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APPENDIX 1

Craven District Council

Craven Local Plan

Modelling Highway Impacts of Submission Draft Plan Developments in Skipton

September 2018

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1 Introduction

1.1 Overview

1.1.1 Jacobs have been asked by Craven District Council (CDC) to undertake traffic modelling work to ascertain the traffic impacts of proposed development sites within the town of Skipton as part of the forthcoming Craven Local Plan.

1.1.2 The results and recommendations of this study are supported, in part, by outputs from the Skipton strategic transport model (2009) and revalidated in 2015, which enables development impacts and proposed transport solutions on the highway network, to be identified. The study uses nationally recognised traffic modelling processes and software, along with local standards, and provides robust and proportionate evidence for the Craven Local Plan.

1.1.3 The Council is now advancing its Local Plan. This will allocate specific sites principally for residential and employment purposes across the District in line with the Local Plan Strategy.

1.1.4 In accordance with paragraph 32 of the National Planning Policy Framework (NPPF 2012), the Craven District Local Plan should take account of whether (amongst other matters) improvements can be undertaken within the transport network that cost effectively limit the significant impacts of any proposed development. In the light of the focus of new development in Skipton and the relatively low levels of growth proposed elsewhere in the Local Plan, such significant impacts are only likely in the Skipton area. This study assesses the impact of committed development (already with planning permission, but not yet occupied) and the potential residential and employment allocations in the Submission Draft Craven Local Plan for the Skipton area. Where appropriate the study recommends improvements to the highway network and measures to mitigate these impacts.

1.1.5 The study has been completed with the cooperation of North Yorkshire County Council (NYCC) as the local highway authority (LHA),

1.2 Aim of Study

1.2.1 This document seeks to provide evidence on the prospective highway impacts of Local Plan development proposals in and around Skipton within the Local Plan period to the year 2032.

1.2.2 The purpose of the analysis is to examine the overall impact of development in terms of travel demands and network performance, with a view to identifying the need for potential mitigation measures and junction improvements to complement the Local Plan growth strategy and support the Local Plan objectives.

1.2.3 The analysis is an essential element of the evidence base underpinning the preparation and justification of site allocations that will be identified in the Local Plan. Key considerations during the study have been:

- The identification of any major constraints on the local roads network as a result of Local Plan proposals and assessment of any improvement measures to mitigate and thus support these.

- The provision of a transport evidence base to aid, if required, the development of a robust developer contributions funding mechanism and help determine how the measures will be funded, to deliver the transport infrastructure to support the Local Plan.

1.3 Report Structure

1.3.1 The remainder of this report is structured as follows:

- Chapter 2 details the base traffic model utilised for the study.
- Chapter 3 details the forecasting methodology.
- Chapter 4 details the Local Plan development sites modelled.
- Chapter 5 contains the results of the junction assessments.
- Chapter 6 discusses further junction assessments should improvements be put in place.
- Chapter 7 discusses supplementary junction improvements which could or should be considered but which are not associated with the Local Plan traffic.
- Chapter 8 presents the final summary and conclusion.

2 Skipton Base Highway Model

2.1 Base Highway Model History

2.1.1 The development of the Skipton traffic model was originally commissioned by NYCC as LHA in 2009 to assess the transport implications of developments and packages of transport improvements on the existing highway network.

2.1.2 The model was built using VISUM software, which is capable of modelling both the impacts of new development and proposed transport improvements on the overall highway network and at individual roads and junctions.

2.1.3 The traffic model covers the built-up area of Skipton and the A65 and A59 along the northern edge of the town. Figure 2-1 below shows the coverage of the detailed elements of the traffic model as used for this study.

