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Rushmoor Local Plan Reference number 106930 24/01/2018

## **TRANSPORT IMPACTS AND MITIGATION**

REPORT





# SYSTIA

## **RUSHMOOR LOCAL PLAN**

## TRANSPORT IMPACTS AND MITIGATION

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## **EXECUTIVE SUMMARY**

### Context

This report examines the transport mitigation measures needed to accommodate future growth over the Local Plan period to 2031. This work forms part of the ongoing transport modelling study which SYSTRA is undertaking on behalf of Rushmoor Borough Council to inform the Local Plan preparation.

This study builds on the results emerging from the Stage 2 NHTM (North Hampshire Transport Model) modelling report (final version (v4)) issued in May 2017. Having identified key locations where significant transport impacts are likely to arise, this current stage of work focusses on the mitigation measures needed. The outputs from this study will then be fed back into the Stage 3 NHTM modelling which will include all planned growth and all planned mitigation.

This report also provides a high-level review of public transport and walking and cycling networks, identifying current gaps and potential mitigation proposals.

### Assessment

Following the Stage 2 work an initial longlist of 15 junctions was identified where junction performance statistics were approaching predefined thresholds, indicating the likelihood of significant transport impacts. This longlist was then refined in consultation with RBC officers to take account of local knowledge and those locations where mitigation is proposed as part of other committed development sites. This resulted in a shortlist of eight junctions being identified for further investigation and the preparation of mitigation schemes:

- 1: M3 Junction 4a North Roundabout
- 2: M3 Junction 4a South Roundabout
- 3: M3 Junction 4 North Roundabout
- 8: A325 Farnborough Road / B3008 Cranmore Lane roundabout
- 11: A327 Elles Road / Ively Road roundabout
- 12: Naafi Roundabout (A323 Wellington Avenue / Station Rd / High St)
- 14: Rectory Road / Coleford Bridge Road T junction
- 15: A325 Farnborough Rd / A323 Wellington Avenue roundabout

Detailed junction models utilising NHTM forecast flows were prepared for each of the above locations to better understand junction performance and potential mitigation measures.

### Mitigation

Proposed mitigation measures have been developed and tested for each of the junctions with the exception of Junction 12 (Naafi Roundabout) which was found not to be significantly adversely affected once examined in greater detail through a detailed junction model.

Full details of the proposed junction mitigation schemes are set out in the report. The results show that these measures are sufficient to address the adverse traffic impacts resulting from future Local Plan growth.

With regard to public transport, walking and cycling, the proposed housing allocation sites are located within or adjacent to existing urban areas with reasonable access to public transport, walking and cycling services and infrastructure. No significant gaps in these transport networks have been identified. However, this does not preclude the possible need for localised improvements to existing infrastructure or services which may be identified as planning applications for individual development sites come forward.

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## 1. INTRODUCTION

### 1.1 Study Background

- 1.1.1 Rushmoor Borough Council (RBC) is preparing a new Local Plan that will supersede the Rushmoor Core Strategy (adopted in 2011) and the saved policies of the Rushmoor Local Plan review (2000). The Local Plan will cover the period through to 2031.
- 1.1.2 To inform and evidence the emerging Local Plan a transport study is being undertaken utilising the North Hampshire Transport Model (NHTM). The study is divided into three stages, of which the first two have been completed and are reported in v4 of "Rushmoor Local Plan NHTM Modelling" Report dated May 2017.
  - Stage 1 2031 Do Minimum (with committed development but without Local Plan allocations)
  - Stage 2 2031 Do Something (with committed development and Local Plan allocations but no mitigation)
  - Stage 3 2031 Transport Mitigation (with committed development and Local Plan allocations and transport mitigation)

### **1.2** Purpose and Objectives of this Report

- 1.2.1 The purpose of this report is to identify the transport mitigation measures necessary to accommodate the planned Local Plan growth. This study builds on the results from Stages 1 and 2 which has highlighted those locations where significant or severe impacts are likely to occur.
- 1.2.2 The objective of this study is to identify and test potential mitigation measures. The outputs will then be coded into the NHTM so that Stage 3 of the study can be completed. The overall objective being to demonstrate that the planned level of growth to 2031 can be satisfactorily accommodated or adequately mitigated.
- 1.2.3 This study is intended to inform the preparation of the Local Plan and does not replace the need for individual Transport Assessments for specific development sites as they come forward through the planning process.
- 1.2.4 In addition to considering mitigation measures for the highway network, this study also provides a high-level review of public transport and walking and cycling networks, identifying current gaps and potential mitigation proposals.

## **1.3 Report Structure**

- 1.3.1 Following this introduction, the remaining sections of the report are structured as follows.
- 1.3.2 Chapter 2 focusses on Highway Impacts and Mitigation. It contains a summary of the key findings from Stages 1 and 2 of the NHTM modelling. It then sets out the assessment criteria used for this study and presents the results of the junction modelling and mitigation proposals.
- 1.3.3 Chapter 3 considers Public Transport, Walking and Cycling Accessibility and provides an overview of current conditions and potential mitigation measures.

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## 2. HIGHWAY IMPACTS AND MITIGATION

### 2.1 Key Findings of Stages 1 and 2

### Stage 1 – Do Minimum Modelling (Without Local Plan)

- 2.1.1 The Do Minimum (DM) scenario includes residential and employment growth based on hard, committed sites and committed highway infrastructure schemes up to a forecast year of 2031. The growth from 2013 within Rushmoor in this scenario amounts to approximately 5,600 residential units and approximately 130,000sqm of employment (Figure 1 identifies the DM residential growth by NHTM model zone). The Do Minimum scenario includes the landuse associated to the Aldershot Urban Extension (AUE) within Rushmoor.
- 2.1.2 Within the remaining modelled area outside of Rushmoor, development growth is assumed to continue in accordance for Tempro growth projections. For clarity, the Do Minimum includes for the 1500 dwellings proposed at Hartland Park that is located within Hart District but on the boundary with Rushmoor.
- 2.1.3 The NHTM modelling shows that the locations most impacted by this growth are:
  - Alison's Road, Aldershot, eastbound
  - Government Road, Aldershot, eastbound
  - A323 Fleet Road
  - A325 Farnborough Road
- 2.1.4 In addition, flows along the M3 in both directions increase by more than 1,500 PCUs in both the AM and PM peaks by 2031, although flow increases on the M3 are also driven by wider growth outside Rushmoor District.
- 2.1.5 Forecast capacity issues on the highway network occur mostly in and surrounding the main urban areas within the district or on the perimeter to the district. Locations include M3 junction 4a westbound / A327 (both peaks); the Frimley Business Park / A331 / M3 junction 4 area; Frimley High Street and A325 in Frimley.

