

## Malton & Norton Strategic Transport Assessment

### Final Report

June 2010

RYEDALE  
DISTRICT  
COUNCIL



**Document control sheet BPP 04 F8**

Client: Ryedale District Council  
 Project: Malton & Norton STA Job No: B1168700  
 Document Title: Final Report

	Originator	Checked by	Reviewed by	Approved by
<b>Draft Final</b>	NAME <b>Richard McGarr</b>	NAME <b>Jill Glover</b>	NAME <b>Richard Jones</b>	NAME <b>Richard Jones</b>
DATE  <b>Feb 2010</b>	SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
<b>Document Status – Final Report</b>				

<b>Final</b>	NAME <b>Richard McGarr</b>	NAME <b>Jill Glover</b>	NAME <b>Richard Jones</b>	NAME <b>Richard Jones</b>
DATE  <b>June 2010</b>	SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
<b>Document Status</b>				

<b>REVISION</b>	NAME	NAME	NAME	NAME
DATE	SIGNATURE	SIGNATURE	SIGNATURE	SIGNATURE
<b>Document Status</b>				

*Jacobs Engineering U.K. Limited*

This document has been prepared by a division, subsidiary or affiliate of *Jacobs Engineering U.K. Limited* ("Jacobs") in its professional capacity as consultants in accordance with the terms and conditions of Jacobs' contract with the commissioning party (the "Client"). Regard should be had to those terms and conditions when considering and/or placing any reliance on this document. No part of this document may be copied or reproduced by any means without prior written permission from Jacobs. If you have received this document in error, please destroy all copies in your possession or control and notify Jacobs.

Any advice, opinions, or recommendations within this document (a) should be read and relied upon only in the context of the document as a whole; (b) do not, in any way, purport to include any manner of legal advice or opinion; (c) are based upon the information made available to Jacobs at the date of this document and on current UK standards, codes, technology and construction practices as at the date of this document. It should be noted and it is expressly stated that no independent verification of any of the documents or information supplied to Jacobs has been made. No liability is accepted by Jacobs for any use of this document, other than for the purposes for which it was originally prepared and provided. Following final delivery of this document to the Client, Jacobs will have no further obligations or duty to advise the Client on any matters, including development affecting the information or advice provided in this document.

This document has been prepared for the exclusive use of the Client and unless otherwise agreed in writing by Jacobs, no other party may use, make use of or rely on the contents of this document. Should the Client wish to release this document to a third party, Jacobs may, at its discretion, agree to such release provided that (a) Jacobs' written agreement is obtained prior to such release; and (b) by release of the document to the third party, that third party does not acquire any rights, contractual or otherwise, whatsoever against Jacobs and Jacobs, accordingly, assume no duties, liabilities or obligations to that third party; and (c) Jacobs accepts no responsibility for any loss or damage incurred by the Client or for any conflict of Jacobs' interests arising out of the Client's release of this document to the third party.

## Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Ryedale District Local Development Framework	1
1.2	Objectives of the Study	1
1.3	Report Structure	1
1.4	Scope of the Modelling	2
<b>2</b>	<b>Methodology</b>	<b>3</b>
2.1	Introduction	3
2.2	Previous Work Completed Prior to the Assessment	3
2.3	SATURN Software Model	6
2.4	Engineering Solutions to Facilitate Development	6
2.5	Major Scheme Design and Highway Cost Estimates	7
<b>3</b>	<b>Development Sites and Scenarios</b>	<b>8</b>
3.1	Introduction	8
3.2	Grouped Development Sites	8
3.3	<i>Group 1</i> - Stage 1 & Stage 2 Town Centre Brownfield Developments	10
3.4	<i>Group 2</i> - Malton Based Development Sites	12
3.5	<i>Group 3</i> - Norton Based Development Sites	14
3.6	<i>Group 4</i> - Norton East	16
3.7	<i>Group 5</i> - Woolgrowers	17
3.8	Development Scenarios	18
3.9	Development Site Size and Trip Generation	18
3.10	Development Density Ratios	20
3.11	Development Trip Distribution	21
3.12	Development Site Interaction (Linked Trips)	21
3.13	Mode Choice Trip Reduction	21
3.14	Congestion Analysis of Scenarios	23
<b>4</b>	<b>Review of Development Scenario 1</b>	<b>25</b>
4.1	Scenario Description	25
4.2	Traffic Generation	25
4.3	Congestion	26
4.4	Queues	27
4.5	Advantages of Scenario 1	28
4.6	Disadvantages of Scenario 1	28
4.7	Recommendation Summary	28
<b>5</b>	<b>Review of Development Scenario 2</b>	<b>29</b>
5.1	Scenario Description	29
5.2	Traffic Generation	29
5.3	Increase in Congestion	30
5.4	Queues (with Mitigation)	31
5.5	Advantages of Scenario 2	32
5.6	Disadvantages of Scenario 2	32
5.7	Recommendation Summary	32

<b>6</b>	<b>Review of Development Scenario 3</b>	<b>33</b>
6.1	Scenario Description	33
6.2	Traffic Generation	33
6.3	Increase in Congestion	34
6.4	Queues (with Mitigation)	35
6.5	Advantages of Scenario 3	36
6.6	Disadvantages of Scenario 3	36
6.7	Recommendation Summary	36
<b>7</b>	<b>Review of Development Scenario 4</b>	<b>37</b>
7.1	Scenario Description	37
7.2	Traffic Generation	37
7.3	Increase in Congestion	38
7.4	Queues (with Mitigation)	39
7.5	Advantages of Scenario 4	40
7.6	Disadvantages of Scenario 4	40
7.7	Recommendation Summary	40
<b>8</b>	<b>Review of Development Scenario 5</b>	<b>41</b>
8.1	Scenario Description	41
8.2	Traffic Generation	41
8.3	Increase in Congestion	42
8.4	Queues (with Mitigation)	43
8.5	Advantages of Scenario 5	44
8.6	Disadvantages of Scenario 5	44
8.7	Recommendation Summary	44
<b>9</b>	<b>Review of Development Scenario 6</b>	<b>45</b>
9.1	Scenario Description	45
9.2	Traffic Generation	45
9.3	Increase in Congestion	46
9.4	Queues (with Mitigation)	47
9.5	Advantages of Scenario 6	48
9.6	Disadvantages of Scenario 6	48
9.7	Recommendation Summary	48
<b>10</b>	<b>Review of Development Scenario 7</b>	<b>49</b>
10.1	Scenario Description	49
10.2	Traffic Generation	49
10.3	Increase in Congestion	50
10.4	Queues (with Mitigation)	51
10.5	Advantages of Scenario 7	52
10.6	Disadvantages of Scenario 7	52
10.7	Recommendation Summary	52
<b>11</b>	<b>Review of Development Scenario 8</b>	<b>53</b>
11.1	Scenario Description	53
11.2	Traffic Generation	53
11.3	Increase in Congestion	54
11.4	Queues (with Mitigation)	55
11.5	Advantages of Scenario 8	56

11.6	Disadvantages of Scenario 8	56
11.7	Recommendation Summary	56
<b>12</b>	<b>Review of Development Scenario 9</b>	<b>57</b>
12.1	Scenario Description	57
12.2	Traffic Generation	57
12.3	Increase in Congestion	58
12.4	Queues (with Mitigation)	59
12.5	Advantages of Scenario 9	60
12.6	Disadvantages of Scenario 9	60
12.7	Recommendation Summary	60
<b>13</b>	<b>Summary of Scenario Assessment</b>	<b>61</b>
13.1	Assessment Overview	61
13.2	Scenario Ranking	62
<b>14</b>	<b>Engineering Solutions to Facilitate Development</b>	<b>64</b>
14.1	Introduction	64
14.2	Junction Options	64
14.3	Pasture Lane	65
14.4	Castle Howard Road	66
14.5	Welham Road	68
14.6	Westfield Way	70
14.7	Summary	71
<b>15</b>	<b>Woolgrowers and Norton East Link Road</b>	<b>73</b>
15.1	General	73
15.2	Norton East Development Link Road	73
15.3	Woolgrowers Development Link Road	75
<b>16</b>	<b>Broughton Road Grade Separated Junction (B1257/A64)</b>	<b>78</b>
16.1	Introduction	78
16.2	Design Options for the Junction	78
16.3	Feasibility Works Cost Estimate	80
16.4	Congestion in Malton and Norton	81
16.5	Scenario Ranking (with GSJ)	82
16.6	Summary	83
<b>17</b>	<b>Selecting Development Scenario(s)</b>	<b>85</b>
17.1	Introduction	85
17.2	Extraction of Results	85
17.3	Refining the Choice of Scenarios	86
<b>18</b>	<b>Scenario 4A Congestion Analysis</b>	<b>88</b>
18.1	Increase in Congestion	88
18.2	Advantages of Scenario 4A	89
18.3	Disadvantages of Scenario 4A	90
18.4	Recommendation Summary	90
<b>19</b>	<b>Scenario 4A Sensitivity Testing</b>	<b>91</b>
19.1	Introduction	91
19.2	Test Results	91

19.3	Conclusion	92
<b>20</b>	<b>Summary and Conclusions</b>	<b>93</b>
20.1	Summary of Methodology	93
20.2	Scenario Testing Results	95
20.3	Conclusion - Recommended Scenarios	96

**Tables**

Table 3.1	Group 1 Development Assumptions	11
Table 3.2	Group 1 Total Development by Type	11
Table 3.3	Group 2 Development Assumptions	13
Table 3.4	Group 2 Total Development by Type	13
Table 3.5	Group 3 Development Assumptions	15
Table 3.6	Group 3 Total Development by Type	15
Table 3.7	Group 4 Development Assumptions	16
Table 3.8	Group 5 Development Assumptions	17
Table 3.9	Development Scenarios	18
Table 3.10	Land Use Interaction Trip Reduction	21
Table 3.11	Mode Change Trip Reduction	22
Table 3.12	Traffic Light System	24
Table 4.1	Scenario 1 Development Totals	25
Table 4.2	Scenario 1 RFC Magnitude (5 Key Junctions)	26
Table 4.3	Scenario 1 RFC Magnitude (Other Junctions)	27
Table 5.1	Scenario 2 Development Totals	29
Table 5.2	Scenario 2 RFC Magnitude (5 Key Junctions)	30
Table 5.3	Scenario 2 RFC Magnitude (Other Junctions)	31
Table 6.1	Scenario 3 Development Totals	33
Table 6.2	Scenario 3 RFC Magnitude (5 Key Junctions)	34
Table 6.3	Scenario 3 RFC Magnitude (Other Junctions)	35
Table 7.1	Scenario 4 Development Totals	37
Table 7.2	Scenario 4 RFC Magnitude (5 Key Junctions)	38
Table 7.3	Scenario 4 RFC Magnitude (Other Junctions)	39
Table 8.1	Scenario 5 Development Totals	41
Table 8.2	Scenario 5 RFC Magnitude (5 Key Junctions)	42
Table 8.3	Scenario 5 RFC Magnitude (Other Junctions)	43
Table 9.1	Scenario 6 Development Totals	45
Table 9.2	Scenario 6 RFC Magnitude (5 Key Junctions)	46
Table 9.3	Scenario 6 RFC Magnitude (Other Junctions)	47
Table 10.1	Scenario 7 Development Totals	49
Table 10.2	Scenario 7 RFC Magnitude (5 Key Junctions)	50
Table 10.3	Scenario 7 RFC Magnitude (Other Junctions)	51
Table 11.1	Scenario 8 Development Totals	53
Table 11.2	Scenario 8 RFC Magnitude (5 Key Junctions)	54
Table 11.3	Scenario 8 RFC Magnitude (Other Junctions)	55
Table 12.1	Scenario 9 Development Totals	57
Table 12.2	Scenario 9 RFC Magnitude (5 Key Junctions)	58
Table 12.3	Scenario 9 RFC Magnitude (Other Junctions)	59
Table 13.1	Assessment Overview	61
Table 13.2	- Road Name Abbreviations for Table 13.1	62
Table 13.3	Scenario Ranking	63
Table 14.1	Deliverable Junction Improvement Option Summary	72
Table 15.1	Norton East Link Road Cost Estimate	75
Table 15.2	Woolgrowers Link Road Cost Estimate	77
Table 16.1	Broughton Road A64 GSJ Works Cost Estimate (£'s)	80
Table 16.2	Assessment Overview with A64 Broughton Road Grade Separated Junction	81
Table 16.3	Scenario Ranking (with GSJ)	82
Table 18.1	Scenario 4A RFC Magnitude (5 Key Junctions)	88

Table 18.2 Scenario 4A RFC Magnitude (Other Junctions)	89
Table 19.1 Scenario 4A Sensitivity Testing Results (5 key Junctions)	91
Table 19.2 Scenario 4A Sensitivity Testing Results (Other Junctions)	92

**Figures**

Figure 3.1 Group 1 Developments	10
Figure 3.2 Group 2 Developments	12
Figure 3.3 Group 3 Developments	14
Figure 3.4 Group 4 Developments	16
Figure 3.5 Group 5 Developments	17
Figure 3.6 Key Junction Locations	23
Figure 4.1 Scenario 1 Developments	25
Figure 5.1 Scenario 2 Developments	29
Figure 6.1 Scenario 3 Developments	33
Figure 7.1 Scenario 4 Developments	37
Figure 8.1 Scenario 5 Developments	41
Figure 9.1 Scenario 6 Developments	45
Figure 10.1 Scenario 7 Developments	49
Figure 11.1 Scenario 8 Developments	53
Figure 12.1 Scenario 9 Developments	57
Figure 16.1 With and Without GSJ Congestion Comparison	83
Figure 17.1 Scenario Assessment Summary	85

**Appendices**

<b>Appendix A</b>	<b>Map of Malton &amp; Norton</b>
-------------------	-----------------------------------

**1**

**Introduction**

**1.1 Ryedale District Local Development Framework**

- 1.1.1 Jacobs was appointed by Ryedale District Council to undertake a Strategic Transport Assessment (STA) to help inform their new Local Development Framework (LDF).
- 1.1.2 The LDF will eventually replace the current Local Plan, forming the development plan for Ryedale to 2026. The LDF is made up of a Core Strategy setting out the broad strategy and vision for the District, and allocation documents which will set out specific areas for future development. This study forms part of the evidence base underpinning the preparation of the LDF.

**1.2 Objectives of the Study**

- 1.2.1 The purpose of the study is to evaluate the traffic impacts associated with potential strategic development in Malton and Norton by 2026. It also considers the requirements of North Yorkshire County Council (NYCC) as the highway authority within the local area.
- 1.2.2 A SATURN traffic model, which is a computer simulation of traffic movements, was used to evaluate the impact of the additional vehicles associated with the proposed strategic developments in Malton & Norton.
- 1.2.3 The main objectives of the study are:
  - To test the impact of strategic development locations on the road network in Malton and Norton.
  - To evidence the quantum of development that can be accommodated in Malton and Norton with out an unacceptable impact on the highway network.
  - To identify any potential highway capacity problems with particular development scenarios.
  - To identify deliverable highway infrastructure improvements that are likely to be required to accommodate development to go ahead without resulting in an unacceptable impact on the highway network.
  - To identify other improvements for further investigation that may not be immediately deliverable, but could provide significant capacity improvements to the local highway network.

**1.3 Report Structure**

- 1.3.1 Following this introduction, the report is divided into 18 Sections.
- 1.3.2 Section 2 describes the methodology used for the assessment and Section 3 describes the development sites, groups and scenarios.



- 1.3.3 Sections 4 to 12 discuss the assessment of the development traffic from each of the scenarios and the impact it has on the highway network, the results of which are summarised in Section 13.
- 1.3.4 The engineering solutions to improve the capacity of key junctions are discussed in Section 14.
- 1.3.5 Sections 15 describes the proposed link roads associated with the larger Woolgrowers and Norton East developments and Section 16 describes the proposed Grade Separated Junction between Broughton Road and the A64.
- 1.3.6 The report is concluded in the last three sections where Section 17 recommends development scenarios, Section 18 summarises the preferred scenario and Section 19 gives a summary and conclusion.
- 1.3.7 A Technical Annex has been created to accompany this report. The Annex displays ratio of flow to capacity (RFC) values for all scenarios along with model outputs from junction capacity assessments.

#### **1.4 Scope of the Modelling**

- 1.4.1 This report makes specific reference to actual sites in Malton and Norton, many of which are being put forward by landowners for inclusion in the LDF. These have been included in this modelling work by virtue that they represent potential development sites. However their inclusion in this study does not imply the site will be allocated in the LDF and /or that planning permission will be granted.
- 1.4.2 This report looks at the broad cumulative impact on the highway network of potential development sites in areas around Malton and Norton. It therefore is a Strategic Transport Assessment to inform choices for the LDF and does not replace the need for a detailed transport assessment in progressing individual sites.

**2**

**Methodology**

**2.1 Introduction**

2.1.1 This section of the report describes the methodology which has been used to examine the effects of a number of development scenarios on the local highway network, the tools used to investigate and calculate future congestion levels and the software solutions used to mitigate this congestion.

2.1.2 The report details some of the key characteristics of the Malton and Norton local highway network. To assist the reader, Appendix A contains an annotated map of Malton and Norton showing the key roads and junctions within the local highway network.

**2.2 Previous Work Completed Prior to the Assessment**

**Malton & Norton - Base Traffic Model**

2.2.1 In 2008 Jacobs was commissioned by NYCC to develop a traffic model of Malton and Norton to be used to test a number of proposed highway improvements across the local highway network.

2.2.2 A validated model was developed using the SATURN software package. The model uses a base year of 2008 and includes all the major highway links and junctions in both Malton and Norton (A64, Musley Bank Junction, A169 and the Brambling Fields Junction).

**Brambling Fields & Butcher Corner Restrictions**

2.2.3 Ryedale District Council (RDC) is committed to improving air quality in Malton. Studies have shown that the best way to do this is to reduce congestion caused by heavy good vehicles (HGVs) at Butcher Corner in the heart of Malton town centre.

2.2.4 The Butcher Corner junction has been designated as an Air Quality Management Area (AQMA). An AQMA is a designated zone where special air quality management proposals (defined in an air quality action plan) are proposed by the local authority to improve air quality and ensure that Air Quality Objectives are met.

2.2.5 At present, due to the existing layout of the A64 Brambling Fields junction, HGVs wishing to access Scarborough Road in Norton have no option but to travel through Butcher Corner. As such, there are proposals to construct an additional slip road at the Brambling Fields junction which would allow HGVs to travel from the A64 to Scarborough Road in Norton without having to go through Butcher Corner.

2.2.6 To test the effects of the additional slip road at Brambling Fields the scheme has been added to the Do Minimum SATURN traffic model of Malton and Norton. Model tests found that the additional slip road alone did not attract many vehicles as the

route through the existing Butcher Corner junction, through Malton and Norton, is more attractive.

2.2.7 In order to bring the required air quality, pedestrian and other environmental benefits to Butcher Corner, it is both desirable and necessary to restrict traffic capacity which will increase journey times, thus making the town centre less attractive to drivers who will be persuaded to reroute onto the A64. To accomplish this, North Yorkshire County Council with support from Ryedale DC is proposing a number of additional measures in the town centre which include:

- A change in the signal timings at Butcher Corner to include an additional pedestrian phase.
- The removal of one traffic lane on the Castlegate approach to the junction which will restrict capacity.
- Vehicles will be banned from using Railway Street and Norton Road which otherwise may be used as a rat run.
- HGVs will be banned across the level crossing, except for those requiring access to local businesses.

2.2.8 These additional measures along with the additional slip road at Brambling Fields have been tested in the SATURN traffic model. The model has shown that applying these measures will have the desired effect and traffic will use the A64 and Brambling Fields to get to Norton. The SATURN model network with these network improvements in place has been used as the base network for the Malton & Norton Strategic Transport Assessment (STA).

#### Malton & Norton Transportation Review & Strategy

2.2.9 Previous to the Malton and Norton Strategic Transport Assessment, Jacobs was commissioned in July 2008 by Ryedale District Council (RDC) to undertake a very similar but smaller scale study to analyse Malton town centre's transportation network in light of a number of proposed allocated and committed developments within the area.

2.2.10 These developments were identified within RDC's Town Centre Strategy (TCS) and LDF, and RDC were keen to ensure that the impact of the developments was kept to a minimum.

2.2.11 The developments sites which this study investigated are the Group 1 (Stage 1 and Stage 2) sites mentioned later in this report (Section 3.2).

2.2.12 The analysis of the transport network following the proposed Group 1 developments showed that improvements were necessary to the route into the town centre along Broughton Road and Newbeggin.

2.2.13 The options that were developed as part of the study were improvements to the Pasture Lane junction; these options were designed to allow more capacity.

### Malton Traffic Management Strategy (TMS)

- 2.2.14 In 2005 North Yorkshire County Council developed a TMS for Malton and Norton aimed at securing long lasting transport improvements, especially for vulnerable road users, whilst maximising the economic and environmental well being of the towns and minimising existing or potential sources of detrimental impact.
- 2.2.15 The TMS was the result of substantial consultation with Ryedale District Council, Malton Town Council, Norton on Derwent Town Council, transport operators, police and emergency services, and other key partners and stakeholders.
- 2.2.16 The strategy proposed, identified, costed and prioritised a programme of schemes for implementation. A phasing programme was devised to implement the Malton and Norton Transportation Strategy, which sets out the main measures and options, the timescale for implementation and the current estimated cost of the projects.
- 2.2.17 NYCC's Ryedale Area committee agreed to the programme and an officer group was established to oversee the implementation of the study.
- 2.2.18 To date a number of schemes have been implemented, some schemes have been cancelled and some schemes are still to be implemented and as such currently sit on NYCC's Reserve List of Schemes. Reserve List schemes which are still required have been brought forward into the SCTS process described below for further investigation.