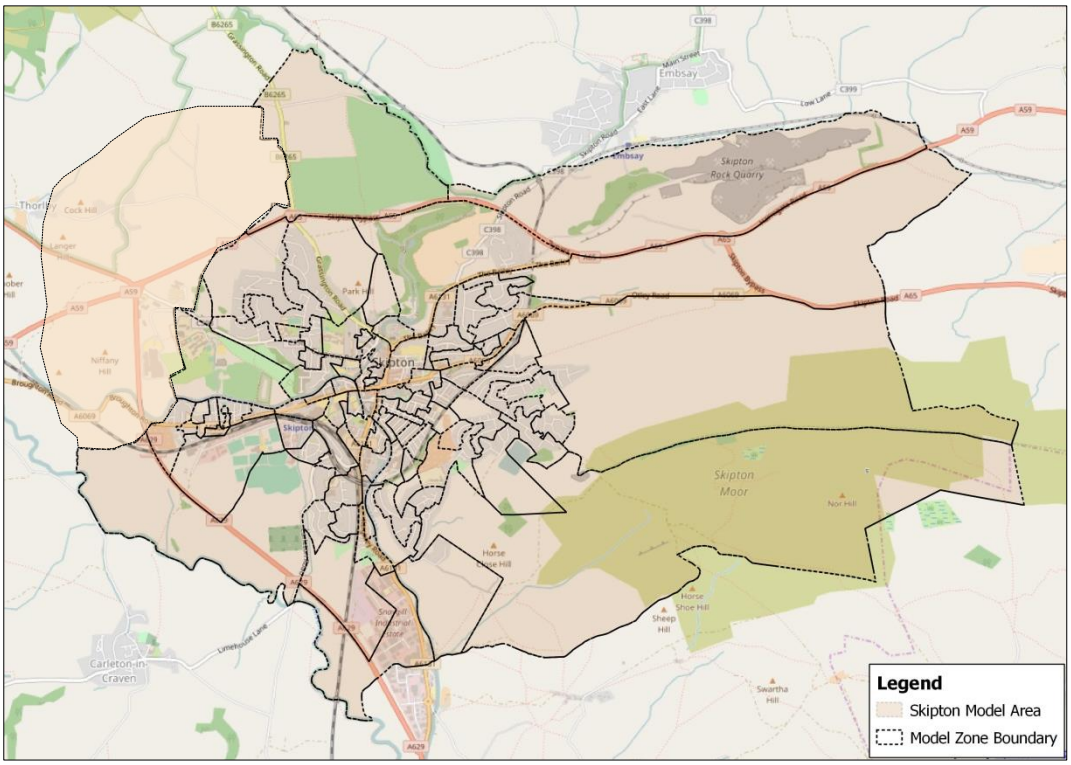

Figure 2-1 – 2015 Model Coverage

2.1.4 As part of the initial model development, an extensive data collection exercise was undertaken in 2009 which included roadside interview surveys, manual and automatic link flow counts and junction turning counts.

2.1.5 The data collected was used to calibrate and validate the 2009 base year model for the PM (1700-1800hrs) peak.

2.2 Interim Forecast Model 2015

2.2.1 To provide further confidence of its ability to replicate more recent traffic flows, the Skipton highway model was updated from its base year of 2009 to the interim forecast year of 2015. This update was undertaken based on traffic flows only and not the origin or destination patterns of trips on the network. This has ensured a platform to develop robust forecast models of development and transport packages and their impacts upon key junctions and the wider highway network.

2.2.2 Traffic count surveys were carried out in 2015 at key locations across the Skipton area for the purposes of revalidating the base model to the interim forecast year of 2015.

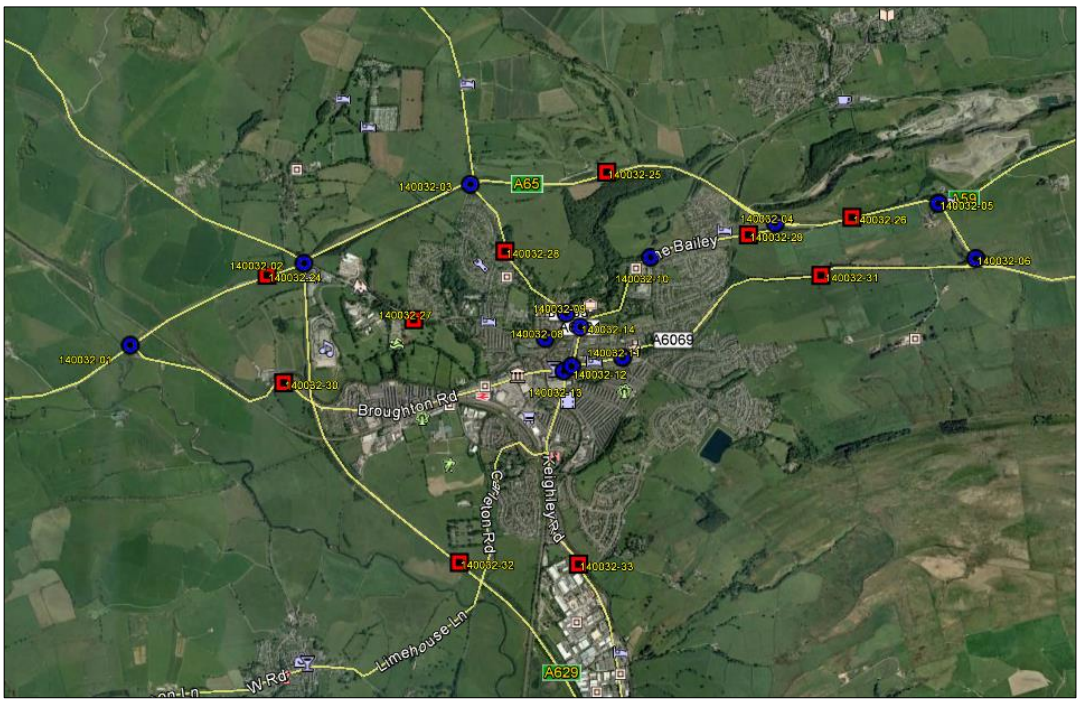

Figure 2-2 – 2015 Survey Locations

2.2.3 The updated traffic counts were analysed to assess the most appropriate daily time period to model development and transport packages in the forecast year 2032. The criteria for assessment were overall traffic volumes at the key junctions in Skipton. The outcome indicated that whilst there was some variation on a junction-by-junction basis, there was a tendency towards the PM peak being marginally the busier time period. Given this was also the period modelled in the base model, the PM peak was deemed suitable to be taken forward for this study.

2.2.4 The VISUM model network was checked against significant highway improvement schemes completed between 2009 and 2015, to ensure the network was as accurate as possible for the 2015 forecast year.

2.2.5 Traffic demand in the model was generated in two ways: by applying National Trip End Model[1] (NTEM) and National Transport Model[2] (NTM) growth factors to

[1] The National Trip End Model (NTEM) forecasts and the TEMPro (Trip End Model Presentation Program) software are used for transport planning purposes. The forecasts include population, employment, households by car ownership, trip ends and simple traffic growth factors based on data from the National Transport Model (NTM).

car, LGV and HGV trips respectively in the 2009 base matrix and by explicitly modelling the demand of key developments in the detailed model area completed between 2009 and 2015.