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Figure 1. Do Minimum Rushmoor Residential Growth (dwellings)

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### Stage 2 – Do Something Modelling (With Local Plan)

- 2.1.6 The Local Plan (LP) developments account for an additional 2,800 dwellings over the Do Minimum values, bringing the total level of growth to approximately 8,400 residential units by 2031 (Figure 2 identifies the LP additional residential growth by NHTM model zone). For this scenario the greatest increases in vehicle flows, in both peaks, occur in central Farnborough, notably in the areas around the Sulzers roundabout, Pinehurst roundabout and Victoria Road.
- 2.1.7 In addition, there are notable increases in flows at M3 junction 4 in both peaks, on the A323 in Aldershot and through the area of Aldershot Camp which will be part of the AUE, the A327 Elles Road westbound and Ively Road.
- 2.1.8 Forecast capacity issues on the highway network are generally similar to those forecast for the Do Minimum scenario. The locations with the greatest increase in capacity utilisation in the AM peak are westbound on Elles Road to the Ively Road roundabout and westbound on the A327 Summit Avenue at the BMW roundabout. During the PM peak all arms of the A325 Farnborough Road / Hawley Road roundabout show increases, particularly Farnborough Road northbound. Ively Road eastbound to Elles Road also has a notable increase in capacity utilisation.





Figure 2. Local Plan Rushmoor Additional Residential Growth (dwellings)

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### 2.2 Assessment Criteria

- 2.2.1 To identify the locations most impacted by the Local Plan development growth and where highway mitigation should be considered, a set of junction performance thresholds have been set. The National Planning Policy Framework (NPPF) identifies the need to ensure that development proposals do not result in severe adverse transport impacts. The following criteria have been adopted to define the severity of impacts. These thresholds have been used in similar studies and are considered appropriate for this assessment:
  - a junction where the ratio of flow to capacity (RFC) on any approach arm was more than **85**% in the DM scenario and has increased by **5%** or more in the DS scenario is considered as experiencing a **significant** impact;
  - a junction where the ratio of flow to capacity (RFC) on any approach arm was more than **95**% in the DM scenario and has increased by **10%** or more in the DS scenario is considered as experiencing a **severe** impact;
  - a junction where the average delay per vehicle in the DM scenario was **two minutes** or more in any period and has increased by **one minute** or more in the DS scenario is considered as experiencing a **severe** impact.
- 2.2.2 In addition to the above assessment criteria, the study has also considered any junctions within Rushmoor where the ratio of flow to capacity (RFC) on any approach arm was more than 80% in any scenario. This provides an indication of other junctions likely to be experiencing capacity problems in 2031.
- 2.2.3 Comparison of the Do Minimum and Do Something scenarios resulted in six junctions being identified as experiencing 'significant' impacts. No locations meeting the criteria for 'severe' impacts were identified. Consideration of the 80% RFC threshold identified a further nine junctions likely to be experiencing capacity issues in the 2031 assessment year. A full list of the junctions, together with details of approach arm statistics for each scenario is included in Appendix A.
- 2.2.4 This initial longlist of 15 junctions (see Figure 3) was then refined in consultation with RBC officers to take account of local knowledge and locations where mitigation is proposed as part of other committed development sites. This resulted in a shortlist of eight junctions being identified for mitigation improvements as follows (junction numbering accords with junction ID numbers in Appendix A):
  - 1: M3 Junction 4a North Roundabout
  - 2: M3 Junction 4a South Roundabout
  - 3: M3 Junction 4 North Roundabout
  - 8: A325 Farnborough Road / B3008 Cranmore Lane roundabout
  - 11: A327 Elles Road / Ively Road roundabout
  - 12: Naafi Roundabout (A323 Wellington Avenue / Station Rd / High St)
  - 14: Rectory Road / Coleford Bridge Road T junction
  - 15: A325 Farnborough Rd / A323 Wellington Avenue roundabout

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Figure 3. Impacted Junction Locations (Long List)

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#### 2.3 **Development of Detailed Junction Models**

- 2.3.1 To fully understand the detailed interactions at the eight locations, detailed junction models were constructed to test options for accommodating the traffic flows emerging from the Stage 2 model assignments.
- 2.3.2 As all eight junctions are either roundabouts or priority controlled T junctions, TRL's "Junctions 9" software was selected as the appropriate tool to represent the detailed junction models. The findings from these models were used to adjust the schemes where necessary and feasible and to feed details of mitigation works back into the wider NHTM assignment model to inform the Stage 3 work.
- 2.3.3 Where differences were identified in individual junction performance statistics between the outputs from the NHTM and Junctions 9 models, the latter was assumed to take precedence. This is because the coding options for individual junctions in the NHTM Saturn model are less sophisticated than can be achieved using the standalone Junctions 9 models and therefore the latter is deemed to provide a more reliable representation of individual junction performance.



### 2.4 Proposed Mitigation and Junction Modelling Results

### **Highway Capacity Mitigations**

- 2.4.1 Table 1 briefly describes the proposed highway capacity mitigations for the eight junctions identified as having 'significant' impacts or likely to experience capacity issues. Appendix B includes outline drawings for the capacity mitigations.
- 2.4.2 The drawings are based on 1:1250 Ordnance Survey mapping purchased in December 2017 and January 2018. The schemes have been designed to be accommodated within highway land; boundaries are indicated where known and will need to be verified as the designs are progressed. The drawings are colour-coded to show new areas of carriageway and footway construction with brown shading and new verge construction in with green shading.

