEMENT MEASURES

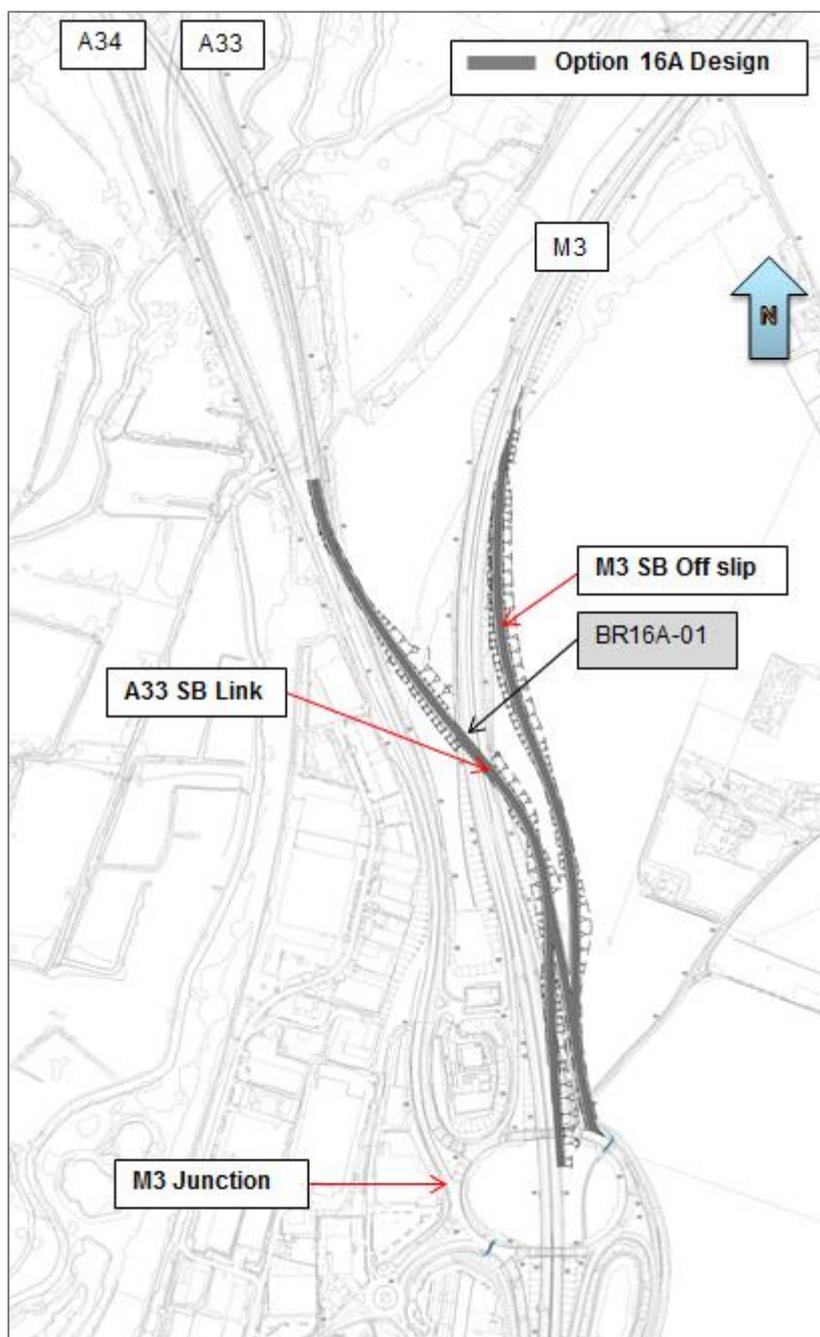
5.9.17 The potential environmental effects of this option are considered in Chapter 12. Mitigation and enhancement measures will be similar to those for Option 11.

¹ PTS – Professional Technical Services

5.10 OPTION 16A

5.10.1 Option 16A is shown on drawing HE551511-WSP-HGN-M3J9PCF1-DR-D-50006 in Appendix D. The basic layout is shown in Figure 5-3 below.

Figure 5-3 Option 16A Layout



5.10.2 Option 16A proposes the incremental delivery of only the A34 southbound link associated with Option 14. This option has been developed as a potential means of partially meeting the scheme free flow objective at a more affordable cost. Option 16A could be combined with 16B at a later stage to effectively provide Option 14 in two phases/schemes, however this is expected to be more expensive in the long term than building Option 14 initially.

A34 SOUTHBOUND TO M3

- 5.10.3 The design of the A34 southbound link will be the same as described in Option 14 until the A34 southbound to Junction 9 link diverge. After this diverge the two traffic lanes of the A34 southbound link road would proceed and join the M3 mainline southbound carriageway to the north of the revised Junction 9 layout via a TD22/06 Type F – lane gain with ghost island merge. This then ties in to the proposed SMART motorway scheme just south of the realigned M3 southbound on slip. and will be the same as described in Option 14.

M3 TO A34 NORTHBOUND

- 5.10.4 Traffic using the northbound A34 from the M3 will continue to use the existing arrangement through the Junction 9 traffic signals. The design of the A33/A34 diverge will be the same as described in Option 14.

M3 JUNCTION 9

- 5.10.5 The existing M3 Junction 9 roundabout will be retained with a departure from standard required on the M3 under the Junction 9 bridges, to allow for a lane reconfiguration.

SLIP ROADS

- 5.10.6 The design of the M3 southbound off slip will be the same as described in Option 14. All other Junction 9 slip roads will be retained in their current form.

BRIDGES

- 5.10.7 Option 16A has one new bridge as follows:
- BR16A-01 – This bridge carries the M3 mainline and realigned M3 northbound merge over the new A34 southbound link. Construction would likely be undertaken using a “top down” methodology which would require lane diversions under traffic management of the M3 carriageways north of the existing M3 Junction 9. The abutments would likely be formed of a contiguous reinforced concrete pile wall, while the deck may be of in-situ reinforced concrete slab. A box jack would be a possible alternative method of construction for consideration within the design development.
- 5.10.8 The existing bridge where the A34/A33 diverge crosses the western channel of the River Itchen may need up to a 2m widening to allow for the revised diverge arrangement. This will be considered further during PCF¹ Stage 2 and Stage 3 and reduced where possible.

NON MOTORISED USERS

- 5.10.9 As the existing Junction 9 roundabout is being retained, the existing NMU² Path is also being retained, however due to the clearances at the subways being sub-standard these will be upgraded to current standards by lowering the subways and adjusting the tie ins to existing paths either side which would close the gap in the existing National Cycle Network Route 23.

¹ PCF – Project Control Framework

² NMU – Non Motorised User

SITE COMPOUNDS

- 5.10.10 For land cost purposes there is currently an allowance made for a construction site compound to be located in land to the east of Junction 9 and the A272 Spitfire Link as well as a secondary compound in the land between the M3 and the A272 Spitfire Link. These locations will be considered further during PCF Stage 2 and Stage 3, as they are located within the SDNP¹.

SERVICE DIVERSIONS

- 5.10.11 Following the NRSWA² C2 Enquiry the following services have been identified as being impacted by the proposed design:

Table 5-3: Utilities affected by Option 16A

Location	Service	Approximate Length of diversion(m)	Comments
M3 SB OFF SLIP	GeneSYS (GE)	222	Permanent Diversion
M3	GeneSYS (GE)	51	Temporary Diversion during construction
M3	GeneSYS (GE)	59	Temporary Diversion during construction
A34 SB LINK	GeneSYS (GE)	568	Permanent Diversion
M3 SB ON SLIP	GeneSYS (GE)	182	Permanent Diversion
M3 NB OFF SLIP	GeneSYS (GE)	88	Permanent Diversion
M3 NB OFF SLIP	GeneSYS (GE)	12	Permanent Diversion, Sleeved
A34 SB LINK	Scottish and Southern Electric Low Voltage (SSE LV)	355	Permanent Diversion, Sleeved
A34 SB LINK	Scottish and Southern Electric High Voltage (SSE HV)	70	Permanent Diversion, Sleeved
M3 NB ON SLIP	Scottish and Southern Electric High Voltage (SSE HV)	16	Permanent Diversion, Sleeved
A34 SB LINK	Southern Gas Networks (SGN LP)	17	Permanent Diversion, Sleeved
JUNCTION 9 ROUNDABOUT	BT Openreach Underground	40	Permanent Diversion

¹ SDNP – South Downs National Park

² NRSWA – New Roads and Streetworks Act

Location	Service	Approximate Length of diversion(m)	Comments
M3	Southern Water (SW)	72	Permanent Diversion, Sleeved
M3 NB ON SLIP	Southern Water (SW)	15	Permanent Diversion, Sleeved

POTENTIAL COST SAVINGS

5.10.12 Some areas where the scheme cost could be reduced include:

- Reducing the land acquisition estimate to reflect the recent change to the batter treatments – similar to the further considerations proposed in Option 11 above.
- Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.
- The design speed used on the A34 Southbound has increased from 85kph to 100kph since the economics were assessed during PCF Stage 1, following discussion with Highways England PTS¹. This is likely to increase the benefits for Option 14.

ENVIRONMENTAL EFFECTS, MITIGATION AND ENHANCEMENT MEASURES

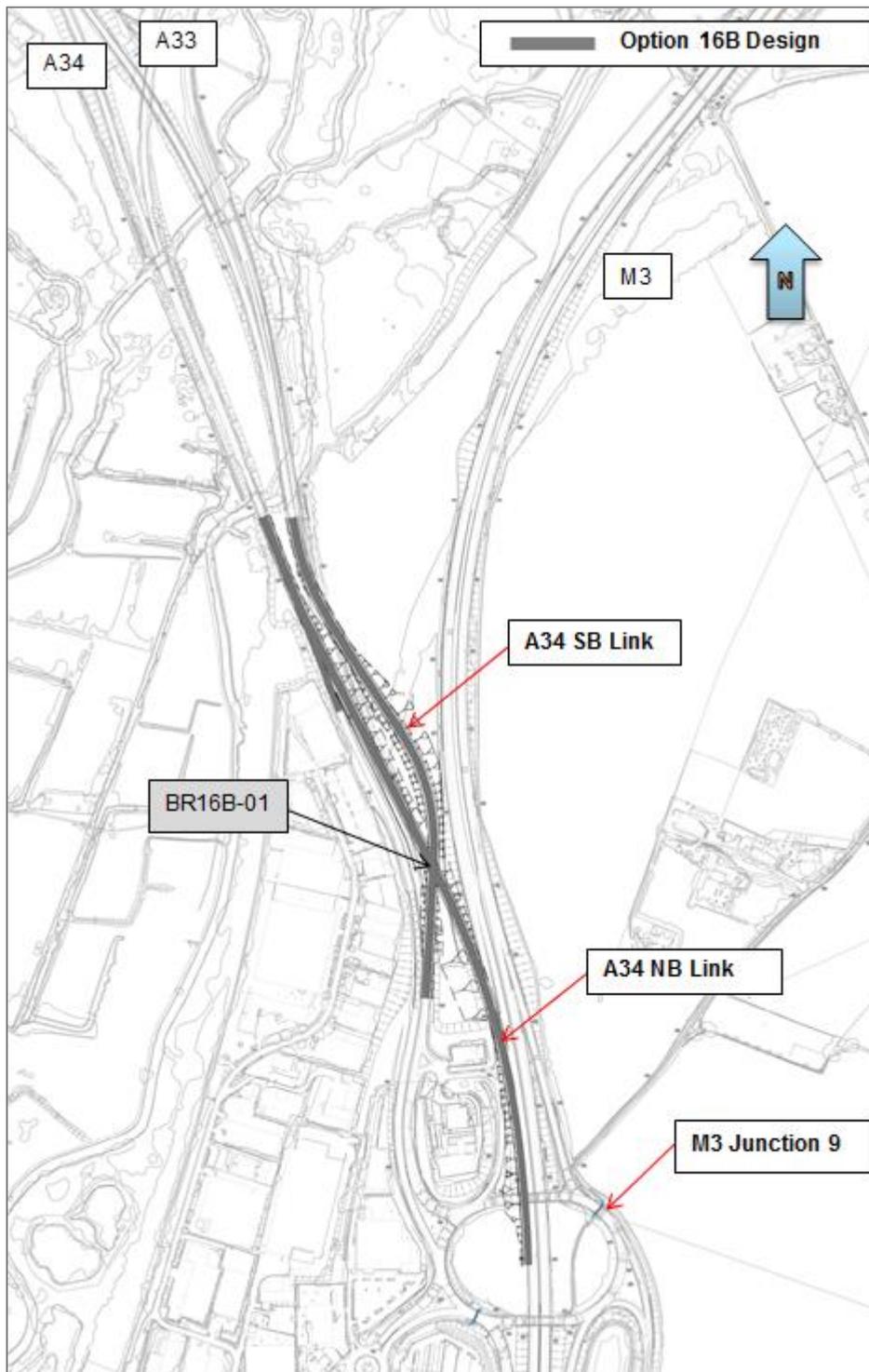
5.10.13 The potential environmental effects of this option are considered in Chapter 12. Mitigation and enhancement measures will be similar to those for Option 11.

¹ PTS – Professional Technical Services

5.11 OPTION 16B

5.11.1 Option 16B is shown on drawing HE551511-WSP-HGN-M3J9PCF1-DR-D-50008 in Appendix D. The basic layout is shown in Figure 5-4 below.