### Malton and Norton Service Centre Transportation Strategy (SCTS)

- 2.2.19 An SCTS involves the identification of transportation improvement schemes and initiatives aimed at helping to build sustainable communities, through contributing to NYCC's second Local Transport Plan (LTP2) Objectives.
- 2.2.20 A total of 28 Service Centre study areas have been identified across North Yorkshire using the outcomes from the Regional Spatial Strategy Settlement Study, carried out by NYCC on behalf of the Regional Assembly.
- 2.2.21 For the 14 areas where a TMS has been undertaken (of which Malton & Norton is one) the aim of the SCTS approach is to capture and report on the transportation and accessibility issues within the town centres and the surrounding hinterland.
- 2.2.22 At the time of writing this report the Malton and Norton SCTS is currently at the public consultation stage after identifying a number of improvement schemes. These improvement schemes have been identified through a TMS and Reserve List review and through stakeholder consultation.
- 2.2.23 The Brambling Fields and Butcher Corner improvements and the recommended junction improvements described in this report have also been taken on board and form part of the SCTS public consultation.

### **2.3 SATURN Software Model**

- 2.3.1 The Malton and Norton traffic model was originally developed by Mouchel Parkman in 2004. Mouchel Parkman were commissioned by NYCC to develop the traffic model to assess the transport implications of the strategic developments in Malton and Norton and transport schemes and packages, including the Brambling Fields junction and Butcher Corner restrictions.
- 2.3.2 The model has been built using the SATURN software package which is capable of modelling the impacts of new developments and proposed transport improvements both on the overall highway network and on individual roads and junctions.
- 2.3.3 The traffic model covers the whole of the built up area of Malton and Norton as far as and including the A64 around the northern edge of the town. All the main routes through the town including the B1248 York Road, B1258 Scarborough Road, B1257 Broughton Road and B1248 Beverley Road are represented in the traffic model.
- 2.3.4 As part of the process of developing the traffic model extensive data collection was undertaken throughout the detailed study area in 2004 and a highway inventory of the key junctions on the network was produced. The data collection included roadside interview surveys, manual and automatic link flow counts and junction turning counts.
- 2.3.5 This data was used to build the 2004 (base year) transport model for the AM (0800-0900) and PM (1700-1800) peak hours and the average inter peak hour (the average hourly flows between 0900-1700).
- 2.3.6 Using this data Jacobs has recalibrated and validated the 2004 traffic model to a base year of 2008. The 2008 model has been calibrated and validated, in accordance with Government guidance, to reflect the local traffic and travel patterns and to ensure that it is sufficiently robust to reliably assess the transport impacts of schemes and developments within Malton and Norton.
- 2.3.7 To produce a robust assessment of the impacts on the highway network the morning peak hour traffic model, the busiest of the two peak periods, has been chosen. The plan period for Ryedale's LDF, in providing housing, employment, retail and other development is to 2026. Therefore the model has been robustly set to consider traffic levels in 2026, assessing the AM peak with the Brambling Fields and Butcher Corner improvements incorporated in to the model.
- 2.3.8 The assessments of the road network against the various development scenarios are therefore based on the imperative of having completed the Brambling Fields interchange improvement and the supplementary Butcher Corner schemes.

### **2.4 Engineering Solutions to Facilitate Development**

- 2.4.1 A package of junction improvement measures is essential to the accommodation of additional development in Malton/Norton. These mitigation measures will eliminate congestion or at least reduce the congestion to levels associated with the baseline scenario in 2026. Without these mitigation measures the development scenarios will present unacceptable impacts on the local road network.

- 2.4.2 At this stage, improvement options are being considered at a strategic level as detailed designs are not yet required. The strategic work undertaken has focussed on four junction improvements (listed below). The four junction improvements are:
- Welham Road / Castlegate / Church Street (Welham Road Junction)
  - Castle Howard Road / Yorkersgate / York Road (Castle Howard Road Junction)
  - Pasture Lane / Newbeggin / Mount Crescent / Broughton Road (Pasture Lane Junction)
  - Westfield Way / Scarborough Road (Westfield Way Junction)
- 2.4.3 For each of the four junctions a deliverable junction improvement has been developed which can be constructed within the existing highway boundary. A further set of measures have been developed which provide maximum capacity at each junction but will require land take or further investigation. These are discussed later in the report and summarised in Section 14 (Engineering Solutions to Facilitate Development).
- 2.4.4 These junction improvement options will provide improved access to the strategic developments and accommodate the additional traffic generated by the developments.

## **2.5 Major Scheme Design and Highway Cost Estimates**

- 2.5.1 As part of this study, Jacobs were asked to provide an outline design and indicative cost estimate for the provision of the grade separated junction (GSJ) between Broughton Road and the A64. A basic design and costing for this junction was considered as part of the preparation of the Malton and Norton TMS in 2005. However a more detailed desktop study has now been carried out to provide an updated design and costing for the scheme. In addition to this commission, NYCC commissioned Jacobs to assess different options and associated costings for the accommodation of junction at this location. This major scheme design is discussed later in Section 16.
- 2.5.2 All details including costing for the four junction improvements proposed can be found in Section 14.

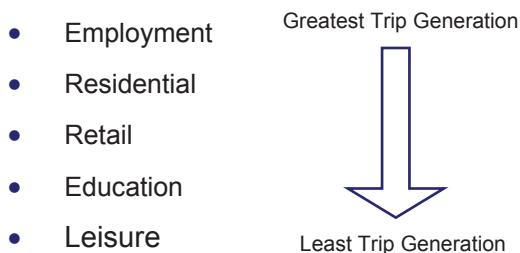
# 3 Development Sites and Scenarios

## 3.1 Introduction

- 3.1.1 This section of the report describes the development sites which have been tested as part of the study and the assumptions made to estimate the trip generation from each development site.
- 3.1.2 As the full details of the sites are not yet known, Ryedale District Council in partnership with Jacobs have applied some general assumptions with regard to the footprint size, development type mix and trip generation and trip distribution for each development site
- 3.1.3 To provide a set of effective and easy to compare/understand results the traffic modelling and the trip generation for each development site has been based on the 2026 AM peak. It is generally accepted that the AM peak is the busiest peak in terms of traffic movements within the local area.

## 3.2 Grouped Development Sites

- 3.2.1 A number of potential development sites in Malton, Norton and Old Malton have been put forward through the RDC's Local Development Framework for potential development.
- 3.2.2 From the sites modelled, there are 5 different types of development have been identified for Malton and Norton. These are set out below in order of how much traffic is generated by these types of development (their trip generation magnitude):



- 3.2.3 Whilst this study has considered actual sites put forward to RDC, this study groups them together to form a strategic view of the transport impacts of this additional development. Sites are not considered on an individual basis except for the Woolgrowers and Norton East sites due to their scale.

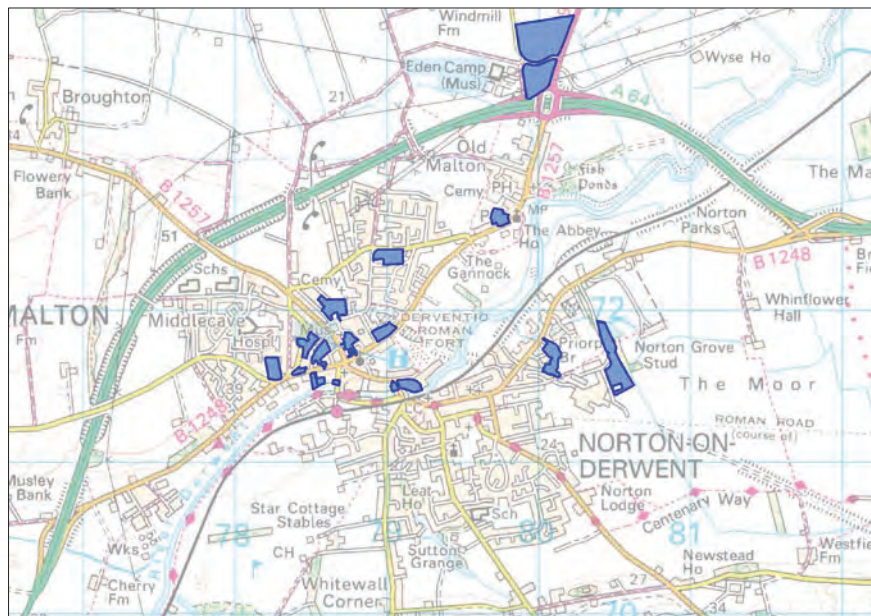
3.2.4 In order to realistically test the effects of these development sites on the local highway network, the sites have been divided into 5 groups based on location, size and or phasing as follows

- Group 1 – Stage 1 and Stage 2 Brownfield Development Sites
- Group 2 – Malton Based Sites
- Group 3 – Norton Based Sites
- Group 4 – Woolgrowers Development Site
- Group 5 – Norton East Development Site

3.2.5 The details of each group are as follows in Sections 3.3 – 3.7.



3.3 **Group 1 - Stage 1 & Stage 2 Town Centre Brownfield Developments**



**Figure 3.1 Group 1 Developments**

3.3.1 Group 1 consists of 2 stages. Stage 1 consists of those sites considered through the Malton Town Centre Strategy. For this stage the sites which involve trip generating development have been considered. These are:

- Livestock Market
- Wentworth Street Car Park
- Pasture Lane / Showfield Lane
- East Mount / Old Maltongate
- Mount Hotel

3.3.2 Stage 2 consists of some sites that are likely to come forward in the near future, some previously developed ('brownfield') sites, sites where planning permission has been sought and those sites considered through the Malton & Norton River/Rail Corridor Study. They are listed as:

- |  |  |
|--|--|
| • Ryedale Business Park, Eden Road         | • Sheepfoot Hill/Castlegate                        |
| • Manor Park                               | • Former Travis Perkins Builders Yard, Yorkersgate |
| • Highfield Lane                           | • Robsons Garage, Welham Road                      |
| • Barton Cottage                           | • Former Dewhirst factory, Welham Road             |
| • Land West of York Road Industrial Estate | • Elements of the 'Woolgrowers' site               |
| • Norton Grove Industrial Estate           |  |
| • Redrow Housing Site, Scarborough Road    |  |

3.3.3 The developments in Group 1 are included within all 9 scenarios. The development assumptions made for the Group 1 (Stage 1 & Stage 2) development sites are as follows:

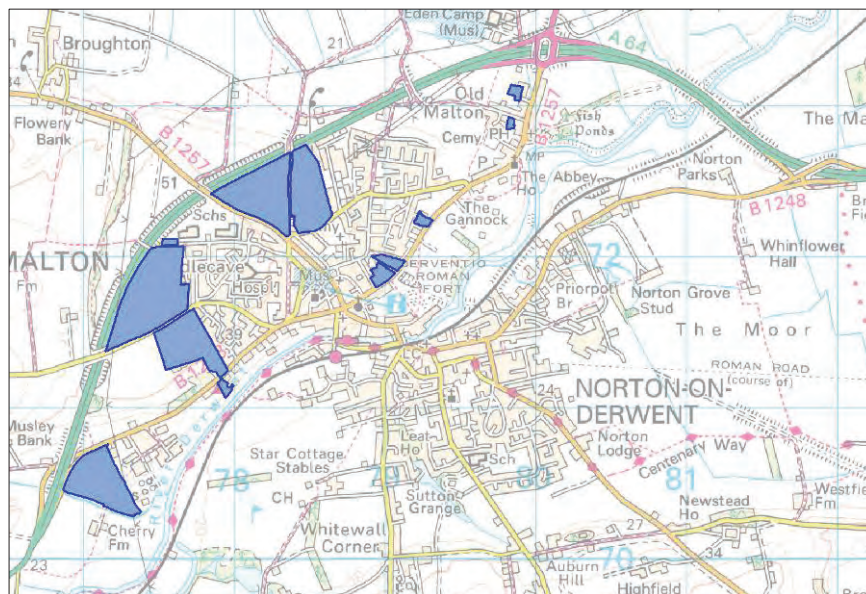
Development Site	Development Type	Plot Area
Livestock Market	Retail - Basket	1000 m <sup>2</sup>
	Retail - Other	800 m <sup>2</sup>
	Residential - Min Flats	58 units
	Residential - Max Flats	98 units
Wentworth Street Car Park	Retail - Trolley	3000 m <sup>2</sup>
Pasture Lane/ Showfield Lane	Residential	4.6 ha
	Employment B1	16667 m <sup>2</sup>
	Employment B2	16667 m <sup>2</sup>
	Employment B8	16667 m <sup>2</sup>
	Retail – Bulky Goods	3709 m <sup>2</sup>
	Cattle Market	2 ha
East Mount/Old Maltongate	Residential - Flats	36 units
Mount Crescent Hotel	Residential - Flats	15 units
Ryedale Business Park, Eden Road	Employment B1	39867 m <sup>2</sup>
	Employment B2	39867 m <sup>2</sup>
	Employment B8	39867 m <sup>2</sup>
Manor Park	Employment B1	10100 m <sup>2</sup>
Highfield Lane	Residential	56 units
Barton Cottage	Residential - Sheltered Acc	48 units
Land West of York Road Industrial Estate	Employment B1	6.35 ha
	Employment B2	6.35 ha
	Employment B8	6.35 ha
Norton Grove Industrial Estate	Employment B1	1.3 ha
	Employment B2	1.3 ha
	Employment B8	1.3 ha
Redrow Housing Site, Scarborough Road	Residential	128 units
Sheepfoot Hill/Castlegate	Retail	11100 m <sup>2</sup>
Former Travis Perkins Builders Yard, Yorkersgate	Residential - Flats	14 units
Robsons Garage, Welham Road	Retail	3200 m <sup>2</sup>
Former Dewhirst factory, Welham Road	Housing	15 units
	Education - Nursery	2100 m <sup>2</sup>
	Retail	2100 m <sup>2</sup>
Elements of the 'Woolgrowers' site	Residential - Housing	161 units
	Residential - Flats	53 units

**Table 3.1 Group 1 Development Assumptions**

Development Type	Total Plot Area
Retail	27 ha
Residential	667 units + 4.6 ha
Education	0.2 ha
Employment	41 ha

**Table 3.2 Group 1 Total Development by Type**

**3.4 Group 2 - Malton Based Development Sites**



**Figure 3.2 Group 2 Developments**

3.4.1 Group 2 consists of 12 development sites north of the River Derwent, in and around Malton. These are:

- Middlecave Road
- Castle Howard Road
- Land East of Broughton Road
- York Road Industrial Estate
- Ryedale House and Tennis / Bowls Club
- Ashfield, Old Malton Road
- Coronation Farm, Old Malton
- Thackrays Yard, Old Malton and Hunters Hill
- Malton School, Middlecave Road and Land Rear of N<sup>o</sup> 67 Middlecave Road
- 35 York Road
- Dickens Road
- Old Malton – Westgate Lane and Allotments

3.4.2 The development assumptions made for the Group 2 development sites are as follows:

Development Site	Development Type	Plot Area
Middlecave Road	Residential	539 units
	D2 - Tennis & Bowls Club	3.25 ha
Castle Howard Road	Residential	339 units
Land East of Broughton Road	Residential	435 units
York Road Industrial Estate	Employment B1	0.34 ha
	Employment B2	1.78 ha
	Employment B8	0.59 ha
Ryedale House and Tennis / Bowls Club	Residential	93 units
Ashfield, Old Malton Road	Residential	20 units
Coronation Farm, Old Malton	Residential	10 units
Thackrays Yard, Old Malton	Residential	20 units
Malton School, Middlecave Road	Residential	12 units
35 York Road	Residential	18 units
Dickens Road	Residential	71 units
Old Malton	Residential - S Westgate Lane	345 units
	Residential - Allotments	5 units

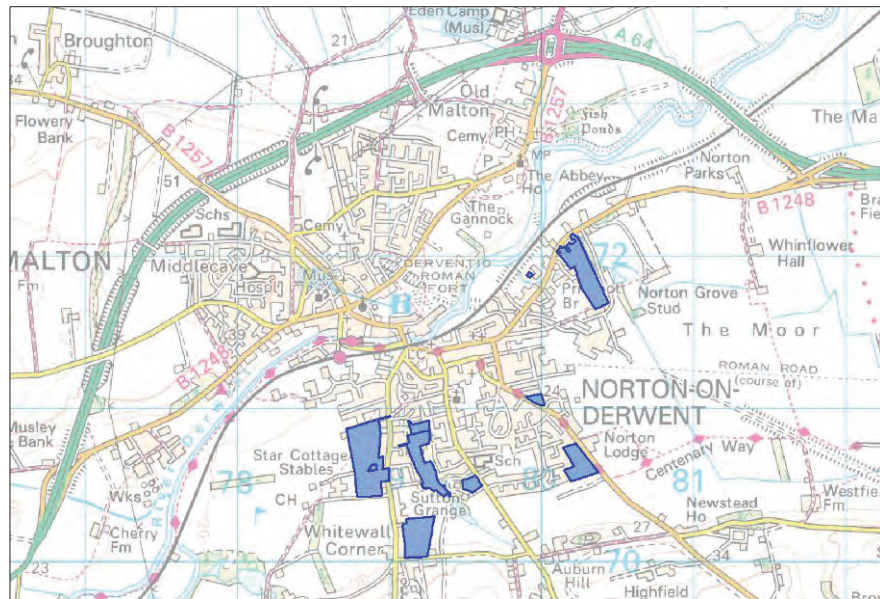
**Table 3.3 Group 2 Development Assumptions**

Development Type	Total Plot Area
Residential	1907 units
Employment	2.71 ha
Leisure	3.25 ha

**Table 3.4 Group 2 Total Development by Type**



**3.5 Group 3 - Norton Based Development Sites**



**Figure 3.3 Group 3 Developments**

3.5.1 Group 3 consists of 9 development sites south of the River Derwent in and around Norton. These are:

- Land West of Welham Road
- Whitewall Gallops, Welham Road
- Welham Fisheries, off Lakeside Gardens
- Sutton Farm, Langton Road
- Cheesecake Farm, Beverley Road
- Hawthorns, Beverley Road
- Westfield Nurseries, Scarborough Road
- Land Rear of 115-119 Scarborough Road
- Land East of 101-137 Welham Road

3.5.2 The development assumptions made for the Group 2 development sites are as follows:

Development Site	Development Type	Plot Area
Land West of Welham Road	Residential	285 units
Whitewall Gallops, Welham Road	Residential	139 units
Welham Fisheries, off Lakeside Gardens	Residential	168 units
Sutton Farm, Langton Road	Residential	28 units
Cheesecake Farm, Beverley Road	Residential	89 units
Hawthorns, Beverley Road	Residential	16 units
Westfield Nurseries, Scarborough Road	Residential	173 units
Land Rear of 115-119 Scarborough Rd	Residential	2 units
Land East of 101-137 Welham Road	Residential	191 units

**Table 3.5 Group 3 Development Assumptions**

Development Type	Total Plot Area
Residential	1091 units

**Table 3.6 Group 3 Total Development by Type**

3.6 Group 4 - Norton East

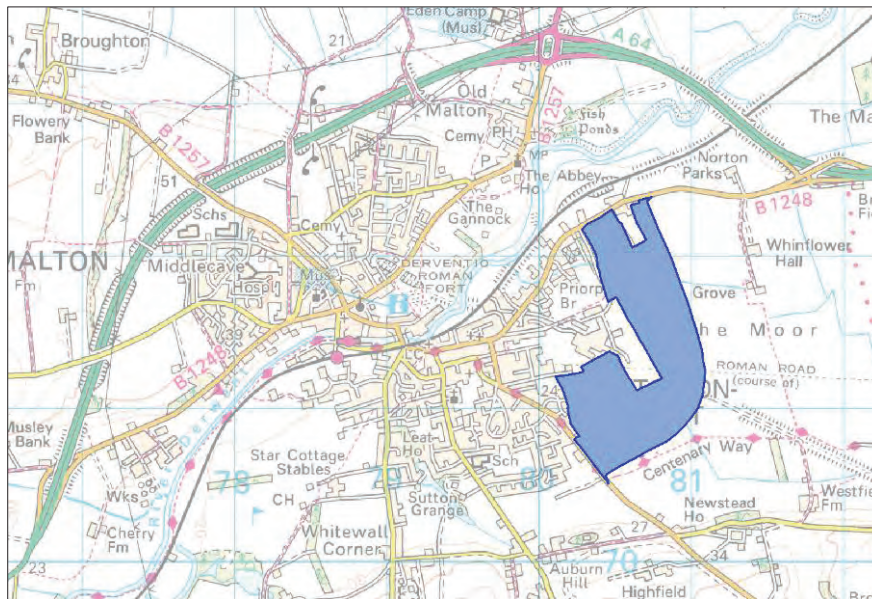


Figure 3.4 Group 4 Developments

- 3.6.1 The scale of the Norton East Development Site at over 90 hectares means that it would be in effect an expansion of Norton rather than numerous extensions to it as shown in Group 3. As such it is appropriate that it is tested individually and cumulatively.
- 3.6.2 Associated and integral to bringing this development site forward is a link road which runs through the site providing access to the various elements of the development. As the link road is proposed to connect into the existing highway network at Scarborough Road to the north and Beverley Road to the south it will have the added benefit of acting as a bypass for some traffic which would otherwise use Norton town centre. This link road has been included in the traffic model when the Group 4 traffic is being tested. Further details on this link can be found in Section 15.
- 3.6.3 The development assumptions made for the Group 4 development sites are as follows:

Development Site	Development Type	Plot Area
Norton Grove Industrial Estate	Residential	1500 Units
	Employment	13.27 Ha
	Retail (Bulky Goods)	13.27 Ha
	Leisure	0.02 Ha

Table 3.7 Group 4 Development Assumptions



3.7 Group 5 - Woolgrowers

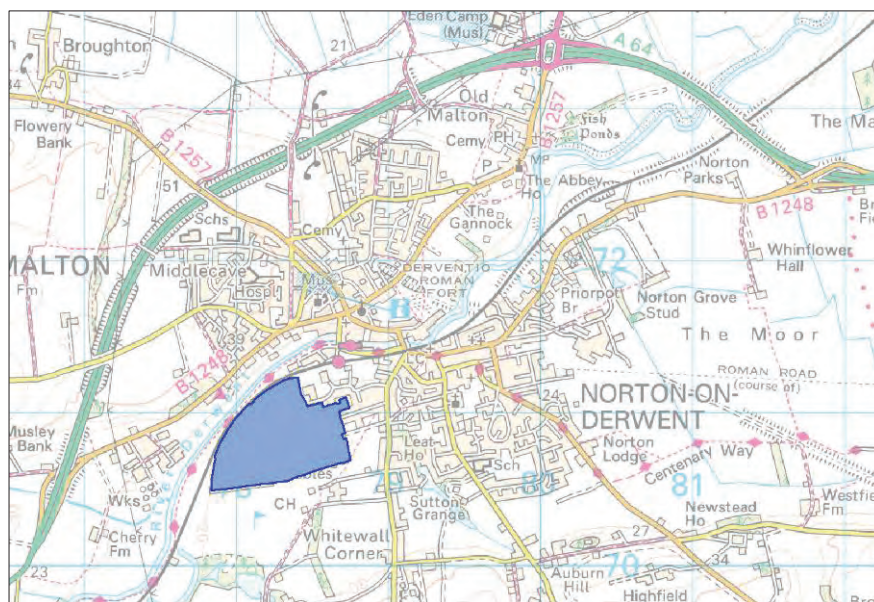


Figure 3.5 Group 5 Developments

- 3.7.1 Similar to Group 4, Group 5 also consists of a single site referred to as the **Woolgrowers Development Site**. The scale of this site again constitutes an expansion of Norton rather than numerous extensions as shown in Group 3. Therefore it is also appropriate to assess it individually and cumulatively.
- 3.7.2 Some of the Woolgrowers site is included in the Stage 2 sites of Group 1. This has been taken into account in this group to avoid double counting.
- 3.7.3 Similar to the Norton East development site, the Woolgrowers site has an associated link road which runs through the site providing access to the various elements of the development and essential to bringing the site forward. The link is proposed to connect into the existing highway network at York Road to the north and Welham Road to the east. This link road has been included in the traffic model when the Group 5 traffic is being tested. Further details on this link can be found in Section 15.
- 3.7.4 The development assumptions made for the Group 5 development sites are as follows:

Development Site	Development Type	Plot Area
Woolgrowers	Residential	700 units
	Employment B1	0.97 ha
	Employment B2	0.73 ha
	Retail	0.97 ha
	Leisure	5.0 ha

Table 3.8 Group 5 Development Assumptions



### 3.8 Development Scenarios

3.8.1 From the 5 development groups, nine scenarios have been created to test the impacts of the development both individually and cumulatively. This allows the traffic impacts of varying levels of development to be tested in Malton and Norton.