#	JUNCTION	PROPOSED MITIGATION
1	M3 – J4a North Roundabout	Widen A327 Minley Road arm to create a 3-lane approach. Widen A327 (South) arm to form a new segregated left-turn lane and to extend the length of the two approach lanes. Also widen A327 (South) exit arm to provide a two-lane exit. Amend exit lane from Minley Rd to Sun Park link road and the M3 slip road exit. Amend layout and road markings on the circulatory carriageway.
2	M3 – J4a South Roundabout	Widening of A327 northern arm to create three approach lanes. Widening of A327 southern arm to create two-lane exit from the roundabout. Addition of a segregated left turn lane from A327 (S) arm to M3 westbound-on slip. Alterations to circulatory carriageway to accommodate above changes. Modifications to the exit from the existing segregated left turn lane from the M3 westbound-off slip road to A327 (N).
3	M3 – Junction 4 North Roundabout	Addition of segregated left-turn lanes on all arms of the junction. Carriageway widening on all three entry and exit arms and the circulatory carriageway to accommodate the above.
8	A325 Farnborough Road / B3008 Cranmore Lane roundabout	Increase diameter of roundabout and widen A325 Farnborough Road 'north' and 'south' arms to provide two-lane approaches.
11	A327 Elles Road / Ively Road roundabout	Widen Elles Road arm to create two-lane approach to the roundabout. Reduce central island diameter to widen circulatory carriageway.
12	Naafi Roundabout (A323 Wellington Avenue / Station Rd / High St)	No mitigation proposed following further analysis – see Section 2.4.18 - 2.4.21
14	Rectory Road / Coleford Bridge Road T junction	Adjust south-east kerb alignment and revise road markings to create a 3-Arm mini- roundabout
15	A325 Farnborough Rd / A323 Wellington Avenue roundabout	Widen A325 Farnborough Road (North) arm to increase entry width.

### Table 1. Proposed Mitigations

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### Proposed Mitigation and Junction Capacity Modelling Results

### 1: M3 – J4a North Roundabout

### Drawing No 106930-SK01-P1



- 2.4.3 This junction is located on the boundary between Rushmoor and Hart districts. The entry and exit arms connecting to the M3 eastbound carriageway are within Rushmoor but the remainder of the junction lies within Hart district. The key features of the mitigation scheme are:
  - Widen A327 Minley Road arm to create a 3-lane approach
  - Widen A327 (South) arm to form a new segregated left-turn lane and to extend the length of the two approach lanes
  - Widen A327 (South) exit arm to provide a two-lane exit.
  - Amend exit lane from Minley Rd to Sun Park link road and the M3 slip road exit.
  - Amend layout and road markings on the circulatory carriageway.
- 2.4.4 Table 2 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).

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2.4.5 The results show that the Minley Road arm of the junction will be approaching capacity and the A327(S) arm will be over capacity in both DM and DS scenarios. The proposed mitigation measures address these issues and are sufficient to bring the junction within capacity.

APPROACH ARM	2031 DM		20	31 DS.	2031 MITIGATION.	
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)
ΑΜ ΡΕΑΚ						
A327 Minley Road (NW)	88	27	85	24	53	5
Sun Park link road	7	5	7	5	6	5
M3 Eastbound Off Slip Rd	58	7	58	8	39	4
A327 Motorway Bridge (S)	99	66	99	69	69	7
РМ РЕАК						
A327 Minley Road (NW)	82	18	81	19	54	5
Sun Park link road	28	6	29	7	27	6
M3 Eastbound Off Slip Rd	53	7	53	7	36	4
A327 Motorway Bridge (S)	103	97	103	102	71	8

### Table 2. J1 - M3 J4a North Roundabout

Notes: an RFC of more than 85% is highlighted in orange an RFC of more than 95% is highlighted in red



### 2: M3 – J4a South Roundabout

Drawing No 106930-SK02-P1



- 2.4.6 This junction also lies on the boundary between Rushmoor and Hart districts. The A327 (South) arm lies within Rushmoor but the remainder of the junction lies within Hart district. The key features of the mitigation scheme are:
  - Widening of A327 northern arm to create three approach lanes
  - Widening of A327 southern arm to create two-lane exit from the roundabout
  - Addition of a segregated left turn lane from A327 (S) arm to M3 westbound-on slip
  - Alterations to circulatory carriageway to accommodate above changes
  - Modifications to the exit from the existing segregated left turn lane from the M3 westbound-off slip road to A327 (N)
- 2.4.7 Table 3 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).

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2.4.8 The results show that the southern arm of the junction will be over capacity and the northern arm will be approaching capacity in both DM and DS scenarios. Mitigation of the southern arm in isolation from other improvements was tested but revealed an adverse impact on the northern arm thus reinforcing the need to also consider mitigation of the A327 (N) arm. The combined mitigation measures for both northern and southern arms are sufficient to bring the junction within capacity.

APPROACH ARM	203	1 DM	2031 DS.		2031 DS. 2031 MITIGAT		ITIGATION.
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	
AM PEAK							
A327 Motorway Bridge (N)	87	31	87	31	38	3	
A327 (S)	106	140	107	144	47	5	
M3 Westbound Off Slip	77	10	77	10	77	10	
PM PEAK							
A327 Motorway Bridge (N)	85	26	87	30	38	3	
A327 (S)	106	131	106	135	45	5	
M3 Westbound Off Slip	72	8	75	9	75	9	

### Table 3. J2 - M3 J4a South Roundabout

Notes: an RFC of more than 85% is highlighted in orange an RFC of more than 95% is highlighted in red a delay of more than 120 sec is highlighted in red

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### 3: M3 – Junction 4 North Roundabout

### Drawing No 106930-SK03-P1



- 2.4.9 This junction is located on the boundary between Rushmoor and Surrey Heath districts. The entry and exit arms connecting to the M3 eastbound carriageway are within Rushmoor but the remainder of the junction lies within Surrey Heath. The key features of the mitigation scheme are:
  - Addition of segregated left-turn lanes on all three arms
  - Widening of the A331(N) arm to increase entry and exit capacity
  - Widening of the A331(S) arm to increase entry and exit capacity
  - Widening of the M3 slip road arm to increase entry and exit capacity
  - Alterations to circulatory carriageway to accommodate above changes
- 2.4.10 Table 4 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.11 The results show that the A331 Southeast arm of the junction will be over capacity and the A331 North arm will be approaching capacity in both DM and DS scenarios. The M3 Westbound slip road arm is also shown to be approaching capacity in the PM peak. A

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mitigation solution for the A331 arms, but without improvements to the M3 arm, was tested but this led to an adverse impact on the M3 slip road arm. Therefore, an alternative solution, with improvements on all three arms, was developed and found to be sufficient to mitigate future growth impacts and bring the junction within capacity.