2.2.6 NTEM growth factors between 2009 and 2015 were produced for cars from TEMPRO[3] software at the model zone and county level.

2.2.7 NTM growth factors between 2009 and 2015 were applied to the LGV and HGV demand matrix using datasets for large urban areas in the Yorkshire and Humber region.

2.2.8 Forecast fuel price and income adjustment factors[4], from 2009 to 2015, were applied to the car, LGV and HGV demand matrices, to produce the final 'prior' interim forecast matrices.

2.2.9 A process of matrix estimation was used to accurately calibrate the 2015 forecast demand matrices against the PM peak count data. This was conducted using the VISUM software suite.

2.2.10 The new PM peak demand matrices created through the matrix estimation process were re-assigned to the VISUM network and the modelled flows compared against corresponding observed count data, to ensure they met the WebTAG minimum validation criteria[5] for link flows. Table 2-1 and Table 2-2 show the criteria and validation results, respectively.

Table 2-1 DfT WebTAG Calibration/Validation Criteria

Link Flow Criteria	% of Cases	Acceptability Guideline	GEH Statistic
Individual Link Flows < 700 veh/hr	> 85% of cases	± 100 vehicles	< 5
Individual Link Flows 700 – 2700 veh/hr		± 15%	< 5
Individual Link Flows > 2700 veh/hr		± 400 vehicles	< 5

Table 2-2 2015 Calibration/Validation Results

All Link Calibration Sites (23 sites 104 counts)	Total Vehicles
No. within DMRB Flow criteria	89
No. within GEH of 5	89
% within DMRB Flow criteria	86%

[2] The National Transport Model (NTM) provides a systematic means of comparing the national consequences of alternative national transport policies or widely-applied local transport policies, against a range of background scenarios which take into account the major factors affecting future patterns of travel.

[3] Trip End Model Presentation Program
[4] WebTAG Data Book, Table M4.2.1, May 2014
[5] WebTAG Unit M3-1 Highway Assignment Modelling, Table 2, October 2013. This is the national DfT Transport Appraisal Guidance on the development of traffic models.

% within GEH of 5	86%

All Turn Calibration Sites (13 sites 114 counts)	Total Vehicles
No. within DMRB Flow criteria	110
No. within GEH of 5	103
% within DMRB Flow criteria	96%
% within GEH of 5	90%

2.2.11 The results in Table 2.2 show that the 2015 interim forecast year model meets national standards as it is WebTAG compliant and provides a robust representation of 2015 traffic flows in Skipton.

2.2.12 As the calibration and validation of the model meets national guidance and local standards the model is considered to be of a high quality and is robust.

2.2.13 The 2015 interim forecast year model is therefore considered suitable for use as a base for forecasting and future testing of the Local Plan development traffic in 2032.

3 Traffic Growth and Forecasting

3.1 Overview

3.1.1 This section describes the methodology and assumptions used for forecasting traffic growth between the interim forecast year model (2015) and the future year model (2032).

3.1.2 The Craven Plan covers the period to the year 2032. It was agreed, therefore, that this would also determine the forecast modelling year, to ensure a thorough impact of built-out development on the highway network, by the end of that period.

3.1.3 This assessment required factoring the 2015 interim forecast model to a 2032 model to represent the forecast growth in background traffic. This was calculated using the Department for Transport's (DfT) **T**rip **E**nd **M**odel **P**resentation **PRO**gramme (TEMPRO) for cars, and the National Traffic Model (NTM), for HGV's.

3.1.4 A Baseline 2032 forecast was established for background traffic growth and committed development sites in Skipton, i.e. minus any Local Plan development options. This enabled comparisons of traffic volumes and junction performance against the Baseline, once the Local Plan scenario was plugged into the forecast model.

3.2 Forecast Growth Methodology

3.2.1 The methodology used for developing forecast traffic flows for 2032 involves developing three trip matrices which when added together will form the total amount of traffic likely to be present. These matrices are

- Background traffic growth (not related to any development trips);
- Committed development trips; and
- Local Plan development trips.

3.2.2 DfT guidance[6] states that the total growth between the 2015 model and the 2032 full development model should be no more than the traffic growth dictated by TEMPRO. This has been achieved for the total amount of traffic likely to be present in 2032 meaning the model is robust and is representative of overall local traffic growth. The level of growth dictated by TEMPRO has been compared to the growth proposed by the Local Plan and it was found to be of a similar magnitude but marginally higher meaning the modelling analysis is giving a robust set of results.

3.2.3 Traffic growth forecasts from TEMPRO take into account changes in car ownership, income, population and jobs, at a national, regional and local level. As local development management forms an integral part of this base data, it is necessary, if trips from committed and Local Plan development sites are included, to remove any TEMPRO growth associated with development, so as to avoid the double-counting of development trips. This adjusted growth, without development growth, is known as the background traffic growth. This is simply

[6] WebTAG: TAG unit M4 Forecasting and Uncertainty

the traffic growth which would be present if none of the Local Plan development sites were to be taken forward and there were no committed developments.

3.2.4 The background growth demand is added to the committed development trips to get the 'Baseline demand matrix'. This represents the minimum level of traffic growth in the forecast year and does not include any Local Plan development trips.