3.8.2 Each Scenario contains the Group 1 developments as a common element.

3.8.3 The groups included within each Scenario are shown in Table 3.9 below.

Scenario	Group 1 (Stage 1 & 2)	Group 2 (Malton)	Group 3 (Norton)	Group 4 (Norton East)	Group 5 (Woolgrowers)
1	●				
2	●	●			
3	●		●		
4	●	●	●		
5	●			●	
6	●				●
7	●	●	●	●	
8	●	●	●		●
9	●	●	●	●	●

Table 3.9 Development Scenarios

### 3.9 Development Site Size and Trip Generation

3.9.1 Each of the individual development sites within each of the five groups will generate traffic on the local highway network. To estimate the amount of traffic each development site will generate, a number of assumptions have been made regarding development size, type, vehicle type split, travel plan measures and interactions with other sites.

3.9.2 The generated trips due to the new developments are calculated by multiplying trip rates by the corresponding planning data as follows:

- Residential trips = residential trip rate (number of trips generated by one unit) \* number of units;
- Employment trips = employment trip rate (number of trips generated by 1 m<sup>2</sup> of employment area) \* employment area (in m<sup>2</sup>); and
- Retail trips = retail trip rate (number of trips generated by 1 m<sup>2</sup> of retail area) \* retail area (in m<sup>2</sup>).

- 3.9.3 Trip rates for the proposed land uses have been generated using the national Trip Rate Information Computer System (TRICS) version 6.2.2. This database has been used to determine likely traffic movements using data from comparable sites.
- 3.9.4 Sites from the Greater London area have been removed from the analysis as they are not considered to provide realistic results as they are not representative of the study area.
- 3.9.5 The remaining areas have been retained for the trip rate calculation to enable a larger pool of data to be available with which to create a robust approximation of the likely number of trips generated by each development. To avoid reducing the available dataset further, all location types (e.g. suburban areas, out of town etc) have been incorporated into the analysis.
- 3.9.6 The trip rates have been calculated for a weekday AM peak (08:00 – 09:00) and so any surveys taking place on a Saturday or Sunday have been removed from the analysis.
- 3.9.7 In line with best practice, trip rates from the ranked 85th percentile have been adopted. Where less than 20 sites are available the average trip rate has been adopted which again is nationally accepted practice.
- 3.9.8 The following land uses classifications have been used under each class to determine a suitable trip rate calculation:
- A1 – Convenience, Retail Park, Car Showroom
  - B1 – Business Park
  - B2 – Industrial Estate
  - B8 – Warehousing (Commercial)
  - D2 – Leisure Centre (unless specific land use detailed)
- 3.9.9 For Groups 2 to 5 the land use mix at each of the mixed use development sites has been assumed as:
- Mixed B1, B2 and B8 – 20:60:20 split
  - Mainly B1 and some B2 – 70:30 split
  - Bulky goods/Car Dealership/Convenience – 60:35:5 split
  - Bulky goods and Convenience – 95:5 split
- 3.9.10 Research has been carried out regarding the variations in trip rates at multiple use sites, such as the 'Norton East' and the 'Greater Woolgrowers' development. It has been estimated that multi-use sites with four or more developments reduce on average the total number of external trips by up to 20%; this is as a result of 'linked trips' (that is people making a single journey to carry out multiple tasks). (JMP, 2005).
- 3.9.11 However, as there is generally a generous supply of parking at multi-use sites, on average an additional 25% trips are generated. Therefore, trip reduction benefits of

a multi-use site are lost where parking is generous. This applies to the Norton East and Woolgrowers development sites and as such no reductions or additions have been applied.

#### Heavy Goods Vehicles (HGV)

- 3.9.12 HGV movements associated with the development proposals have been calculated using the TRICS database, following the same methodology and criteria as detailed earlier. Trip rates have been calculated for Public Service Vehicles (PSVs) and Ordinary Goods Vehicles (OGVs).
- 3.9.13 Some surveys were unable to supply information for OGV or PSVs. Where this data was not readily available, trip rates for a similar land use have been adopted.

#### Transport Assessments

- 3.9.14 As part of their planning application, 5 of the development sites within Group 1 have had a Transport Assessment submitted to the County Council and the District Council. As these Transport Assessments were written specifically for the development site in question they provide more accurate trip generation data than an estimated number of trips calculated using the TRICS database.
- 3.9.15 As such the trip generation for the following sites have been extracted directly from their Transport Assessments:
  - Livestock Market
  - Ryedale Business Park
  - Manor Park
  - Land West of York Road Industrial Estate
  - Norton Grove Industrial Estate

### 3.10 Development Density Ratios

- 3.10.1 Given the strategic nature of this study, only the total plot size or area of each development is known, unless stated otherwise in a Transport Assessment. However to estimate trip rates using the TRICS database the area of useable floor space is required, and therefore a number of density ratios have been used to convert from total plot area to useable floor space.
- 3.10.2 The development density ratios have been estimated based on the different land use types and previous planning submissions and are as follows:

Land Use	Ratio of Total Area to Useable Area	% Useable Area
A1 Convenience Retail	1:3.45	29%
A1 Bulky Goods Retail	1:4.9	20%
B1	1:7.19	14%
B2	1:4.11	24%
B8	1:4.11	24%
D2	1:2.84	35%

**3.11 Development Trip Distribution**

- 3.11.1 The distribution of traffic to and from each of the proposed development sites is determined by its origin and destination.
- 3.11.2 To distribute the traffic generated by each development site the SATURN traffic model has been used to produce trip distributions using nearby comparative zones within the model.
- 3.11.3 This allows the existing patterns of distribution of traffic from existing residential, employment and other development sites to be mirrored in the proposed sites.

**3.12 Development Site Interaction (Linked Trips)**

- 3.12.1 It is anticipated that the proposed new development sites are likely to interact and will attract traffic to and from each other. The new employment sites will attract traffic from both the existing residential sites, the new residential developments and from destinations further a field via the A64.
- 3.12.2 This means that the two way traffic generation calculated for each development site can not be directly added to the traffic model as some of this traffic will be double counted within another development site.
- 3.12.3 An exercise has therefore been undertaken using the existing distribution of traffic to determine the likely reduction in generated traffic from employment, residential and other land uses required to eliminate this double counting. The calculated reduction for each land use is show in Table 3.10 below.

Land Use	Direction	% Reduction
Employment	Inbound	21%
	Outbound	23%
Residential	Inbound	8%
	Outbound	11%
Other	Inbound	1%
	Outbound	2%

**Table 3.10 Land Use Interaction Trip Reduction**

**3.13 Mode Choice Trip Reduction**

- 3.13.1 The physical characteristics of Malton and Norton are such that the percentage of residents that travel to work by sustainable modes will be significantly greater than the national average. In order to quantify this difference the 2001 Census data was analysed, with information obtained from [www.neighbourhood.statistics.gov.uk](http://www.neighbourhood.statistics.gov.uk).
- 3.13.2 Data for the wards of Malton and Norton was reviewed, alongside data depicting the national average; this information was taken from the ‘Census Area Statistics’ topic utilising the ‘Method of Travel to Work (Resident Population)’ sub-topic which provides details of mode choice across the ward.
- 3.13.3 For the purposes of this comparison it was considered that a number of categories would be excluded from the calculations as they would not contribute to the number of vehicles on the road. These consisted of ‘Works mainly at or from home’,

‘Passenger in a car or van’ and ‘Not currently working’. The remaining categories are considered to represent the proportions of modes residents use to travel to and from their place of employment.

- 3.13.4 Four modes of public and sustainable travel were considered in this assessment as an alternative to a private vehicle trip; ‘Bicycle’, ‘On foot’, ‘Train’ and ‘Bus’. The number of people utilising these modes, for their journey to work, was calculated as a percentage of the total population who currently travel to a place of employment (having excluded the categories referred to above).
- 3.13.5 It can be seen from Table 3.11 below that the percentage of the population who cycle or walk to work in Malton and Norton is considerably higher than the National Average. It is also clear that the percentage commuting by train and bus is lower than across the country as a whole. As such it is considered viable that the traffic generation calculated from TRICS and Transport Assessments, both of which are based on the national average, should be adjusted to account for this.
- 3.13.6 As the table demonstrates, the overall difference, taking into account positive and negative values, for Malton and Norton, compared to the National Average, is 8% and 13.2% respectively. An average reduction factor of 10.6% has therefore been applied to employment to residential and residential to employment trips.

Mode	Area (Ward)			Difference from National Average	
	England	Malton	Norton	Malton	Norton
Bicycle	3.3%	8.2%	14.6%	4.9%	11.3%
On Foot	11.8%	22.6%	21.9%	10.8%	10.1%
Train	5.0%	2.2%	1.5%	-2.8%	-3.5%
Bus	8.9%	4.0%	4.2%	-4.9%	-4.7%
<b>Total</b>	<b>29.0%</b>	<b>37.0%</b>	<b>42.2%</b>	<b>8.0%</b>	<b>13.2%</b>

**Table 3.11 Mode Change Trip Reduction**

### 3.14 Congestion Analysis of Scenarios

3.14.1 The next 9 sections of this report give commentary on each of the nine development scenarios including the traffic impact on the local highway network, the advantages and disadvantages of each scenario, and a recommendation summary for each scenario.

3.14.2 To test the impact of the development locations on the Malton & Norton highway network the congestion levels created by the development traffic have been measured using the ratio of flow to capacity (RFC)<sup>1</sup> on each arm at each of the key junctions listed below.

3.14.3 The congestion analysis focuses on five key junctions because they were flagged up by the traffic model as being over capacity when the traffic from Scenario 9 was assigned to the highway network.

- Castle Howard Road / Yorkersgate / York Road
- Welham Road / Castlegate / Church Street
- Westfield Way / Scarborough Road
- Pasture Lane / Broughton Road / Newbeggan / Mount Crescent
- Butcher Corner

3.14.4 The locations of the junctions are shown in Figure 3.6 below.

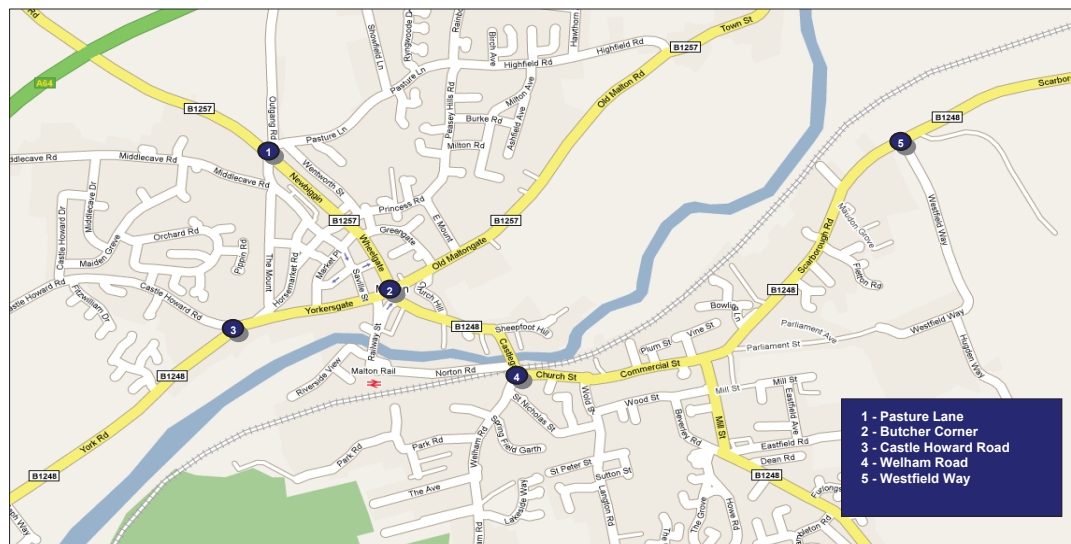





Figure 3.6 Key Junction Locations

<sup>1</sup> Ratio of flow to capacity (RFC) at the junction. i.e. how much traffic is using the junction in comparison to the maximum amount of traffic the junction can theoretically accommodate before becoming congested.

- 3.14.5 In addition to the four junctions the following junctions have also been assessed using the traffic model.
- Town Street / Old Malton Road / Highfield Road
  - Railway Street / Yorkersgate
  - Norton Road / Castlegate / Church Street
  - The Level Crossing on Castlegate
  - Wold Street / Commercial Street / Church Street
  - Mill Street / Scarborough Road / Commercial Street
- 3.14.6 For each of the nine scenarios the nationally recognised level of congestion (RFC) at each of the junctions listed above has been compared to the level of congestion (RFC) created by the traffic associated with Scenario 1.
- 3.14.7 Each scenario compares results with and without mitigation measures. These measures are the improvements to the junctions that are deliverable within the highway boundary. The detail of these measures is covered in Section 14. The commentary considers these deliverable mitigation measures in assessing what the impact of these scenarios is on the local highway network.
- 3.14.8 The commentary does not consider at this stage the benefit of the Grade Separated Junction (GSJ) at Broughton Road and the A64, given the constraints to bringing such strategic improvements forward, particularly within the timeframe of the LDF. However the improvement to congestion levels at the key junctions in Malton and Norton from a GSJ is considered separately in Chapter 16.
- 3.14.9 Scenario 1 represents the baseline for this study. It is taken as a ‘committed’ level of development to which the other scenarios will contribute differing levels of additional housing, employment, education and retail etc. The mitigation measures for each junction should eliminate any congestion (RFC<85%) or reduce the congestion levels at the junction to a level less than the congestion in Scenario 1 (without any mitigation measures).
- 3.14.10 To illustrate the magnitude in the level of congestion a traffic light system has been adopted. The results of this assessment have been presented in two tables, one for the 5 key junctions and Butcher Corner and the other for the other six junctions listed above. The traffic light system works as shown in Table 3.12 below. The RFC values associated with each traffic light can be found in the Technical Annex which accompanies this report.

Colour	Meaning	RFC Value Range
	<b>No Congestion</b>	Less or equal to 85% (under capacity)
	<b>Minimal Congestion</b>	Between 85% and 100% (approaching capacity)
	<b>Significant Congestion</b>	Greater than 100% (over capacity)

**Table 3.12 Traffic Light System**



# 4 Review of Development Scenario 1

## 4.1 Scenario Description

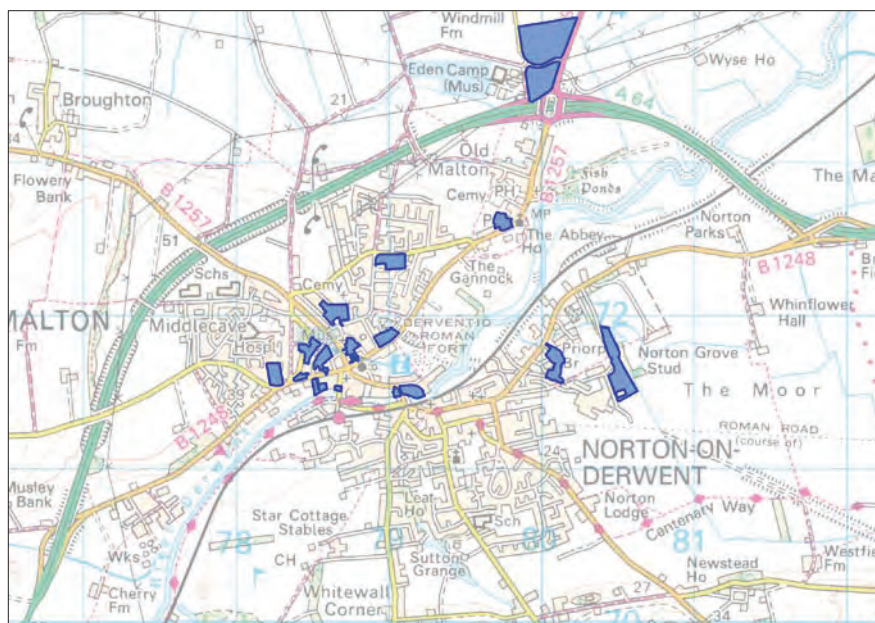


Figure 4.1 Scenario 1 Developments

4.1.1 Scenario 1 involves the lowest level of development out of the 9 scenarios and represents the ‘committed’ baseline scenario of development. Subsequent scenarios will add varying levels of development onto this baseline. Scenario 1 consists of the Group 1 sites (Stages 1 and 2).

4.1.2 The total amount of development within Scenario 1 is as follows.

Development Type	Plot Area (ha)
Retail	27 ha
Residential	4.6 ha + 667 dwellings
Education	0.2 ha
Employment	41 ha

Table 4.1 Scenario 1 Development Totals

## 4.2 Traffic Generation

4.2.1 As the development sites in Scenario 1 are included in all the scenarios, the traffic generated by Scenario 1 is also included within all the other scenarios and hence Scenario 1 forms a base on which all the Scenario assumptions are built.

4.2.2 The estimated two way traffic flow which will be generated by Scenario 1 is **2487 light vehicles** (Cars, Light Goods Vehicles) and **191 heavy vehicles** (Heavy Goods Vehicles).



### 4.3 Congestion

4.3.1 For Scenario 1 the magnitude of the ratio of flow to capacity (RFC) at each of the 5 key junctions is shown in Table 4.2 below. The circular traffic light symbols represent the actual RFC values for each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation
Butcher Corner	Wheelgate	●
	Old Maltongate	●
	Castlegate	●
	Yorkersgate	●
Welham Road Junction	Castlegate	●
	Welham Road	●
	Church Street	---
Castle Howard Road Junction	Castle Howard Road	●
	Yorkersgate	●
	York Road	---
Pasture Lane Junction	Broughton Road	●
	Pasture Lane	●
	Newbeggin	●
	Mount Crescent	●
Westfield Way Junction	Scarb. Rd West	●
	Scarb Rd. East	●
	Westfield Way	●

**Table 4.2 Scenario 1 RFC Magnitude (5 Key Junctions)**

- 4.3.2 At Butcher Corner there will be congestion on Old Maltongate, Castlegate and Wheelgate with RFCs greater than 100%. Wheelgate will have RFCs less than 85%. The congestion at Butcher Corner is due to the capacity restriction measures applied to the junction as part of the Brambling Fields junction improvement proposals.
- 4.3.3 At the existing Welham Road Junction, Castlegate and Welham Road will have RFCs greater than 100% meaning there will be congestion on both arms of the junction.
- 4.3.4 At the existing Castle Howard Road Junction, Castle Howard Road and Yorkersgate will have no congestion with RFCs less than 0.85.
- 4.3.5 All four arms of the existing Pasture Lane Junction will be congested with RFCs greater than 100%.
- 4.3.6 At the existing Westfield Way Junction, Scarborough Road West and Westfield Way will have no congestion but Scarborough Road East will be congested with an RFC greater than 100%.