APPROACH ARM	203	1 DM	2031 DS.		2031 DS. 2031 MITIGATIC	
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)
АМ РЕАК						
A331 (N)	93	28	93	30	47	4
A331 Motorway Bridge (SE)	114	244	120	398	62	6
M3 Westbound Slip Rds (SW)	83	15	84	15	54	6
РМ РЕАК						
A331 (N)	106	118	104	97	53	5
A331 Motorway Bridge (S)	120	396	121	406	78	10
M3 Westbound Off Slip (W)	91	28	89	25	63	9

### Table 4. J3 - M3 J4 North Roundabout

Notes: an RFC of more than 85% is highlighted in orange an RFC of more than 95% is highlighted in red a delay of more than 120 sec is highlighted in red

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### 8: A325 Farnborough Road / B3008 Cranmore Lane roundabout

Drawing No 106930-SK04-P1



- 2.4.12 This junction is located on the A325 to the south-west of Aldershot. It operates as a small roundabout with single-lane approaches on all three arms. The proposed mitigation measures consist of:
  - Increasing the diameter of the roundabout
  - Widening the A325 Farnborough Road north and south arms to provide two-lane approaches
- 2.4.13 Table 5 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.14 The results show that the junction will be approaching the limits of capacity in 2031 with RFC values ranging from 91% to 96% on the northern and southern arms of the junction in both the DM and DS scenarios. The proposed mitigation measures, including widening of both northern and southern approaches to the junction, satisfactorily resolve this issue and bring the junction back within capacity.

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APPROACH ARM	203	31 DM	2031 DS.		2031 DS. 2031 MITIGATION		ITIGATION.
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	
AM PEAK							

### Table 5. J8 - A325 Farnborough Road / B3008 Cranmore Lane roundabout

an RFC of more than 85% is highlighted in orange Notes: an RFC of more than 95% is highlighted in red

PM PEAK

A325 Farnborough Rd (S)

A325 Farnborough Rd (N)

B3008 Cranmore Lane (E)

A325 Farnborough Rd (S)

A325 Farnborough Rd (N)

B3008 Cranmore Lane (E)

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### 11: A327 Elles Road / Ively Road roundabout



- 2.4.15 This junction is located on the A327 and immediately to the north of Farnborough Airport. It is a large diameter 4-Arm roundabout with two-lane approaches on all arms. The proposed mitigation measures consist of:
  - Widening the eastern arm (A327 Elles Road) to extend the flare length and increase entry capacity
  - Reduce the size of the central island to provide two lanes on the circulatory carriageway
- 2.4.16 Table 6 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.17 The results show that the proposed Local Plan development is predicted to increase the RFC on Elles Road by 12%, from 81% in the DM scenario to 91% in the AM peak. The proposed mitigation measures address this impact and bring the junction back within capacity.

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Table 6. JII - A327 Elles Road 7 Wely Road Touridabout								
APPROACH ARM	203	1 DM	20	2031 DS.		2031 DS. 2031 MITIG		TIGATION.
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)		
AM PEAK								
A327 Elles Road (E)	81	17	91	31	58	5		
Wessex Road (S)	14	7	16	8	16	9		
Ively Road (W)	30	5	32	5	32	5		
A327 Ively Road (N)	53	5	57	6	57	6		
PM PEAK								
A327 Elles Road (E)	60	7	61	8	40	3		
Wessex Road (S)	17	6	19	7	19	7		
Ively Road (W)	48	6	52	8	52	8		
A327 Ively Road (N)	37	4	39	5	39	5		

### Table 6. J11 - A327 Elles Road / Ively Road roundabout

Notes: an RFC of more than 85% is highlighted in orange an RFC of more than 95% is highlighted in red

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### 12: Naafi Roundabout (A323 Wellington Ave / Station Rd / High St)

- 2.4.18 This junction is located on the A323 on the north side of Aldershot town centre. The junction comprises a 5-Arm roundabout with single-lane approaches on all arms.
- 2.4.19 The Stage 2 NHTM modelling indicated RFC values above 85% on the A323 (E) arm with a 5% change in the AM peak, thus triggering the criteria for further assessment. However, the results from the detailed junction modelling reveal slightly improved performance with RFC and delay statistics below the thresholds for 'significant' impacts. When considering standalone junctions, the "Junctions 9" modelling software is more refined and considered to give more reliable results than those obtained from the Saturn model which underpins the NHTM.
- 2.4.20 Table 7 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.21 Comparing DM and DS scenarios, the results show that the RFC on the A323 (E) increases by 6%, from 67% to 71%, in the AM and by 4%, from 72% to 75%, in the PM. However, as the RFC values remain below 85%, no mitigation is considered necessary at this junction.

APPROACH ARM	2031	. DM	20	031 DS.	
	RFC (%)	RFC (%) DELAY (s)		DELAY (s)	
АМ РЕАК					
A323 Wellington Ave (NW)	34	5	35	5	
Gun Street		Arm	Not	Modelled	
A323 (E)	67	9	71	11	
Station Road (S)	29	7	37	8	
High Street (SW)	3	5	4	5	
РМ РЕАК					
A323 Wellington Ave (NW)	35	6	41	6	
Gun Street		Arm	Not	Modelled	
A323 (E)	72	12	75	12	
Station Road (S)	27	7	30	7	
High Street (SW)	16	6	19	5	

Table 7. J12 - Naafi Roundabout (A323 Wellington Ave / Station Rd / High St)

Notes:

an RFC of more than **85%** is highlighted in orange an RFC of more than **95%** is highlighted in red

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### 14: Rectory Road / Coleford Bridge Road T junction



- 2.4.22 This junction is located on the eastern side of Farnborough and comprises a 3-Arm T junction. The junction currently experiences congestion during peak periods and this it predicted to worsen over time both with or without Local Plan development. It is in a built-up area with limited highway land adjacent to the junction, which limits the options for capacity enhancement.
- 2.4.23 The current junction layout has Rectory Road as the priority route with Coleford Bridge Road forming the side road. Junction capacity modelling demonstrates that significant congestion occurs because of high volumes of traffic turning between Rectory Road south and Coleford Bridge Road. To address the imbalance of flows between the major and minor arms of the junction consideration was given to modifying the layout to give priority to movements between Rectory Roads south and Coleford Bridge Road. Whilst the modelling of this arrangement did show an improvement in performance, it did not fully address the capacity problems.
- 2.4.24 The concept of a mini-roundabout was also tested and was found to offer significant improvements compared with retaining a T junction arrangement and this has been taken forward as the preferred solution.
- 2.4.25 In summary, the proposed mitigation measures consist of:
  - Amend road markings (and traffic signs) to create a 3-Arm mini-roundabout
  - Realign southern kerbline to increase space for vehicle manoeuvring