Figure 5-4 Option 16B Layout



- 5.11.2 Option 16B proposes the incremental delivery of only the northbound A34 link associated with Option 14. This option has been developed as a potential means of partially meeting the scheme free flow objective at a more affordable cost. Option 16B could be combined with Option 16A at a later stage to effectively provide option 14 in two phases/schemes, however the alignment of the Option 16B, A34 southbound link may limit the space available to facilitate construction of the Option 16A, A34 southbound link bridge under the M3.
- 5.11.3 The eventual construction of the option 14 arrangement over two phases is expected to be more expensive in the long term than building option 14 initially.

A34 SOUTHBOUND TO M3

- 5.11.4 The A34 southbound will be realigned under the new A34 northbound link to maintain access to Junction 9 and therefore the M3 southbound.
- 5.11.5 Traffic using the southbound A34 to the M3 will continue to use the existing arrangement through the Junction 9 traffic signals.

M3 TO A34 NORTHBOUND

- 5.11.6 The proposed northbound A34 lane will pass under Junction 9 alongside the two M3 lanes, after which they bifurcate with a TD22/06 Type D – Ghost Island diverge for lane drop from the M3 to form the new A34 northbound link with the remaining two offside lanes continuing north as the M3.
- 5.11.7 A new TD22/06 Type A taper merge layout is proposed to connect the Junction 9 roundabout with the A34 northbound.

M3 JUNCTION 9

- 5.11.8 The existing M3 Junction 9 roundabout will be retained with a departure from standard required on the M3 under the Junction 9 bridges, to allow for a lane reconfiguration.

SLIP ROADS

- 5.11.9 The existing M3 northbound on-slip is to be removed to accommodate the new free-flowing northbound link and is not currently reprovided in this option, although this will be considered further during PCF¹ Stage 2 and Stage 3. Traffic from Winchester wishing to join the M3 northbound will be required to do so via Junction 11 or the A33/A30 and Junction 7. All other Junction 9 slip roads will be retained in their current form. Currently the flows using the northbound on slip are low compared to the other slip roads at Junction 9 and therefore won't significantly impact capacity. Alternative routes to access the M3 northbound would either be via M3 Junction 11 to the south of Winchester or via the A33/A30 to Junction 7 to the south of Basingstoke. As a result of these longer routes to access the M3, the journey times will likely increase.

BRIDGES

- 5.11.10 Option 16B has one new bridge as follows:

¹PCF – Project Control Framework

→ BR16B-01 – This bridge carries the new A34 northbound link over the realigned M3 northbound merge. The structural type would likely be an integral bridge structure comprising of precast pre-stressed concrete beams with in-situ concrete slab.

5.11.11 The existing bridge where the A34/A33 diverge crosses the western channel of the River Itchen may need up to a 2m widening to allow for the revised diverge arrangement. This will be considered further during PCF Stage 2 and Stage 3 and reduced where possible.

NON MOTORISED USERS

5.11.12 As the existing Junction 9 roundabout is being retained, the existing NMU¹ Path is also being retained, however due to the clearances at the subways being sub-standard these will be upgraded to current standards by lowering the subways and adjusting the tie ins to existing paths either side which would close the gap in the existing National Cycle Network Route 23. .

SITE COMPOUNDS

5.11.13 For land cost purposes there is currently an allowance made for a construction site compound to be located in land to the east of Junction 9 and the A272 Spitfire Link as well as a secondary compound in the land between the M3 and the A272 Spitfire Link. These locations will be considered further during PCF Stage 2 and Stage 3, as they are located within the SDNP².

SERVICE DIVERSIONS

5.11.14 Following the NRSWA³ C2 Enquiry the following services have been identified as being impacted by the proposed design:

Table 5-4: Utilities affected by Option 16B

Location	Service	Approximate Length of diversion(m)	Comments
A34 SB LINK TO ROUNDABOUT	Southern Water (SW)	194	Permanent Diversion
A34 NB LINK	GeneSYS (GE)	408	Permanent Diversion
M3 NB LINK TO A34	Southern Gas Networks (SGN LP)	14	Permanent Diversion, Sleeved
JUNCTION 9 ROUNDABOUT	BT Openreach Underground	40	Permanent Diversion
A34 NB LINK	Scottish and Southern Electric High Voltage (SSE HV)	12	Permanent Diversion, Sleeved

¹ NMU – Non Motorised User

² SDNP – South Downs National Park

³ NRSWA – New Roads and Streetworks Act

POTENTIAL COST SAVINGS

- 5.11.15 Some areas where the scheme cost could be reduced or benefits increased include:
- Consider reducing the A33 diverge cross-section – similar to the further considerations proposed in Option 14 above.
 - Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.

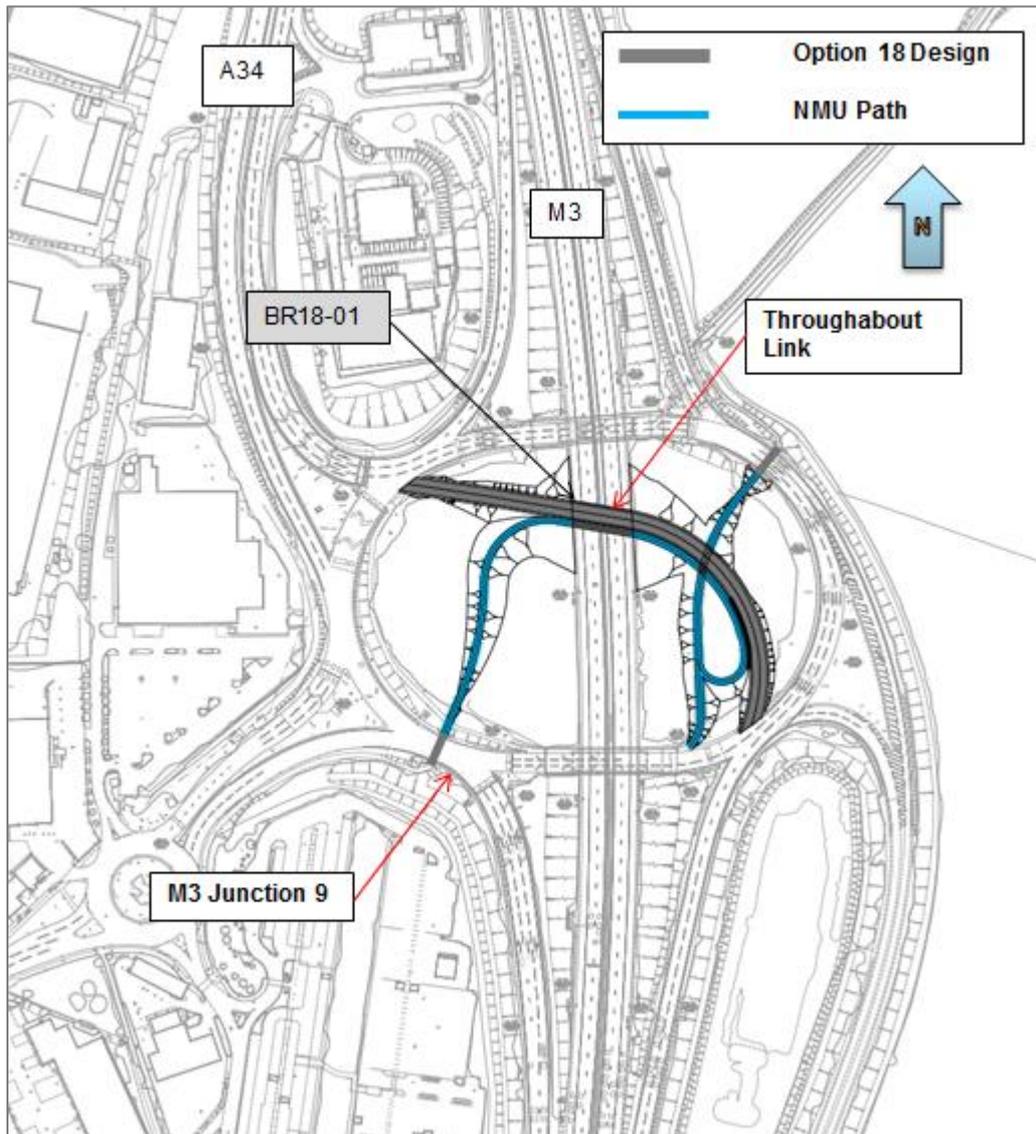
ENVIRONMENTAL EFFECTS, MITIGATION AND ENHANCEMENT MEASURES

- 5.11.16 The potential environmental effects of this option are considered in Chapter 12. Mitigation and enhancement measures will be similar to those for Option 11.

5.12 OPTION 18

5.12.1 Option 18 is shown on drawing HE551511-WSP-HGN-M3J9PCF1-DR-D-50009 in Appendix D. The basic layout is shown in Figure 5-5 below.

Figure 5-5 Option 18 Layout



¹ NMU – Non-Motorised User

A34 SOUTHBOUND TO M3

- 5.12.2 Option 18 proposes a throughabout link at Junction 9 to provide a direct link for southbound A34 traffic across the Junction 9 roundabout to the M3 southbound. This link is on a curve of 75m which, if assumed to be a loop in accordance with TD 22/06, would adhere with standards. If however the link is classified as a connector it would have a greater than four step relaxation in accordance with TD 9/93. There are currently no specific requirements for throughabout design in the DMRB¹ and hence a departure for ‘an aspect not covered ‘ by standards would need to be considered during PCF Stage 2. The throughabout junction will be fully signalised and provide improved lane widths which will increase the capacity of the circulatory carriageway. It will not however meet the free flow objective.

M3 TO A34 NORTHBOUND

- 5.12.3 The existing A33/A34 diverge will be upgraded similar to Option 14.

BRIDGES

- 5.12.4 Option 18 has one new bridge as follows:

→ BR18-01 – This bridge carries the A34 southbound link over the M3 mainline. It would likely be a 2 span precast, pre-stressed concrete beam deck with in-situ concrete slab. The foundation would comprise a leaf pier in the central reserve, and abutments at either side of the M3. Construction may be done by lifting of the beams during night-time closure of the M3 with traffic diverted around the junction via the on and off slip roads in each direction.

- 5.12.5 The existing bridge where the A34/A33 diverge crosses the western channel of the River Itchen may need up to a 2m widening to allow for the revised diverge arrangement. This will be considered further during PCF² Stage 2 and Stage 3 and reduced where possible.

NON MOTORISED USERS

- 5.12.6 As the existing Junction 9 roundabout is being retained, the existing NMU³ Path is also being retained, where it passes under the circulatory carriageway via subways. Due to the clearances at the subways being sub-standard however these will be upgraded to current standards by lowering the subways and adjusting the tie ins to existing paths either side. A new alignment for the NMU path across the centre of the Junction 9 roundabout is proposed due to the severance caused by the throughabout carriageway. From the western subway the proposed NMU path will ascend to run alongside the southern side of the proposed throughabout carriageway as it crosses the M3 before looping under the throughabout at a new subway after which it ties in to the adjusted subway on the eastern side of the junction. This would close the gap in the existing National Cycle Network Route 23.

¹ DMRB – Design Manual For Roads and Bridges

² PCF – Project Control Framework

³ NMU – Non Motorised User

SITE COMPOUNDS

- 5.12.7 For land cost purposes there is currently an allowance made for a construction site compound to be located in land to the east of Junction 9 and the A272 Spitfire Link as well as a secondary compound in the land between the M3 and the A272 Spitfire Link. These locations will be considered further during PCF Stage 2 and Stage 3, as they are currently located within the SDNP¹.

SERVICE DIVERSIONS

- 5.12.8 Following the NRSWA² C2 Enquiry the following services have been identified as being impacted by the proposed design:

Table 5-5: Utilities affected by Option 18

Location	Service	Approximate Length of diversion(m)	Comments
JUNCTION 9 ROUNDABOUT	BT Openreach Underground	70	Permanent Diversion

- 5.12.9 The construction of the option 18 throughabout bridge could complicate the subsequent construction of the dumbbell roundabout at a later stage and would likely result in the bridge having to be demolished to make way for the new dumbbell bridge.

POTENTIAL COST SAVINGS

- 5.12.10 Some areas where the scheme cost could be reduced or benefits increased include:
- Consider reducing the A33 diverge cross-section – similar to the further considerations proposed in Option 14 above.

ENVIRONMENTAL EFFECTS, MITIGATION AND ENHANCEMENT MEASURES

- 5.12.11 The potential environmental effects of this option are considered in Chapter 12. Mitigation and enhancement measures will be similar to those for Option 11.

5.13 REJECTED OPTIONS

OPTION 12

- 5.13.1 Option 12 proposes free-flowing links between the A34 and M3 underneath the M3 to a design speed of 120kph with two-step curve radii relaxations. Option 12 follows the same general alignment as option 11 but with two-step curve radii relaxations for the curves.
- 5.13.2 The alignment of the A34 southbound to M3 link still diverges from its current alignment before the River Itchen Bridge as in Option 11 meaning a new bridge would still be required. This option was therefore rejected because it does not reduce structural and land take costs, it still impacts the River Itchen flood plain and the visual impact remains similar to Option 11. There were therefore no perceived benefits of this option compared to Option 11.