4.3.7 The table below shows the magnitude of the congestion at the other six junctions. It is clear that none of the junctions will experience any significant congestion with all RFCs below 100%. The circular traffic light symbols represent the actual RFC values for each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation
Town Street Junction	Highfield Road	●
	Old Malton Road	●
	Town Street	●
Railway Street Junction	Yorkersgate E	---
	Yorkersgate W	●
	Railway Street	●
Norton Road Junction	Castlegate	●
	Church Street	---
	Norton Road	●
Level Crossing	Castlegate	●
	Church Street	●
Wold Street Junction	Church Street	●
	Commercial Street	---
	Wold Street	●
Mill Street Junction	Commercial Street	●
	Scarborough Road	---
	Mill Street	●

Table 4.3 Scenario 1 RFC Magnitude (Other Junctions)

#### 4.4 Queues

4.4.1 At the Welham Road junction the traffic on Castlegate will queue back to the Sheepfoot Hill junction and on Welham Road the traffic will queue back to St. Nicholas Street. Church Street has priority and so will not have any significant queues.

4.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to the school playing fields. Traffic on Newbeggin, Pasture Lane and Mount Crescent will also experience some queuing and delays.

4.4.3 Traffic using the Castle Howard Road and Westfield Way junctions and the other six junctions will also have no significant queues or delays.

#### **4.5 Advantages of Scenario 1**

- 4.5.1 The congestion across the network will not be significantly worse than existing.

#### **4.6 Disadvantages of Scenario 1**

- 4.6.1 There will be localised queuing and congestion at the Pasture Lane junction particularly on Broughton Road and at the Welham Road junction.

#### **4.7 Recommendation Summary**

- 4.7.1 Scenario 1 is the base scenario and represents only a limited amount of development against that being proposed through the Local Development Framework (LDF).



# 5 Review of Development Scenario 2

## 5.1 Scenario Description

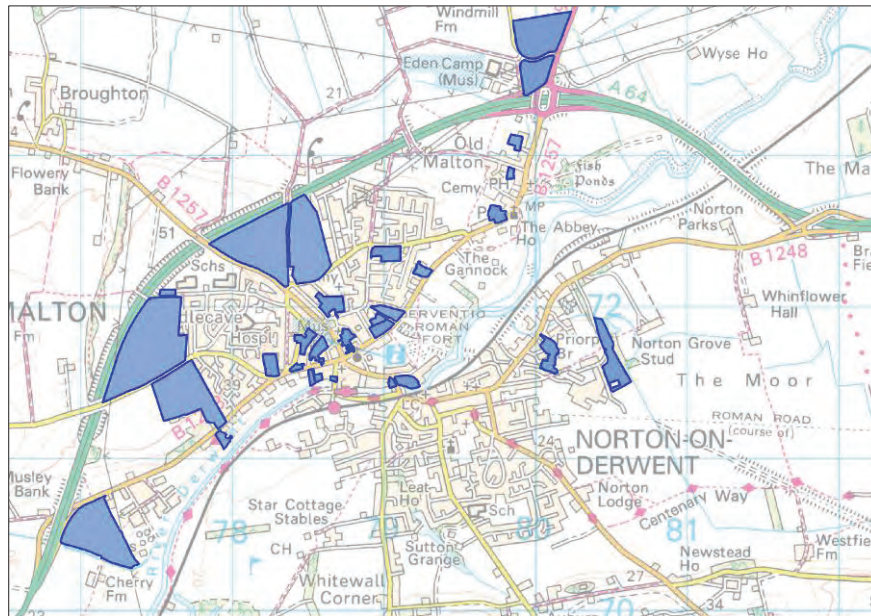


Figure 5.1 Scenario 2 Developments

5.1.1 Scenario 2 includes all the development sites from Scenario 1 plus the development sites from Group 2. This Scenario allows an assessment of the effects of the traffic associated with the development sites in Malton (i.e. north of the River Derwent).

5.1.2 The total amount of development within Scenario 2 is as follows.

Development Type	Plot Area (ha)
Retail	27 ha
Residential	4.6 ha + 2574 dwellings
Education	0.2 ha
Employment	44 ha
Leisure	3 ha

Table 5.1 Scenario 2 Development Totals

## 5.2 Traffic Generation

5.2.1 The estimated two way traffic flow which will be generated by Scenario 2 is **3953 light vehicles** and **204 heavy vehicles**.

### 5.3 Increase in Congestion

5.3.1 For Scenario 2 the magnitude of the congestion with and without mitigation in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 2 No Mitigation	2026 AM Scenario 2 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

Table 5.2 Scenario 2 RFC Magnitude (5 Key Junctions)

5.3.2 As with Scenario 1 there will be congestion on Old Maltongate, Castlegate and Yorkersgate at the Butcher Corner junction. In comparison to the Scenario 1 traffic there will be little if any increase in congestion at Butcher Corner.

5.3.3 The capacity restriction measures at the Butcher Corner junction are designed to keep the junction operating just over 100% capacity. This increases journey times which causes traffic to find alternative routes i.e. the A64 and Brambling Fields.

5.3.4 At the Welham Road Junction, without mitigation, Castlegate and Welham Road will be congested. With mitigation Castlegate is given priority and therefore will have no congestion. Welham Road and Church Street will also not be congested. Overall, with mitigation measures in place, the congestion created by the Scenario 2 traffic will be less than that created by the Scenario 1 traffic on the existing junction layout.

5.3.5 At the Castle Howard Road Junction, relative to Scenario 1, there will be a substantial amount of additional congestion both with and without mitigation. This is due to the traffic to and from the major development sites at the north west end of Castle Howard Road.

- 5.3.6 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic. Broughton Road, Pasture Lane and Mount Crescent will however still be over capacity with RFCs greater than 100% and Newbeggin will have no congestion.
- 5.3.7 In Norton, with no mitigation measures the Westfield Way junction will have a slight increase in RFC (when compared to Scenario 1) causing minimal congestion on Scarborough Road. With mitigation all three arms of the junction will operate with RFCs less than 85% and less than Scenario 1.
- 5.3.8 The table below shows the congestion at the other six junctions. At the level crossing, Church Street will have an RFC greater than that in Scenario 1 but less than 100% meaning the crossing will not be over capacity. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 2 No Mitigation	2026 AM Scenario 2 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 5.3 Scenario 2 RFC Magnitude (Other Junctions)

**5.4 Queues (with Mitigation)**

- 5.4.1 At the Welham Road junction, there will be no queues on Castlegate, Welham Road or Church Street.
- 5.4.2 The traffic on Broughton Road at the Pasture Lane junction (with mitigation) will experience queues reaching back to and beyond the school playing fields. There

will be minimal queuing on Pasture Lane and the traffic on Newbeggin and Mount Crescent will experience no queuing or delays.

5.4.3 The traffic using the Castle Howard Road junction will experience significant queues.

5.4.4 With mitigation in place the traffic using the Westfield Way junction will not experience any queues.

5.4.5 The other six junctions will have no significant queues or delays.

## **5.5 Advantages of Scenario 2**

5.5.1 In comparison to Scenario 1 there will be no significant additional congestion at the majority of the junctions on the highway network within Malton and Norton.

## **5.6 Disadvantages of Scenario 2**

5.6.1 The existing and proposed Castle Howard Road junction will have significant queue lengths due to the amount of traffic generated from the Malton development sites. Broughton Road at the Pasture Lane junction will also experience queuing with the Scenario 2 traffic.

## **5.7 Recommendation Summary**

5.7.1 When compared to Scenario 1 the majority of the highway network will not be detrimentally affected by the development proposed in Scenario 2. However, there may be some additional queues at Castle Howard Road. These queue lengths will not be substantial enough to cause any serious problems. Scenario 2 therefore represents a potential option for accommodating additional development in Malton and Norton.



# 6 Review of Development Scenario 3

## 6.1 Scenario Description

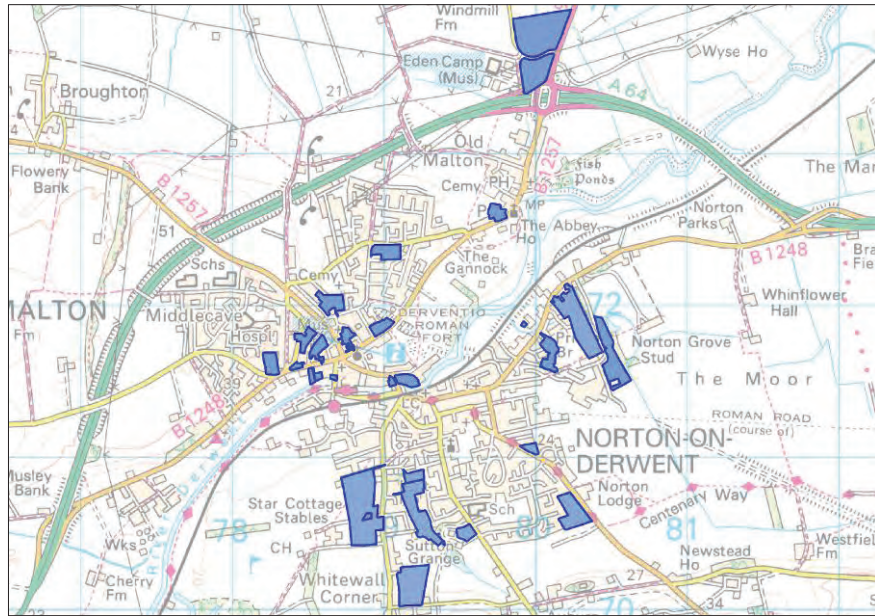


Figure 6.1 Scenario 3 Developments

- 6.1.1 Scenario 3 includes all the development sites from Scenario 1 plus the development sites from Group 3. This scenario allows an assessment of the effects of the traffic associated with the development sites in Norton (south of River Derwent).
- 6.1.2 The total amount of development within Scenario 3 is as follows.

Development Type	Plot Area (ha)
Retail	27 ha
Residential	4.6 ha + 1758 dwellings
Education	0.2 ha
Employment	41 ha

Table 6.1 Scenario 3 Development Totals

## 6.2 Traffic Generation

- 6.2.1 The estimated two way traffic flow which will be generated by Scenario 3 is **3102 light vehicles** and **201 heavy vehicles**.



### 6.3 Increase in Congestion

6.3.1 For Scenario 3 the magnitude of the congestion in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 3 No Mitigation	2026 AM Scenario 3 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 6.2 Scenario 3 RFC Magnitude (5 Key Junctions)**

6.3.2 As with Scenario 2, due to the capacity restrictions, there will be congestion on Old Maltongate, Castlegate and Yorkersgate at the Butcher Corner junction. This congestion will be no greater in magnitude than that in Scenario 1. Wheelgate will experience a minor increase in congestion.

6.3.3 At the Welham Road Junction, with mitigation, there will be no congestion on Castlegate and minor congestion on Welham Road. There will however be an increase in congestion on Church Street due to the change in priority at the junction.

6.3.4 At the Castle Howard Road Junction there will no congestion on the existing junction. The proposed mitigation measure at this junction will slightly increase the congestion on Yorkersgate and is therefore not required for Scenario 3.

6.3.5 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic. Broughton Road and Pasture Lane will however still be over capacity with RFCs greater than 100%. Mount Crescent will have minimal congestion and Newbeggin will have no congestion.

- 6.3.6 With no mitigation measures in place the Westfield Way junction will also experience no congestion. The proposed mitigation measure at this junction will slightly increase the congestion on Scarborough Road and is therefore not required for Scenario 3.
- 6.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. There will be some additional congestion on Town Street but none of the other junctions will have any significant increases in congestion when compared to both the existing and Scenario 1. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 3 No Mitigation	2026 AM Scenario 3 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 6.3 Scenario 3 RFC Magnitude (Other Junctions)

**6.4 Queues (with Mitigation)**

- 6.4.1 At the Welham Road junction there will be no queues on Castlegate or Welham Road. The traffic on Church Street however will experience significant queues due to the change in priority.
- 6.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to the school playing fields but the traffic on Newbeggin, Pasture Lane and Mount Crescent will experience no queuing or delays.
- 6.4.3 The traffic using the existing Castle Howard Road junction and the Westfield Way junction will experience no queues or delays in Scenario 3.
- 6.4.4 The other six junctions will also have no significant queues or delays.

## **6.5 Advantages of Scenario 3**

- 6.5.1 With the exception of Broughton Road and Church Street, with the mitigation measures in place there will be no significant increases in congestion when compared to Scenario 1. Castle Howard Road and Westfield Way will require no mitigation measures for Scenario 3.

## **6.6 Disadvantages of Scenario 3**

- 6.6.1 There will be significant queue lengths on Broughton Road. These will however be less than the queue lengths estimated for Scenario 1. Due to the change in priority the mitigation measure for the Welham Road junction will create congestion on Church Street.

## **6.7 Recommendation Summary**

- 6.7.1 With mitigation measures in place, Scenario 3 represents a potential option for accommodating additional development in Malton and Norton as there will be limited congestion across the highway network.



# 7 Review of Development Scenario 4

## 7.1 Scenario Description

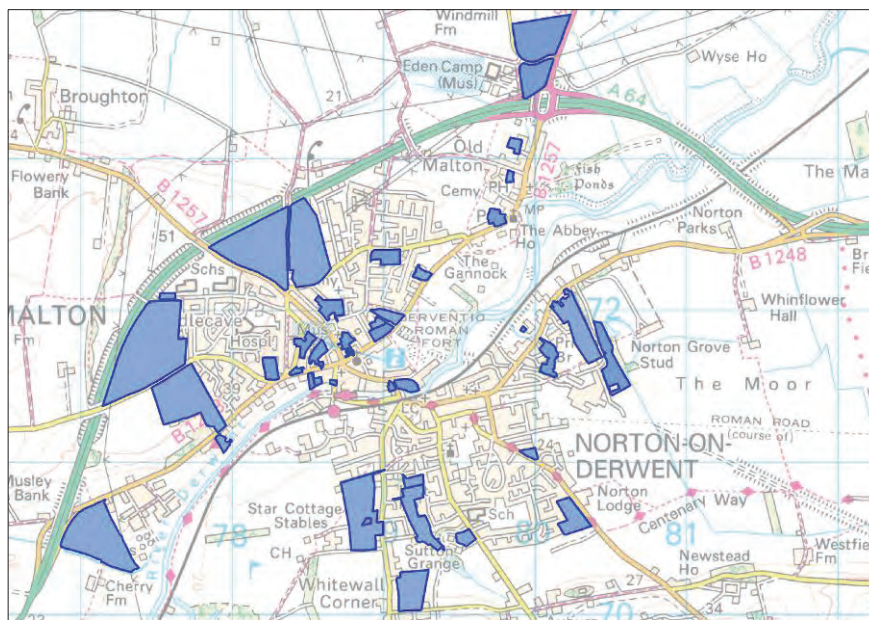


Figure 7.1 Scenario 4 Developments

7.1.1 Scenario 4 includes all the development sites from Scenario 1 plus the development sites from Groups 2 & 3. This scenario allows an assessment of the effects of the traffic associated with the development sites in both Malton and Norton (i.e. north and south of the River Derwent).

7.1.2 The total amount of development within Scenario 4 is as follows.

Development Type	Plot Area (ha)
Retail	27 ha
Residential	4.6 ha + 3665 dwellings
Education	0.2 ha
Employment	44 ha
Leisure	3.3 ha

Table 7.1 Scenario 4 Development Totals

## 7.2 Traffic Generation

7.2.1 The estimated two way traffic flow which will be generated by Scenario 4 is **4567 light vehicles** and **269 heavy vehicles**.

### 7.3 Increase in Congestion

7.3.1 For Scenario 4 the magnitude of the congestion in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 4 No Mitigation	2026 AM Scenario 4 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 7.2 Scenario 4 RFC Magnitude (5 Key Junctions)**

7.3.2 As with Scenarios 1, 2 and 3 there will be congestion at the Butcher Corner junction. Wheelgate, however, will experience no congestion. In comparison to the Scenario 1 traffic there will be little if any increase in congestion at Butcher Corner.

7.3.3 At the Welham Road Junction, with mitigation, there will be no congestion on Castlegate and Welham Road. There will however be an increase in congestion on Church Street due to the change in priority at the junction. The total congestion at the junction will be less with the mitigation measures in place and the change in priority will allow a free flow of traffic across the level crossing.

7.3.4 At the Castle Howard Road Junction, due to the additional traffic from the Malton based sites at the north west end of Castle Howard Road, the junction will be congested both with and without mitigation. For Scenario 4 there will be less congestion on the existing junction layout as the proposed deliverable signalisation of the junction will not be able to cope with the development traffic.

7.3.5 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction). This shows that the proposed junction improvement does mitigate the impact of the development traffic.

Broughton Road, Pasture Lane and Mount Crescent will however still be over capacity with RFCs greater than 100%. Newbeggins will have no congestion.

7.3.6 With the proposed mitigation in place the Westfield Way junction will also experience no congestion.

7.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. Town Street and Church Street (level crossing) will have RFCs greater than those in Scenario 1. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 4 No Mitigation	2026 AM Scenario 4 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 7.3 Scenario 4 RFC Magnitude (Other Junctions)

7.4 Queues (with Mitigation)

7.4.1 At the Welham Road junction there will be no queues on Castlegate or Welham Road. The change in priority on Church Street will however create significant queues.

7.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields but the traffic on Newbeggins, Pasture Lane and Mount Crescent will experience no queuing or delays.

7.4.3 There will be significant queues on Castle Howard Road both with and without the mitigation measures in place.

7.4.4 With mitigation the Scenario 4 traffic will create no queues at the Westfield Way junction.

- 7.4.5 As mentioned above, the Castle Howard Road junction will operate with less congestion if the existing junction layout is used.

## **7.5 Advantages of Scenario 4**

- 7.5.1 Scenario 4 allows the effects of sites spread across Malton, Old Malton and Norton to be tested. Cumulatively these sites represent a substantial amount of development, well in excess of Ryedale's total RSS figure for the District. However in relative terms, there is little increase in congestion from Scenario 2.

## **7.6 Disadvantages of Scenario 4**

- 7.6.1 The model results show there will be congestion on Church Street at the Welham Road junction.
- 7.6.2 The Castle Howard Road junction will have more congestion than Scenario 1 due to the development sites located at the north west end of the road. This congestion will be less if the existing junction layout is used as opposed to signalling the junction.
- 7.6.3 There will be a slight increase in congestion on Church Street at the Level Crossing and on Town Street.

## **7.7 Recommendation Summary**

- 7.7.1 At this level of development, Scenario 4 is not a viable option as it results in an unacceptable impact on the local highway network even with mitigation. However this scenario does contain sites distributed across both Malton & Norton and therefore allows an assessment of the complex traffic impacts and interrelationships across the towns in a single scenario. A variant of Scenario 4, Scenario 4A, which proportionately scales down the housing to a more realistic level of growth for Malton and Norton, is considered in Section 18.



8 Review of Development Scenario 5

8.1 Scenario Description

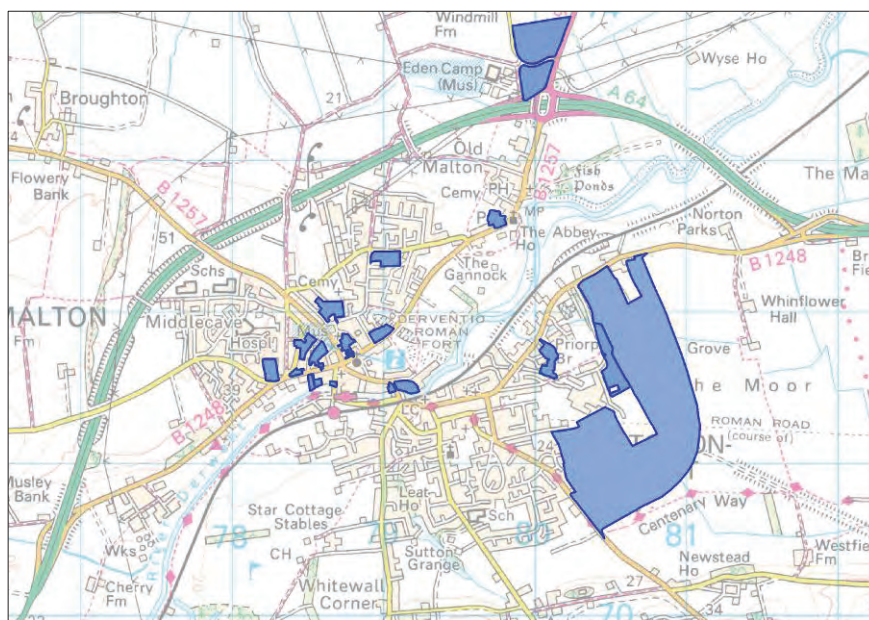


Figure 8.1 Scenario 5 Developments

- 8.1.1 Scenario 5 includes all the development sites from Scenario 1 and the Norton East development site from Group 4 including the associated Beverley Road – Scarborough Road link road (Discussed in detail – Section 15).
- 8.1.2 This scenario allows an assessment of the effects of the traffic associated with the substantial Norton East development site independent of the other development sites.
- 8.1.3 The total amount of development within Scenario 5 is as follows.

Development Type	Plot Area (ha)
Retail	40.3 ha
Residential	4.6 ha + 2167 dwellings
Education	0.2 ha
Employment	54.3 ha
Leisure	0.02 ha

Table 8.1 Scenario 5 Development Totals

8.2 Traffic Generation

- 8.2.1 The estimated two way traffic flow which will be generated by Scenario 5 is **4290 light vehicles** and **291 heavy vehicles**.



### 8.3 Increase in Congestion

8.3.1 For Scenario 5 the magnitude of the congestion in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 5 No Mitigation	2026 AM Scenario 5 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

Table 8.2 Scenario 5 RFC Magnitude (5 Key Junctions)

8.3.2 As with the previous 4 scenarios there will be congestion at Butcher Corner junction due to the capacity restrictions. In comparison to the Scenario 1 traffic there will be little if any increase in congestion at Butcher Corner.