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- 2.4.26 Table 8 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.27 The results indicate that the junction is significantly over capacity in the DM and DS scenarios with very large RFC and delay values. The very high values suggest that the modelling software is operating outside of normal operating limits. In these circumstances, the absolute values of RFC's and delays from the model should be treated with caution. It is however possible to draw comparisons between the scenarios.
- 2.4.28 The results from the Mitigation scenario show that the proposed mini-roundabout offers significant improvements compared with the DM and DS results. RFC values ranging from 92% to 101% remain on two of the arms indicating that the junction is approaching the limit of its capacity in the AM peak and will be over capacity in the PM peak, however overall performance is substantially improved relative to DM and DS scenarios.

			lerera briage rieu	a i janotion				
APPROACH ARM	2031	DM	2031 DS.			2031 MITIGATION.		
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)		
AM PEAK								
Rectory Road (N)	0	0	0	63	69	24		
Coleford Bridge Road	9999999999	59999940	9999999999	59999940	73	12		
Rectory Road (S)	195	3044	195	3016	101	81		
PM PEAK								
Rectory Road (N)	0	138	0	199	92	68		
Coleford Bridge Road	9999999999	59999940	99999999999	59999940	64	11		
Rectory Road (S)	192	2824	192	2778	96	54		

Table 8 114 - Rectory Road / Coleford Bridge Road T junction

an RFC of more than 85% is highlighted in orange Notes: an RFC of more than 95% is highlighted in red a delay of more than 120 sec is highlighted in red

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### 15: A325 Farnborough Rd / A323 Wellington Ave roundabout

SYSTRA Drawing No: 106930-SK-08P1



- 2.4.29 This junction is located on the A325 to the west of Aldershot. It is a large diameter, 4-Arm roundabout with two entry lanes on each approach arm. The proposed mitigation measures consist of:
  - Widening of A325 Farnborough Road (North) arm to increase entry width
- 2.4.30 Table 9 shows the ratio of flow to capacity (RFC) and average delay (in seconds) results by approach arm for the 2031 Do Minimum Case (with committed development but without Local Plan), 2031 Do Something (with committed development and Local Plan but without mitigation) and the 2031 Transport Mitigation case (with committed development, Local Plan and proposed highway mitigation), for the AM and PM peaks (as also shown in Appendix A).
- 2.4.31 The results show that the RFC value on the Farnborough Road (S) arm is predicted to be 89% in the AM peak. Whilst this is slightly above the preferred maximum value of 85%, this arm remains within capacity and is not made worse by the proposed development and therefore no mitigation is proposed for this arm.
- 2.4.32 The results for the PM peak show that the RFC on the Farnborough Road (N) arm is predicted to increase from 93% in the DM scenario to 97% with Local Plan development indicating that improvements are needed for this arm. The proposed mitigation measures address the impacts of development and bring the junction back within capacity.

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APPROACH ARM	203	31 DM 2031 DS. 2031 MIT		2031 DS.		ITIGATION.	
	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	RFC (%)	DELAY (s)	
АМ РЕАК							
Welesley Road (W)	52	7	52	8	52	8	
A325 Farnborough Rd (N)	67	6	68	7	55	4	
A323 Wellington Ave (E)	83	14	84	17	84	17	
A325 Farnborough Rd (S)	89	29	89	32	89	32	
PM PEAK							
Welesley Road (W)	62	8	62	9	62	9	
A325 Farnborough Rd (N)	93	26	97	43	78	8	
A323 Wellington Ave (E)	53	5	53	6	53	6	
A325 Farnborough Rd (S)	67	8	67	9	67	9	

### Table 9. J15 - A325 Farnborough Rd / A323 Wellington Ave roundabout

Notes: an RFC of more than 85% is highlighted in orange an RFC of more than 95% is highlighted in red

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### 2.5 Mitigation Construction Costs

- 2.5.1 Cost estimates were calculated for the seven junctions for which designs have been prepared as part of this study. Details are included at Appendix C. Table 10 shows a summary of the cost estimate ranges. The costs should be regarded as high-level estimates for budgeting purposes, they will need to be refined as more detailed designs come forward.
- 2.5.2 As detailed in Appendix C, the cost ranges presented in Table 10 include allowance for:
  - Associated Features (25% to 50% depending on the nature of the works)
  - Planning and Design (10%)
  - Supervision (5%)
  - Land Acquisition (0% assumed as designs are within highway boundaries)
  - Inflation from SPONS cost base 2011 to 2018 (10%)
  - Quantified Risk Assessment (12.5%)
  - Optimism Bias (44%)

#	JUNCTION	LOW ESTIMATE	HIGH ESTIMATE
1	M3 – J4a North Roundabout	£1,043,000	£1,555,000
2	M3 – J4a South Roundabout	£630,000	£946,000
3	M3 – Junction 4 North Roundabout	£687,000	£1,024,000
8	A325 Farnborough Rd / B3008 Cranmore Lane rbt	£336,000	£503,000
11	A327 Elles Road / Ively Road roundabout	£132,000	£197,000
14	Rectory Rd / Coleford Bridge Rd mini-roundabout	£25,000	£44,000
15	A325 Farnborough Rd / A323 Wellington Ave roundabout	£18,000	£27,000
	Total	£2,871,000	£4,296,000

### Table 10. Estimated Mitigation Construction Costs

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## 3. PUBLIC TRANSPORT WALKING AND CYCLING ACCESSIBILITY

### 3.1 Public Transport

Rail

3.1.1 There are six rail stations within or adjoining Rushmoor district, providing access to a wide range of local and mainline rail routes and services operated by South Western and Great Western Railways. These include mainline services to and from London and the South West and local services to nearby destinations including Guildford, Farnham, Camberley and the Thames Valley. The location of the district in relation to wider rail services is indicated in the diagram below:

Rail Network



3.1.2 There are established connections between these stations and the main urban areas of the district by all travel modes. Connections between the proposed housing allocations and existing rail services are considered further below.