¹ SDNP – South Downs National Park

² NRSWA – New Roads and Streetworks Act

OPTION 13

- 5.13.3 Option 13 proposes free-flowing links between the A34 and M3 over the M3 to a design speed of 120kph and two-step curve radii relaxations. Option 13 follows the same general alignment as Option 11 but with two-step relaxations for the curve radii and goes over the M3 instead of underneath it.
- 5.13.4 The alignment of the A34 southbound to M3 link is the same for Option 12 where it diverges from its current alignment before River Itchen Bridge meaning that a new bridge would be required. Option 13 goes over the M3 rather than underneath, which would require a 22m high viaduct resulting in significant visual impacts, buildability issues and increased land take requirements, therefore Option 13 was not considered further.

OPTION 15

- 5.13.5 Option 15 proposes free-flowing links between the A34 and M3 over the M3 to a design speed of 85kph and two-step curve radii relaxations. Option 15 follows the same general alignment as option 14 but goes over the M3 rather than underneath which would require a 22m high viaduct resulting in significant visual impacts, buildability issues and increased land take requirements. It also requires the southbound link to take a wider curve alignment than option 14 to achieve the correct vertical curvature.
- 5.13.6 Option 15 was therefore rejected because it increases the land take and visual impact of the scheme compared with Option 14.

OPTION 17

- 5.13.7 Option 17 proposes free-flowing links between the A34 and M3 to a design speed of 120kph. The southbound link is proposed to go underneath the M3 and merge via a basic loop merge junction. The loop splits in two before the merge to form the new A34 to roundabout link.
- 5.13.8 The M3 northbound link to A34 diverges from the mainline via a lane drop diverge and ties in with the A34 prior to the River Itchen Bridge. The roundabout to A34 link then diverges from the new northbound on-slip and ties in with the new northbound link after the Itchen Bridge.
- 5.13.9 This option was rejected due to large visual impact and land take costs as well as requiring significant land take within SDNP¹ compared with the non-loop junction options and was not considered to provide any additional benefits over other options.

¹ SDNP – South Downs National Park

6 TRAFFIC ANALYSIS

6.1 TRAFFIC DATA

- 6.1.1 Sections 6.1 to 6.4 summarise the traffic analysis and modelling undertaken by Systra to assess the options using the Sub-Regional Transport Model (SRTM), which is a land use and transport interaction model for the Solent region. As agreed with Highways England and Highways England's Traffic Appraisal, Modelling and Economics (TAME) team, the scheme options were tested in the strategic model SRTM together with the Do Minimum network.
- 6.1.2 Model years of 2022 (the opening year for both operational and economic tests) and 2036 (the assessment year for both operational and economic tests) were run for weekday AM, inter-peak and PM peak time periods.
- 6.1.3 The latest SRTM 'Core Forecast' (controlled to TEMPRO¹) was used in the economic appraisal of the scheme options. This allowed an estimate of both background traffic growth and individual committed developments to be included.
- 6.1.4 The SRTM model represented the following time periods:
- AM peak: busiest hour between 0700 and 1000 (defined as 38.2% of the three hours for Highway and 40% for Public Transport);
 - Inter-peak: average of 1000 to 1600 hours (i.e. 16.7% of the six hours for both modes); and
 - PM peak: busiest hour between 1600 and 1900 (defined as 35.8% of the three hours for Highway and 40% for Public Transport)
- 6.1.5 The DM² scenarios make use of the standard SRTM³ reference case with the addition of a number of committed and funded schemes along the M3 and M27, included within the recent study appraising SMP⁴ options. The DM scenario also includes an updated land use growth profile developed for SMP, including actual observed growth up to 2014. The DM scenario feeds through the full SRTM model to 2036 to enable valid economic appraisal between scheme options.
- 6.1.6 Output flows from the SRTM have been used to derive input flows for further operational modelling tests using micro-simulation modelling software Paramics. The Paramics model is not validated but compares the key journey time routes against SRTM to ensure they were representative of the typical traffic conditions.
- 6.1.7 Details of the traffic models used and the modelling methodology including network coverage can be found in the Appraisal Specification Report.

¹ TEMPRO – Trip End Model Presentation Program

² DM - Do Minimum

³ SRTM - Sub-Regional Transport Model

⁴ SMP - Smart Motorway Program

6.2 TRAFFIC ANALYSIS

- 6.2.1 Using outputs from the SRTM, traffic forecasts were produced in order to assess both the operational and economic impacts of the scheme options. Details can be found in the M3 Junction 9 SRTM Modelling Summary Report.
- 6.2.2 For the purpose of traffic analysis all five options were assumed to commence construction works by January 2020, and open for traffic by 2022. These programme dates will be refined further for individual options during PCF¹ Stage 2.
- 6.2.3 The year of assessment for the model networks is 2036. This provides a consistent approach to economic assessment for all options and the future year (almost 15 years post opening - 2036) is modelled in line with TAG guidance to capture most benefit.
- 6.2.4 The core growth scenarios created for this scheme is the core growth in SRTM, constrained to TEMPRO² (version 6.2).
- 6.2.5 The growth scenario above was applied to the modelled networks shown in Table 6-1.

Table 6-1: Modelled Scenarios

NETWORK TYPE	DESCRIPTION
Do Minimum	2036 comparison base
Do Something	2036 comparison base + Option 11
Do Something	2036 comparison base + Option 14
Do Something	2036 comparison base + Option 16A
Do Something	2036 comparison base + Option 16B
Do Something	2036 comparison base + Option 18

- 6.2.6 The growth forecast and inclusion of committed and funded schemes are consistent throughout the scenarios, while the modelled impact of each of the options resulted in percentage growth as shown in Table 6-2.

Table 6-2: Demand Change Totals (DM vs. DS Scenarios)

TIME PERIOD	OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
AM Peak	0.03%	0.03%	0.00%	0.00%	0.02%
Inter-peak	0.07%	0.06%	0.01%	0.02%	0.00%
PM Peak	0.02%	0.01%	0.01%	-0.01%	0.00%

- 6.2.7 The resulting flows for the forecast models for sections between M3 south of junction 9 and A34/A33 north of the diverge are shown in Table 6-3.

¹ PCF – Project Control Framework

² TEMPRO – Trip End Model Presentation Program

Table 6-3: Option Comparison with DM - Total North- and Southbound Traffic Flows (veh)

AM PEAK						
Forecast Flows in Model	Do Min	Option 11	Option 14	Option 16A	Option 16B	Option 18
NORTHBOUND						
M3 J10 – J9	6,781	7,282	7,652	6,795	7,790	7,006
M3 J9 – J8	4,092	4,064	4,064	4,096	3,866	4,077
A34	2,200	3,352	3,168	2,468	3,132	2,601
A33	352	509	938	233	848	259
SOUTHBOUND						
A33	551	834	820	658	487	575
A34	3,080	3,354	3,336	3,237	3,139	3,058
M3 J8 – J9	3,432	3,524	3,520	3,469	3,444	3,429
M3 J9 – J10	5,579	6,633	6,626	6,468	5,567	5,562
PM PEAK						
Forecast Flows in Model	Do Min	Option 11	Option 14	Option 16A	Option 16B	Option 18
NORTHBOUND						
M3 J10 – J9	5,506	6,206	6,190	5,498	6,221	5,743
M3 J9 – J8	3,134	2,981	2,979	3,111	2,833	3,133
A34	2,200	3,282	3,161	2,545	3,112	2,655
A33	335	539	592	194	565	191
SOUTHBOUND						
A33	524	694	654	585	468	522
A34	3,066	3,308	3,272	3,249	3,106	3,096
M3 J8 – J9	4,087	4,139	4,128	4,103	4,095	4,039
M3 J9 – J10	6,433	7,293	7,270	7,064	6,448	6,324

6.3 ROAD LAYOUT AND STANDARDS

- 6.3.1 The five options assessed during PCF¹ Stage 1 are presented in Chapter 5, under Description of Options. A key feature applicable to all options except Option 18 is to provide a free flow lane either from the A34 to M3 southbound or from the M3 northbound to the A34. According to the results of a traffic count undertaken in 2015, traffic flows show these are the two movements under greatest pressure during peak periods and the free-flow of one or both of these movements will significantly improve the performance of the junction.
- 6.3.2 The M3 Junction 9 roundabout is an existing junction. Proposed modifications to the road layout have been assessed against the relevant design standards, taking existing constraints into account. Among the standards considered, some departures from standard were identified in relation to TD 9/93 and TD 22/06 for the road layout. Details can be found in the [Departures from Standard Checklist Report](#). These findings will be reviewed in subsequent PCF Stages as a preferred option is selected, and as design developments continue to progress.

6.4 CONCLUSIONS

- 6.4.1 The SRTM² has been used to model all five options for future years of 2022 and 2036. The results have been used to develop an operational model using Paramics.
- 6.4.2 The SRTM has also been used to carry out economic assessment of all five options which is summarised in the following chapter.

¹ PCF – Project Control Framework

² SRTM - Sub-Regional Transport Model

7 ECONOMIC ASSESSMENT

7.1 APPLICATION OF ASSESSMENT SOFTWARE

- 7.1.1 The economic appraisal of the scheme options for M3 Junction 9 has been carried out by Systra with outputs and assessment summarised here. The appraisal was conducted in TUBA¹ version 1.9.6. The default TUBA economic file (TUBA 1.9.6) was used. This was based on WebTAG December 2015 and Data Book December 2015. The price base used was 2010.
- 7.1.2 An accident analysis assessment was undertaken and added to the above, which provided additional information of the benefits through potential accident savings. These were added to the BCR² figures for the scheme options.
- 7.1.3 To ensure that benefits to users were not overstated a conservative approach has been adopted to annualisation factors with the modelled outputs factored to represent the annual benefits as follows:
- AM peak (0700 to 1000) A = 3 hours x 253 days = 759
 - Inter peak (1000 to 1600) A = 6 x 253 days = 1518
 - PM peak (1600 to 1900) A = 3 hours x 253 days = 759
- 7.1.4 Given the assessed hours, the assessment is conservative, as likely benefits from off peak periods and weekends have not been included.
- 7.1.5 The economic assessment was based on model outputs representing 2019, 2026 and 2036 with the 2022 opening year values interpolated between the 2019 and 2026 model runs. To enable valid economic appraisal on the scheme options the output land use from the DM³ has been used as the input for all DS⁴ models (i.e. there is a fixed land use for DM and DS model runs). All model runs have been constrained to TEMPRO⁵ growth forecasts
- 7.1.6 Benefits beyond 2036 are considered to be level in magnitude, although are influenced by changing value of time assumptions and the increasing impact discounting, reducing their values as would be perceived in 2010.
- 7.1.7 To assess the economic impact of changes in safety it was agreed with Highways England TAME⁶ that a COBALT⁷ methodology should be used. This methodology is described in greater detail in the Appraisal Specification Report.

¹ TUBA - Transport User Benefit Analysis

² BCR - Benefit to Cost Ratio

³ DM – Do Minimum

⁴ DS - Do Something

⁵ TEMPRO - Trip End Model Presentation Program

⁶ TAME - Traffic Appraisal Modelling and Economics

⁷ COBALT - Cost Benefit Analysis – Light Touch

7.2 INDIVIDUAL IMPACTS

7.2.1 TUBA was used to assess the costs and benefits for travel time savings and vehicle operating costs. The trip length, trip volume and journey time information needed for this has been extracted from the Solent Transport's SRTM¹.

7.2.2 TUBA also provides a forecast of the impacts on indirect tax revenues as a result of the scheme.

7.2.3 Cost inputs to the economic appraisal of scheme options were provided by Highways England's cost consultant, Benchmark, and are shown in Table 7-1. These costs were discounted to 2010 and converted to market prices to get the PVC² values.

Table 7-1: Present value of costs for all options

OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
£126.4 million	£92.4 million	£42.4 million	£32.3 million	£14.4 million

Note: Values are in 2010 prices discounted to 2010

7.2.4 Table 7-2 summarises the headline economic appraisal outputs for each of the five scheme options.

Table 7-2: Summary of Scheme Options' Economic Growth (PVB)

OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
£135.2million	£145.5million	£53.4million	£71.8million	£17.2million

Note: Values are in 2010 prices discounted to 2010

7.2.5 From the TUBA analysis, Option 11 and Option 14 provide the highest benefits. Option 16B is forecast to result in a higher benefit than Option 16A, highlighting that the northbound issues are expected to be more significant than the southbound impacts. Option 18 provides the lowest benefits amongst the options assessed.

7.2.6 To assess the economic impact of changes in safety, the COBALT³ software has been used. Details of this assessment can be found in the Economic Assessment Report. Overall the analysis showed a positive impact upon accidents for all options as shown in Table 7-3.

