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Modelling Highway Impacts of Local Plan Developments on the Strategic Road Network (A64)

March 2018

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RYEDALE DISTRICT COUNCIL

Document control sheet BPP 04 F8

Project: Ryedale Local Plan Transport Modelling
Client: Ryedale District Council Project No: B1990600
Document title: SRN Impacts

Ref. No: V1.0

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DATE **20 March 2018**	**Final**		

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1 Introduction

1.1 Overview

1.1.1 The Ryedale Local Plan defines the strategic policies to shape spatial and economic development to 2027. It includes the proposed location, type and size of new developments across Ryedale, in particular the major settlement centres of Malton, Norton and Pickering.

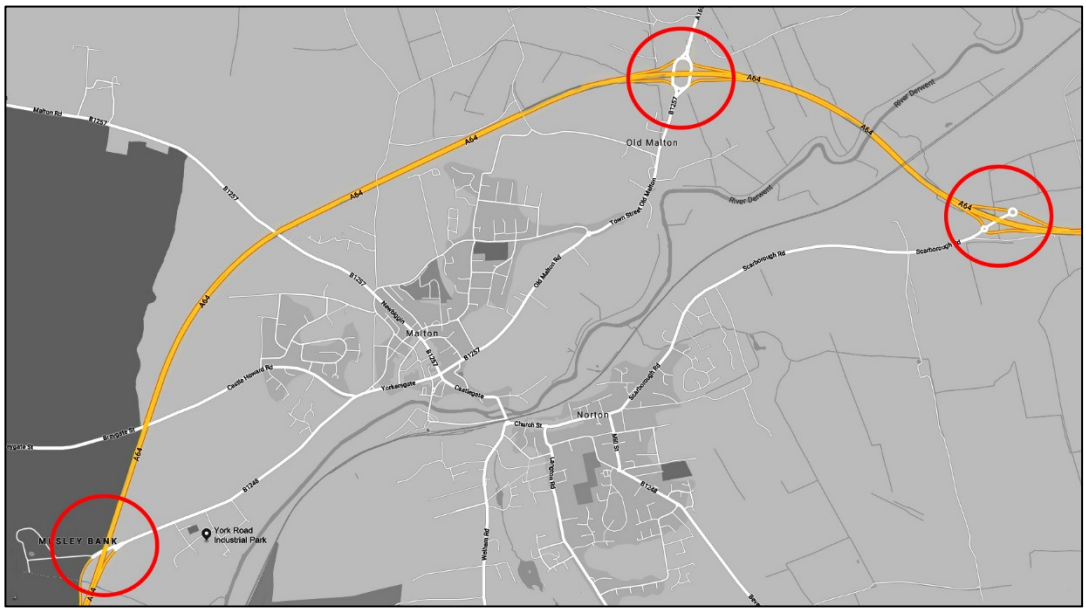
1.1.2 As well as the local highway network the strategic road network (SRN) needs to be assessed to ensure it remains able to cope with the additional traffic associated with new developments.

1.1.3 This technical note describes the effects of the traffic generated by proposed Local Plan developments on the three junctions on the SRN (A64) in Malton and Norton. These junctions are

- Musley Bank (Junction of B1248 York Road and the A64 west Malton).
- A169 / B1257 / A64 Junction north of Malton.
- Brambling Fields (Junction of B1248 Scarborough Road and the A64 east of Malton).

1.1.4 The location of these junctions is shown in Figure 1-1 below.

Figure 1-1 – Location of SRN Junctions



1.2 Aim of Report

1.2.1 This document seeks to provide evidence on the prospective SRN highway impacts of development proposals in the Malton, Norton and Pickering areas, within the Local Plan period to the year 2027.

2 Junction Assessment Methodology

2.1 Overview

2.1.1 The three SRN junctions have been modelled using two methods

- Roundabout capacity assessments using Junctions9 software at the A169 and the Brambling Fields junctions.
- Merge and Diverge type recommendations using merging and diverging diagrams in TD22/06 for all three junctions.

2.2 Roundabout Capacity Assessments

2.2.1 To assess the operational capacity of the grade separated roundabout at the A169/A64 junction and the two dumbbell roundabouts at the Brambling Fields junction the industry standard Junctions9 software has been used.

2.2.2 Roundabout geometry has been measured using Ordinance Survey Landline tiles in CAD and using aerial photography taken from Google Earth and Google Street View imagery.

2.2.3 Traffic flows and HGV percentages have been taken from the SATURN traffic model.

2.3 Merge and Diverge Type Recommendations

2.3.1 DMRB, Volume 6, Section 2, Part 1, TD22/06, Layout of Grade Separated Junctions provides design requirements for diverge and merge slip roads to ensure adequate length for deceleration and acceleration.