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### Bus

3.1.3 The principal bus operator in the district is Stagecoach. The diagram below illustrates the main bus routes serving Farnborough, Aldershot and the surrounding area:

Bus Network



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3.1.4 A number of the bus routes provide connections to railway stations, these are summarised in Table 11:

ROUTE	DESCRIPTION	STATIONS SERVED			
1	Old Dean – Camberley – Farnborough - Aldershot	Camberley; Farnborough (Main); Aldershot			
2	Farnborough – Camberley - Yateley	Camberley			
3	Aldershot – Frimley - Yateley	Aldershot; Ash Vale; Camberley			
4 / 5	Farnham - Aldershot	Farnham; Aldershot			
7	Reading – Fleet – Aldershot	Reading; Fleet; Aldershot			
11	Farnborough – Camberley – Paddock Hill	Farnborough (Main); Camberley			
14	Aldershot – North Town - Aldershot	Aldershot			
15	Aldershot – Heron Wood - Aldershot	Aldershot			
16	Rowledge – Farnham - Aldershot	Farnham; Aldershot			
17/18/19	Aldershot – Farnham – Bordon - Haslemere	Farnham; Haslemere			
41 / 42	Ash - North Camp - Farnborough	Ash; Ash Vale; North Camp; Farnborough (Main)			
YoYo	Prospect Estate - Farnborough	Farnborough			

### Table 11. Bus Routes Serving Rail Stations

3.1.5 The proposed housing allocation sites are located within or adjacent to existing urban areas with reasonable access to bus and rail services. No significant gaps in public transport networks have been identified. However, this does not preclude the possible need for localised improvements or restructuring of existing bus services which may be identified as planning applications for individual development sites come forward.

### 3.2 Walking and Cycling

- 3.2.1 There are a number of established pedestrian and cyclist routes linking the principal towns of Farnborough and Aldershot and within existing urban areas. These comprise a range of on and off-road, dedicated and shared cycle lanes and footways. Full details can be found on the Rushmoor website at <a href="http://www.rushmoor.gov.uk/article/5259/Cycle-routes">http://www.rushmoor.gov.uk/article/5259/Cycle-routes</a>
- 3.2.2 The proposed housing allocation sites are located within or adjacent to existing urban areas which are readily accessible by walking and cycling. No significant gaps in pedestrian and cycling infrastructure have been identified. However, this does not preclude the possible need

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for new connections and localised improvements to existing networks which may be identified as planning applications for individual development sites come forward.

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## Appendix A – Junction Hotspot Summary

## SYSTIA

## Junction Approach Arm Statistics (Summary Sheet)

				SATUR	N Delay	- AM and	I PM		SATU	RN RFC -	AM		J9 Mode	el - AM		SATU	RN RFC -	PM		J9 Mode	l - PM	
			2013	2031	2031	2013	2031	2031	2013	2031	2031	2013	2031	2031	2031	2013	2031	2031	2013	2031	2031	2031
			BASE	DM	DS	BASE	DM	DS	BASE	DM	DS	BASE	DM	DS	MIT	BASE	DM	DS	BASE	DM	DS	MIT
			AM	AM	AM	PM	PM	PM	AM	AM	AM	AM	AM	AM	AM	PM	PM	PM	PM	PM	PM	PM
			Delav	Delav	Delay	Delav	Delav	Delay	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC	RFC
ID	Junction Name	Approach Arm	(s)	(s)	(s)	(s)	(s)	(s)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1	M3-J4a North RBT	A327 Minley Rd [NW]	42	17	14	9	106	83	1.00	0.93	0.90	0.92	0.88	0.85	0.53	0.55	1.04	1.03	0.47	0.82	0.81	0.54
1		Sun Park Link Road [N]	*	*	*	*	*	*	*	*	*	0.06	0.07	0.07	0.06	*	*	*	0.08	0.28	0.29	0.27
1		M3 EB Off-Slip [SE]	7	8	8	7	7	7	0.55	0.62	0.62	0.52	0.58	0.58	0.39	0.41	0.55	0.55	0.42	0.53	0.53	0.36
1		A327 Motorway Bridge [S]	72	126	122	73	134	143	1.03	1.06	1.06	0.98	0.99	0.99	0.69	1.03	1.07	1.07	0.99	1.03	1.03	0.71
2	M3-J4a South RBT	A327 Motorway Bridge [N]	9	55	210	8	30	53	0.86	1.01	1.09	0.75	0.87	0.87	0.38	0.64	0.98	1.01	0.50	0.85	0.87	0.38
2		A327 [S]	71	203	210	8	275	261	1.03	1.11	1.11	1.30	1.06	1.07	0.47	0.97	1.14	1.14	1.30	1.06	1.06	0.45
2		M3 WB Off-Slip [W]	9	77	74	10	12	14	0.56	1.03	1.03	0.33	0.77	0.77	0.77	0.75	0.93	0.96	0.46	0.72	0.75	0.75
3	M3-J4 North RBT	A331 [N]	41	173	170	141	328	325	1.00	1.08	1.08	0.92	0.93	0.93	0.47	1.06	1.16	1.16	1.06	1.06	1.04	0.53
3		A331 [SE]	184	221	340	12	171	178	1.08	1.10	1.16	1.20	0.83	0.84	0.54	0.78	1.07	1.08	1.13	0.91	0.89	0.63
3		M3-J4 EB Off-Slip [SW]	29	27	26	61	99	103	0.90	0.81	0.82	0.92	1.14	1.20	0.62	0.85	0.85	0.86	0.93	1.20	1.21	0.78
8	A325 Farnborough Road /	A325 [S]	39	61	56	8	26	33	1.01	1.03	1.02	0.91	0.91	0.91	0.53	0.90	1.01	1.01	0.81	0.91	0.91	0.53
8	B3008 Cranmore Ln	A325 [N]	10	10	10	15	15	14	0.62	0.76	0.77	0.61	0.74	0.75	0.48	0.97	0.97	0.96	0.96	0.96	0.94	0.59
8		B3008 Cranmore Lane [E]	9	10	10	10	10	10	0.27	0.25	0.25	0.25	0.24	0.24	0.24	0.19	0.23	0.23	0.18	0.22	0.22	0.23
11	A327 Elles Rd / Ively Rd RBT	A327 [N]	9	9	10	7	8	8	0.60	0.71	0.76	0.45	0.53	0.57	0.57	0.38	0.51	0.52	0.28	0.37	0.39	0.39
11		A327 Elles Road [E]	9	10	12	8	9	9	0.54	0.81	0.90	0.54	0.81	0.91	0.58	0.60	0.60	0.62	0.60	0.60	0.61	0.40
11		Wessex Road [S]	*	*	*	*	*	*	*	*	*	0.13	0.14	0.16	0.16	*	*	*	0.11	0.17	0.19	0.19
11		lvely Rd [W]	10	11	11	9	11	11	0.43	0.41	0.42	0.32	0.30	0.32	0.32	0.39	0.63	0.68	0.29	0.48	0.52	0.52
12	Naafi RBT	A323 [NW]	6	6	6	6	6	7	0.25	0.43	0.44	0.19	0.34	0.35	NA	0.43	0.45	0.48	0.34	0.35	0.41	NA
12	(A323 Wellington Ave / High St)	A323 [E]	10	10	11	10	11	11	0.56	0.83	0.88	0.45	0.67	0.71	NA	0.47	0.88	0.91	0.38	0.72	0.75	NA
12		Station Rd [S]	9	11	11	9	11	11	0.24	0.32	0.41	0.21	0.29	0.37	NA	0.23	0.30	0.34	0.20	0.27	0.30	NA
12		High St [SW]	10	11	11	10	11	11	0.05	0.04	0.05	0.04	0.03	0.04	NA	0.07	0.21	0.24	0.05	0.16	0.19	NA
14R	Rectory Rd	Rectory Road [N]	1	1	1	1	1	1	0.12	0.16	0.17	0.00	0.00	0.00	0.69	0.17	0.23	0.24	0.00	0.00	0.00	0.92
14R		Coleford Bridge Road [E]	49	75	75	123	39	95	1.01	1.03	1.03	1E+10	1E+10	1E+10	0.73	1.05	1.00	1.03	1E+10	1E+10	1E+10	0.64
14R		Rectory Road [S]	30	73	96	40	98	112	1.01	1.03	1.04	1.97	1.95	1.95	1.01	1.01	1.04	1.05	1.95	1.92	1.92	0.96
15	A325 Farnborough Road /	Wellesley Road [W]	7	27	27	18	45	156	0.51	0.93	0.92	0.32	0.52	0.52	0.52	0.95	1.00	1.06	0.70	0.62	0.62	0.62
15	A323 Wellington Ave RBT	A325 Farnborough Rd [N]	5	16	17	31	35	39	0.44	0.56	0.57	0.52	0.67	0.68	0.55	0.61	0.81	0.84	0.71	0.93	0.97	0.78
15		A323 Wellington Av [E]	7	23	26	8	9	9	0.47	0.90	0.92	0.45	0.83	0.84	0.84	0.35	0.57	0.57	0.32	0.53	0.53	0.53
15		A235 Farnborough Rd [S]	8	59	63	4	6	6	0.79	1.01	1.01	0.76	0.89	0.89	0.89	0.50	0.68	0.69	0.52	0.67	0.67	0.67