¹ SRTM - Sub Regional Transport Model

² PVC - Present Value of Cost

³ COBALT – Cost Benefit Analysis – Light Touch

Table 7-3: Summary of Accident Assessment

	OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
Number of 'Without' Scheme Accidents	20,376	20,376	20,376	20,376	20,376
Number of 'With' Scheme Accidents	19,730.7	19,752.5	19,933.0	20,018.4	20,105.1
Total Number of Accidents Saved by Scheme	645.3	623.5	443.1	357.7	271.0
Total Accident Benefits Saved by Scheme (£M)	£30.407	£28.580	£24.093	£10.360	£11.622

- 7.2.7 Table 7-3 shows that the highest number of accident reductions are predicted to be from Option 11 and Option 14. Option 18 shows the lowest number of estimated accident reductions.
- 7.2.8 Option 11, Option 14 and Option 16A provide the biggest benefits with the highest predicted benefits for Option 11. The lowest benefit was estimated from Option 16B.
- 7.2.9 This analysis could only identify Personal Injury Accidents that would have been saved during the period assessed. It could not identify what new safety concerns, potentially other accidents, that could be generated as a result of the scheme option.
- 7.2.10 DIs¹ consider the variance of transport intervention impacts across different social groups. The analysis of DIs is mandatory in the appraisal process and is a constituent of the Appraisal Summary Table. Both beneficial and/or adverse DIs of transport interventions need to be considered, along with the identification of social groups likely to be affected.
- 7.2.11 A review of the accident benefits showed that both Option 11 and Option 14 are expected to have 'Slight Beneficial' impacts for the vulnerable groups. This is expected, as they would encourage a greater re-routing of vehicles away from local roads towards strategic routes. The other options are expected to be 'Neutral' in the assessment area.
- 7.2.12 Further details on the Social Impact Assessment and Distribution Impact Assessment can be found in the Economic Assessment Report.

¹ DI - Distributional Impact

7.3 SUMMARY OF RESULTS

7.3.1 The adjusted BCR¹, taking into account the potential benefits from accidents saved, are shown in Table 7-4.

Table 7-4: Adjusted Benefits (£ Millions, Values are in 2010 Prices Discounted to 2010)

		OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
PVB	TUBA	135.2	145.5	53.4	71.8	17.2
	COBALT	30.4	28.6	24.1	10.4	11.6
	Total	165.6	174.1	77.5	82.2	28.8
PVC		126.4	92.4	42.4	32.3	14.4
Overall impacts						
NPV		39.2	81.7	35.1	49.9	14.4
BCR		1.31	1.88	1.83	2.54	2.00

Note: Values are in 2010 prices discounted to 2010

7.3.2 The forecast benefits and costs cover a standard 60 year appraisal period. From the above analysis, all schemes are forecast to deliver benefits greater than the cost of the scheme. Option 16B and Option 18 provide a 'high' BCR². Option 14 and Option 16A provide a 'medium' BCR with Option 11 showing a 'low' BCR.

¹ BCR - Benefit to Cost Ratio

² BCR - Benefit to Cost Ratio

7.4 DISCUSSION OF OVERALL RESULTS

- 7.4.1 The results of the modelling and economic appraisal have shown that each scheme option would provide low to high BCR values following the value for money categories shown in the DfT Value for Money Statement document.
- 7.4.2 The benefits that Option 16A and Option 16B are showing need to be considered further at PCF Stage 2 after further design work has been carried out. These options are principally aimed at providing Option 14, but in stages – with the general layout of Option 16A constructed at a later date, with some additional changes such as a new dumbbell roundabout at Junction 9 and the addition of the M3 northbound onslip, to provide the comprehensive solution at M3 Junction 9.
- 7.4.3 Option 11 and Option 14 both provide free-flow arrangements for north and southbound movements between the M3 and the A34. The modelled Option 14 includes a two step relaxation on the southbound free-flow link that results in movements being restricted at a speed of 85kph (however this will be increased during PCF¹ Stage 2 to 100kph with a three step relaxation). In that respect the benefits of Option 11 would be expected to be greater than Option 14 but Option 14 benefits are increased as a result of the A34/A33 diverge arrangement performing with fewer wider impacts than that in Option 11. More specifically the diverge arrangement in Option 11 is less beneficial for trips from the M3 to A33 than Option 14 as a result of needing to negotiate the proposed dumbbell arrangement at Junction 9.
- 7.4.4 Option 16A and Option 16B are essentially the two individual components of Option 14 modelled in isolation with Option 16A providing the southbound A34-M3 free-flow only and Option 16B the northbound free-flow only.
- 7.4.5 For each of Option 16A and Option 16B the scale of benefits from the A34 sector to the A33 sector is consistent with those forecast in the full Option 14 run. However, there are wider benefits/reduced disbenefits of both halves of the scheme being in operation together which is why the total benefits for Option 16A and Option 16B do not total those of Option 14.
- 7.4.6 Option 16A does not provide higher benefits than Option 16B suggesting that the northbound problem / solution from M3 to A34 is more acute than the reverse southbound movements.
- 7.4.7 For Option 18 the benefits are all driven by improvements at the A34/A33 diverge and the proposed hamburger junction arrangement at M3 Junction 9 is over capacity and actually results in small disbenefits to users

¹ PCF – Project Control Framework

8

SAFETY ASSESSMENT

8.1 IMPACT ON ROAD USERS – STRATEGIC SAFETY ACTION PLAN

- 8.1.1 The M3 Junction 9 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 Fatal Weighted Injury casualties per year is no more than the 2005-2009 safety baseline stated in Highways England’s ‘Our Approach to Improving Road Safety’ document.
 - The rate of FWIs¹ per billion vehicle miles per annum is no more than the safety baseline.
- 8.1.2 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.
- 8.1.3 FWI is defined as:
- $$(\text{Number of fatalities}) + 0.1 \times (\text{number of serious casualties}) + 0.01 \times (\text{number of slight casualties})$$
- 8.1.4 This definition reflects the approximate ratios between the costs of fatal, serious, and slight casualties given in DfT’s² WebTAG (Unit 3.4.1).
- 8.1.5 The use of FWI, rather than the numbers of killed and seriously injured, allows for the use of a larger data set, leading to more accurate and stable results. DfT’s Strategic Framework for Road Safety 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 KSIs³ and the rate of KSIs per billion vehicle miles. Although all external reporting of safety performance of schemes and the programme will comply with the framework, FWI numbers and rates will be used for internal monitoring of safety performance.
- 8.1.6 For each trafficked route [link] 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.
- 8.1.7 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 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.

¹ FWI – Fatal Weighted Injury

² Dft – Department for Transport

³ KSI – Killed and Seriously Injured

- 8.1.8 It is likely that the M3 Junction 9 Improvement scheme will be categorised under IAN139 Table 2-1, as a scheme requiring a Type A Safety Management System.
- 8.1.9 The M3 Junction 9 currently experiences high traffic flows and congestion. A large volume of traffic on the M3 both northbound and southbound when leaving the M3 exacerbates the problems of congestion by causing a slowing of through traffic on the M3. Accidents, especially during periods of congestion, often lead to lane closures and travel time reliability issues. The scheme has several objectives:
- to provide free flow traffic movements between the M3 and the A34 in both northbound and southbound directions,
 - to increase capacity and thereby reduce delays, reducing the impact of queuing traffic and improving safety performance as a result, together with a reduction in accidents, improvement in journey times and reliability.
- 8.1.10 The provision of additional lanes will improve the resilience of the network when incidents occur as the impact of a stopped vehicle will be less.
- 8.1.11 A significant volume of traffic currently use this grade-separated, part signalised gyratory roundabout which acts as a bottleneck on the local and strategic highways network and causes significant delay throughout the day. Both northbound and southbound movements between the M3 and the A34 are particularly intensive, with downstream queues on the northbound off-slip of the M3 backing onto the mainline carriageway, often resulting in safety concerns during peak periods.
- 8.1.12 The improvements at M3 Junction 9 are considered to have positive impacts on the safety of road users. On the one hand, the amelioration of congestion will allow traffic to move more freely, reducing the incidence of driver shunts. The improvements to journey time reliability and subsequently the diffusion of driver frustration will equally help reduce these types of incidents. Contrastingly, the implementation of free-flow movements will prevent collisions caused by merging traffic. This is particularly pertinent because these incidents are more severe than driver shunts as they typically involve vehicles travelling at significantly higher speeds.
- 8.1.13 Notable features of Option 11 that will improve the safety performance of the proposed scheme compared to existing include:
- The provision of free flow traffic movement between the M3 and the A34 in both directions.
 - Increased capacity for the M3 through the junction.
 - Reduced congestion and queuing at the junction roundabout layout with five feeder links reduced to four for local traffic only and all with reduced traffic flows.
- 8.1.14 Notable features of Option 14 that will improve the safety performance of the proposed scheme compared to existing are all of the above. Option 14 does have tighter horizontal curvature on the new southbound link compared to Option 11, as a result of a three step relaxation, however this would be no worse than the curvature of the existing A34 approaching Junction 9 and would be in an improved road cross-section.
- 8.1.15 Notable features of Option 16A that will improve the safety performance of the proposed scheme compared to existing include:
- The provision of free flow traffic movement between the A34 southbound and the M3 southbound.
 - Increased capacity for the M3 through the junction.

- A lesser reduction of congestion and queuing at the junction roundabout layout with five feeder links reduced to four but with only one volume of traffic flow from the A34 southbound removed. All the other links onto the roundabout have the same flows as before.

8.1.16 Notable features of Option 16B that will improve the safety performance of the proposed scheme compared to existing include:

- The provision of free flow traffic movement between the M3 northbound and the A34 northbound.
- Increased capacity for the M3 through the junction.
- A lesser reduction of congestion and queuing at the junction roundabout layout with five feeder links maintained onto the roundabout as the dumbbell solution is not provided and with only one volume of traffic flow from the A34 northbound removed. All the other links onto the roundabout have the same flows as before.

8.1.17 The sole notable feature of Option 18 that will improve the safety performance of the proposed scheme is the provision of a throughabout link through junction 9 to provide a direct link for the A34 southbound onto the M3 southbound albeit signalised and not free flow. A departure from standard would be required for the tight radius curve on the throughabout which would identify any potential hazards associated with this curve. This has been identified in the PCF Stage 1 [Departures from Standard Checklist](#). In addition a departure for 'an aspect not covered by standard' will be considered during PCF Stage 2. There will still be five feeder links onto the roundabout with the same volumes of traffic, the only difference being a different route for one link aided with signals.

8.2 IMPACT DURING CONSTRUCTION AND OPERATION – CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015

DURING CONSTRUCTION

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

8.2.2 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 temporary traffic management.
- Provide diversion routes for NMU¹s which are suitable and appropriate and as direct as possible.
- The use of narrow lanes to ensure that sufficient working space is available to enable works to be constructed safely and to provide through traffic capability is considered as an appropriate measure on all roads feeding into this scheme.
- The use of temporary vehicle restraint systems to prevent incursions into the scheme by errant vehicles providing protection to the construction work force.

¹ NMU – Non Motorised User

- Work to be undertaken at night when additional space is required and the roads feeding into the scheme are reduced to a single traffic lane or closed to generate adequate safe working areas.

8.2.3 Construction aspects specific to Option 11 include;

- working over water on the new southbound A34 link,
- constructing in sequence; the A34 southbound, then the A34 northbound, then building the new junction roundabout before demolishing the old junction roundabout,
- the Highways England maintenance depot will have its access and egress changed to one link direct off the roundabout.

8.2.4 Construction aspects specific to Option 14 include;

- the same as those for Option 11 but,
- with less cut and fill than Option 11,
- avoiding the need to work over water.
- the Highways England depot will have its access and egress changed to one link direct off the roundabout.

8.2.5 Construction aspects specific to Option 16A include;

- works associated with both the old and new roundabouts will still have the traffic moving northbound from the M3 to the A34 passing alongside part of the working area, creating a significant pinch point,
- the Highways England depot will keep the existing two links for access and egress.

8.2.6 Construction aspects specific to Option 16B include;

- shifting a length of the A34 southbound due east to make space for the new A34 northbound,
- closing access from the roundabout to the M3 northbound,
- constructing the new A34 northbound link over the existing A34 southbound link
- the Highways England depot will keep the existing two links for access and egress.

8.2.7 Construction aspects specific to Option 18 include;

- constructing the through-about link across the existing roundabout,
- reconfiguring the signal sequencing on the existing roundabout,
- the Highways England depot will keep the existing two links for access and egress.

DURING OPERATIONS

8.2.8 The options being considered in this Technical Appraisal Report will have the same operations and maintenance requirements as would be expected at a major roundabout with feeder roads to and from all of the following; the motorway network, a major A road, and a local road and similar to that currently experienced on the existing road layout. The provision of the following (in addition to the measures outlined in the section 3.15 Maintenance Repair Strategy Statement) would enable the operations and maintenance requirements to be optimised:

- Existing formal access arrangements to the current roundabout to be replicated for the new roundabout, dependent on the option carried forward.

- Existing access arrangements to the verges and central reservations are to be maintained or relocated dependent on the option carried forward.
- Existing access arrangements to the footways and bridlepaths are to be maintained or improved dependent on the option carried forward.
- New access arrangements will need to be developed for the structures on the new sections of the A34 bridging over the River Itchen and for its associated drainage and embankments.
- Off network access to be considered to enable assets to be maintained reducing the need to implement TTM¹ as the reduction in the amount of TTM required has a significant impact on reducing road worker risk exposure.

¹ TTM – Temporary Traffic Management

9

OPERATIONAL ASSESSMENT

9.1.1 The operational assessment outlines the road characteristics and options design implications for the:

- Scheme's operating regime; and
- Driver compliance.

9.1.2 A meeting was held on 12 September 2016 between WSP | Parsons Brinckerhoff, Highways England Operations and Traffic Officers Service to discuss the operational and maintenance strategies and its implications for the proposed options.

9.2 SCHEMES OPERATING REGIME

9.2.1 The current ASC¹ Contractor for Area 3 has responsibility for routine inspection, maintenance and operation for the M3, Junction 9 and the A34.