3.2.5 'Development trip only' demand matrices are developed for the Local Plan scenario, and then added to the 'Baseline demand matrix' to create a separate full growth forecast matrix representing the Local Plan scenario. This allows comparison of the highway impacts of the Local Plan scenario against the equivalent Baseline, for the 2032 PM peak period.

3.2.6 As per WebTAG, Goods Vehicles (LGV and HGV) were considered separately from cars and used growth factors derived from the National Travel Model (NTM) for Yorkshire and Humber.

3.3 Growth Factors – Skipton (Cars)

3.3.1 Growth factors were obtained from the default planning assumptions in TEMPRO between the forecast years 2015-2032, for three specific NTEM zones, or aggregation of zones. These were:

- Craven – Authority;
- Yorkshire/Humber – Regional area; and
- North West – Regional area.

3.3.2 Each NTEM zone, county or region, represented a zone in the Skipton Highway model. Those for county or regional areas represent the external zones, or those zones where traffic originates from or travels to zones outside of Skipton.

3.3.3 The TEMPRO growth factors were then fine-tuned to account for future fuel cost changes and income growth between 2015 and 2032. The factors come from WebTAG.

3.3.4 Table 3-1 shows the final growth factors applied to the 2015 PM peak matrix for cars, to generate the background demand for the 2032 Baseline Forecast. As indicated in 3.2.1 committed development trips and Local Plan trips on top of that have been added to this demand for the modelling scenarios.

Table 3-1 Final Skipton Growth Factors

TEMPRO Area	Growth Factor	Income Factor	Fuel Factor	Final Growth Factor
Craven	1.050	1.055	1.011	1.119
Yorks/Humber	1.081	1.055	1.011	1.152
North West	1.101	1.055	1.011	1.174

3.4 LGV and HGV Growth Factors

3.4.1 As indicated in 3.2.6 Light Goods Vehicles (LGV) which include vans and small lorries and Heavy Goods Vehicles (HGV) which include medium sized lorries and larger articulated lorries have been treated separately to cars. LGV and HGV growth factors were taken from the latest version of the DfT's National Trip End Model (NTM) developed in 2015. This provides growth factors for all vehicle types on either a regional basis or by road classification. Table 3-1 shows the LGV and HGV growth factors applied to generate the growth from 2015 to 2032.

Table 3-2 Final LGV and HGV Growth Factors

Mode	Growth Factor
LGV	1.483
HGV	1.159

4 Development Sites

4.1 Introduction

4.1.1 Developments specifically taken into consideration for the purposes of this report are divided into two types:

- Committed development sites – Employment and Housing with valid permissions and likely to be completed during the Plan Period on significant developments; and
- Proposed allocations in the Submission Draft Plan in Skipton Area which would be expected to be delivered by 2032.

4.1.2 Figure 4-1 shows the locations of the committed and Local Plan development sites in and around Skipton which have been modelled in this study.

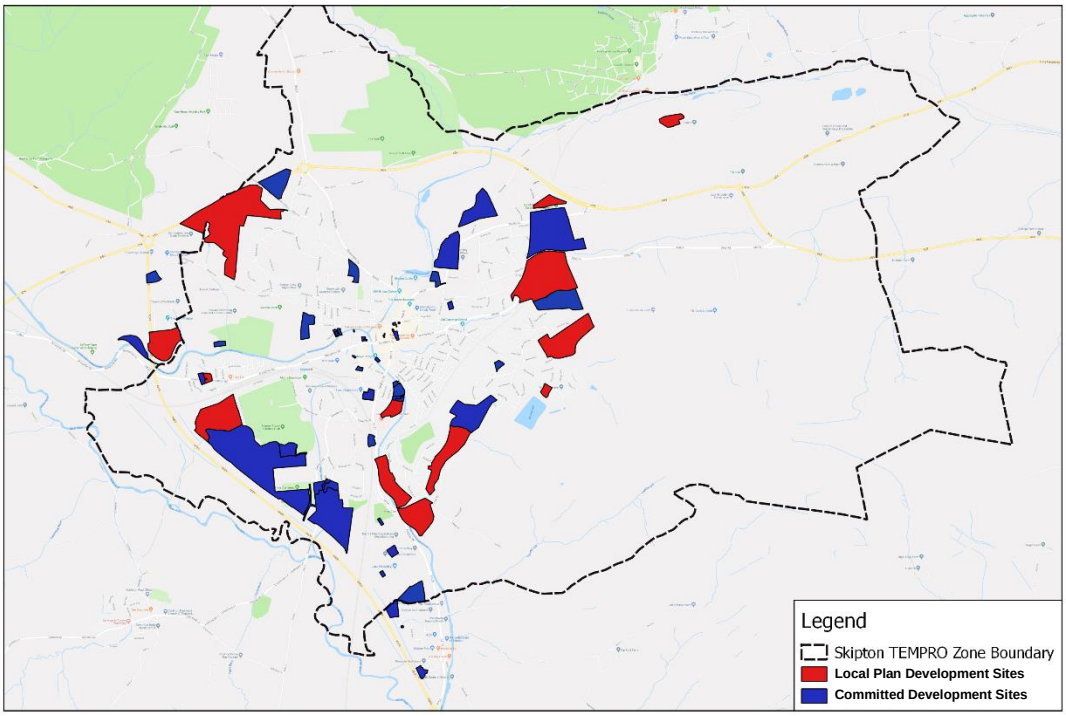

Figure 4-1 – Committed and Local Plan Development Site Locations

4.2 Committed Development Sites

4.2.1 Committed development sites were those considered to be of sufficient size (>5 dwellings) and trip-making capability to warrant explicit modelling, in order to assess the traffic impacts upon the network. This approach is consistent with other studies undertaken across North Yorkshire. Table 4-1 shows the explicitly modelled committed development sites, from 2015 onwards.