\* Arm not represented in strategic Saturn Model

## APPENDIX A

## Appendix B – Junction Mitigation Drawings

## SYSTIA



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## <u>KEY</u>



Proposed adoptable carriageway construction

Proposed adoptable footway construction



Proposed adoptable verge construction



Scale 1:500 (m) 0 5 10 15 20 25 

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Clien	Client : Rushmoor Borough Council								
Proje	Project : NHTM34 Rushmoor Local Plan Junction Improvement Works								
Title	Title : Concept Layout Junction 1 A327 / Minley Road / M3, Junction 4A Northern Roundabout								
Draw	Drawn : Checked : Approved : AJC CW IB								
Draw	ing Size : A1		Date of Issue : Scale : December 2017 1:250 @ A1						
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Proposed adoptable carriageway construction

Proposed adoptable footway construction

Proposed adoptable verge construction



Scale 1:500 (m) 0 5 10 15 20 25

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Proje	Project : NHTM34 Rushmoor Local Plan Junction Improvement Works							
Title	Title : Concept Layout Junction 2 A327 / M3, Junction 4A Southern Roundabout							
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Proposed adoptable carriageway construction

Proposed adoptable footway construction

Proposed adoptable verge construction



-H - H - H - H Existing extent of public highway



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Junction Improvement Works

Title :

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Proposed adoptable carriageway construction

Proposed adoptable footway construction



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Rushmoor Borough Council

Project :

Client :

NHTM34 Rushmoor Local Plan Junction Improvement Works

- Title : Concept Layout Junction 8 Farnborough Road / Cranmore Lane Junction

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## <u>KEY</u>

Proposed adoptable carriageway construction

Proposed adoptable footway construction

Sca	ale 1	:250 (	(m)		
0	2	4	6	8	10

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P1	T.B.C.	Preliminary issue	MH	SC	IB				
Rev.	Date	Description		Drawn	Chkd	Appd			
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Rushmoor Borough Council

Project :

Drawing Status :

A1

PRELIMINARY

Client :

NHTM34 Rushmoor Local Plan Junction Improvement Works

Title : Concept Layout Junction 14R Rectory Road / Coleford Bridge Road Junction							
Drawn : MH	Checked : SC	Approved : IB					
Drawing Size :	Date of Issue :	Scale :					

Janurary 2018

Drawing Number :

106930/SK07

1:250 @ A1

Rev.