9.2.2 The Traffic Officer Service patrols the M3 and A34 to mitigate the congestion effects of vehicle stoppages. The M3 has VMS² to aid the management of congestion through the use of reduced speed limits and warning symbols. This section of the A34 has no technology assets.

9.2.3 The Traffic Officer Service provides vehicle recovery services for the M3 and A34. As the existing A34 has two live traffic lanes and no hardshoulder the impact of a lane blockage can lead to significant delays. The continuation of the service after construction would enable the rapid removal of vehicles and minimise congestion. It is not considered that the scheme will impact on the resources needs of the Traffic Officer Service.

OPTION 11, 14, 16A AND 16B

9.2.4 The proposed free-flowing links between the M3 and A34 have been designed as a D2AP with a one metre hard-strip to tie in with the existing A34. The Traffic Officer Service expressed concerns over vehicle recovery for the free-flowing links, especially the northbound link for Option 14 and 16B which have substandard weaving lengths. The development of safe recovery areas for the free-flowing links is to be considered further at subsequent PCF Stages.

9.2.5 In terms of winter maintenance, the free-flowing links will require an increase in resources to handle the increased length of route required to grit the roads.

OPTION 16B

9.2.6 Option 16B proposes the closure of the M3 northbound onslip at Junction 9. The closure of the onslip removes access to the M3 northbound at Junction 9 and forces traffic to find alternative routes to access the M3 northbound such as Junction 11 to the south of Winchester or Junction 7 to the south of Basingstoke.

¹ Asset Support Contract

² VMS – Variable Message Sign

- 9.2.7 Removing the northbound access to the M3 will force the Operations and Traffic Officer Service to take longer routes to access the M3 between Junction 11 and Junction 7, a distance of approximately 20 kilometres. If Option 16B is to be taken forward, further consideration must be given to providing access for the Operations and Traffic Officer Service in between the junctions at subsequent PCF¹ Stages.

OPTION 18

- 9.2.8 The proposed throughabout for Option 18 will increase the route length for the gritter trucks during winter operations by causing an additional, inefficient detour. This will require an increase in resources to handle the increased route.

9.3 DRIVER COMPLIANCE

- 9.3.1 Option 14 and 16A propose a free-flowing A34 southbound link with a three-step relaxation for the horizontal curvature. To mitigate this, a mandatory 50mph speed limit will be implemented on the southbound link. The link will require adequate signage to encourage appropriate driver behaviour.
- 9.3.2 The proposed Smart Motorway Plans for the M3 Junction 9 to 14 will utilise VMS's² to close lanes for accidents through the use of a red 'X' over the lane. The Traffic Officer Service expressed concern that compliance with the red 'X' for lane closures was not particularly high and causes safety concerns to Traffic Officers, especially in the proximity of merges and diverges. Further means of encouraging driver compliance will be considered at subsequent PCF Stages.

¹ PCF – Project Control Framework

² VMS – Variable Message Signs

10 TECHNOLOGY ASSESSMENT

10.1.1 The technology assessment outlines the option design implications for the utilisation of technology in terms of:

- ITS¹ Systems
- RCC² Systems and Sub Systems
- Communications Network

VARIABLE MESSAGES SIGNS

10.1.2 The VMS's located on the M3 mainline on the approach to Junction 9 in each direction will need to be relocated to accommodate the free-flowing links. For Option 11 and 14 this will require relocation of both VMS's. For Option 16A the southbound VMS will need to be relocated and for Option 16B the northbound. The location of the relocated VMS's would be determined based on their integration with the potential Junction 9 to 14 Smart motorway scheme and will be considered further at preliminary design.

10.1.3 The VMS's³ on the M3 mainline will not be affected by Option 18.

CCTV MASTS

10.1.4 The existing CCTV⁴ mast located at the Junction 9 roundabout will be relocated to fit the proposed dumbbell layout for Options 11 and 14. This should not affect the operation of the technology.

10.1.5 The existing CCTV mast will be unaffected by the Option 16A, 16B and 18 design.

TRAFFIC SIGNALS

10.1.6 The M3 Junction 9 roundabout is currently signalised on all arms, with the exception of the A272 Spitfire Link. The proposed throughabout provides a direct link between the A34 and M3 in the southbound direction. This option will require signals on the throughabout arm, additional signals within the roundabout and realignment of existing signals. This will have an operational effect on the existing ITS/RCC systems.

10.1.7 Options 11 and 14 propose a dumbbell layout which removes signalisation from the roundabout. Options 16A and 16B do not impact the existing roundabout arrangement, however the existing signals would need to have their phasing adjusted to allow for one direction of A34 traffic being removed from the roundabout.

¹ ITS – Intelligent Transport Systems

² RCC – Regional Control Centre

³ VMS – Variable Message Signs

⁴ CCTV – Closed Circuit Television

11 MAINTENANCE ASSESSMENT

- 11.1.1 The maintenance assessment outlines the design implication for the maintenance and repair of:
- Civil infrastructure; and
 - Road side technology.
- 11.1.2 The maintainability, including life cycle planning and accessibility for routine/reactive maintenance activities, of all road side assets is to be fully considered at PCF¹ Stage 5 during the detailed design.

11.2 CIVILS INFRASTRUCTURE

BRIDGES

- 11.2.1 The scheme proposes the construction of a number of new bridges:
- Option 11 – 6 new bridges;
 - Option 14 – 3 new bridges;
 - Option 16A – 1 new bridge;
 - Option 16B – 1 new bridge; and
 - Option 18 – 1 new bridge.
- 11.2.2 It should be noted that if Option 16A and 16B are combined together at some stage in the future, another bridge will be required for the proposed dumbbell layout.
- 11.2.3 The proposed bridges will be designed to minimise maintenance requirements and maximise access points. However, the proposed options will have an impact on the maintenance procedures and resources for the Area 3 ASC² Contractor, especially option 11 which proposes six new bridges.
- 11.2.4 Option 14, 16A and 16B propose to utilise existing road bridges for the free-flowing links, in this circumstance, maintenance access will be retained, or improved where possible. This should have no impact on the maintenance requirements of the bridge.

ROUNDBABOUT

- 11.2.5 The proposed dumbbell roundabout removes the existing subway access to the interior of the roundabout. Access arrangements into the interior roundabout will be considered further at subsequent PCF³ Stages with the Operations department stating their preference for access from the motorway verge between the bridges of each carriageway.

¹ PCF – Project Control Framework

² ASC – Asset Support Contract

³ PCF – Project Control Framework

ACCESS

- 11.2.6 The current Area 3 ASC¹ Contractor employs a policy of no live carriageway crossing, aimed at minimising the risk to its maintenance operatives. Highways England's Operation team recommended maintenance hardstanding on both sides of the carriageway to eliminate the need for carriageway crossings. The location of the maintenance hardstandings will be developed to provide access to multiple maintenance areas via footpaths or stairs.

11.3 ROAD SIDE TECHNOLOGY

VARIABLE MESSAGE SIGNS

- 11.3.1 The existing VMS² technology will be affected by each option as detailed in Chapter 10.
- 11.3.2 Access arrangements to the relocated VMS will be considered further at subsequent PCF Stages. This will not have a major impact on the maintenance procedures of the Area 3 ASC Contractor.

CCTV

- 11.3.3 The existing CCTV³ mast at Junction 9 will be affected by each option as detailed in Chapter 10. Access arrangements to the CCTV mast will be considered further at subsequent PCF Stages. Maintenance requirements for the CCTV mast should not change for the relocated mast.

TRAFFIC SIGNALS

- 11.3.4 The existing traffic signals at Junction 9 will be affected by each option as detailed in Chapter 10. Access arrangements to the proposed traffic signals will be considered further at subsequent PCF Stages. Maintenance requirements for any unchanged traffic signals would be as existing.

¹ ASC – Asset Support Contract
² VMS – Variable Message Sign
³ CCTV – Closed Circuit Television

12 ENVIRONMENTAL ASSESSMENT

12.1 INTRODUCTION

12.1.1 This section considers the relative merits of the alternative options, in relation to potential environmental effects, which have been assessed using professional judgement, based on experience from similar schemes, due to the limited data availability at this early stage of scheme development. The scheme area and study areas are described in section 3.5.

12.2 NOISE AND VIBRATION

- 12.2.1 Option 11 is the most extensive in terms of the number and length of new and realigned roads and associated structures, and consequently this option is likely to have the greatest potential to generate significant noise and vibration effects during construction. Option 18 has the least extensive construction area and structures and is therefore likely to have the least potential to generate significant noise and vibration effects. However, this does not necessarily mean that there will be significant adverse effects associated with any of the options. The likelihood of a significant noise and vibration effect arising will depend on, amongst other things, the number and proximity of NSRs¹, the timing and duration of works and how all construction and demolition processes are managed.
- 12.2.2 All the options have few, if any, NSRs close to the main focus of activity. Therefore, it is likely that construction related noise and vibration effects would mainly affect those NSRs that are located in areas near where the existing roads will join the new alignments (i.e. at the periphery of the junction, rather than at its heart). The risk of significant construction noise and vibration effects on NSRs will be minimised by appropriate measures in the CEMP², which will be applied throughout the construction phase.
- 12.2.3 While there is potential for significant operational noise and vibration effects associated with all of the options, It is reasonable to assume that the potential for such effects would be greatest for Option 11 (the option with the most extensive changes and potential for varying traffic flows) and least for Option 18 (the option with the least extensive changes). Of those remaining, Options 14 and 16A would have greater potential to cause adverse noise and vibration effects compared to Option 16B. This is because the new links forming Options 14 and 16A take a more easterly line, bringing traffic closer to sensitive receptors located off Easton Lane, compared with Option 16B where the majority of works are contained within the narrow corridor formed by the existing M3 and A34.
- 12.2.4 The preliminary overall ranking for noise and vibration would be Option 11, 14, 16A, 16B and 18, with Option 11 having the greatest potential to cause adverse effects and Option 18 the least.
- 12.2.5 The effects of noise on non-human receptors within the designated sites have been considered by the appropriate environmental topic e.g. biodiversity has considered the potential noise and vibration effects on the SAC and SSSI. With respect to human users of the designated sites, the information available at this time precludes any quantitative assessment of likely construction and operational traffic noise effects. Nonetheless, it can be concluded that there is potential for adverse effects to arise, with an associated loss of amenity and on this basis, consideration should be given to mitigation. This will be addressed during Stage 2.

¹ NSR – Noise Sensitive Receptors

² CEMP – Construction Environment Management Plan

12.3 AIR QUALITY

- 12.3.1 The risk of a significant construction air quality effect, either in terms of human receptors or designated scheme receptors, will be minimised by appropriate measures in the CEMP, which will be applied throughout the construction phase.
- 12.3.2 During operation, Option 11 is likely to result in fewest adverse air quality effects, as it has fewest human receptors in close proximity (50m) to the option alignment. Residential premises in the Abbots Worthy area would experience an improvement in air quality, due to the shift in centreline of the A34/A33, although this benefit is likely to be marginal. The other options will have a very similar effect, but can be ranked from lowest to highest in terms of exposure to air pollutants¹: with Option 11 followed by 16B, 18, 14 and 16A.
- 12.3.3 The assessment has considered effects on Designated Site receptors within 200m of the route alignments. The scheme options will have negligible effects on ambient annual mean NO_x and nitrogen deposition beyond 200m from the alignment. The options have been ranked from least to most exposed in terms of receptor locations to road sources of air pollutants associated with the scheme on the basis of the changes in road alignment. Option 11 is likely to result in the least effect on SAC² and SSSI³ designations as traffic emissions will affect smaller areas of the designated sites than other options on the basis of the changes in road alignment. Option 11 is followed by options 14, 16B, 16A and 18, in terms of the options least likely to result in adverse effects on the SAC and SSSI.
- 12.3.4 All 'with scheme' options are likely to improve traffic movements compared to the 'without scheme' scenario. They all have the potential to result in air quality benefits at human receptors and designated sites within the study area, dependent upon the trip generation and the redistribution of traffic as a result of the scheme.

12.4 GREENHOUSE GASES

- 12.4.1 Option 11 followed by options 14, 16A, 16B and 18 are the most likely to reduce congestion and encourage the free flow of traffic. Based on the assumption that there would be less congestion, it is reasonable to assume that there will be an improvement in GHG⁴ emissions associated with all the 'with scheme' options. The conclusion is based on the following reasoning:
- GHG emissions are altered when the flow of traffic is changed in terms of speed and or volume. Increased speed and stop/start traffic would have an adverse effect on emissions due to vehicles operating at lower fuel efficiency. Conversely, reducing queuing would have an overall beneficial effect on GHG emissions as vehicles are operating closer to optimum efficiency.
 - Roundabouts can cut down vehicular emissions and fuel consumption as well as improve traffic flow by reducing the vehicle idle time at intersections. Options 11, 14 and 16A include an offline dumbbell roundabout.
 - Equally, additional links to the junction to provide a greater area for traffic to move, will result in reduced queuing which applies to options 11, 14, 16A and 16B. Reduced queuing would

¹ It has not been possible to quantify air quality impacts at PCF stage 1 and so the ranking of options has been on the basis of road centreline proximity to receptors with consideration of likely changes in traffic characteristics (all options are likely to improve traffic movements).