2.3.2 The guidance provides a chart (Figure 2/3 and Figure 2/5 in the guidance) where merge or diverge flows can be plotted against mainline upstream flows to give an appropriate merge or diverge layout for the given flows.

2.3.3 These charts have been used to determine the recommended appropriate merge and diverge layouts for each of the 3 A64 junctions and these layouts have been compared against the actual layout at each of the junctions.

2.4 Demand Scenarios

2.4.1 The SRN junctions have been modelled using the traffic demand taken from the SATURN traffic models. The demand scenarios modelled are as follows

- Baseline (no Local Plan trips)
- Scenario 3
- Scenario 7

2.4.2 In order to determine the effect of the Local Plan traffic generated by Scenario 3 and Scenario 7 the Baseline has been used as a control against which the two Local Plan scenarios have been compared.

2.5 Pickering Trips

2.5.1 The SRN junctions have been modelled using the traffic demand taken from the SATURN traffic models representing Malton and Norton. The demand scenarios modelled include specific trips associated with Local Plan developments in Malton and Norton only. There is no model of Pickering.

2.5.2 Trips associated with specific developments in Pickering have not been modelled however traffic growth associated with trips to and from Pickering has been taken into account.

2.5.3 The growth associated with trips to and from Pickering on the A169 is as shown in Table 2-1 below. This traffic growth is made up of background growth and growth associated with Pickering trips both estimated using TEMPRO. Also included are trips associated with specific developments in Malton and Norton which use the A169.

Table 2-1 – Traffic Growth on A169 Peak Hour

Direction	2014 Base	Baseline Scenario			Scenario 3			Scenario 7		
		Trips	Growth	% Growth	Trips	Growth	% Growth	Trips	Growth	% Growth
Northbound	463	671	208	45%	762	299	65%	753	290	63%
Southbound	553	738	185	33%	769	216	39%	720	167	30%

3 Results – Musley Bank Junction

3.1 Merge Layout

3.1.1 Using the diagrams in TD22/06 the recommended southbound merge on slip layout type is as follows

- Baseline – Type E Lane Gain
- Scenario 3 – Type E Lane Gain
- Scenario 7 – Type E Lane Gain

3.1.2 The existing merge layout at the junction is a Type B Parallel Merge which is a design which is capable of managing more merging and mainline traffic than the recommended Type E layout. It is therefore concluded that the capacity of the existing merge layout will not be effected by the proposed Local Plan development traffic.

3.2 Diverge Layout

3.2.1 Using the diagrams in TD22/06 the recommended southbound diverge off slip layout type is as follows

- Baseline – Type A Taper Diverge
- Scenario 3 – Type A Taper Diverge
- Scenario 7 – Type A Taper Diverge

3.2.2 The existing diverge layout at the junction is a Type A Taper Diverge so it is therefore concluded that the capacity of the existing diverge layout will not be effected by the proposed Local Plan development traffic.

3.3 Summary

3.3.1 The existing merge and diverge layouts at the Musley Bank junction provide the same or additional capacity than the recommended merge and diverge layouts in TD22/06 so the junction is therefore unlikely to be effected by the Local Plan traffic.

4 Results – A64 / A169 Junction

4.1 Merge Layouts

4.1.1 Using the diagrams in TD22/06 the recommended westbound merge on slip layout type is as follows

- Baseline – Type E Lane Gain
- Scenario 3 – Type E Lane Gain
- Scenario 7 – Type E Lane Gain

4.1.2 The recommended eastbound merge on slip layout type is as follows

- Baseline – Type E Lane Gain
- Scenario 3 – Type E Lane Gain
- Scenario 7 – Type E Lane Gain

4.1.3 The existing merge layouts at the junction are Type A or B, Taper or Parallel Merges, which is a design capable of managing more merging and mainline traffic than the recommended Type E layout. It is therefore concluded that the capacity of the existing merge layouts will not be effected by the proposed Local Plan development traffic.

4.2 Diverge Layouts

4.2.1 Using the diagrams in TD22/06 the recommended eastbound diverge off slip layout type is as follows

- Baseline – Type A Taper Diverge
- Scenario 3 – Type A Taper Diverge
- Scenario 7 – Type A Taper Diverge

4.2.2 The recommended westbound diverge off slip layout type is as follows

- Baseline – Type A Taper Diverge
- Scenario 3 – Type A Taper Diverge
- Scenario 7 – Type A Taper Diverge

4.2.3 The existing diverge layouts at the junction are Type A Taper Diverge so it is therefore concluded that the capacity of the existing merge layout will not be effected by the proposed Local Plan development traffic.