Table 4-1 Committed Development Sites

Ref ID	Site Name/Location	Type	Size C3: Dwellings B1, B2, B8: m^2
8257	Craven Buildings, Church Street, Skipton, Bd23 2an	C3	7
10596	Land Adjacent to, 42 Sackville Street, Skipton, Bd23 2ps	C3	7
11998	Former Craven District Council Offices, Granville Street, Skipton, Bd23 1ps	C3	35
12082	St Monica's Convent, St Stephen's Church, Gargrave Road, Skipton, Bd23 1pj	C3	70
13350	Elsey Croft, Moorview Way, Skipton Bd23 2tw	C3	103
13949	High Trees, Rectory Lane, Skipton, Bd23 1as	C3	9
14371	Belle Vue Square, Broughton Road, Skipton, Bd23 1fj	C3	39
14420	Butterfield of Skipton, 3 Cross Street, Skipton, Bd23 2ah	C3	6
14656	Eller House, Belle Vue Mills, Broughton Road, Skipton, Bd23 1fr	C3	11
14688	Land Bounded by A65, White Hills Lane and Raikes Road, Skipton	C3	45
14815	Roughaw Close, Skipton, Bd23 2pz	C3	12
15036	Greatwood Avenue, Skipton, Bd23 2rz	C3	10
15268	Caroline House, Providence Place, Skipton, Bd23 1ds	C3	6
15027	Vasco Gb Ltd, Clitheroe Street, Skipton Bd23 1su	C3	29
15417	Reward Manufacturing, Sackville Mills, Sackville Street, Skipton Bd23 2pr	C3	43
15388	Willis of Skipton, Stirton Depot, Gargrave Road, Skipton BD23 1UD	B8	1,800
15774	Guyson International Ltd, Snaygill Industrial Estate, Skipton Bd23 2qr	B8	57
14916	Guyson International Ltd, Snaygill Industrial Estate, Skipton, Bd23 2qr	B2	939
15332	Canalside Warehouse, Westgate Centre, Swadford Street, Skipton Bd23 1ur	C3	11
15792	Land North of A629 and West of Carleton Road, Skipton BD23 3BT	C3	225
		B1, B2, B8	25,000
18340	Land at Corner Field, North of A6131/Harrogate Road, Skipton	C3	73
16865	Chinthurst Guest House, Otley Road, Skipton, Bd23 1ex	C3	12
15503	Land at North Parade, Skipton BD23 2SR	C3	105
16300	Land to South of Burnside Crescent, Skipton, Bd232bj	C3	39
17312	Clay Hall, Broughton Road, Skipton, Bd23 3aa	C3	20
17515	R N Wooler and Co., Carleton Road, Skipton	C3	30
18282	Firth Mill, Firth Street, Skipton Bd23 2pt	C3	5
17773	Firth Mill, Firth Street, Skipton, Bd23 2pt	C3	32
18719	Cavendish House, 12 Newmarket Street, Skipton, Bd23 2hn	C3	26
18656	Former Allotments and Garages, Broughton Road, Skipton	C3	8
18237	Hawbank Fields, North of Otley Road, Skipton	C3	140
16300	Land to South of Burnside Crescent, Skipton, Bd232bj	C3	39
17465	Land at Carleton Road, Skipton, Bd23 2bj	C3	67
16047	9a, Newmarket Street, Skipton BD23 2HX	B1	**46**
16122	Devonshire Place, Skipton Bd23 2ns	B1	218
16312	Skipton Building Society, The Bailey, Skipton Bd23 1ap	B1	352
16325	Land Opp Unit 3, Enterprise Way, Airedale Business Centre, Skipton BD23 2TZ	B1	620
16334	Navigation House, Back Bridge Street, Skipton Bd23 1rl	B1	113
16593	Skinner Ground Farm, Broughton Hall Estate, Broughton, Skipton, Bd23 3ah	B1	3,260
16534	Dechra Pharmaceuticals Manufacturing, Snaygill Industrial Estate, Keighley Road	B1	1252
16395	John Binns & Son (Springs) Ltd, Airedale Business Centre, Keighley Road, Skipton	B1, B2, B8	866
16936	Whitakers Chocolatiers Ltd, 85 Keighley Road Skipton Bd23 2na	B1	990
17008	Bowers Wharf, Skipton Bd23 2pd	B1	50
17175	Unit 5d Millenium Road, Airedale Business Centre, Skipton Bd23 2tz	B2	246
17224	Unit 2 Union Business Park, Snaygill Industrial Estate, Skipton	B1	108
17210	Former Fuel Depot, Snaygill Industrial Estate, Keighley Road, Skipton, Bd23 2qr	B8	2,200
17698	Belle Vue Mills, Part Ground Floor East Wing, Broughton Road, Skipton, Bd23 1fj	B1	448

4.3 Local Plan Development Sites

4.3.1 Craven District Council provided a list of residential and employment submission draft allocations which, as at June 2018, had not been granted planning permission nor were minded to be granted planning permission and thus have not been included as committed developments. These are listed below in Table 4-2. It should be noted that standard planning use codes also apply for proposed land use, and subsequent trip generation purposes – B1 office only, B2 light industry, B8 warehousing and C3 for residential only schemes.