² SAC - Special Areas of Conservation

³ SSSI - Sites of Specific Scientific Interest

⁴ GHG – Greenhouse gases

have an overall beneficial effect on GHG emissions due to vehicles operating closer to optimum efficiency.

- 12.4.2 Option 18 aims to reduce congestion and encourage free flow of traffic, but on a significantly reduced scale to the other options. As the proposed works are relatively modest, the potential effect on emissions will also be relatively modest. However, it is anticipated that the works will result in reduced idling time due to reduced congestion, and so will result in a small improvement in GHG emissions.
- 12.4.3 The improvements to congestion are also likely to attract additional vehicles to the M3/A34 (induced traffic), which may locally increase overall GHG emissions. The effect of each Option will be dependent on the combination of changes to the vehicle flow and speed, and the volume of induced traffic.

12.5 LANDSCAPE

LANDSCAPE AND VISUAL

- 12.5.1 The M3 is located adjacent to and partially within the SDNP¹. The extent of the direct and indirect effects on the SDNP will be relatively small and localised, in comparison to the large size of the SDNP. The overall magnitude of change on the SDNP as a whole would be low to negligible for Options 11, 14 and 16A, reducing to negligible for Option 16B and no change for Option 18, assuming appropriate mitigation.
- 12.5.2 The overall landscape character effects for the options would be slight adverse for Options 11, 14 and 16A reducing to neutral for Options 16B and 18.
- 12.5.3 Significant visual effects would be limited to Options 11, 14 and 16A, with more limited visual effects associated with Options 16B and 18.
- 12.5.4 The options which avoid Easton Down (Options 16B and 18) perform best in landscape and visual terms and are therefore ranked higher than the other options. Option 18 is ranked above Option 16B as it is slightly less visually intrusive. The lower ranking options are those which extend across Easton Down (Options 11, 14 and 16A). The ranking of options in terms of landscape and visual receptors is as follows: Option 18, Option 16B, Option 16A/Option 14 and Option 11.

ARBORICULTURE

- 12.5.5 Options 16B and 18 require the removal of only a relatively small area of established trees. These two options will therefore have the most limited effect on amenity during construction and the subsequent period of operation during which the replacement planting will establish and grow.

¹ SDNP – South Downs National Park

- 12.5.6** Conversely Option 11 will result in the greatest adverse effect on amenity over the short to medium term. This is because it requires the largest area of tree removals and will therefore have the biggest effect during both construction and the period between planting and the trees reaching a semi-mature age. This will be further compounded by the removal of an area of moderate quality trees and the effect that this will have on residents living close to the northbound carriageway of the A34. Options 14 and 16A will have a lesser short to medium term adverse effect than Option 11 both in terms of tree removal and geographical extent. While both require the removal of a smaller area of trees of unknown quality, Option 16A will necessitate the removal of approximately 2ha less trees than Option 14 and will therefore have the least magnitude of effect of the two.
- 12.5.7** The overall value of the arboricultural resource which is likely to be affected by the scheme is assessed as being low/moderate. This assessment is based solely upon its arboricultural merits (i.e. species and condition), does not account for any landscape or ecological values and has been reached without the benefit of any site survey work. An arboriculture survey will be undertaken at PCF¹ Stage 3 to provide further detail. The magnitude of effect during and immediately post-construction is likely to be medium adverse, however, this will be mitigated over time by planting, which is anticipated to have a medium beneficial effect. The overall long-term arboricultural effect of all options is therefore considered to be neutral on the basis that only predominately low quality trees will be affected and that an equal area of potentially more resilient trees will be planted, as mitigation, and will be established once construction is complete.

12.6 HERITAGE AND HISTORIC RESOURCES

- 12.6.1** Options which effect nationally significant heritage assets should be avoided where possible, however, if unavoidable, they would require careful mitigation through the design. All other physical effects to non-designated heritage assets can be mitigated through preservation by record.
- 12.6.2** Options 11, 14, 16A and 16B all have the potential for direct physical construction effects on known and previously unrecorded buried archaeology and earthworks.
- 12.6.3** Option 11 could potentially have a physical effect on nationally significant water meadows and therefore has the greatest potential for harm due to direct physical effects on nationally significant heritage assets.
- 12.6.4** Options 14, 16A, and 16B are similar in terms of their potential for harm, they are however considered to be less adverse than Option 11 as they cover a smaller area and the effects can be mitigated for. Options 14, 16A and 16B have the potential to have an adverse effect on non-designated buried archaeology and earthworks of up to regional significance, however, direct qualitative comparisons between them cannot be made without further, more detailed, assessment. Further stages of assessment would typically include both non-intrusive geophysical survey and intrusive archaeological investigation such as trial trenching, both of which would occur at PCF Stage 3. A Setting Assessment should be undertaken at PCF Stage 2 to assess any potential effects of the options on designated and nationally significant heritage assets.
- 12.6.5** Option 18 is considered to have a neutral effect on the historic environment. Due to the work previously undertaken during the original construction of the junction it is unlikely that the necessary works will create any additional effect to buried archaeology. The additional sections of carriageway will potentially be at the same elevation, or slightly higher, than the existing road layout and therefore this option is unlikely to have any effect on the setting of designated or locally listed assets.

¹ PCF – Project Control Framework

- 12.6.6 There would be no further effects on heritage and historic resources during the operational phase of the options.

12.7 BIODIVERSITY

- 12.7.1 Option 18 is least likely to result in significant ecological effects, primarily due to the limited footprint located within the existing junction. While this option may have temporary effects associated with the removal of tree and shrub vegetation, measures to replace and enhance habitat would form part of the designs and avoid any permanent, adverse effects upon ecological features.
- 12.7.2 Options 11, 14, 16A and 16B all require the removal of semi-natural habitat to the north of the existing roundabout and are in closer proximity to the River Itchen SAC¹ and SSSI².
- 12.7.3 Option 11 would have the greatest ecological effects, as it would result in:
- Damage to the integrity of Easton Down SINC³
 - Fragmentation of retained calcareous grassland habitat
 - Potential effects upon habitat hydraulically connected to the River Itchen SAC and SSSI.
- 12.7.4 Options 14, 16A and 16B have a smaller footprint, however, they still require land take from habitat that is of nature conservation value at the County scale.

12.8 GEOLOGY AND SOILS

- 12.8.1 There will likely be a neutral or slight adverse effect on geology and geomorphology, soils, built environment and future end users as there are no geological features of importance such as geological SSSIs and RIGS⁴; the built environment may be effected by ground gas during the construction of the Scheme and direct contact for end users with potentially contaminated material post-construction will be limited due to the presence of the roadway.
- 12.8.2 There is potential for a slight adverse effect on construction workers as there is the potential for adverse effects to health due to oral, inhalation or dermal contact with potential contaminants within soils during any ground disturbance.
- 12.8.3 There is potential for a slight or moderate adverse effect on groundwater in relation to soils as there is potential for elevated concentrations of contaminants based on current and historic land use.
- 12.8.4 There is potential for a temporary moderate to large adverse effect on surface water and ecology in relation to soils as during construction there is the potential for the mobilisation of soil/sediment, both natural and potentially contaminated which could effect surface waters, altering ecological parameters.
- 12.8.5 Option 18 is the least likely to result in significant effects on geology and soils as the extent of the earthworks and works within the River Itchen are minimal. Option 16B is considered to have the potential for the second least effects as it does not intend to disturb the Spitfire Link Landfill. Options 14 and 16A have the joint next most potential for adverse effects as they involve a similar degree of disturbance and excavation within the Spitfire Link Landfill. Option 11, is considered to pose the greatest risk of effects occurring as it has the largest extent of earthworks and the requirement for works within the River Itchen.

¹ SAC - Special Areas of Conservation

² SSSI - Sites of Specific Scientific Interest

³ SINC - Sites of Importance for Nature Conservation

⁴ RIGS - Regionally Important Geological Sites

12.9 WATER ENVIRONMENT

- 12.9.1 Option 11, is considered to have the greatest likelihood of resulting in adverse effects on the water environment. This is primarily due to Option 11 needing the largest scale of works as the proposed alignment is longer than the other options and the need for the alignment to cross the River Itchen in three locations (the other options do not cross the river). Given the National and European designations of the River Itchen, the crossing of the watercourse increases the risk of this option having significant effects to the surface water features within the study area. There is also the potential for adverse effects from direct migration of pollutants to the ground and the Principal Aquifer (Seaford and Newhaven Chalk Formation) underlying the scheme. The need for the Option 11 alignment to cross the River Itchen may also result in additional effects in terms of flood risk and on the river itself. The potential for adverse effects will be assessed in more detail at PCF¹ Stage 2 when further design information will be available.
- 12.9.2 Options 14, 16A, 16B and 18 all have the potential to increase the risk of surface water and groundwater pollution, as well as increasing flood risk within the study area and to neighbouring areas; however these options do not cross the River Itchen and are therefore, anticipated to have a lower potential to result in adverse effects on the water environment. Option 14 is anticipated to have the next greatest potential for adverse effects after Option 11, as it will involve the next greatest extent of works. The potential pollution risks to surface water and groundwater bodies from the construction and operation of the highway alignment are therefore, greater than those for options 16A, 16B and 18. Option 16A is anticipated to have the next greatest potential for adverse effects on the water environment, again due to the scale of the extent of the works followed by Option 16B.
- 12.9.3 Option 18 is least likely to result in significant effects to the water environment due to the limited footprint located within the existing junction and because it requires the least structures and interventions. Furthermore, Option 18 is the only option that is not at risk of fluvial or surface water flooding and will therefore not effect on flood risk within the scheme area or surrounding study area.
- 12.9.4 The potential adverse effects associated with the construction of all scheme options will be mitigated through the implementation of a CEMP². Potential for residual effects is likely to remain for Options 11, 14, 16A and 16B given the potentially short distance of the highway drainage system to the River Itchen.
- 12.9.5 The proposed drainage strategy for all options will incorporate attenuation and treatment stages. Flood storage displacement will be mitigated by compensatory storage and / or features that accommodate obstructed flow routes. Any proposed crossings will incorporate mitigation measures to reduce their effect on ecology. At this stage the above mitigation measures have not been confirmed. Further investigation on the types and location of mitigation measures that will be required will be undertaken as part of PCF Stage 2 and 3.
- 12.9.6 It is not possible to differentiate between the proposed options in relation to groundwater, based on the limited information that is currently available. If groundwater is intercepted by the scheme options, groundwater mitigation will be required. A detailed information gathering exercise will be completed at PCF Stage 2 in order to enable conceptualisation and assessment of the scheme options effects to the groundwater environment.

¹ PCF – Project Control Framework

² CEMP – Construction Environment Management Plan

12.10 PEOPLE AND COMMUNITIES

- 12.10.1 The alignment alterations will have a restricted view with frequent cuttings for Options 11, 14, 16A and 16B; and for Option 18 a short section with a restricted view with frequent cuttings.
- 12.10.2 For all options driver stress may be temporarily adversely affected by construction works but will reduce in the locality of the new layout as the traffic flows improve. There may be a slight increase in stress while regular users acclimatise to the new layout, but this is likely to be very short term.
- 12.10.3 For all options non-motorised user amenity will potentially be affected on public rights of way during construction, and these will require suitable diversions and/or new crossing points in order to prevent significant changes in journey time or journey length. An NMU Context Report has been completed during PCF Stage 1 which identifies the current issues with NMU facilities. In PCF Stage 2 further consideration will be given to NMU issues and consultation will be conducted with NMU user groups to understand how the routes are currently used. This will be followed by a further assessment of NMU issues and consideration of mitigation and enhancement measures.
- 12.10.4 None of the options are considered to have the potential to adversely affect community and private assets; tourism or recreational facilities; future housing developments; require the demolition of existing housing or cause severance.
- 12.10.5 All of the options are likely to have a beneficial effect on commuter journeys through the junction and on the A34 and it is not likely there will be any direct effects on the areas of strategic growth and employment land allocations within Winchester which would disproportionately affect any vulnerable groups.
- 12.10.6 Option 11 is likely to bring about the greatest level of disruption to People and Communities due to its magnitude in comparison to the other four options, but the overall effect of each option is likely to be minimal and as such it is difficult to differentiate between the five options in this context. Therefore, in order to rank the five options in terms of effect on People and Communities, the size of the proposed scheme has been utilised as the key determinate. The ranking for People and Communities is Option 11, 14, 16A, 16B and 18 in descending order of potential for the highest effect.

12.11 CONCLUSION

- 12.11.1 Considering all of the above environmental topics Option 18 is likely to have the least adverse effects during both construction and operation followed by 16B, 16A, 14 and 11. However, it should be noted that Options 16B, 16A, and 14 are ranked very similarly in the environmental appraisal given the similarities in their design.

13 APPRAISAL SUMMARY

13.1 APPRAISAL SUMMARY TABLES (AST'S)

Please refer to Appendix F.

14 PROGRAMME

14.1 SCHEME LEVEL PROGRAMME

- 14.1.1 Programmes are presented below for each option, which illustrate the anticipated development and delivery of the M3 Junction 9 scheme. Each option's programme is based upon envisaged timescales if the current Highways England PCF¹ approach is adopted without modification.
- 14.1.2 All information presented below will be subject to ongoing 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 – solidifies.
- 14.1.3 PCF Stage 7 for each option is anticipated to be approximately five years in duration as it includes the Contractor's defects period.