4.3 Roundabout Assessment

4.3.1 The A169 roundabout has been modelled using Junctions9 software. Table 4-1 below shows the results of the modelling. The results show that the junction will remain within capacity in both Local Plan scenarios.

Table 4-1 – A169 Roundabout Assessment Results

Scenario	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC
	A169 N			A64 E			B1257 S			A64W		
Baseline	0.5	2.18	0.32	0.5	2.68	0.33	0.5	2.31	0.29	0.0	1.97	0.04
Local Plan Scenario 3	0.7	2.62	0.42	0.7	3.14	0.38	0.6	2.70	0.36	0.1	2.23	0.05
Local Plan Scenario 7	0.7	2.51	0.40	0.6	2.98	0.37	0.7	2.75	0.37	0.1	2.28	0.05

4.1 Summary

4.1.1 The existing merge and diverge layouts at the junction provide the same or additional capacity than the recommended merge and diverge layouts in TD22/06. The roundabout will also operate within capacity so the junction is therefore unlikely to be effected by the Local Plan traffic.

5 Results – Brambling Fields Junction

5.1 Merge Layouts

5.1.1 Using the diagrams in TD22/06 the recommended northbound merge on slip layout type is as follows

- Baseline – Type E Lane Gain
- Scenario 3 – Type E Lane Gain
- Scenario 7 – Type E Lane Gain

5.1.2 The recommended eastbound merge on slip layout type is as follows

- Baseline – Type E Lane Gain
- Scenario 3 – Type E Lane Gain
- Scenario 7 – Type E Lane Gain

5.1.3 The existing merge layouts at the junction are Type A Taper Merges which is a design capable of managing more merging and mainline traffic than the recommended Type E layout. It is therefore concluded that the capacity of the existing merge layout will not be effected by the proposed Local Plan development traffic.

5.2 Diverge Layout

5.2.1 Using the diagrams in TD22/06 the recommended eastbound diverge off slip layout type is as follows

- Baseline – Type A Taper Diverge
- Scenario 3 – Type A Taper Diverge
- Scenario 7 – Type A Taper Diverge

5.2.2 The recommended westbound diverge off slip layout type is as follows

- Baseline – Type A Taper Diverge
- Scenario 3 – Type A Taper Diverge
- Scenario 7 – Type A Taper Diverge

5.2.3 The existing diverge layouts at the junction are Type A Taper Diverge so it is therefore concluded that the capacity of the existing merge layout will not be effected by the proposed Local Plan development traffic.

5.3 Roundabout Assessment

5.3.1 The dumbbell roundabouts have been modelled using Junctions9 software. Table 5-1 below shows the results of the modelling of the eastern roundabout and Table 5-2 shows the results for the western roundabout. The results show that the junction will remain within capacity in both Local Plan scenarios.

Table 5-1 – Brambling Fields Eastern Roundabout Assessment Results

Scenario	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC
	A64 SB Offslip			Overbridge		
Baseline	0.1	5.04	0.10	0.3	3.01	0.21
Local Plan Scenario 3	0.2	4.42	0.17	0.3	3.11	0.24
Local Plan Scenario 7	0.2	4.31	0.19	0.3	3.10	0.23

Table 5-2 – Brambling Fields Western Roundabout Assessment Results

Scenario	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC	Queue (PCU)	Delay (sec)	RFC
	Overbridge			A64 NB Offslip			B1248 – Scarb. Rd		
Baseline	0.1	4.40	0.09	0.0	2.13	0.00	0.7	3.16	0.40
Local Plan Scenario 3	0.2	3.73	0.15	0.0	2.21	0.00	1.3	4.28	0.56
Local Plan Scenario 7	0.2	3.64	0.16	0.0	2.24	0.00	1.0	3.76	0.50

5.4 Summary

5.4.1 The existing merge and diverge layouts at the junction provide the same or additional capacity than the recommended merge and diverge layouts in TD22/06. Both roundabouts will also operate within capacity so the junction is therefore unlikely to be effected by the Local Plan traffic.

6 Summary & Conclusion

6.1 Summary

6.1.1 The results of the merge type tests and the junction modelling show that the Local Plan traffic generated by Scenario 3 and by Scenario 7 is unlikely to have any detrimental effect on the three A64 junctions.

6.2 Conclusion

6.2.1 It is concluded that the existing layout of the A64 SRN junctions offers sufficient capacity and will not require any improvements or mitigation measures to provide more capacity to cope with traffic generated by the Local Plan development sites.