Table 4-2 Local Plan Development Sites – Skipton

Reference ID	Site name/ Location	Type	Size (dwellings/ GFA)
Sk013	Land East of Aldersley Avenue, Skipton	C3	100
Sk015	Cefn Glas, Shortbank Road, Skipton	C3	14
Sk044	Former Allotments and Garages, Broughton Road, Skipton	C3	19
Sk058	Whittakers Chocolate Factory, Skipton	C3	16
Sk060	Business Premises and Land, West of Firth Street, Skipton	C3	123
Sk061	East of Canal, West of Sharphaw Avenue, Skipton	C3	89
Sk081, Sk082 & Sk108	Land North of Gargrave Road, West of Park Wood Drive, Skipton	C3	324
Sk087	Land North of A6131, South of A65, Skipton	C3	35
Sk089 & Sk090	Land North of Airedale Ave & Elsey Croft, East of Railway Line, Skipton	C3	218
Sk101	East of Keighley Road, South of Cawder Lane, Skipton	C3	110
Sk114 & Sk124	Land East of North Parade, Skipton	C3	112
Sk049	Land East of Skipton By-Pass, Skipton	B1, B2, B8	60,200
Sk113	Land South of Skipton Auction Mart, Skipton	B1, B2, B8	30,100
Sk135	Skipton Rock Quarry, Skipton	B1, B2, B8	10,640

4.4 Development Trip Generation

4.4.1 The number of trips generated by the individual sites was estimated using, where appropriate, the 85th percentile trip rates calculated using the nationally accepted and industry standard TRICS[7] database version 7.5.1 (2018). The rates are based on the number of dwellings and size of employment areas put forward as the Council's potential Draft Allocations.

4.4.2 Trip rates calculated in TRICS were based on specified land uses of various site locations and sizes. Table 4-3 shows the trip rates considered.

Table 4-3 TRICS trip rates (PM Peak)

Land use	Units	Trip Rate In	Trip Rate Out
C3 residential	No. of dwellings	0.403	0.219
Class B1	100 sqm of GFA	0.412	2.587
Class B2	100 sqm of GFA	0.159	0.544
Class B8	100 sqm of GFA	0.060	0.485

4.4.3 The trip rates were applied to the relevant development sites to generate trips. The total trips generated for committed developments and local plan developments (housing and employment) are presented below in Table 4-4.

Table 4-4 Total Committed and Local plan trips ends (PM Peak)

Development	Trips In	Trips Out
Committed	574	679
Local Plan	514	539

4.5 Development Trip Distribution

4.5.1 Access points onto the highway network for Local Plan sites were determined by information supplied by Craven District Council.

4.5.2 Each development requires a trip distribution to dictate the origin and destination point of all generated trips. For Skipton, this was obtained by using existing distribution patterns in the traffic model, for sites with similar land use characteristics and proximity, and adjusting the trip totals according to the Local Plan site in question. This formed the demand matrix for that site which, along with the other sites and background growth, was assigned to the model network to determine the overall routing of traffic.

4.1 Development Trips from Neighbouring Authority (Bradford)

[7] TRICS – Trip Rate Information Computer System, the national standard for trip generation analysis.

4.1.1 Within the traffic model the traffic to and from neighbouring authorities is represented by growth associated with TEMPRO. These neighbouring authorities do of course have their own Local Plan aspirations.

4.1.2 A comparison has been made of the neighbouring Bradford authority area to look at proposed growth in Bradford and the assumed TEMPRO growth in traffic entering and leaving Bradford in the model.

4.1.3 Bradford covers a large geographical area but there are parts of the Bradford Local Authority area which lie adjacent to Craven. These are known as the 'Close Proximity' areas and are:

- Addingham
- Ilkley
- Keighley
- Silsden
- Steeton

4.1.4 It is known from Bradford's Core Strategy that there are aspirations for housing and employment growth in central Bradford and in the areas within close proximity to Craven shown above. This will produce a growth in trips in and out of these areas.

4.1.5 Growth will also be produced by other population growth, growth in workers and a growth in car ownership.

4.1.6 An exercise has been undertaken to convert this growth into trips based on trip rates. The results are as shown in Table 4-4 below.

Table 4-5 Predicted Growth in Trips to and from Areas of Bradford in Close Proximity

Growth Component	Origin Trips	Destination Trips	Total Trips
Total Core Strategy Bradford Growth (Close Proximity)	1,773	1,698	3471
Population Growth (Close Proximity)	726	364	1,090
Workers Growth (Close Proximity)	843	747	1,591
Car Ownership (Close Proximity)	1,264	1,120	2,384
Total Predicted Bradford Growth (Close Proximity)	**4,606**	**3,929**	**8,535**

4.1.7 The actual modelled growth between 2015 and 2032 is shown in Table 4-6 below.

Table 4-6 Total Modelled Bradford Core Plan Growth

Growth Component	Origin Trips	Destination Trips	Total Trips
Total Modelled Bradford Growth	4,322	3,935	8,257

4.1.1 The results show that the modelled growth (8,257) and the predicted growth (8,535) are within 3% which shows the model growth is robust.