P1



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## <u>KEY</u>



Proposed adoptable carriageway construction

Proposed adoptable footway construction

Proposed adoptable verge construction



Scale 1:500 (m) 0 5 10 15 20 25

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P1	T.B.C.	Prelimir	hary iss	ue	AJC	CW	IB			
Rev.	Date		Des	cription	Drawn	Chkd	Appd			
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SoanePoint 6-8 Market Place Reading RG1 2EG T +44 (0)1183 345510 E uk_reading@systra.co W www.systra.co.uk										
Clien	Client :									
Project : NHTM34 Rushmoor Local Plan Junction Improvement Works										
Title : Concept Layout Junction 15 Wellington Roundabout										
Draw	n : AJC		Check	ed : CW	Approved : IB					
Draw	ing Size : A1		Date o De	f Issue : cember 2017	Scale : 1:250 @ A1					
Drawing Status : Drawing Nu PRELIMINARY 1				Drawing Number 106930	: Rev. D/SK08 P1					

## Appendix C – Construction Cost Estimates

## SYSTIA

### Appendix C: Highway Construction Cost Estimates

					67.01/2 V	2										Quantified			Einal Cost (ro	undod)
	lunction	Junction	Improvement	Width	SPONS unit o	sost /m <sup>-</sup>	ongth	Base	Cost	Pricing	Associated	Planning	Supervision	Land	Inflation	KISK Assessment	Optimism	I otal Multiplier	Final Cost (10	unueu)
		Type		width	10w	/ Ligh	engen	Low	High	Tear	reatures	and Design	Supervision	Acquisition	10 2010	Assessment	Dias	watepiter	Low	High
1	M3 – I4a North Roundabout	Roundabout	Widening A327 (Minley Rd) entry	5.0	f132	f197	150.0	£99.000	f147.750	201	1 50%	10%	59	6 0%	5 10%	6 12.5%	44%	309%	£306.000	£456.000
1			Widening A327 (Minley Rd) exit	3.0	£132	£197	130.0	£51.480	£76.830	201	1 50%	10%	59	6 0%	5 10%	6 12.5%	44%	309%	£159.000	£237.000
1			Widening A327 (S) entry	5.0	£132	£197	120.0	£79,200	£118,200	201	1 25%	10%	59	6 0%	5 10%	6 12.5%	44%	257%	£204,000	£304,000
1			Widening A327 (S) exit	4.0	£132	£197	100.0	£52,800	£78,800	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£163,000	£243,000
1			Widening circulatory carriageway	531.0	£132	£197	1.0	£70,092	£104,607	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£180,000	£269,000
1			Widening M3 slip road exit	3.0	£132	£197	30.0	£11,880	£17,730	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£31,000	£46,000
2	M3 – J4a South Roundabout	Roundabout	Widening A327 (N) entry	7.0	£132	£197	70.0	£64,680	£96,530	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£200,000	£298,000
2			Widening A327 (S) exit	7.0	£132	£197	80.0	£73,920	£110,320	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£228,000	£341,000
2			Widening A327 (N) exit	2.5	£132	£197	30.0	£9,900	£14,775	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£31,000	£46,000
2	2		Widening circulatory carriageway	12.0	£132	£197	25.0	£39,600	£59,100	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£122,000	£182,000
2	2		Jet Lane (south to east) road markings					£5,000	£10,000	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£13,000	£26,000
2	2		Adjustments to M3 slip road arm	1.5	£132	£197	70.0	£13,860	£20,685	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£36,000	£53,000
3	M3 – Junction 4 North Roundabout	Roundabout	Widening A331 (N) entry and exit arms	2.0	£132	£197	190.0	£50,160	£74,860	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£155,000	£231,000
3	8		Widening A331 (S) entry and exit arms	4.0	£132	£197	220.0	£116,160	£173,360	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£359,000	£535,000
3			Widening M3 Slip Rd entry and exit arms	3.0	£132	£197	80.0	£31,680	£47,280	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£98,000	£146,000
3	8		Widening circulatory carriageway	4.0	£132	£197	55.0	£29,040	£43,340	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£75,000	£112,000
8	A325 Farnborough Road / B3008 Cranmore Lane roundabout	Roundabout	Widening north arm	5.0	£132	£197	50.0	£33,000	£49,250	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£85,000	£127,000
8	3		Widening south arm	2.0	£132	£197	50.0	£13,200	£19,700	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£34,000	£51,000
8	8		Widening and adjust southeast kerb	0.5	£132	£197	50.0	£3,300	£4,925	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£8,000	£13,000
8	3		Circulatory carriageway 28m ICD	615.8	£132	£197	1.0	£81,290	£121,319	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£209,000	£312,000
11	A327 Elles Road / Ively Road roundabout	Roundabout	Widening Elles Rd entry	1.5	£132	£197	50.0	£9,900	£14,775	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£25,000	£38,000
11			Widening Elles Rd exit	1.0	£132	£197	70.0	£9,240	£13,790	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£24,000	£35,000
11			Widen Circulatory carriageway	3.0	£132	£197	81.7	£32,350	£48,280	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£83,000	£124,000
12	Naafi Roundabout (A323 Wellington Avenue / Station Rd / High St)	Roundabout	No Mitigation Proposed																	
14	Rectory Road / Coleford Bridge Road T junction	Mini-Rbt	Adjust south eastern kerb	1.5	£132	£197	20.0	£3,960	£5,910	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£12,000	£18,000
14			Adjust signs and road markings					£5,000	£10,000	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£13,000	£26,000
14								£0	£0	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£0	£0
15	A325 Farnborough Rd / A323 Wellington Avenue roundabout	Roundabout	Widening North Arm	1.5	£132	£197	30.0	£5,940	£8,865	201	1 50%	10%	5%	6 0%	5 10%	6 12.5%	44%	309%	£18,000	£27,000
15								£0	£0	201	1 25%	10%	5%	6 0%	5 10%	6 12.5%	44%	257%	£0	£0

NB Cost rates per sqm are calculated from "SPONS 2012 Part 4 Approximate Estimating" rates per metre for a single lane carriageway 3.7m wide, as follows:

Low (per m for 3.7 wide carriageway) 490 Low (per sqm) 132 High (per m for 3.7 wide carriageway) 730 High (per sqm) 197

Sum by junction

1 M3 · 2 M3 3 M3

8 A32

11 A32 12 Naa

14 Rect

15 A32

– J4a North Roundabout	£1,043,000	£1,555,000
– J4a South Roundabout	£630,000	£946,000
– Junction 4 North Roundabout	£687,000	£1,024,000
25 Farnborough Rd / B3008 Cranmore La	£336,000	£503,000
27 Elles Road / Ively Road roundabout	£132,000	£197,000
afi Rbt (Wellington Ave / Station Rd / High St)	£0	£0
ctory Rd / Coleford Bridge Rd T junction	£25,000	£44,000
25 Farnborough Rd / A323 Wellington Ave	£18,000	£27,000
	£2,871,000	£4,296,000

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