8.3.3 At the Welham Road Junction, with mitigation, there will be no congestion on Castlegate and Welham Road. There will however be an increase in congestion on Church Street due to the change in priority at the junction. The total congestion at the junction will be less with the mitigation measures in place and the change in priority will allow a free flow of traffic across the level crossing.

8.3.4 At the Castle Howard Road Junction, due to there being no additional sites in Malton both Castle Howard Road and Yorkersgate will have no congestion at the existing junction. The mitigation option for the junction will however cause the RFC's to be over 85% creating minimal congestion.

8.3.5 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic. Broughton Road and Pasture Lane will however still be over capacity with RFCs

greater than 100%. Mount Crescent will have minimal congestion and Newbeggin will have no congestion.

8.3.6 The mitigation at the Westfield Way junction will experience no congestion.

8.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12. None of the junctions will have any significant increases in congestion when compared to Scenario 1. There will be additional demand on the Level Crossing due to the amount of traffic to and from Butcher Corner from the Norton East site. When the crossing closes there will be an additional but acceptable increase in congestion on Church Street across the level crossing.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 5 No Mitigation	2026 AM Scenario 5 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 8.3 Scenario 5 RFC Magnitude (Other Junctions)

8.4 Queues (with Mitigation)

8.4.1 At the Welham Road junction there will be no queues on Castlegate or Welham Road. The change in priority on Church Street will however create significant queues.

8.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields but the traffic on Newbeggin, Pasture Lane and Mount Crescent will experience no queuing or delays.

8.4.3 The traffic using the Castle Howard Road junction and the Westfield Way junction will not experience any queues or delays.

8.4.4 The other six junctions will have no significant queues or delays.

## **8.5 Advantages of Scenario 5**

8.5.1 With the exception of Church Street and with mitigation measures in place there will be limited detrimental impact on the highway network. The existing Castle Howard Road junction will operate below capacity so no improvement measures will be required.

## **8.6 Disadvantages of Scenario 5**

8.6.1 As the Norton East development site is located close to the Westfield Way junction, without any mitigation there will be a significant increase in congestion on Scarborough Road East and West. Mitigation measures are therefore vital at this junction.

8.6.2 There will also be an increase in congestion on Church Street both across the level crossing and at Welham Road. This is due to the concentration of traffic from the major development travelling into Malton. The Welham Road junction will however operate with less congestion with the deliverable mitigation measure in place.

## **8.7 Recommendation Summary**

8.7.1 There will be significant congestion at the Westfield Way junction but with mitigation measures in place the junction will operate under capacity. Scenario 5 is a potential option for accommodating development in Malton and Norton but there will be considerable congestion on Church Street with the Welham Road mitigation measures in place. There will however be no congestion on Welham Road itself or on Castlegate.

9 Review of Development Scenario 6

9.1 Scenario Description

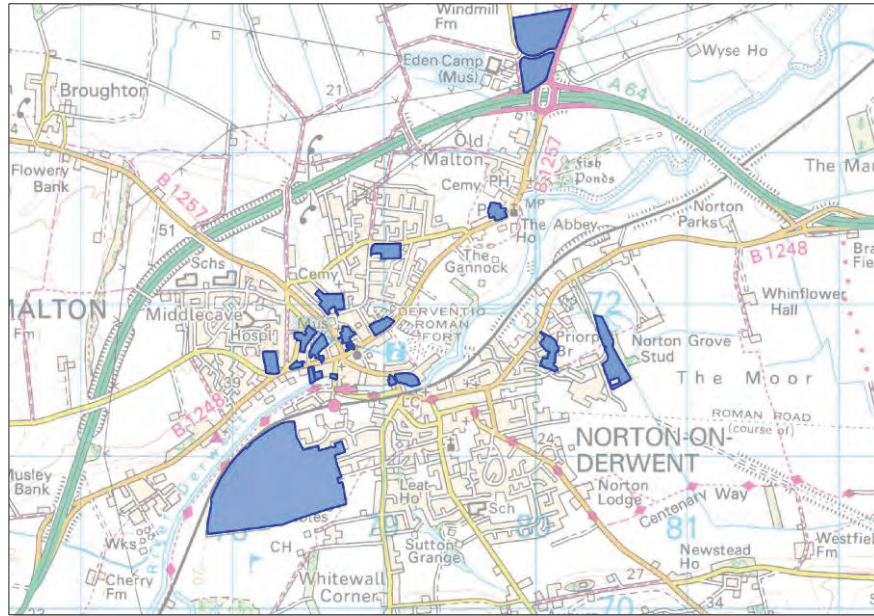


Figure 9.1 Scenario 6 Developments

- 9.1.1 Scenario 6 includes all the development sites from Scenario 1 including the associated Woolgrowers link road between York Road and Welham Road.
- 9.1.2 This scenario allows an assessment of the effects of the traffic associated with the Woolgrowers development site independent of the other development sites.
- 9.1.3 The total amount of development within Scenario 6 is as follows.

Development Type	Plot Area (ha)
Retail	28 ha
Residential	4.6 ha + 1367 dwellings
Education	0.2 ha
Employment	42.7 ha
Leisure	5 ha

Table 9.1 Scenario 6 Development Totals

9.2 Traffic Generation

- 9.2.1 The estimated two way traffic flow which will be generated by Scenario 6 is **3479 light vehicles** and **232 heavy vehicles**.

**9.3 Increase in Congestion**

9.3.1 For Scenario 6 the magnitude of the congestion in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 6 No Mitigation	2026 AM Scenario 6 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 9.2 Scenario 6 RFC Magnitude (5 Key Junctions)**

9.3.2 As with the previous scenarios there will be a substantial but acceptable increase in congestion at the Butcher Corner junction.

9.3.3 At the Welham Road Junction, even with mitigation measures in place both Welham Road and Church Street will experience significant congestion due to the traffic from the Woolgrowers site using the junction, this congestion will be greater than that in Scenario 1. Castlegate will have no additional congestion in comparison to the Scenario 1 congestion currently the existing network.

9.3.4 At the Castle Howard Road Junction, due to there being no additional sites in Malton, both Castle Howard Road and Yorkersgate will have a minimal amount of additional congestion with the mitigation measures in place and no congestion on the existing junction layout.

9.3.5 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic. Broughton Road and Pasture Lane will however still be over capacity with RFCs greater than 100%. Mount Crescent will have minimal congestion and Newbeggin will have no congestion.

- 9.3.6 The mitigation at the Westfield Way junction will produce RFCs less than those in Scenario 1.
- 9.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. None of the junctions will have any significant increases in congestion when compared to Scenario 1. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 6 No Mitigation	2026 AM Scenario 6 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 9.3 Scenario 6 RFC Magnitude (Other Junctions)

**9.4 Queues (with Mitigation)**

- 9.4.1 At the Welham Road junction the traffic on Castlegate will not experience any significant queues or delay. On Welham Road and Church Street however there will be queues due to the congestion at the junction.
- 9.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields but the traffic on Newbeggins, Pasture Lane and Mount Crescent will experience no queuing or delays.
- 9.4.3 The traffic using the Castle Howard Road junction will not experience any queues or delays on the existing junction. With the mitigation in place the junction will have some additional queuing compared to Scenario 1; this queuing will however be minimal.
- 9.4.4 With mitigation measures in place the Westfield Way junction and the other six junctions will have no significant queues or delays.

## **9.5 Advantages of Scenario 6**

- 9.5.1 The Castle Howard Road junction (without mitigation), Pasture Lane and the Westfield Way junctions will mostly operate under capacity and will not have any significant increases in congestion when compared to Scenario 1.

## **9.6 Disadvantages of Scenario 6**

- 9.6.1 There will be more traffic to and from the Woolgrowers site using the Welham Road junction via the proposed new link road. There will therefore be significant queues and delays at the Welham Road junction.

## **9.7 Recommendation Summary**

- 9.7.1 Scenario 6 will not cause any extensive capacity and queuing problems on the Castle Howard Road, Westfield Way or Pasture Lane junctions. The Welham Road junction will, even with the deliverable mitigation, experience additional queuing on Welham Road and Church Street due to the amount of additional traffic from the Woolgrowers development. Due to the large traffic flows in and out of the Woolgrowers development there will be significant congestion at Welham Road.



10 Review of Development Scenario 7

10.1 Scenario Description

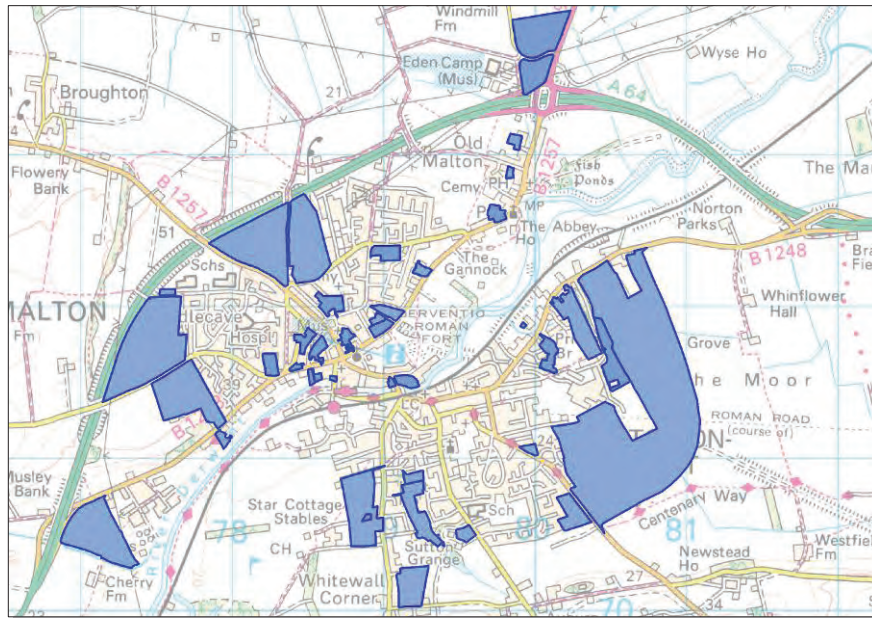


Figure 10.1 Scenario 7 Developments

- 10.1.1 Scenario 7 includes all the development sites from Scenario 1 plus the Malton and Norton sites from Group 2 and Group 3 and the Norton East development site from Group 4.
- 10.1.2 This Scenario is the first assessment of the traffic generated by a combination of sites spread across Malton and Norton together with a substantial single “expansion” site.
- 10.1.3 The total amount of development within Scenario 7 is as follows.

Development Type	Plot Area (ha)
Retail	40.3 ha
Residential	4.6 ha + 5165 dwellings
Education	0.2
Employment	57 ha
Leisure	3.3 ha

Table 10.1 Scenario 7 Development Totals

10.2 Traffic Generation

- 10.2.1 The estimated two way traffic flow which will be generated by Scenario 7 is **6370 light vehicles** and **369 heavy vehicles**.



**10.3 Increase in Congestion**

10.3.1 For Scenario 7 the magnitude of the increase in congestion with and without mitigation in comparison to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 7 No Mitigation	2026 AM Scenario 7 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 10.2 Scenario 7 RFC Magnitude (5 Key Junctions)**

- 10.3.2 As with the previous scenarios there will be a substantial but acceptable increase in congestion at the Butcher Corner junction.
- 10.3.3 The change in the number and pattern of trips between Scenario 7 and Scenario 1 will cause a substantial increase (between Scenario 1 & 7) in congestion in Norton at the Westfield Way and Welham Road junctions. Mitigation measures at these junctions will eliminate the congestion on Castlegate and Welham Road and on all three arms of the Westfield Way junction. Church Street will however be over capacity due to the priority change at the Welham Road junction.
- 10.3.4 At the Castle Howard Road Junction, due to the additional traffic from the Malton based sites at its north west end, Castle Howard Road will have a significant amount of congestion in comparison to Scenario 1. This congestion cannot be mitigated by the deliverable junction improvements.
- 10.3.5 At the Pasture Lane Junction, Broughton Road will have a significant amount of additional congestion in comparison to the existing levels of congestion currently on the network and a substantial increase in congestion when compared to Scenario 1.

- 10.3.6 With the mitigation measures in place the Westfield Way junction will experience no congestion.
- 10.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. Town Street and Church Street (Level Crossing) will have additional congestion when compared to Scenario 1. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 7 No Mitigation	2026 AM Scenario 7 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 10.3 Scenario 7 RFC Magnitude (Other Junctions)

**10.4 Queues (with Mitigation)**

- 10.4.1 At the Welham Road junction there will be queuing on Church Street due to the change in priority. There will be no queues on Castlegate or Welham Road.
- 10.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields. The traffic on Newbeggin could queue back up to 150m. Pasture Lane and Mount Crescent will experience no queuing or delays.
- 10.4.3 The traffic using the Castle Howard Road junction will queue back beyond Appletree Way on Castle Howard Road and the traffic on Yorkersgate will queue back to Butcher Corner. These queues will be present both with and without mitigation.
- 10.4.4 The mitigation measures for the Westfield Way junction will eliminate the queues which will be present on the existing junction with the Scenario 7 traffic.

10.4.5 With the exception of Town Street and Church Street the other six junctions will have no significant queues or delays.

### **10.5 Advantages of Scenario 7**

10.5.1 In terms of providing minimal congestion on the local highway network there are no advantages to Scenario 7 even with mitigation measures in place.

### **10.6 Disadvantages of Scenario 7**

10.6.1 The magnitude of additional traffic arising from the Malton, Norton and Norton East sites means there will be considerable congestion problems across the highway network particularly on Welham Road and on Castle Howard Road.

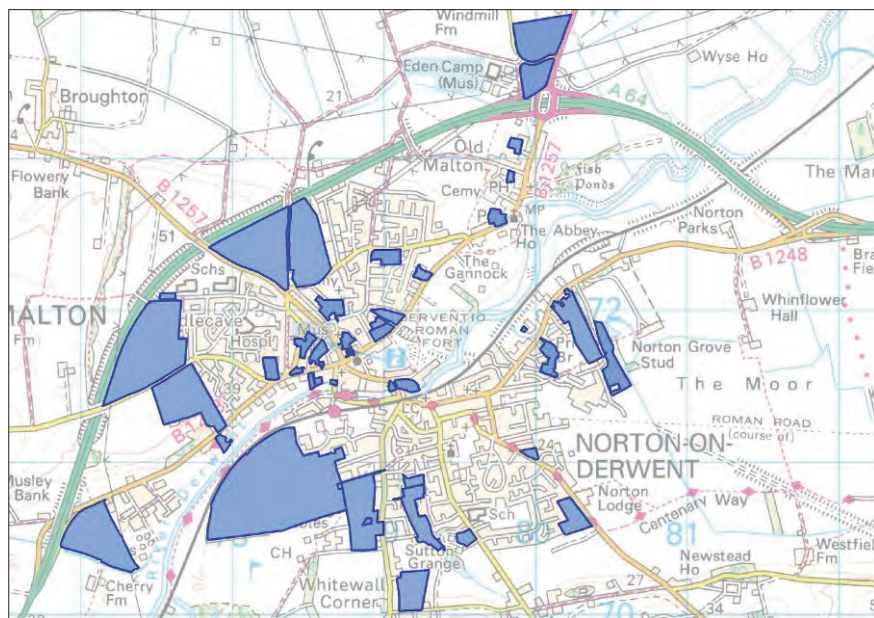
10.6.2 The amount of additional congestion when compared to Scenario 1 will be significant.

### **10.7 Recommendation Summary**

10.7.1 Scenario 7 is not a realistic option as it will generate an unacceptable level of congestion on the existing highway network.

**11 Review of Development Scenario 8**

**11.1 Scenario Description**



**Figure 11.1 Scenario 8 Developments**

- 11.1.1 Scenario 8 includes all the development sites from Scenario 1, the Malton and Norton sites from Group 2 and Group 3 and the Woolgrowers development site from Group 5.
- 11.1.2 Similar to Scenario 7, this Scenario tests the traffic generated by a combination of sites spread across Malton and Norton together with a substantial single “expansion” site.
- 11.1.3 The total amount of development within Scenario 8 is as follows.

Development Type	Plot Area (ha)
Retail	28 ha
Residential	4.6 ha + 4365 dwellings
Education	0.2 ha
Employment	45.4 ha
Leisure	8.25 ha

**Table 11.1 Scenario 8 Development Totals**

**11.2 Traffic Generation**

- 11.2.1 The estimated two way traffic flow which will be generated by Scenario 8 is **5559 light vehicles** and **310 heavy vehicles**.

### 11.3 Increase in Congestion

11.3.1 For Scenario 8 the magnitude of the increase in congestion with and without mitigation relative to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 8 No Mitigation	2026 AM Scenario 8 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

Table 11.2 Scenario 8 RFC Magnitude (5 Key Junctions)

- 11.3.2 As with the previous scenarios there will be a substantial but acceptable increase in congestion at the Butcher Corner junction.
- 11.3.3 The traffic generated by Scenario 8 will cause significant congestion on both the existing junction and if the priority of the junction was changed to give Castlegate priority. This is due to the traffic from the Woolgrowers site using the Welham Road junction to enter the highway network.
- 11.3.4 At the existing Castle Howard Road Junction, due to the additional traffic from the Malton based sites at its northern end, Castle Howard Road will have a substantial amount of additional congestion in comparison to the congestion in Scenario 1. Yorkersgate will have no congestion. The mitigation measures for Castle Howard Road will not work as there will be significant congestion with the Scenario 8 traffic.
- 11.3.5 The traffic to and from the Woolgrowers site in addition to the traffic from the Malton sites will mean Broughton Road will have a significant amount of additional congestion in comparison to the existing levels of congestion currently on the network and a substantial increase in congestion when compared to Scenario 1.

11.3.6 Compared to Scenario 1 and with mitigation measures in place, the Westfield Way junction will experience additional congestion on Scarborough Road West. This congestion will however be minimal. Scarborough Road East and Westfield Way will have less congestion than Scenario 1.

11.3.7 The table below shows the magnitude of the increase in congestion at the other six junctions. Town Street and Commercial Street will have more congestion than Scenario 1. The other junctions will have no congestion. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 8 No Mitigation	2026 AM Scenario 8 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 11.3 Scenario 8 RFC Magnitude (Other Junctions)

11.4 Queues (with Mitigation)

11.4.1 At the Welham Road junction, there will be no significant queues on Castlegate but on Welham Road and Church Street there will be significant queuing.

11.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields. The traffic on Newbeggin, Pasture Lane and Mount Crescent will experience no queuing or delays.

11.4.3 The traffic using the existing Castle Howard Road junction will queue back beyond Appletree Way on Castle Howard Road but there will be no significant queues on Yorkersgate.

11.4.4 Traffic on Scarborough Road East and West using the Westfield Way junction will experience minimal queuing. Traffic on Westfield Way will not experience any considerable queues or delays.

11.4.5 With the exception of Town Street the other six junctions will have no significant queues or delays.

### **11.5 Advantages of Scenario 8**

11.5.1 Compared to Scenario 7, this Scenario results in a little less congestion on the local highway network, though numerous congestion problems remain.

### **11.6 Disadvantages of Scenario 8**

11.6.1 The scale of additional traffic from the Malton, Norton and Woolgrowers sites means there will be congestion problems at all four of the key junctions particularly on Welham Road and on Castle Howard Road.

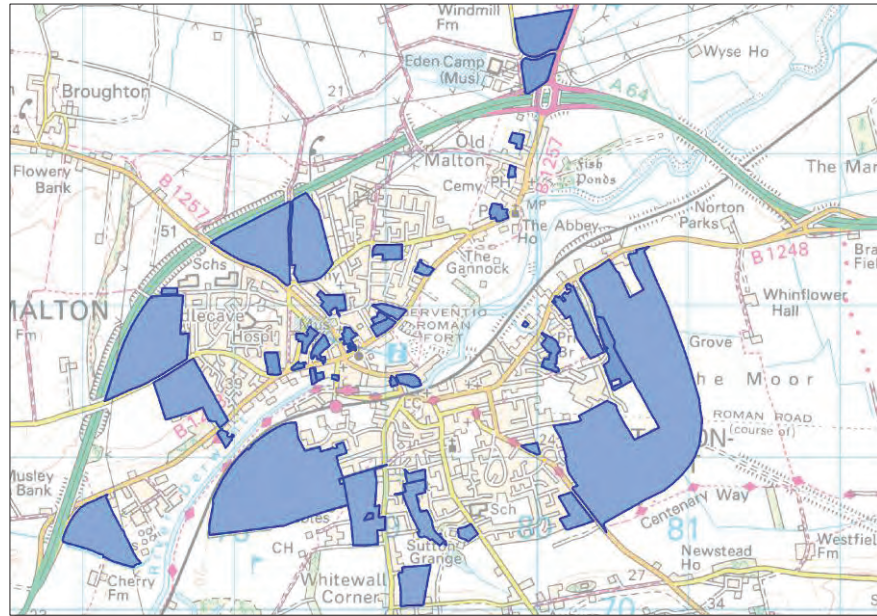
11.6.2 The amount of additional congestion when compared to Scenario 1 will be significant.

### **11.7 Recommendation Summary**

11.7.1 Whilst generating proportionally less congestion than Scenario 7, Scenario 8 is still not a realistic option due to additional congestion on the existing and mitigated highway network.

**12 Review of Development Scenario 9**

**12.1 Scenario Description**



**Figure 12.1 Scenario 9 Developments**

12.1.1 Scenario 9 includes all the development sites from Scenario 1 plus the development sites from all the other groups (i.e. all the development sites). Scenario 9 therefore represents the maximum level of generated traffic.