5 The Effect of Local Plan Development Traffic at Key Junctions

5.1 Introduction

5.1.1 This chapter details the results of the impact assessment of the Local Plan Development traffic on key junctions in Skipton.

5.1.2 The list of junctions assessed, in no particular order, is shown in Table 5-1 with an accompanying location plan in Figure 5-1. For the assessed junctions, traffic flows were extracted from the highway model for the year 2032 Baseline and Local Plan scenarios.

Table 5-1 Assessed Junctions

Town	Junction Number	Junction Name	Type
Skipton	1	A65 / Gargrave Road / A629 / A59	Roundabout
	2	A6069 / Cavendish St	Priority
	3	A6131 / A6069 (Bottom High Street)	Roundabout
	4	A6131 / A65	Priority
	5	A6131 / Cawder Lane	Priority
	6	Skipton Road / The Bailey	Priority
	7	Water Street / Raikes Road	Priority
	8	Shortbank Road / Newmarket Street	Mini Roundabout
	9	Broughton Road / Carleton New Road	Priority
	10	Craven Street / Keighley Road	Signals
	11	Keighley Road / Carleton Road	Signals

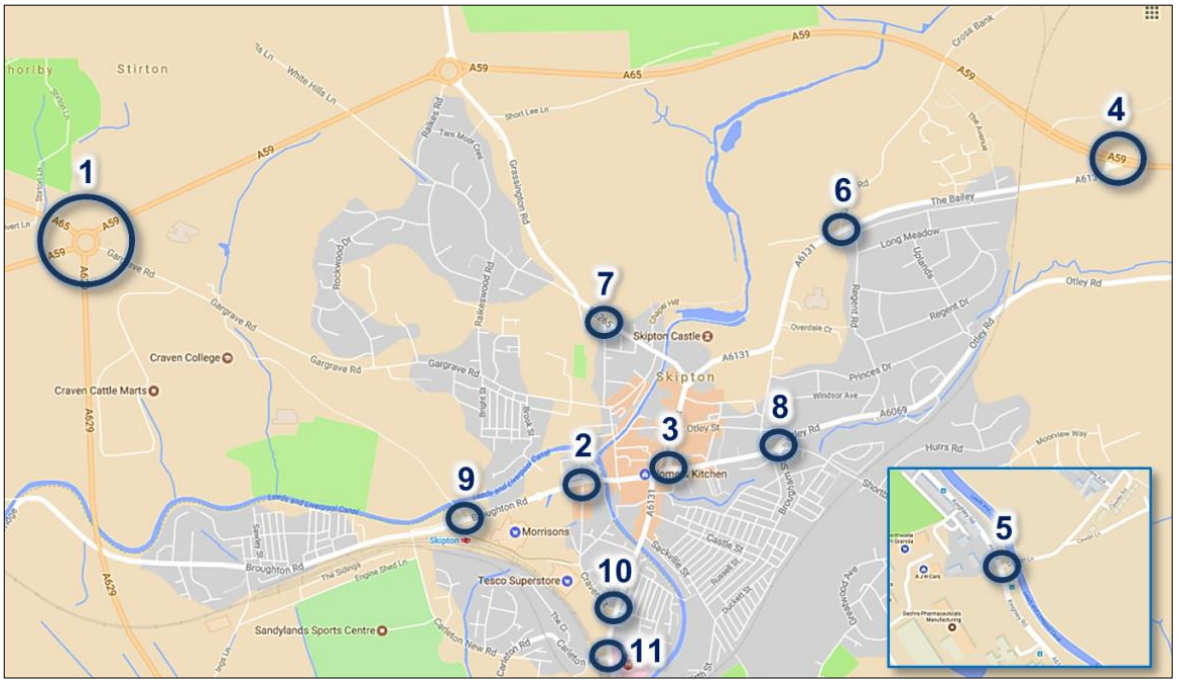

Figure 5-1 Assessed Junctions – Location Plan

5.2 Interpretation of Results

5.2.1 The junctions identified were assessed through nationally accepted junction modelling software called Junctions 9 for priority and roundabout junctions and Linsig for signalised junctions.

5.2.2 Inputs into the junction assessments are based on traffic flows through the junction taken from the VISUM model. In the case of Skipton, these were extracted directly as turning flows from the 2032 Baseline and Local Plan forecast models, for each scenario.

5.2.3 The key output of a junction assessment is the ratio of flow to capacity (RFC) on each arm or entry, which shows demand compared to the available capacity. The models present an RFC figure (degree of saturation in LINSIG) for each junction arm during the modelled period, which ensures any RFC 'spike' is captured and not overlooked by an average RFC across all junction arms. This is a standard nationally accepted way of measuring congestion at a junction.

5.2.4 RFCs are reported using a nationally accepted traffic light colouring system which has been used previously by Jacobs for North Yorkshire County Council, as the Local Highway Authority, and Local Authority districts for other strategic transport assessments involving detailed junction analysis. The traffic light colouring system works as follows:

- **Green** - RFC less than 0.85, junction is likely to operate without delays; 0.85 is an industry recognised level of congestion, where a junction starts to approach capacity
- **Amber** - RFC between 0.85 and 1, junction is approaching capacity and may be subject to minor delay
- **Red** - RFC greater than 1, junction is over capacity and delays will occur

5.2.5 Perceived congestion at junctions may be worse than that shown in the modelling results; this is due to a range of factors. An issue is the ability of the junction models to identify what may be perceived as queuing. Queues at signalised junctions include stationary vehicles and also vehicles in a 'rolling queue'. The modelling software used to undertake junction assessment cannot measure rolling queues and so only static queues are reported. If static queues clear when given a green light at signals, the junction is judged to be performing within capacity.