Table 14-1: Programme Summary & Key Milestones for Option 11

PCF STAGE	KEY MILESTONES	START DATE	TARGET COMPLETION DATE	PCF STAGE DURATION
0	Completion of Stage 0	June 2015	October 2015	4 months
1	SGAR1 ²	November 2015	November 2016	13 months
2	SGAR2	December 2016	November 2017	12 months
3	SGAR3	December 2017	June 2018	7 months
4	SGAR4	July 2018	December 2019	18 months
5	SGAR5	January 2020	December 2020	12 months
6	SGAR6	January 2021	July–October 2023	27-30 months
7	SGAR7	August–November 2023	July–October 2028	60 months

Table 14-2: Programme Summary & Key Milestones for Option 14

PCF STAGE	KEY MILESTONES	START DATE	TARGET COMPLETION DATE	PCF STAGE DURATION
0	Completion of Stage 0	June 2015	October 2015	4 months
1	SGAR1	November 2015	November 2016	13 months
2	SGAR2	December 2016	November 2017	12 months
3	SGAR3	December 2017	June 2018	7 months
4	SGAR4	July 2018	December 2019	18 months
5	SGAR5	January 2020	December 2020	12 months
6	SGAR6	January 2021	December 2022–March 2023	24-27 months
7	SGAR7	January 2023–April 2023	December 2027– March 2028	60 months

¹ PCF – Project Control Framework

² SGAR – Stage Gate Assessment Review

Table 14-3: Programme Summary & Key Milestones for Option 16A

PCF STAGE	KEY MILESTONES	START DATE	TARGET COMPLETION DATE	PCF STAGE DURATION
0	Completion of Stage 0	June 2015	October 2015	4 months
1	SGAR1	November 2015	November 2016	13 months
2	SGAR2	December 2016	November 2017	12 months
3	SGAR3	December 2017	June 2018	7 months
4	SGAR4	July 2018	December 2019	18 months
5	SGAR5	January 2020	November 2020	10 months
6	SGAR6	December 2020	June-September 2022	18-21 months
7	SGAR7	July-October 2022	June-September 2027	60 months

Table 14-4: Programme Summary & Key Milestones for Option 16B

PCF STAGE	KEY MILESTONES	START DATE	TARGET COMPLETION DATE	PCF STAGE DURATION
0	Completion of Stage 0	June 2015	October 2015	4 months
1	SGAR1	November 2015	November 2016	13 months
2	SGAR2	December 2016	November 2017	12 months
3	SGAR3	December 2017	June 2018	7 months
4	SGAR4	July 2018	December 2019	18 months
5	SGAR5	January 2020	September 2020	8 months
6	SGAR6	October 2020	December 2021-March 2022	15-18 months
7	SGAR7	January-April 2022	December 2026- March 2027	60 months

Table 14-5: Programme Summary & Key Milestones for Option 18

PCF STAGE	KEY MILESTONES	START DATE	TARGET COMPLETION DATE	PCF STAGE DURATION
0	Completion of Stage 0	June 2015	October 2015	4 months
1	SGAR1	November 2015	November 2016	13 months
2	SGAR2	December 2016	November 2017	12 months
3	SGAR3	December 2017	June 2018	7 months
No Stage 4				0 months
5	SGAR5	July 2018	March 2019	8 months
6	SGAR6	April 2019	May-November 2020	12-18 months
7	SGAR7	June - December 2020	May-November 2025	60 months

15 CONCLUSION AND RECOMMENDATIONS

15.1 OPTIONS FOR PUBLIC CONSULTATION

15.1.1 The five options presented in this report have been assessed under the following headings:

- Environmental Effect
- Buildability and Programme
- Option Cost
- BCR¹ and VfM²
- Compatibility with Scheme Objectives

15.2 ENVIRONMENTAL EFFECT

15.2.1 Chapter 12 of this report summarised the findings of the ESR³, which considered the environmental effects of each option. Please note that these findings are not definitive, and will be subject to review as more detailed, quantitative assessments are undertaken in future PCF⁴ stages. This may change the potential effects – and their significance – identified throughout this document.

15.2.2 Table 15-1 summarises the potential effects associated with each option during the construction phase. It uses the seven point scale from WebTAG⁵ and assumes normal mitigation measures. Where several different effects arise from a DMRB⁶ topic, or the receptors are affected to a differing degree, the score in Table 15-1 presents the most significant associated with that topic.

Table 15-1: Potential construction environmental effects

DMRB TOPIC	OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
Air Quality	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Cultural Heritage	Very Large Adverse	Moderate	Moderate	Moderate	Neutral
Landscape	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Nature Conservation	Large Adverse	Moderate	Moderate	Moderate	Slight Adverse
Geology and Soils	Large Adverse	Moderate	Moderate	Moderate	Slight Adverse

¹ BCR – Benefit to Cost Ratio

² VfM – Value for Money

³ ESR – Environmental Study Report

⁴ PCF – Project Control Framework

⁵ WebTAG – Transport Analysis Guidance

⁶ DMRB – Design Manual for Roads and Bridges

DMRB TOPIC	OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
Materials	Large Adverse	Moderate	Moderate	Moderate	Slight Adverse
Noise and Vibration	Slight Adverse				
People and Communities	Slight Adverse				
Road Drainage and Water Environment	Large Adverse				

15.2.3 The most significant construction effects are associated with Option 11 due to its larger construction footprint and crossing of the River Itchen. The scheme has the potential to have large adverse construction effects in relation to the following topics:

- Cultural Heritage for Option 11 due to the potential for a significant effect on nationally significant water meadows as well as direct physical effects on known and previously unrecorded buried archaeology and earthworks
- Nature Conservation for Option 11 which would require the removal of semi-natural habitat, is in close proximity to the River Itchen SAC¹ and SSSI², and include land take from Easton Down SINC³ and Easton Lane RVEI⁴. Option 11 would also potentially damage the integrity of Easton Down SINC; fragment retained calcareous grassland habitat; and effect upon habitat hydraulically connected to the River Itchen SAC and SSSI.
- Geology and Soils for Option 11 due to the extent of the earthworks and the requirement for works within the River Itchen
- Materials for Option 11 due to the extent of the works required
- Road Drainage and the Water Environment for all options as there is potential to increase the risk of surface water and groundwater pollution as well as increasing flood risk, however any increased flood risk would be mitigated as part of the detailed design. This is particularly the case for Option 11 due to the scale of works and the crossing of the River Itchen in three locations. The other options do not cross the river but Option 14 is anticipated to have the next greatest potential for adverse effects after Option 11 as it will involve the next greatest extent of works, followed by Options 16A, 16B and 18 due to their respective sizes.

15.2.4 There is the potential for the scheme to have a moderate adverse construction effect in relation to the following topics:

- Cultural Heritage for Options 14, 16A and 16B due to the potential for direct physical effects on known and previously unrecorded buried archaeology and earthworks
- Nature Conservation for Options 14, 16A and 16B which would require the removal of semi-natural habitat; are in close proximity to the River Itchen SAC and SSSI and includes land take from Easton Lane RVEI for Option 14 and 16A.

¹ SAC - Special Areas of Conservation

² SSSI - Sites of Specific Scientific Interest

³ SINC - Sites of Importance for Nature Conservation

⁴ RVEI – Road Verge of Ecological Importance

- Geology and Soils for Options 14,16A and 16B due to their reduced scale in comparison with Option 11. However, they still have the potential to effect groundwater in relation to soils from elevated concentrations of contaminants based on current and historic land use and the potential for the mobilisation of soil/sediment, both natural and potentially contaminated which could effect surface waters.
- Materials for Options 14,16A and 16B due to a reduced scale in comparison with Option 11 but still of significant extent

15.2.5 Potential construction effects are not expected to differ significantly between the five options for several topics, namely: Air Quality; Landscape; Noise and Vibration; and People and Communities as there will likely be a marginal difference between the effects of each option in relation to these topics.

15.2.6 Table 15-2 summarises the potential effects associated with each option during the operational phase. It uses the seven point scale from WebTAG¹ and assumes the mitigation measures, described in the ESR² are adopted. Where several different effects are described in a DMRB³ topic, or the receptors are likely to be affected to a differing degree, the score in Table 15-2 presents the most significant effect associated with that topic.

Table 15-2: Potential operational environmental effects

DMRB TOPIC	OPTION 11	OPTION 14	OPTION 16A	OPTION 16B	OPTION 18
Air Quality	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial
Cultural Heritage	Neutral	Neutral	Neutral	Neutral	Neutral
Landscape	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Neutral
Nature Conservation	Very Large Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Geology and Soils	Moderate	Moderate	Moderate	Moderate	Moderate
Materials	Neutral	Neutral	Neutral	Neutral	Neutral
Noise and Vibration	Slight Adverse	Slight Adverse	Slight Adverse	Neutral	Neutral
People and Communities	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Road Drainage and Water Environment	Very Large Adverse	Very Large Adverse	Very Large Adverse	Very Large Adverse	Large Adverse

¹ WebTAG – Transport Analysis Guidance

² ESR – Environmental Study Report

³ DMRB – Design Manual for Roads and Bridges

- 15.2.7 The scheme has the potential to have a large adverse operational effect on Nature Conservation for Option 11 which would require land take from Easton Down SINC and bring traffic closer to the SINC¹.
- 15.2.8 There is also potential for large adverse operational effects on Road Drainage and the Water Environment for all options due to the potential for an increase in the deposition of pollutants that may be transferred to the water environment via the highway drainage system. The large adverse score is derived due to the sensitivity of the water receptors and the limited design information that is available at this stage, this score could be reduced during PCF Stage 2 and 3 as additional baseline information is collected, mitigation measures developed and further assessments conducted. In addition, works for Option 11 would be in areas of fluvial flood risk and would potentially include works that may impact on the flow of the River Itchen. The proposed drainage strategy for all options will incorporate attenuation and treatment stages. Flood storage displacement will be mitigated by compensatory storage and / or features that accommodate obstructed flow routes. Any proposed crossings will incorporate mitigation measures to reduce their effect on ecology.
- 15.2.9 There is the potential to have a moderate adverse operational effect for all options on Geology and Soils for groundwater in relation to soils from elevated concentrations of contaminants based on current and historic land use.
- 15.2.10 Potential operational effects are not expected to differ significantly between the five options for several topics, namely: Air Quality; Cultural Heritage; Materials; and People and Communities as there will likely be a marginal difference between the effects of each option in relation to these topics.
- 15.2.11 Considering all of the above environmental topics Option 18 is likely to have the least adverse effects during both construction and operation followed by 16B, 16A, 14 and 11 due to the extent of each option and the proximity of sensitive receptors. However, it should be noted that Options 16B, 16A, and 14 are ranked very similarly in the environmental appraisal given the similarities in their design.

15.3 BUILDABILITY AND PROGRAMME

- 15.3.1 For all options it is important to ensure that access between the A34 and M3 in both directions is maintained at all times during construction. This would require further detailed investigation in subsequent PCF² Stages.
- 15.3.2 In terms of buildability, the options were all designed to maximise offline construction thereby improving the safety to construction workers and reducing the complexity of the interfaces with traffic under traffic management. Examples of this include:
- Option 11 & 14 – the A34 alignments have been designed to allow the bridges to be built offline as well as a majority of the proposed new link roads. The design of the proposed Junction 9 dumbbell roundabout allows construction mostly offline allowing the existing roundabout to remain unaffected for a majority of the construction period.
 - Option 16A – the A34 southbound meets the M3 as a one lane merge and one lane gain to allow this option to be built without effecting the existing Junction 9 bridges and roundabout.

¹ SINC - Sites of Importance for Nature Conservation

² PCF – Project Control Framework

This therefore reduces the need for TTM¹ during construction at the existing Junction 9 roundabout.

- Option 16B – the A34 northbound diverges from the M3 as a one lane diverge and one lane drop to allow this option to be built without effecting the existing Junction 9 bridges and roundabout. This therefore reduces the need for TTM during construction at the existing Junction 9
- Option 18 - The design of the proposed Junction 9 throughabout allows construction mostly offline thereby reducing construction effects on the existing roundabout.

15.3.3 It is currently anticipated that the options could be constructed within the following timescales as detailed in Chapter 14:

- Option 11 – 27-30 months
- Option 14 – 24-27 months
- Option 16A – 18-21 months
- Option 16B – 15-18 months
- Option 18 – 12-15 months

OPTION COST

15.3.4 The expected cost for each option are shown in Table 15-3.

Table 15-3: Expected Option Cost expressed in 2014 Prices

OPTION	TOTAL SCHEME COST (£)
Option 11	186.8M
Option 14	134.1M
Option 16A	59.4M
Option 16B	45.2M
Option 18	18.7M

¹ TTM – Temporary Traffic Management

15.4 BCR¹ AND VfM²

15.4.1 Table 15-4 summarises the adjusted BCR and the corresponding VfM category for each option. The stated VfM is based on definition set out within WebTAG³ guidance, as follows:

- Poor VfM if BCR is less than 1.0
- Low VfM if BCR is between 1.0 and 1.5
- Medium VfM if BCR is between 1.5 and 2.0
- High VfM if BCR is between 2.0 and 4.0
- Very high VfM if BCR is greater than 4.0

Table 15-4: Summary Comparison of BCR and VfM Assessments

OPTION	BCR, WITH BENEFITS FROM ACCIDENT SAVINGS APPLIED	VFM CATEGORY
Option 11	1.31	Low
Option 14	1.88	Medium
Option 16A	1.83	Medium
Option 16B	2.54	High
Option 18	2.00	High

15.5 COMPATIBILITY WITH SCHEME OBJECTIVES

OPTIONS THAT FULFIL SCHEME OBJECTIVES

15.5.1 Options 11 and 14 are considered to be compatible with the scheme objectives set out within the [Client Scheme Requirements](#) by providing free flowing links between the M3 south of Junction 9 and the A34 in both directions.