12.1.2 The total amount of development within Scenario 9 is as follows.

Development Type	Plot Area (ha)
Retail	41.2 ha
Residential	4.6 ha +5865 units
Education	0.2 ha
Employment	56.7 ha
Leisure	8.3 ha

**Table 12.1 Scenario 9 Development Totals**

**12.2 Traffic Generation**

12.2.1 The estimated two way traffic flow which will be generated by Scenario 9 is **7362 light vehicles** and **410 heavy vehicles**.



### 12.3 Increase in Congestion

12.3.1 For Scenario 9 the magnitude of the increase in congestion relative to Scenario 1 is shown in the table below. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 9 No Mitigation	2026 AM Scenario 9 With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 12.2 Scenario 9 RFC Magnitude (5 Key Junctions)**

12.3.2 The increase in congestion at Butcher Corner remains more or less constant with each Scenario indicating that traffic is finding an alternative route when the junction reaches a certain ‘capacity threshold’. This shows that restricting the capacity at Butcher Corner, even with the maximum amount of generated traffic from Scenario 9, will persuade drivers to use the A64 and access Norton via the Brambling Fields junction.

12.3.3 At the Welham Road Junction both Church Street and Welham Road will have a significant amount of congestion due to the additional traffic from the Malton and Norton based sites as well as the larger Woolgrowers and Norton East Sites. Castlegate which has priority should not experience any congestion.

12.3.4 At the Castle Howard Road Junction, due to the additional traffic from the Malton based sites at the north west end of Castle Howard Road and the additional traffic on Yorkersgate and York Road both Castle Howard Road and Yorkersgate will have a significant amount of additional congestion in comparison to Scenario 1.

12.3.5 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic.

Broughton Road, Pasture Lane and Mount Crescent will however still be over capacity with RFCs greater than 100% and Newbeggin will have no congestion.

12.3.6 The Westfield Way junction will experience additional congestion on Scarborough Road East and West. Westfield Way will however not be congested both with and without mitigation.

12.3.7 The table below shows the results for the other six junctions. With the exception of Town Street there will be no significant increases in congestion when compared to Scenario 1. The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 9 No Mitigation	2026 AM Scenario 9 With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 12.3 Scenario 9 RFC Magnitude (Other Junctions)

12.4 Queues (with Mitigation)

12.4.1 At the Welham Road junction both Church Street and Welham Road will experience considerable queues and delays due to the magnitude of the Scenario 9 traffic.

12.4.2 The traffic on Broughton Road at the Pasture Lane junction will experience queues reaching back to and beyond the school playing fields. The traffic on Newbeggin could queue back up to 100m. Pasture Lane and Mount Crescent will experience no queuing or delays.

12.4.3 The traffic using the Castle Howard Road junction will queue back beyond Appletree Way on Castle Howard Road and the traffic on Yorkersgate will queue back to Butcher Corner. There will also be considerable queues on York Road.

12.4.4 Traffic on Scarborough Road East using the mitigated Westfield Way junction will queue back more than 200m and traffic on Scarborough Road West will queue back approximately 150m. These queues will cause a significant amount of delay at the junction.

12.4.5 Apart from Town Street, the other six junctions will have no significant queues or delays.

### **12.5 Advantages of Scenario 9**

12.5.1 Scenario 9 involves a significant amount of development and represents a major expansion of Malton beyond that considered in the RSS. It demonstrates that to accommodate this substantial level of growth, strategic junction improvements would be necessary.

### **12.6 Disadvantages of Scenario 9**

12.6.1 The magnitude of additional traffic from the Malton, Norton, Norton East and Woolgrowers sites means there will be significant congestion problems at all four of the key junctions particularly on Welham Road and on Castle Howard Road.

### **12.7 Recommendation Summary**

12.7.1 The significant amount of development involved in Scenario 9, leads to numerous areas of congestion across the existing local highway network in Malton and Norton. To overcome this, it is likely major highway improvements beyond that of the proposed mitigation measures would be necessary.

# 13 Summary of Scenario Assessment

## 13.1 Assessment Overview

13.1.1 Sections 4 to 12 show, for each of the 9 scenarios, the estimated levels of congestion for each scenario both with and without mitigation.

13.1.2 The congestion levels have been measured using RFC values and have been illustrated using a traffic light system for each of the 4 key junctions, for Butcher Corner and for 6 other junctions across the local highway network. The traffic light system works by giving a 'green light' if the RFC is less than or equal to 85%, an 'amber light' if the RFC is between 85% and 100% and a 'red light' if the RFC is more than 100%.

13.1.3 Table 13.1 below shows an aggregation of all 9 tables from Sections 4 to 12 for the 4 key junctions and Butcher Corner. The road names have been abbreviated.

Junction	Road Names	Scenario 1 No Mitigation	With Mitigation									No Mitigation								
			Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9		
Butcher Corner	WG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	OM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	G	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	CG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Welham Road Junction	YG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	CG	●	--	--	--	--	--	--	--	--	●	●	●	●	●	●	●	●		
	WR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Castle Howard Junction	CS	●	●	●	●	●	●	●	●	●	--	--	--	--	--	--	--	--		
	CHR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	YG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Pasture Lane Junction	YR	--	●	●	●	●	●	●	●	●	--	--	--	--	--	--	--	--		
	BR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	PL	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	NB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Westfield Way Junction	MC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SRW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SRE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Westfield Way Junction	WW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	WW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		

Table 13.1 Assessment Overview

Junction	Abbreviated Road Names	Road Name
Butcher Corner	WG	Wheelgate
	OMG	Old Maltongate
	CG	Castlegate
	YG	Yorkersgate
Welham Road Junction	CG	Castlegate
	WR	Welham Road
	CS	Church Street
Castle Howard Junction	CHR	Castle Howard Road
	YG	Yorkersgate
	YR	York Road
Pasture Lane Junction	BR	Broughton Road
	PL	Pasture Lane
	NB	Newbiggin
	MC	Mount Crescent
Westfield Way Junction	SRW	Scarborough Road West
	SRE	Scarborough Road East
	WW	Westfield Way

**Table 13.2 - Road Name Abbreviations for Table 13.1**

- 13.1.4 The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12. As a relative measure, the cells or boxes with a green background in Table 13.1 show where the congestion is less than that of Scenario 1 and the cells or boxes with a pink background show where the congestion is greater than Scenario 1.
- 13.1.5 The results show that none of the scenarios can fully mitigate congestion levels associated with development to below that generated in Scenario 1, although Scenarios 3, 5 and 6 have significant congestion (red light) only on Church Street which is caused by the mitigation as a result of eliminating congestion on Castlegate.

**13.2 Scenario Ranking**

- 13.2.1 A further assessment has been undertaken to give a quantitative indication of how the 8 development scenarios compare against each other in terms of total increase in congestion above Scenario 1 across all four of the key junctions. This has been undertaken by ranking the 9 scenarios with 1<sup>st</sup> in the list having the least amount of increased congestion and 9<sup>th</sup> having the most when compared to Scenario 1.

13.2.2 Table 13.2 below gives each scenario a rank using the comparison against the Scenario 1 congestion. The results include the mitigation measures for each junction except where the mitigation measure has a detrimental effect (e.g. Castle Howard Road).

<b>Rank</b>	<b>Increase in Congestion (Without Grade Separated Junction)</b>
<b>1<sup>st</sup></b>	Scenario 3
<b>2<sup>nd</sup></b>	Scenario 6
<b>3<sup>rd</sup></b>	Scenario 5
<b>4<sup>th</sup></b>	Scenario 2
<b>5<sup>th</sup></b>	Scenario 4
<b>6<sup>th</sup></b>	Scenario 7
<b>7<sup>th</sup></b>	Scenario 8
<b>8<sup>th</sup></b>	Scenario 9

**Table 13.3 Scenario Ranking**

13.2.3 The ranked results show that Scenarios 3, 6 and 5 will create the least overall increase in congestion compared to Scenario 1 congestion overall. Scenarios 2 and 4 are positioned 'mid table' and the scenarios with the most amount of generated traffic (8, 7 and 9) are at the bottom of the table as they will produce the greatest increase in congestion against Scenario 1.

### 14.1 Introduction

14.1.1 Sections 4 to 13 discuss the traffic impact on the highway network within Malton and Norton by giving a commentary on the congestion at the four key junctions in their existing format and with mitigation measures in place.

14.1.2 This section of the report describes the proposed mitigation measures for each junction.

14.1.3 These proposed improvement options, proposed to increase the capacity of the four key junctions, fall into two categories:

- Immediately deliverable
- Not Immediately Deliverable (due to land take restraints or further development required).

14.1.4 The deliverable options will allow the layout or format of the junction to be changed without any land take outside of the highway boundary, and are therefore immediately 'deliverable'.

14.1.5 The deliverable options for each of the four key junctions are as follows

- Castle Howard Road / Yorkersgate / York Road – Signalisation.
- Welham Road / Castlegate / Church Street – Priority Change.
- Westfield Way / Scarborough Road – Change signal timings and extra lane.
- Pasture Lane / Broughton Road – Double Mini Roundabout

14.1.6 It should be noted that the deliverable options are not necessarily the optimum in terms of delivering maximum capacity to each junction. This section of the report will also describe the range of improvement options which have been developed to provide the maximum realistic capacity at each junction but which take up land or may not be immediately deliverable. These improvements will require further investigation.

### 14.2 Junction Options

14.2.1 The junction options described below have all been assessed in detail using relevant industry standard software packages (SATURN, ARCADY, PICADY and LINSIG). The deliverable options have been assessed for all 9 scenarios and the other non-deliverable options have been assessed using the traffic flows generated by Scenario 4.

14.2.2 The costs given for each junction option are indicative and do not include any costs which may arise as result of a NRSWA enquiry which could identify statutory undertakers that may be affected by the proposals.

**14.3 Pasture Lane**



- 14.3.1 The double mini roundabout option for Pasture Lane is the only option which has been designed in some detail. This option was developed as part of the Malton and Norton Transportation Review and Strategy undertaken by Jacobs in 2008.
- 14.3.2 The deliverable junction improvements consist of two mini roundabouts, one to the north at Pasture Lane and Broughton Road and one to the south at Newbeggins and Mount Crescent.
- 14.3.3 Incorporated into the design are pedestrian crossings on Mount Crescent and Newbeggins. These crossings will allow school children to access the nearby school via its current entrance on Middlecave Road.
- 14.3.4 It should be noted that the pedestrian facilities which shall be introduced as part of the double mini roundabout will provide a similar or an improved level of safety to the existing facilities.
- 14.3.5 The cost of converting the two junctions to a double mini roundabout will be approximately £65-75,000.
- 14.3.6 The results of the assessment of the 9 scenarios show that in most cases the proposed double mini roundabout will alleviate any capacity problems at the Pasture Lane junction. Traffic on the Broughton Road approach will still experience some queuing although the queue will be smaller than on the existing signalised junction.



**14.4 Castle Howard Road**

14.4.1 The Castle Howard Road junction is currently a priority junction with Castle Howard Road being the minor road and Yorkersgate and York Road being the major roads.

14.4.2 To improve the junction three options have been developed.

**Option 1 – Immediately Deliverable**

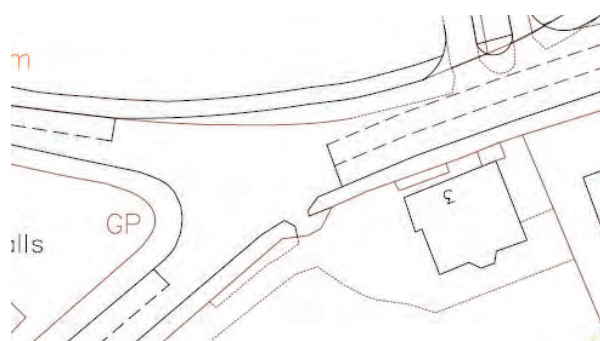


14.4.3 The only deliverable option which will not require any land is to convert the junction from a priority to a signalised junction. This will involve removing the central island on Castle Howard Road, installing traffic lights and painting the necessary junction markings into the carriageway.

14.4.4 The cost of converting the junction from priority to signals will be approximately £25-35,000.

14.4.5 However, the results of the detailed assessment of the signalisation of the junction show that for some of the scenarios the existing junction layout will provide more capacity than the proposed signalised option.

**Option 2 – Preferred (Not Immediately Deliverable)**

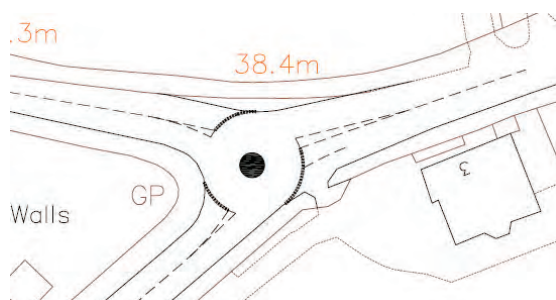


14.4.6 A preferred option and the one which will provide the most capacity but will take up land to the north side of Yorkersgate is again to convert from a priority junction to a signalised junction but to include a right turn lane from Yorkersgate to Castle Howard Road.

14.4.7 This will allow the development traffic heading up Castle Howard Road to wait without blocking the straight ahead traffic between Yorkersgate and York Road.

- 14.4.8 Option 2 is expected to reduce the congestion on Yorkersgate by up to 70% and by optimising the signal timings is expected to reduce the congestion on Castle Howard Road by up to 240%. These reductions in capacity should allow the junction to operate at or below the existing levels of congestion.
- 14.4.9 The cost of converting the junction from priority to signals will be approximately £35-45,000 excluding land.

Option 3 (Not Immediately Deliverable)



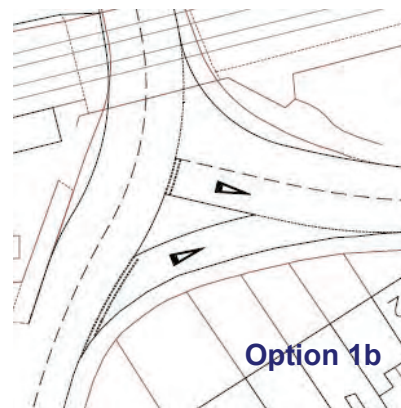
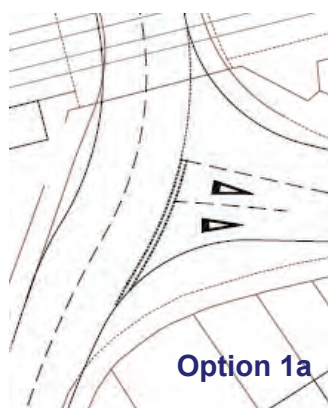
- 14.4.10 Another option is to change from a priority junction to a mini roundabout with a right turn lane from Yorkersgate to Castle Howard Road. The right turn lane will mean widening the carriageway on Yorkersgate which would entail taking land to the north.
- 14.4.11 The capacity assessment for this option showed that the mini roundabout will reduce congestion on Castle Howard Road by up to 280% but will not significantly reduce the congestion on Yorkersgate.
- 14.4.12 The cost of converting the junction from priority to a mini roundabout will be approximately £25-35,000.

**14.5 Welham Road**



- 14.5.1 The existing Welham Road junction is a priority junction with Welham Road as the minor arm. There is a segregated left turn between Church Street and Welham Road which is segregated by a traffic island.
- 14.5.2 Immediately to the north of the junction the railway line crosses Castlegate over a level crossing and there is the junction between Norton Road and Castlegate just north of the railway line.

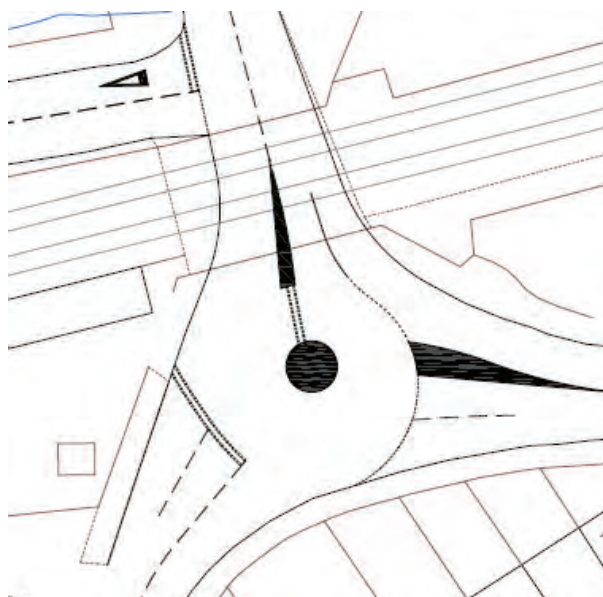
**Option 1a – 1b – Immediately Deliverable**



- 14.5.3 There are two deliverable options which have been developed for this junction. Both are to change the priority of the junction so that Church Street becomes the minor road and Welham Road and Castlegate become the major roads giving Castlegate priority. One of the options involves keeping the island (1b) and the other involves removing the island (1a). Analysis has showed that keeping the island will provide more capacity at the junction. As such the preferred deliverable option for the Welham Road junction is a change in priority and keeping the island (Option 1b). A further advantage of Option 1b is that the existing signage currently located on the island can remain.

- 14.5.4 The capacity assessment of Option 1b shows that changing the priority of the junction will reduce congestion on Welham Road by up to 290% and will eliminate the congestion on Castlegate as Castlegate will have priority. This of course takes the priority away from Church Street which will therefore become congested. The overall congestion at the junction will be less under Option 1b than existing.
- 14.5.5 The cost of changing the priority of the junction will be approximately £20,000 for Option 1a and approximately £20-25,000 for Option 1b.

Option 2 – Hybrid Mini Roundabout - Preferred (Not Deliverable)



- 14.5.6 For safety reasons a standard mini roundabout at this junction is not suitable as a mini roundabout will mean traffic backing up over the level crossing as they give way and queue to enter the roundabout via Castlegate.
- 14.5.7 To solve this problem a hybrid mini roundabout has been designed which gives priority to Castlegate traffic as right turners from Welham Road have to give way to the Castlegate traffic either at the Welham Rd entry or on the circulatory carriageway.
- 14.5.8 The Welham Road entry has two lanes, one for left turns up Castlegate and the other for right turns to Church St. The give way on the circulatory will have capacity for one vehicle so the majority of traffic waiting to turn right will queue at the Welham Road entry.
- 14.5.9 This junction layout provides maximum capacity and traffic using the roundabout will not experience any significant congestion or queuing problems under all 9 scenarios.
- 14.5.10 This option needs to be investigated further through a Stage 1 Safety Audit and it needs to be discussed with the DfT so is not immediately deliverable.
- 14.5.11 The cost of converting the junction to a hybrid mini roundabout will be approximately £25-30,000.

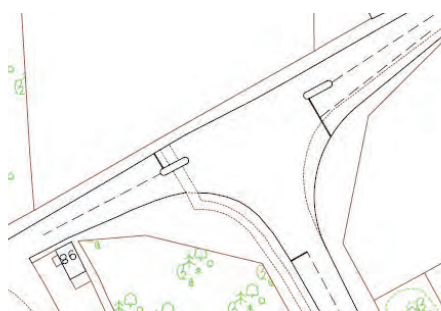
**14.6 Westfield Way**

**Option 1 – Optimise Signal Timings (Deliverable)**



- 14.6.1 The junction between Westfield Way and Scarborough Road is currently a signalised junction with one lane entries on each arm. The first option for this junction is to optimise the signal timings for the traffic flows generated by each scenario.
- 14.6.2 A detailed assessment has shown that optimising the signal timings could reduce congestion on Scarborough Road by up to 40% but as a consequence may increase congestion on Westfield Way.
- 14.6.3 The cost of optimising signal timings will be approximately £2,000.

**Option 2 – Best Case Deliverable**



- 14.6.4 The deliverable option for this junction is to add a left turning lane between Scarborough Road East and Westfield Way. This will provide some extra capacity by preventing the left turners from blocking the straight through vehicles. This option will involve taking some land to the south of the existing junction footprint. This land is within the existing highway boundary so land acquisition is not necessary.
- 14.6.5 Modelling this deliverable improvement adds enough capacity to alleviate congestion generated in all nine scenarios.
- 14.6.6 The cost of adding a left turn lane with optimised signal timings will be approximately £30-35,000.

Option 3 – Preferred (Not Deliverable)



- 14.6.7 The preferred option for this junction to add the maximum amount of capacity is to add a left turn lane on Scarborough Road East and a right turn lane on Scarborough Road West. However this requires land take from the wooded area and fields belonging to Quarry Farm.
- 14.6.8 As this option will provide more capacity at the junction than the deliverable option it as well as the deliverable option will alleviate all congestion at the junction under all 9 scenarios.
- 14.6.9 The cost of adding a left and right turn lane with optimised signal timings will be approximately £45-55,000 excluding land.

**14.7 Summary**

- 14.7.1 Given the strategic nature of this study, these mitigation measures are theoretical solutions to the impact on the highway network and it is important to note that:
  - Additional modelling work will be required to test the impact of site specific allocations to demonstrate that the proposed solutions are still necessary, suitable and appropriate.
  - Alternative mitigation measures may be considered and developed as part of the additional modelling work.
  - Mitigation measures identified within the report could work in traffic modelling terms but any delivery will be subject to normal NYCC scheme approval and consultation procedures.
  - Should the proposed mitigation measures in this study not take place, alternative measures which achieve at least the same level of mitigation will be necessary. This will need to be agreed with NYCC.

14.7.2 Table 14.1 below shows the deliverable junction option for each of the four key junctions and a brief summary of how the proposed option performs in terms of reducing the congestion levels below those of Scenario 1.

Junction	Deliverable Option	Approximate Cost	Comments
Pasture Lane	Double Mini Roundabout	£65-75,000	Increased capacity on all arms. Pedestrian facilities will be similar or will improve on existing facilities.
Castle Howard Road	Signalisation with no additional lanes	£25-35,000	Does not mitigate congestion in all scenarios.
Welham Road	Change in priority so that Church Street becomes the minor road. Existing traffic island will remain.	£20-25,000	Gives Castlegate priority and provides additional capacity on Welham Road. Church Street becomes congested due to change in priority.
Westfield Way	Left turning lane between Scarborough Road East and Westfield Way.	<b>£30-35,000</b>	Provides additional capacity for traffic in and out of Westfield Way.

**Table 14.1 Deliverable Junction Improvement Option Summary**

**15.1 General**

- 15.1.1 As part of the Norton East development a link road is proposed through the site. The proposed road will provide access to the various elements of the development. The link is proposed to connect into the existing highway network at Scarborough Road to the north and Beverley Road to the south. This link road has been included in the traffic models.
- 15.1.2 Similar to the Norton East development site the Woolgrowers site has an associated link road which runs through the site providing access to the various elements of the development. The link is proposed to connect into the existing highway network at York Road to the north and Welham Road to the east. This link road has been included in the traffic model.
- 15.1.3 The design and layouts of the Woolgrowers and Norton East link roads have been considered in combination with the 'North Yorkshire Highway Design Guide' requirements for local distributor roads (LDR) and also where appropriate the DfT's Design Manual for Roads and Bridges (DMRB) due to the high level of predicted traffic.
- 15.1.4 The indicative layouts for both sites have been detailed to best replicate those indicated on the master plans albeit with minor alterations to accommodate the above design standards.
- 15.1.5 The profile of the link roads proposes a 7.3m superelevated carriageway with 3m footway/cycleways on both sides separated by 1.5m verges and 1.5m verges at the back of footways.

**15.2 Norton East Development Link Road**

**Ground Conditions**

- 15.2.1 From a basic desk study it is understood that there are areas of marsh land to the south of B1248 Scarborough Road. Therefore the indicative works cost estimate allows for a 1m deep excavation in this location to provide a suitable sub-formation surface for the construction of the development road.

**Statutory Undertakers**

- 15.2.2 A preliminary NRSWA enquiry has been carried out which has identified several statutory undertakers that may be affected by the proposals.
- 15.2.3 They include BT overhead and underground cables, Yorkshire water mains that either cross the route close to, and at the tie-in with Beverley Road. Both may require diversion or protection works.



15.2.4 There are also overhead electric cables in the vicinity of Norton Grove Stud which may require diverting or transferring underground to accommodate the proposed development road.

15.2.5 At this stage budgetary diversion/protection works cost estimates have not been obtained from the statutory undertakers. An arbitrary estimate has been included in the works cost estimate based on experience of similar types of work.

#### Junction Consideration

15.2.6 A roundabout or traffic signalled junction would be most appropriate for the northern tie-in with B1248 Scarborough Road and a ghost island junction at the western Beverley Road tie-in as shown on the layout drawing included in Appendix xx. If this development road is to be considered further consideration should be given to other factors including an accident, geometric capacity and land cost benefit analysis.

15.2.7 The proposals include for an underpass at the point at which the proposed development road crosses the existing none motorised user facility along the disused railway and has been included in the works estimate cost.

#### Drainage

15.2.8 At this stage based on a feasibility design check with consideration given to the requirements of Sustainable Urban Drainage Systems (SUDS), the proposed highway surface water run-off will discharge into a number of attenuation ponds and then into existing watercourses. The junction tie-ins may require direct discharge into the existing highway surface water systems.

15.2.9 It should be noted, based on the ground model data along with an assumption the existing water courses are 1m deep, that the proposed carriageway will require lifting approximately 1.2 to 2.5m above existing ground level. This could be markedly different following a more accurate traditional topographical survey.

15.2.10 Due to the inclusion of footways on both sides of the carriageway and subsequent inclusion of a kerbed edge the most appropriate and cost efficient collection method is to provide gullies and carrier drainage system while also superelevating virtually the entire length of the road.

#### Road Lighting

15.2.11 Due to the volume of access likely to be required along the main development roads it is envisaged the entire length (except for a short section at the river and rail crossing) will require lighting.

Cost Estimate

15.2.12 Table 15.1 below shows the estimated quantified costs for the design and construction of the Norton East Link Road.

Item	Cost
Total Works Cost	£13,587,537
Design & Supervision	£1,644,092
Quantified Risk Assessment (QRA)	£1,358,754
<b>Total 2009/10 Works Cost</b>	<b>£16,590,382</b>
<b>Total with Optimism Bias Uplift (45%)</b>	<b>£24,056,054</b>

**Table 15.1 Norton East Link Road Cost Estimate**

**15.3 Woolgrowers Development Link Road**

Existing Ground Conditions

15.3.1 From a basic desk study and comments detailed in the Malton / Norton River-Rail Study, Jacobs understand that this site is within a flood plain and therefore has areas of land possibly consisting of silt and river deposits. Jacobs have therefore, for the purposes of providing an indicative works cost estimate allowed for a 1m deep excavation in this location to provide a suitable sub-formation surface for the construction of the development road.

Statutory Undertakers

- 15.3.2 A preliminary NRSWA enquiry has been carried out which has identified several statutory undertakers that may be affected by the proposals.
- 15.3.3 They include BT underground cables along York Road and overhead cables at Star Cottage Stables and Welham Road, a Yorkshire water main along York Road and a Foul sewer between the River Derwent and York Road, all of which may require diversion/protection works. There are also underground electric cables at both tie-ins which may require diverting.
- 15.3.4 At this stage budgetary diversion/protection works cost estimates have not been obtained from the statutory undertakers. An arbitrary estimate has been included in the works cost estimate based on experience of similar types of work.

Junction Consideration

- 15.3.5 A roundabout or traffic signalled junction would be most appropriate at both junction tie-ins. If this development road is to be considered further consideration should be given to other factors including an accident, geometric capacity and land cost benefit analysis.
- 15.3.6 At this stage it has been assumed the link road will service the development area with a series of simple T-junctions but include a roundabout and ghost island junctions at points considered to have the highest traffic demand.

- 15.3.7 Consideration has been given to potential junction tie-in locations with the existing road network on Welham Road to the east of the development.
- 15.3.8 It is considered that both Park Road and the private access between property no's 66 and 77 are unsuitable locations for a major junction without having a significant impact on property within the immediate vicinity, although the latter could accommodate a minor connection.
- 15.3.9 The Malton / Norton River-Rail Corridor Study suggests a traffic signal control junction for further consideration at the junction between Welham Road and Church Street. Although it is felt that this is a potential site for a development road tie-in, it is also likely to be very expensive and would require a thorough feasibility study to determine its viability and possible additional benefits to the network. At this stage tie-ins that are likely to have less impact on the existing network have been considered.

#### River Derwent and Rail Crossing

- 15.3.10 A development road tie-in with York Road to the northwest of the development will require a bridge crossing of the River Derwent and railway with a span of approx. 100m. The works cost estimate will provide costings for 2 bridge options, a steel composite bridge and an iconic cable-stayed bridge. There will be ecological and flood risk sensitivities associated with the crossing as the River Derwent is a Site of Special Scientific Interest (SSSI) in this location.

#### Drainage

- 15.3.11 If this site is to be considered further the highway drainage will require careful consideration as the options to discharge into an existing watercourse appear fairly limited to only the River Derwent. With the considerations of SUDS a balancing ponds will be required both sides of the River Derwent valley. This would require a carrier pipe to be bored under the railway lines potentially incurring a significant cost. An alternative solution would be to pump the surface water along the structure and discharge to the balancing pond on the western side of the river. This may provide a cheaper initial installation cost than the boring option but factoring in the maintenance liability cost may prove more expensive long term.
- 15.3.12 It is unlikely the existing highway surface water sewer will have sufficient capacity to accommodate the development road surface water run off.
- 15.3.13 The works cost estimate also assumes the development surface water will be dealt with separately.

#### Road Lighting

- 15.3.14 Due to the volume of access likely to be required along the main development roads it is envisaged the entire length (except for a short section at the river and rail crossing) will require lighting.

Cost Estimate

15.3.15 Table 15.2 below shows the estimated quantified costs for the design and construction of the Woolgrowers Link Road.

Item	Cost
Total Works Cost	£14,453,309
Design & Supervision	£1,748,850
Quantified Risk Assessment (QRA)	£1,445,331
<b>Total 2009/10 Works Cost</b>	<b>£17,647,490</b>
<b>Total with Optimism Bias Uplift (45%)</b>	<b>£25,588,860</b>

**Table 15.2 Woolgrowers Link Road Cost Estimate**

**16.1 Introduction**

- 16.1.1 Jacobs was commissioned to provide an outline design and indicative cost estimate for the provision of the GSJ at the crossing of the A64 and B1257 Broughton Road, to the north west of Malton.
- 16.1.2 As the A64 is a trunk road, it falls within the responsibility of the Highways Agency (HA) whereas NYCC are responsible for the B1257 Broughton Road. The existing structure crossing the A64 on the B1257 Broughton Road is also the responsibility of the HA. It is assumed at this stage that a proposed GSJ including slip roads and junctions would also be adopted by the HA.
- 16.1.3 As part of this study a preferred option (Option 1) has been developed to provide the lowest cost which achieves current DfT design criteria without departures from standards. However, due to planning proposals for developing the land to the south west of the crossing, Jacobs were asked by NYCC to consider alternative design approaches to avoid the development area, and the likely cost implication. Option 4 achieves this requirement but requires significant land take. Two further options (Options 2 & 3) have therefore been considered which reduce but don't eliminate the requirement to take land from the development area.

**16.2 Design Options for the Junction**

Option 1

- 16.2.1 This option is based on a 'dumb-bell' type layout with two new proposed roundabouts and retains the existing A64 / B1257 road structure. It is assumed that the bridge is structurally capable of accommodating the additional traffic volume although this will need to be confirmed by the HA if this option is to be progressed.
- 16.2.2 Assuming the above this option has minimal impact on the existing structure and requires the least amount of overall land take. However this option requires most of its land from the south west quadrant of the A64 / B1257 crossing and would have a significant impact on the proposed development in this quadrant.

Option 2

- 16.2.3 This option requires less land than Option 4 but would slightly impact on the proposed south west quadrant development. This option significantly impacts on the B1257 bridge and for the purposes of the estimate it has been assumed a replacement bridge will be required.

### Option 3

- 16.2.4 This option requires less overall land than Options 2 and 4 but takes slightly more land from the development than Option 2.
- 16.2.5 Option 2 has been designed to avoid the B1257 southern bridge pier such that it may be possible to incorporate the existing northern abutment and both piers within the proposal, or even allow the construction of a separate box culvert / structure to accommodate the south western slip road.
- 16.2.6 This could significantly reduce the cost of this option compared with Option 2 subject to the retention of the existing structure or parts of it being feasible (due to this uncertainty an estimate has not been provided for Option 3).

### Option 4

- 16.2.7 This option achieves the requirement not to impact on the proposed development but it requires the most overall land take. This option also does not affect the existing B1257 Broughton Road bridge but it will have a major impact on the Outgang Road bridge further east. For the purposes of the estimate it has been assumed the existing bridge will require total reconstruction.

**16.3 Feasibility Works Cost Estimate**

16.3.1 The table below provides an indicative cost estimate for each option. Note an estimate is not included for Option 3 as this option would not be economically viable if the existing road bridge is to be reconstructed:

Item	Option 1	Option 2	Option 4
<b>Road Works</b>			
***Roadwork's	3,200,000	3,000,000	3,200,000
Statutory Undertakers Works	250,000	250,000	250,000
Traffic Management	320,000	300,000	320,000
Sub-total	3,770,000	3,550,000	3,770,000
Preliminaries (10%)	377,000	355,000	377,000
Sub-total	4,147,000	3,905,000	4,147,000
* *Contingencies (40%)	1,658,800	1,562,000	1,658,800
<b>Road Works Total</b>	<b>5,805,800</b>	<b>5,467,000</b>	<b>5,805,800</b>
<b>Structures</b>			
Bridge Reconstruction	0	900,000	600,000
Traffic Management	0	54,000	54,000
Sub-total	0	954,000	654,000
Preliminaries (10%)	0	95,400	65,400
Sub-total	0	1,049,400	719,400
** Contingencies (40%)	0	419,760	287,760
<b>Structure Works Total</b>	<b>0</b>	<b>1,469,160</b>	<b>1,007,160</b>
<b>Works Cost (2009/10)</b>			
* Total works cost total	5,805,800	£6,936,160	£6,812,960
Design & Supervision	638,638	762,978	749,426
Quantified Risk Assessment (QRA)	580,580	693,616	681,296
<b>Total 2009/10 Works Cost</b>	<b>7,025,018</b>	<b>8,392,754</b>	<b>8,243,682</b>
<b>Total with Optimism Bias Uplift (45%)</b>	<b>10,186,276</b>	<b>12,169,493</b>	<b>11,953,338</b>
<b>Outturn Works Cost (2015/16)</b>			
<b>Total with Optimism Bias Uplift (45%)</b>	<b>13,649,105</b>	<b>16,306,517</b>	<b>16,016,881</b>

**Table 16.1 Broughton Road A64 GSJ Works Cost Estimate (£'s)**

\*\* A 40% contingency has been allowed for due to the number of unknowns (for example topography and ground conditions).

\*\*\* Road works costs including drainage, earthworks, pavement, road lighting, traffic signs, accommodation works etc.

**16.4 Congestion in Malton and Norton**

16.4.1 Using the traffic model the 9 scenarios have been tested to establish what effect the GSJ has on the increase in congestion at Butcher Corner and at the 4 key junctions within Malton and Norton.

16.4.2 The model shows that the introduction of the GSJ will reduce the impact of the development across the four junctions.

16.4.3 Introducing the proposed junction improvements as well as the GSJ will reduce the increase in congestion even further.

16.4.4 Table 16.2 below shows the summarised results for the congestion at the 4 main junctions and Butcher Corner. This table should be compared with Table 13.1 to compare the effects of the GSJ on each junction both with and without mitigation. The actual RFC values can be found in the Technical Annex which accompanies this report.

Junction	Road Names	Scenario 1 No Mitigation with GSJ	With Mitigation & GSJ									No Mitigation with GSJ								
			Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9		
Butcher Corner	WG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	OM	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	G	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	CG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Welham Road Junction	YG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	CG	●	--	--	--	--	--	--	--	--	●	●	●	●	●	●	●	●		
	WR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Castle Howard Junction	CS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	CHR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	YG	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Pasture Lane Junction	YR	--	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	BR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	PL	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	NB	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Westfield Way Junction	MC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SRW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
	SRE	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		
Westfield Way Junction	WW	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		

Table 16.2 Assessment Overview with A64 Broughton Road Grade Separated Junction



- 16.4.5 As a relative measure, the cells shaded green in Table 16.2 show where the congestion is less than that of Scenario 1 (with GSJ) and the pink shaded cells show where the congestion is greater than Scenario 1 (with GSJ).
- 16.4.6 The results show that the congestion levels of scenarios 3 and 5 can be fully mitigated with the GSJ and mitigation measures in place. Scenario 4 has only the congestion on Church Street which is caused by the mitigation as a result of eliminating congestion on Castlegate and a small increase in congestion on Castle Howard Road.

**16.5 Scenario Ranking (with GSJ)**

- 16.5.1 A further assessment has been undertaken to give a quantitative indication of how the 8 development scenarios compare against each other in terms of total increase in congestion above Scenario 1 across all four of the key junctions with the GSJ in place. This has been undertaken by ranking the 9 scenarios with 1<sup>st</sup> in the list having the least amount of increased congestion and 9<sup>th</sup> having the most when compared to Scenario 1.
- 16.5.2 Table 16.3 below gives each scenario a rank using the comparison against the Scenario 1 congestion. The results include the mitigation measures for each junction except where the mitigation measure has a detrimental effect (e.g. Castle Howard Road). These results can be compared with table 13.3.

Rank	Increase in Congestion (With GSJ)
1 <sup>st</sup>	Scenario 5
2 <sup>nd</sup>	Scenario 6
3 <sup>rd</sup>	Scenario 3
4 <sup>th</sup>	Scenario 2
5 <sup>th</sup>	Scenario 7
6 <sup>th</sup>	Scenario 8
7 <sup>th</sup>	Scenario 4
8 <sup>th</sup>	Scenario 9

**Table 16.3 Scenario Ranking (with GSJ)**

- 16.5.3 The ranked results show that Scenarios 3, 6 and 5 will create the least increase in congestion above the Scenario 1 congestion overall. Scenarios 2 and 7 are positioned ‘mid table’ and scenarios 8, 4 and 9 are at the bottom of the table.
- 16.5.4 Figure 16.1 below gives an illustrative summary of the total congestion levels for each scenario across the network both with and without the GSJ in place. The total congestion across the network includes mitigation measures where required.

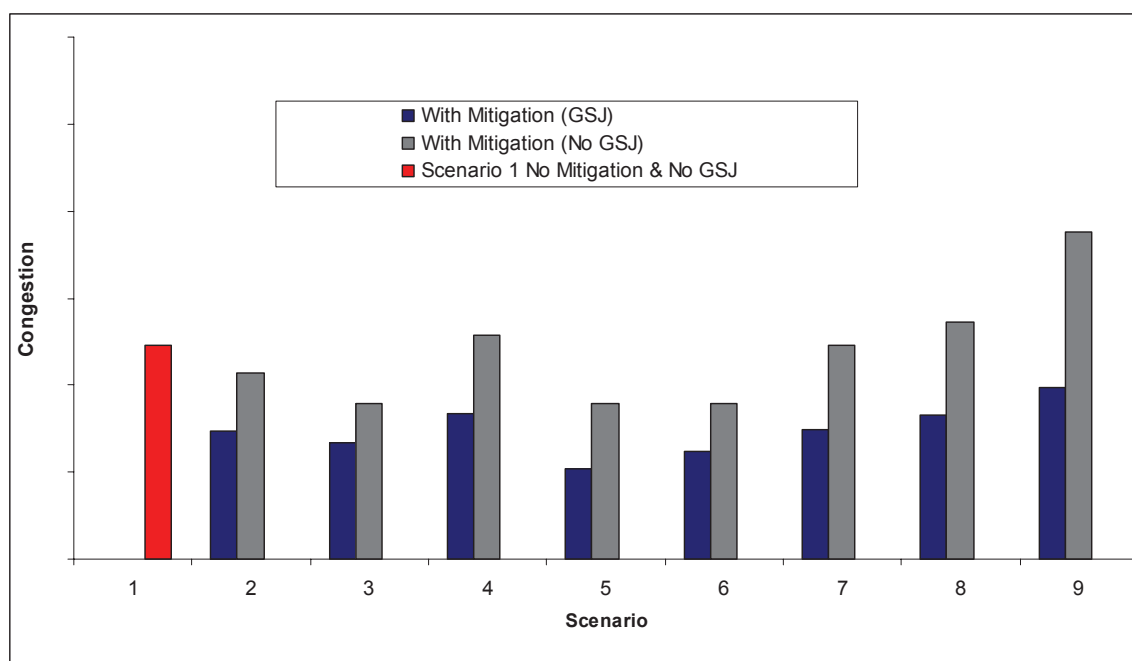


Figure 16.1 With and Without GSJ Congestion Comparison

16.5.5 It is clear from Figure 16.1 that the introduction of the Broughton Road GSJ will reduce the congestion across the Malton and Norton highway network.

**16.6 Summary**

16.6.1 From the works cost estimate it can be seen Option 1 is the least costly and is likely to have the lowest land costs. However it has a significant affect on the proposed development within the junction’s southwest quadrant. Option 4 is the only option that has no affect on the proposed development. However this is the most expensive option in terms of construction costs and likely land take. It should also be noted this option would have a significant impact on the allotments to the east of the crossing.

16.6.2 Options 2 and 3 require less overall land take than Option 4 but they both require a small amount of land from the development area. Option 2 requires less land from the development area but is likely to require the replacement of the B1257 bridge whereas Option 3 takes slightly more land but may achieve savings by allowing retention of the bridge, or part of it. Further assessment of the existing bridge is required before the treatment of the existing bridge can be determined.

16.6.3 However in any event both options will be cheaper than Option 4. This section recommends several areas to investigate and consult further to provide a greater certainty in design achievability and cost. It also suggests that if departures from standard or the use of compact grade separated junctions are to be considered then the HA should be consulted at an early stage to obtain their acceptance.

16.6.4 The list below summarises the areas for further investigation and consultation if the options mentioned are to be considered further:

- A more detailed desktop ground investigation.
- Topographical survey.
- Draft NRSWA enquiry to establish more robust statutory undertaker diversionary / protection works.
- Consultation with the HA with regards the existing road structures, drainage philosophy, consideration of a compact grade separated junction and possible departures from standard.
- Quantified Risk Assessment (QRA)
- Stage 1 Safety Audit.

16.6.5 The GSJ is considered to be a longer term option put forward as part of the preparation of this Local Development Framework. Whilst the junction will offer substantial benefits in terms of reducing queues and congestion across the highway network there are significant challenges to it coming forward.

16.6.6 National advice has a presumption against new accesses onto trunk roads and the cost of the GSJ at (£13-16m) is substantial and is unlikely to attract funding from the Highways Agency. This policy presumption applies even if alternative funding was secured for the scheme. The Council needs to show that its plans are deliverable within the plan period to 2026 such as setting out what infrastructure will be required, how it will be funded and how it will be delivered.

16.6.7 Whilst seeking developer contributions towards funding this junction is a possibility, this will be on top of the contributions already being sought for Brambling Fields, which RDC and NYCC are already committed to. Viability work is being carried for the Council as part of a separate study. However indications are that the substantial costs involved in providing a new GSJ – regardless of the policy presumption against such improvements - will have a detrimental effect on the Council's ability to secure viable housing development. That is not to say that the GSJ is not worthy of further investigation by the Council with key partners such Highways Agency and NYCC should this situation change in the future.