Table 15-5: Cost, BCR and VfM summary table for Options 11 and 14

OPTION	TOTAL SCHEME COST (£)	BCR, WITH BENEFITS FROM ACCIDENT SAVINGS APPLIED	VFM ⁴ CATEGORY
Option 11	186.8M	1.31	Low
Option 14	134.1M	1.88	Medium

¹ BCR – Benefit to Cost Ratio

² VfM – Value for Money

³ WebTAG – Transport Analysis Guidance

⁴ VfM – Value for Money

- 15.5.2 Table 15-5 summarises the Cost, BCR and VfM for Options 11 and 14. Option 11 has the lowest BCR of all the options and has the greatest effect on the environment. If this option were to progress to PCF Stage 2, further work could be investigated to reduce the overall cost of the option and hence increase the BCR such as:
- Reducing the land acquisition estimate to reflect the recent change to the batter treatments - The batters have been steepened in areas of cut and therefore the scheme footprint has been reduced as a result. The existing land acquisition estimate is based on the original batter treatment.
 - Refining the link cross-sections - Due to the high level nature of the design at PCF Stage 1, refinements to lane arrangements and cross-sections may be possible at PCF Stage 2 to reduce the overall scheme footprint and therefore the cost.
 - Reducing the A34 merge and diverge provision with the M3 – depending on the traffic flows it may be possible to get a departure to reduce the provision to a single lane merge or diverge.
 - Consider realigning the A34 northbound link and A33 diverge to be similar to Option 14, therefore removing the need for the bridge over the A33.
 - Consider removing the northbound onslip to the M3 – this will remove the need for the A34 Northbound bridge over the northbound M3 onslip as well as narrowing the A34 southbound bridge under the M3 due to the removal of the northbound onslip over it. This would considerably reduce the cost of the scheme, but is likely to also reduce the benefits.
- 15.5.3 It is unlikely however that these items will reduce the significant environmental effect of the option or increase the BCR¹ enough for Option 11 to provide a scheme that gives “high” VfM. Option 14 was specifically developed for the purpose of providing a fully compliant option which minimises environmental effects while also providing higher VfM compared to Option 11.
- 15.5.4 Option 14 has the third highest BCR² of all options. The BCR is marginally less than 2 and it is likely that with further development during PCF³ Stage 2 the cost of the scheme could be reduced or the benefits from the scheme increased and therefore the BCR increased to greater than 2, which would make it an option with high Value for Money. Some areas where the scheme cost could be reduced or benefits increased include:
- Reducing the land acquisition estimate to reflect the recent change to the batter treatments – similar to the further considerations proposed in Option 11 above.
 - Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.
 - Consider removing the northbound onslip to the M3 – similar to the further considerations proposed in Option 11 above.
 - Reducing the A34 merge and diverge provision with the M3 – depending on the traffic flows it may be possible to get a departure to reduce the provision to a single lane merge or diverge.
 - Consider reducing the A33 diverge cross-section – it may be possible to reduce the lane widths at the A33 diverge to reduce the works required at this localised location.

¹ BCR – Benefit to Cost Ratio

² BCR - Benefit to Cost Ratio

³ PCF – Project Control Framework

- The design speed used on the A34 Southbound has currently been assumed to be 85kph with a two step relaxation as a worst case scenario. It is likely that further benefits would be recognised in PCF Stage 2 as a result of this design speed changing to 100kph as agreed with Highways England PTS¹. This should be updated in future traffic and economic modelling and is likely to increase the benefits for Option 14.

15.5.5 Of the two options that fully meet the scheme objectives, Option 14 has the lower cost, lower environmental effect and higher BCR in comparison to Option 11. Both options exceed the scheme budget allocated by Highways England.

OPTIONS THAT PARTIALLY FULFIL SCHEME OBJECTIVES

15.5.6 Option 16A and 16B as individual options are considered to be only partially compatible as they each only provide free flowing links in one direction. They have been developed to facilitate the incremental delivery of Option 14 in two or more phases to suit the scheme budget available to Highways England.

15.5.7 It should be noted that combining Options 16A and 16B does not provide a direct comparison with Option 14 as 16A and 16B do not include the M3 northbound onslip with its bridge over the A34 southbound link or the new dumbbell roundabout at Junction 9. The delivery in phases is likely to still require the whole scheme to be considered at DCO², but would result in higher overall costs compared to Option 14 due to increased preliminaries and the effects of inflation. In addition, if Option 16B is built before Option 16A this would reduce the availability of working space for the building of the M3 underpass during the construction of 16A in order to realign the A34 Southbound from its position as part of Option 16B which will also involve additional cost compared to building Option 16A first.

Table 15-6: Cost, BCR and VfM summary table for Options 16A and 16B

OPTION	TOTAL SCHEME COST (£)	BCR, WITH BENEFITS FROM ACCIDENT SAVINGS APPLIED	VFM CATEGORY
Option 16A	59.4M	1.83	Medium
Option 16B	45.2M	2.54	High

15.5.8 Table 15-6 summarises the Cost, BCR and VfM for Options 16A and 16B. Option 16A has the second lowest BCR of all options and only partially fulfils the scheme objectives as it only provides a free flowing link between the A34 in the southbound direction and the M3 south of Junction 9. The BCR is also currently estimated at being marginally less than 2. It is possible with further development during PCF Stage 2 the cost of the scheme could be reduced or the benefits from the scheme increased and therefore the BCR increased to greater than 2, which would make it an option with high Value for Money. Some areas where the scheme cost could be reduced include:

- Reducing the land acquisition estimate to reflect the recent change to the batter treatments - similar to the further considerations proposed in Option 11 above.
- Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.

¹ PTS – Professional Technical Services

² DCO – Development Consent Order

- The design speed used on the A34 Southbound has increased from 85kph to 100kph since the economics were assessed during PCF Stage 1, following discussion with Highways England PTS. This is likely to increase the benefits for Option 14.

- 15.5.9 Any reduction of cost or increase in benefits for Option 16A as a result of the above changes will be of a reduced scale compared to Option 14 as it is a smaller scheme. The increase in BCR¹ is therefore likely to be less significant.
- 15.5.10 Option 16B, although having the highest BCR of all options and already providing high Value for Money, only partially fulfils the scheme objectives as it only provides a free flowing link between the M3 south of Junction 9 and the A34 in the northbound direction. In addition this option removes the existing facility of a northbound on slip to the M3 from Junction 9. If required, some areas where the scheme cost could be reduced or benefits increased include:
- Consider reducing the A33 diverge cross-section – it may be possible to reduce the lane widths at the A33 diverge to reduce the works required at this localised location.
 - Refining the link cross-sections - similar to the further considerations proposed in Option 11 above.
- 15.5.11 Both of these items are unlikely to significantly affect the BCR due to the reduced scale of works required compared to Options 11 or 14.
- 15.5.12 Option 16B has the lower cost, lower environmental effects and higher BCR compared to Option 16A. Both options are within the scheme budget currently available to Highways England.

OPTIONS THAT DO NOT FULFIL SCHEME OBJECTIVES

- 15.5.13 Option 18 is not considered to be compatible with the scheme objectives as it does not provide free flowing links between the A34 and M3.

Table 15-7: Cost, BCR and VfM summary table for Options 18

OPTION	TOTAL SCHEME COST (£)	BCR, WITH BENEFITS FROM ACCIDENT SAVINGS APPLIED	VFM CATEGORY
Option 18	18.7M	2.00	High

- 15.5.14 Table 15-7 summarises the Cost, BCR and VfM for Options 18. Although overall it has the second highest BCR, the benefits are all driven by the improvements to the A34/A33 diverge and not the throughabout which would be over capacity and contributes a small disbenefit.

¹ BCR – Benefit to Cost Ratio

15.6 OPTIONS RECOMMENDED FOR PUBLIC CONSULTATION

- 15.6.1 It is recommended that Option 14 is taken forward for further development within PCF¹ Stage 2, as it is the option that has the lower environmental effects, lower cost and higher VfM that fully complies with the scheme considerations. It is also unlikely to be less safe than Option 11 as the proposed horizontal curve and speed limit is similar to the existing A34 approach to Junction 9 and is of a similar standard to other motorway to motorway links on the local network. An assessment of the safety implications of the proposed departures from standard in accordance with GD04/12 will be undertaken during PCF Stage 2. It is likely that the “Medium” VfM category this option currently has would be increased to ‘high’ with further design and cost refinement during PCF Stage 2. It is however not currently within the scheme budget available to Highways England.
- 15.6.2 It is also recommended that both Option 16A and 16B are taken forward for further development within PCF Stage 2, having achieved a “Medium” and “High” VfM category respectively and due to the high likelihood of the BCR, and therefore VfM, increasing even more with further design and cost refinement. It is advisable to continue developing both options even though only one would be built initially as they are both required in the long term to enable the completion of an eventual fully compliant option equivalent to Option 14. These options individually are within the available budget, however they do not fully comply with the scheme objectives.
- 15.6.3 The economic analysis supporting these two options will be continuously refined during subsequent PCF Stages to give Highways England and stakeholders a continued confidence in the economic justification for the scheme.

¹ PCF – Project Control Framework

16 DETAILED COST ESTIMATE

16.1 OPTION COST COMPARISON

- 16.1.1 Table 16-1 over the page provides a summary of the detailed cost estimate for each option. The option estimates are provided by cost estimates consultants on working on behalf of Highways England.
- 16.1.2 Cost estimates for the scheme will be subject to change in future PCF¹ stages, when more detailed assessments and design developments are undertaken.

¹ PCF – Project Control Framework

Table 16-1: Summary of Detailed Cost Estimate for Each Option

OPTION		WORKS ESTIMATE	UNSCHEDULED ITEMS	UNCERTAINTY ¹	RISK	PORTFOLIO RISK	INFLATION ²	SCHEME TOTAL
Option 11	Min	68.390	2.600	-0.588	1.970	9.423	57.713	139.507
	Expected	100.420	3.900	8.701	20.440	13.284	40.086	186.831
	Max	149.322	5.200	31.543	42.401	16.572	22.870	267.909
Option 14	Min	48.652	1.861	-0.558	1.390	6.877	40.632	98.852
	Expected	73.178	2.791	6.198	14.414	9.733	27.737	134.051
	Max	112.137	3.721	12.873	29.885	12.130	15.151	185.897
Option 16A	Min	21.170	0.664	-0.023	0.671	3.043	17.983	43.507
	Expected	31.467	0.996	4.732	6.952	4.393	10.879	59.419
	Max	50.675	1.328	9.722	14.391	5.542	4.252	85.910
Option 16B	Min	15.011	0.519	0.000	0.515	2.373	13.610	32.028
	Expected	22.748	0.779	4.369	5.335	3.405	8.552	45.188
	Max	35.085	1.038	8.982	11.039	4.276	3.290	63.710
Option 18	Min	6.838	0.198	0.028	0.218	0.990	5.260	13.532
	Expected	10.279	0.297	1.513	2.222	1.463	2.918	18.692
	Max	16.785	0.395	3.580	4.533	1.875	0.130	27.298

All figures shown in million pounds and rounded to 3 decimal places, in 2014 prices.

¹ Negative uncertainties given in the minimum case are as a result of opportunities to recycle existing pavement

² Including range narrowing

17 LIST OF ENCLOSURES

17.1 APPENDIX A – COLLISION PLOTS

17.2 APPENDIX B – SUMMARY OF EXPLORATORY BOREHOLE DATA FROM THE BGS

17.3 APPENDIX C – EXISTING EARTHWORK DETAILS

17.4 APPENDIX D – PROPOSED OPTION DRAWINGS

→ Option 11:

- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50001 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50002 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50003 Revision P2

→ Option 14:

- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50004 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50005 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50069 Revision P2

→ Option 16A:

- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50006 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50007 Revision P2

→ Option 16B:

- Drawing no HE551511-WSP-HGN-M3J9PCF1-DR-D-50008 Revision P2
- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50068 Revision P2

→ Option 18:

- Drawing no: HE551511-WSP-HGN-M3J9PCF1-DR-D-50009 Revision P2

17.5 APPENDIX E – REJECTED OPTION

→ Rejected option sketches

17.6 APPENDIX F – APPRAISAL SUMMARY TABLES

- Appraisal Summary Table Option 11
- Appraisal Summary Table Option 14
- Appraisal Summary Table Option 16A
- Appraisal Summary Table Option 16B
- Appraisal Summary Table Option 18

Appendix A

COLLISION PLOTS

Appendix B

SUMMARY OF EXPLORATORY BOREHOLE DATA FROM THE BGS

Appendix C

EXISTING EARTHWORK DETAILS

Appendix D

OPTION DRAWINGS

Appendix E

REJECTED OPTIONS DRAWINGS

Appendix F

APPRAISAL SUMMARY TABLES