# 17 Selecting Development Scenario(s)

## 17.1 Introduction

- 17.1.1 Sections 4 to 12 describe in detail the impacts the traffic generated by each of the nine scenarios will have on the local highway network within Malton and Norton compared to the Scenario 1 conditions.
- 17.1.2 The emphasis of this impact has been focussed on the four key junctions by detailing the amount of additional congestion they will experience in the morning peak in 2026 using both the existing junction layouts and a set of deliverable junction layouts (designed where possible to mitigate congestion).
- 17.1.3 The congestion (RFCs) for each arm of each junction ranges from near zero to significant (above 100%) which could potentially affect other nearby junctions and cause major problems in the future.

## 17.2 Extraction of Results

- 17.2.1 The qualitative traffic light system within the results tables in Sections 4 to 12 shows how congested the junctions will be in comparison to Scenario 1. The results from these tables have been collated and summarised in Section 13 to give an illustration of the congestion levels the traffic from each scenario will have on the network both with and without the proposed junction improvements.
- 17.2.2 Figure 17.1 below gives an illustrative summary of the total congestion levels for each scenario across the network both with and without junction improvements in place.

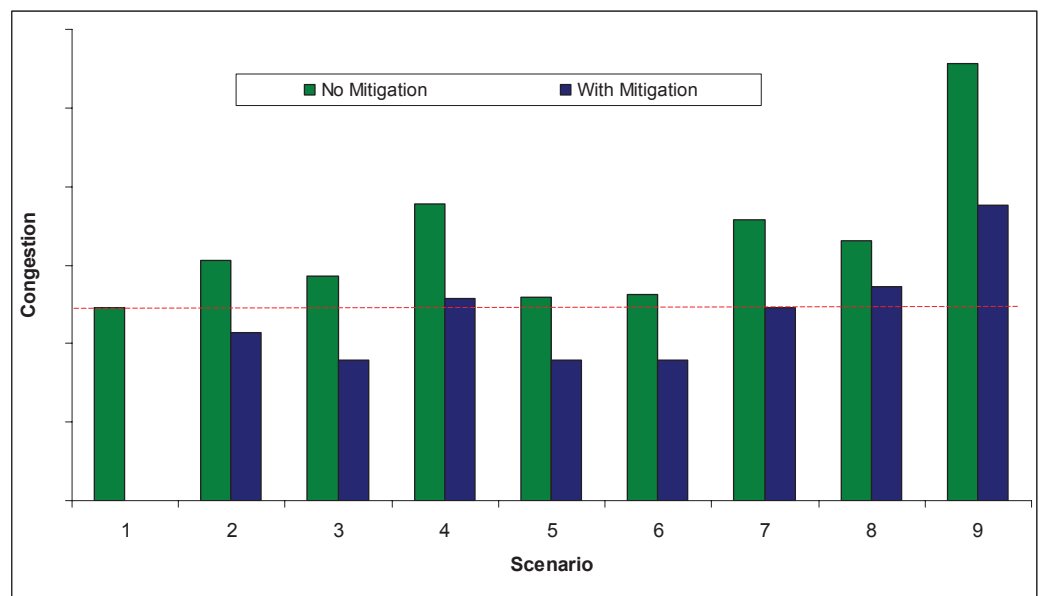


Figure 17.1 Scenario Assessment Summary

- 17.2.3 In comparison to Scenario 1, Scenarios 2, 3, 5 and 6 with mitigation in place will generally have less congestion across the highway network than Scenario 1.
- 17.2.4 Scenarios 4 and 7 are likely to produce no significant increase in overall congestion, however locally within each junction there will be some increases on certain arms such as on Church Street at the Welham Road junction. Scenarios 8 and 9 will produce a significant increase in congestion across the network even with mitigation.

### **17.3 Refining the Choice of Scenarios**

- 17.3.1 Recommending a scenario depends on a number of factors. It is not just about the amount of additional congestion produced from development but also balancing that against the magnitude and geographical spread of that development.
- 17.3.2 The above results show that scenarios 2, 3, 5 and 6 create the least amount of congestion with the mitigation measures in place. Of these Scenarios 2, and 6 produced no significant increase in congestion at each junction but Scenario 5 produced significant increases on Welham Road. On this basis Scenarios 3 and 6 could be taken forward as recommended scenarios in highway terms.
- 17.3.3 As mentioned in Section 6, Scenario 4 represents a spread of development across Malton and Norton without a concentration of development traffic on any particular part of the network. However Scenario 4 also involves a scale of development beyond that which is likely to be proposed through the LDF.
- 17.3.4 Even at this higher level of development the increase in congestion levels associated with Scenario 4 compared to Scenario 1 is relatively low with congestion particularly occurring at the Welham Road junction. There is potential that under the junction improvement with a 'hybrid mini roundabout that this congestion could be eliminated. However, this option would need to pass a Stage 1 Safety Audit and be given authorisation by DfT to be put into place. Whilst this is being investigated, no approval exists at this time.
- 17.3.5 In light of this a sensitivity test has been undertaken to test the effects of reducing the amount of residential development by 50% in this scenario so that it equates to a lower level of housing that is more likely to be considered through the Council's LDF.
- 17.3.6 This development scenario with 50% of the Scenario 4 residential development has been named Scenario 4A. It is important to note that whilst the level of residential development has been reduced proportionately by 50%, the level of other development remains the same. This is due to the fact that other uses cannot be proportionately reduced in comparison to housing. Similarly as this study is on a strategic basis, no site could be left out. However the result of this is that the quantum of employment and in particular retail development (which is higher trip generating development than housing) is in excess of what is being proposed through the Council's LDF. On this basis we consider the figures from Scenario 4A to be extremely robust.

17.3.7 The amount of development land in Scenario 4A is as shown in the table below:

<b>Development Type</b>	<b>Plot Area</b>
Retail	<b>27 ha</b>
Residential	<b>2165 dwellings</b>
Education	<b>0.2 ha</b>
Employment	<b>44 ha</b>
Leisure	<b>3.3 ha</b>

17.3.8 The modelling of Scenario 4A is shown in Section 18.

**18 Scenario 4A Congestion Analysis**

**18.1 Increase in Congestion**

18.1.1 For Scenario 4A the magnitude of the increase in congestion relative to Scenario 1 is shown in the table below.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 4A No Mitigation	2026 AM Scenario 4A With Mitigation
Butcher Corner	Wheelgate	●	●	●
	Old Maltongate	●	●	●
	Castlegate	●	●	●
	Yorkersgate	●	●	●
Welham Road Junction	Castlegate	●	●	---
	Welham Road	●	●	●
	Church Street	---	---	●
Castle Howard Road Junction	Castle Howard Road	●	●	●
	Yorkersgate	●	●	●
	York Road	---	---	●
Pasture Lane Junction	Broughton Road	●	●	●
	Pasture Lane	●	●	●
	Newbeggin	●	●	●
	Mount Crescent	●	●	●
Westfield Way Junction	Scarb. Rd West	●	●	●
	Scarb Rd. East	●	●	●
	Westfield Way	●	●	●

**Table 18.1 Scenario 4A RFC Magnitude (5 Key Junctions)**

18.1.2 The circular traffic light symbols represent the actual RFC values for each scenario and each junction as described in Table 3.12. As a relative measure, the cells or boxes with a green background in Table 18.1 show where the congestion is less than that of Scenario 1 and the cells or boxes with a pink background show where the congestion is greater than Scenario 1.

18.1.3 As with the other 9 scenarios the capacity restrictions at Butcher Corner will cause the junction to operate at or around capacity on Old Maltongate and Yorkersgate. Castlegate will operate just under capacity (RFC < 100%) and Wheelgate will have no congestion. The congestion at Butcher Corner will be no worse than in Scenario 1.

18.1.4 At the Welham Road Junction, Welham Road and Castlegate will have less congestion than Scenario 1. Church Street will also operate within capacity with minimal congestion. Overall, with the proposed change in priority at the junction the junction will operate with less congestion than the existing junction under the Scenario 1 traffic.

- 18.1.5 At the proposed signalised Castle Howard Road junction, Castle Howard Road, Yorkersgate and York Road will have no congestion.
- 18.1.6 On the existing junction layout the Pasture Lane Junction will be over capacity on all four arms. With mitigation measures in place the RFCs on all four arms will be considerably less than in Scenario 1 (existing junction) which shows that the proposed junction improvement does mitigate the impact of the development traffic for Scenario 4A. Broughton Road and Pasture Lane will however still be over capacity with RFCs greater than 100%.
- 18.1.7 With mitigation in place the Westfield Way junction will experience no congestion.
- 18.1.8 The table below shows the results for the other six junctions. There will be no significant increases in congestion when compared to Scenario 1.

Junction	Road Name	2026 AM Scenario 1 No Mitigation	2026 AM Scenario 4A No Mitigation	2026 AM Scenario 4A With Mitigation
Town Street Junction	Highfield Road	●	●	●
	Old Malton Road	●	●	●
	Town Street	●	●	●
Railway Street Junction	Yorkersgate E	---	---	---
	Yorkersgate W	●	●	●
	Railway Street	●	●	●
Norton Road Junction	Castlegate	●	●	●
	Church Street	---	---	---
	Norton Road	●	●	●
Level Crossing	Castlegate	●	●	●
	Church Street	●	●	●
Wold Street Junction	Church Street	●	●	●
	Commercial Street	---	---	---
	Wold Street	●	●	●
Mill Street Junction	Commercial Street	●	●	●
	Scarborough Road	---	---	---
	Mill Street	●	●	●

Table 18.2 Scenario 4A RFC Magnitude (Other Junctions)

**18.2 Advantages of Scenario 4A**

- 18.2.1 With the proposed deliverable junction Improvements Scenario 4A will have zero to minimal congestion levels when compared to Scenario 1 while also containing a realistic level of development likely to be proposed in the future, and developments distributed across both Malton & Norton.



### **18.3 Disadvantages of Scenario 4A**

- 18.3.1 The model results show there will be some congestion at the Pasture Lane junction. This congestion will however be less than that in Scenario 1.

### **18.4 Recommendation Summary**

- 18.4.1 At this level of development, Scenario 4A is a robust and viable option as it results in an acceptable impact on the local highway network particularly with mitigation and contains sites distributed across both Malton & Norton and therefore allows an assessment of the complex traffic impacts and interrelationships across the towns in a single scenario.

# 19 Scenario 4A Sensitivity Testing

## 19.1 Introduction

19.1.1 To establish the relative impacts of the traffic generated by three of the development sites within Group 1 the following sensitivity tests have been carried out based on Scenario 4A.

- Test 1 – Remove the Pasture Lane / Showfield Lane development.
- Test 2 – Remove the Ryedale Business Park development on Eden Road
- Test 3 – Remove the Wentworth Street Car Park development.

19.1.2 These sites have been chosen for sensitivity testing as they represent choices over where development could be accommodated and it is therefore appropriate to test the difference in traffic impact from removing them from the model.

## 19.2 Test Results

19.2.1 The results of the three sensitivity tests are shown in Table 19.1 and 19.2 below. Both tables show the RFC values for each scenario and each junction using the traffic light colours as described in Table 3.12.

Junction	Road Name	2026 AM Scenario 4A With Mitigation	2026 AM Test 1 With Mitigation	2026 AM Test 2 With Mitigation	2026 AM Test 3 With Mitigation
Butcher Corner	Wheelgate	76.1	79.2	74.3	77.3
	Old Maltongate	126.5	127.9	125.6	126.2
	Castlegate	100.0	99.8	100.0	100.0
	Yorkersgate	105.6	105.6	105.7	105.6
Welham Road Junction	Castlegate	---	---	---	---
	Welham Road	74.7	69.0	70.7	78.0
	Church Street	70.6	64.3	66.1	65.3
Castle Howard Road Junction	Castle Howard Road	52.4	51.0	52.4	52.9
	Yorkersgate	75.0	74.7	73.7	66.6
	York Road	82.7	77.2	80.2	80.3
Pasture Lane Junction	Broughton Road	151.4	124.3	144.5	147.3
	Pasture Lane	104.3	104.9	104.5	104.3
	Newbeggin	26.0	18.4	26.5	23.7
	Mount Crescent	59.8	57.8	59.5	56.7
Westfield Way Junction	Scarb. Rd West	84.6	82.2	80.2	84.5
	Scarb Rd. East	73.4	68.2	70.9	70.3
	Westfield Way	84.0	82.5	80.3	83.3

Table 19.1 Scenario 4A Sensitivity Testing Results (5 key Junctions)

Junction	Road Name	2026 AM Scenario 4A With Mitigation	2026 AM Test 1 With Mitigation	2026 AM Test 2 With Mitigation	2026 AM Test 3 With Mitigation
Town Street Junction	Highfield Road	6.0	3.3	3.3	3.2
	Old Malton Road	28.9	24.4	25.3	24.4
	Town Street	96.9	96.8	102.1	96.8
Railway Street Junction	Yorkersgate E	102.3	103.0	102.4	102.3
	Yorkersgate W	14.9	18.0	17.0	16.7
	Railway Street	3.6	3.7	3.7	3.8
Norton Road Junction	Castlegate	40.8	43.4	40.3	40.1
	Church Street	26.9	24.7	27.1	24.7
	Norton Road	12.5	12.9	12.4	11.9
Level Crossing	Castlegate	40.6	43.1	40.2	40.0
	Church Street	25.9	24.3	26.2	24.4
Wold Street Junction	Church Street	42.2	42.5	41.9	42.6
	Commercial Street	61.9	56.1	60.4	56.9
	Wold Street	59.1	58.4	59.0	57.9
Mill Street Junction	Commercial Street	83.7	84.8	83.6	84.3
	Scarborough Road	38.2	34.9	37.9	35.9
	Mill Street	54.6	49.8	50.7	52.7

Table 19.2 Scenario 4A Sensitivity Testing Results (Other Junctions)

19.2.2 The results show that the removal of any one of the three sites has a minimal effect on the congestion within the highway network. The colour of the majority of the traffic lights remains the same as Scenario 4A for all three tests. In Test 2 Town Street is slightly over capacity.

**19.3 Conclusion**

19.3.1 The removal of any one of the three development sites in Tests 1, 2 and 3 will have a minimal effect on the congestion within the highway network.

19.3.2 In the majority of cases (exception of Town Street in Test 2) the traffic light colour will not change from that of Scenario 4A.

**20.1 Summary of Methodology**

20.1.1 The purpose of the Malton and Norton Strategic Transport Assessment is test the impact of strategic development locations on the road network in Malton and Norton and compare the congestion levels against development represented by Scenario 1. The study objective is also to identify any potential problems with particular development scenarios and to confirm where deliverable highway infrastructure improvements are likely to be required to enable individual developments to go ahead without incurring an unacceptable impact on the highway network.

Traffic Model

20.1.2 Jacobs has used NYCC’s fully validated SATURN traffic model of Malton and Norton to test a number of proposed highway improvements across the Malton and Norton local highway network.

20.1.3 The AM peak model has been used based on an assessment year of 2026 and including all the major highway links and junctions in both Malton and Norton (A64, Museley Bank Junction, A169, A64 Grade Separated Junction and the Brambling Fields Junction).

20.1.4 Additional measures at the Butcher Corner junction along with the additional slip road at Brambling Fields have been tested in the SATURN traffic model. The SATURN model network with these network improvements in place has been used as the base network for the Malton & Norton STA.

Development Sites

20.1.5 A number of development sites in the vicinity of Malton & Norton have the potential to be developed in the future. In order to realistically test the effects of these development sites on the local highway network, the sites have been divided into 5 groups based on location, size and or phasing as follows

- Group 1 – Stage 1 and Stage 2 Brownfield Development Sites
- Group 2 – Malton Based Sites
- Group 3 – Norton Based Sites
- Group 4 – Woolgrowers Development Site
- Group 5 – Norton East Development Site

20.1.6 Nine scenarios have been created to test the traffic impact of different combinations of the five development site groups. The scenarios allow realistic varying levels of development to be tested all with Group 1 as a base. These tests then allow a maximum ‘best case’ level of development to be determined which will provide the most development for the least amount of congestion on the network.

20.1.7 Each of the individual development sites within each of the five groups will generate traffic on the local highway network. To estimate the amount of traffic each development site will generate, a number of assumptions have been made regarding development size, type, vehicle type split, travel plan measures and interactions with other sites.

#### Engineering Solutions to Facilitate Development

20.1.8 To minimise the amount of congestion as a result of the traffic generated by the nine development scenarios a number of junction improvements have been considered. A number of options have been developed some involving land take and some which are immediately deliverable as they do not take up any land outside of the existing highway boundary. The junctions which have been considered are as follows:

- Welham Road
- Castle Howard Road
- Pasture Lane
- Westfield Way

20.1.9 The deliverable options mentioned above are not necessarily the optimum in terms of delivering maximum capacity to each junction. As such a range of improvement options have been developed to provide the maximum realistic capacity at each junction but which take up land or may not be immediately deliverable.

20.1.10 In addition to the improvement options for the four junctions listed above Jacobs was commissioned to provide an outline design and indicative cost estimate for the provision of the GSJ at the crossing of the A64 and B1257 Broughton Road, to the north west of Malton. This junction could bring substantial benefits to the local highway network to significantly reduce congestion, improve journey times and improve air quality within the town centres.

20.1.11 Associated with the Norton East and the Woolgrowers sites are proposed link roads. The design and layouts of the Woolgrowers and Norton East link roads have been considered in combination with the 'North Yorkshire Highway Design Guide' requirements for local distributor roads (LDR) and also where appropriate the DfT's DMRB due to the high level of predicted traffic.

20.1.12 The indicative layouts for both link roads have been detailed to best replicate those indicated on the master plans albeit with minor alterations to accommodate the above design standards.

## **20.2 Scenario Testing Results**

- 20.2.1 Scenario 1 is a viable option. However, this is only the base scenario and represents a limited amount of development which will not deliver the wider objectives of the Local Development Framework (LDF).
- 20.2.2 When compared to Scenario 1 the majority of the highway network will not be detrimentally affected by the development proposed in Scenario 2. However, there may be some additional queues at Castle Howard Road. These queue lengths will not be substantial enough to cause any serious problems. Scenario 2 therefore represents a potential option for accommodating additional development in Malton and Norton.
- 20.2.3 With mitigation measures in place, Scenario 3 represents a potential option for accommodating additional development in Malton and Norton as there will be limited congestion across the highway network.
- 20.2.4 At this level of development, Scenario 4 is not a viable option as it results in an unacceptable impact on the local highway network even with mitigation. However this scenario does contain sites distributed across both Malton & Norton and therefore allows an assessment of the complex traffic impacts and interrelationships across the towns in a single scenario.
- 20.2.5 Scenario 4A is a robust and viable option resulting in an acceptable impact on the local highway network particularly with mitigation and contains sites distributed across both Malton & Norton and therefore allows an assessment of the complex traffic impacts and interrelationships across the towns in a single scenario. Sensitivity tests have been carried out on Scenario 4A by removing three of the development sites in Group 1. These tests show that there would be minimal effect on the congestion on the highway network.
- 20.2.6 In Scenario 5 there will be significant congestion at the Westfield Way junction but with mitigation measures in place the junction will operate under capacity. Scenario 5 is a potential option for accommodating development in Malton and Norton but there will be considerable congestion on Church Street with the Welham Road mitigation measures in place. There will however be no congestion on Welham Road itself or on Castlegate.
- 20.2.7 Scenario 6 will not cause any extensive capacity and queuing problems on the Castle Howard Road, Westfield Way or Pasture Lane junctions. The Welham Road junction will, even with the deliverable mitigation, experience additional queuing on Welham Road and Church Street due to the amount of additional traffic from the Woolgrowers development. Due to the large traffic flows in and out of the Woolgrowers development there will be significant congestion at Welham Road.
- 20.2.8 Scenario 7 is not a realistic option as it will generate an unacceptable level of congestion on the existing highway network.
- 20.2.9 Whilst generating proportionally less congestion than Scenario 7, Scenario 8 is still not a realistic option due to additional congestion on the existing and mitigated highway network.

20.2.10 The significant amount of development involved in Scenario 9, leads to numerous areas of congestion across the existing local highway network in Malton and Norton. To overcome this, it is likely major highway improvements beyond that of the proposed mitigation measures would be necessary.

### **20.3 Conclusion - Recommended Scenarios**

20.3.1 This study indicates that there are a number of potential options for accommodating the anticipated level of new development in Malton and Norton. These involve different patterns of development such as development just in Malton or Norton, in both, or a major expansion to Norton. Therefore the Council has choices in how it can accommodate new development in Malton and Norton in highway terms. Rather than recommend a particular scenario in this study, it is for the Council to make that choice based on consultation and it's evidence base, which includes this Strategic Transport Assessment.

20.3.2 Therefore, the four top rated scenarios are scenarios 2, 3, 6 and 4A.

20.3.3 The increase in congestion levels associated with Scenario 4A are small with only limited congestion occurring at the Pasture Lane junction with the double mini roundabout layout proposal.

20.3.4 In Scenario 2, there may be some additional queues at Castle Howard Road but will not be substantial enough to cause any serious problems. Scenario 2 therefore represents a potential option for accommodating additional development in Malton and Norton.

20.3.5 With mitigation measures in place, Scenario 3 represents a potential option for accommodating additional development in Malton and Norton as there will be limited congestion across the highway network.

20.3.6 Scenario 6 will not cause any extensive capacity and queuing problems on the Castle Howard Road, Westfield Way or Pasture Lane junctions. Due to the large traffic flows in and out of the Woolgrowers development there will be significant congestion at Welham Road.

**Appendix A Map of Malton & Norton**