5.2.6 The junction capacity assessment software only models junctions on an individual basis and therefore does not take into account the interaction between more than one junction as a result of queuing or 'platooning' traffic. The VISUM traffic model does however model the interaction between adjacent junctions so traffic flows between junctions has been taken into account.

5.3 Analysis of Results

5.3.1 Results of the assessments for the 2032 Baseline and Local Plan scenarios for the five junctions in Skipton are shown in Table 5-2. The figures represent the maximum RFC, per junction arm, of any 15-minute period during the 1700hrs and 1800hrs PM peak modelling period.

Table 5-2 Junction Assessment Results

Junction Number	Junction Type	Junction Name	Arm	Baseline Scenario	Local Plan Scenario
1	Roundabout	A65 / Gargrave Road / A629 / A59	A65 - North East Arm	0.72	0.72
			Gargrave Road	0.77	0.99
			A629	1.08	1.24
			A59	0.67	0.71
			A65-Northwest Arm	0.53	0.58
2	Priority	A6069 / Cavendish Street	Cavendish Street Left	0.31	0.29#
			Cavendish Street Right	0.51	0.35#
			A6068W/Broughton Road	1.16	1.05#
3	Roundabout	A6131 / A6069 *(Bottom of High Street)*	A6131 North High Street	0.28	0.35
			A6069 East	0.59	0.61
			A6131 West	0.68	0.75
4	Priority	A6131 / A65	A6131 Left	0.96	1.06
			A6131 Right	0.96	1.06
			A65W to A6131	0.22	0.23
5	Priority	A6131 / Cawder Lane	Cawder Lane Left	0.70	0.83
			Cawder Lane Right	0.70	0.84
			A6131W to Cawder Lane	0.50	0.53
6	Priority	Skipton Road / The Bailey	A6131 East	0.16	0.17
			The Bailey- A6131 West	0.21	0.30
			Skipton Road (to Embsay)	0.17	0.16#
7	Priority	Water Street / Raikes Road	Mill Bridge	0.54	0.65
			Water Street	0.12	0.15
			Raikes Road	0.61	0.64
8	Mini Roundabout	Shortbank Road / Newmarket Street	Shortbank Road	0.37	0.55
			Brougham Street	0.47	0.38
			Newmarket Street	0.29	0.49
			Otley Road	0.51	0.58
9	Priority	Broughton Road / Carleton New Road	Broughton Road (East)	0.66	0.55#
			Black Walk	1.59	1.34#
			Broughton Road (West)	0.02	0.02
			Carleton New Road	1.83	1.70#
10	Signals	Craven Street / Keighley Road	Craven Street	0.81	0.72#
			Keighley Road North	0.51	0.58
			Upper Union Street	0.60	0.68
			Keighley Road South	0.63	0.69
11	Signals	Keighley Road / Carleton Road	Carleton Road	0.19	0.25
			Keighley Road North	0.42	0.41#
			Keighley Road South	0.63	0.68

Cells highlighted where Scenario RFC is greater than 0.85 and greater than Baseline RFC. **Red >1,** **Amber<1**.
#A small reduction in trips due to rerouting to avoid congestion means RFC is lower in Local Plan Scenario.
Blue shading indicates junctions which will require improvement to increase capacity as a result of Local Plan.

5.3.2 The results from Table 5-2 show that the following four junctions are forecast to operate at approaching capacity or over capacity in 2032 with Local Plan developments in place:

- **Junction 1:** A65 / Gargrave Road / A629 / A59;
- **Junction 2:** A6069 Cavendish St; and
- **Junction 4:** A6131/A65.
- **Junction 9:** Broughton Road / Carleton New Road.

5.3.3 Of these only junctions 1 and 4 will have more congestion than in the Baseline Scenario and thus justifies the local planning authority seeking developer funding to increase capacity to mitigate the congestion consequent upon the allocations.

5.3.4 Outputs from the capacity analysis therefore indicate the following junctions in Skipton will require increased capacity to mitigate congestion caused by the Local Plan traffic:

- **Junction 1:** A65 / Gargrave Road / A629 / A59 / A629
- **Junction 4:** A6131/A65

5.3.5 The above junctions have been assessed to identify and test mitigation measures. The assessment is detailed in Chapter 6.

5.3.6 It should be noted that one arm at Junction 1 is likely to operate over capacity in the Baseline without any Local Plan development traffic present. When Local Plan traffic is present at the junction this arm will remain over capacity and a further arm will operate over capacity.

6 Junction Improvements to Accommodate Local Plan Traffic

6.1 Introduction

6.1.1 This chapter details, where possible, the mitigation measures proposed to add capacity to identified junctions to accommodate the extra demand consequent upon the proposed allocations and presents the results of further capacity assessments assessed with the improvements in place.

6.1.2 All the mitigation measures detailed below have no adverse impacts for pedestrians and other non-motorised traffic users. All designs have catered for pedestrians and include footways and crossings where appropriate. This includes putting footways back where proposed improvements extend the carriageway width.

6.2 Junction 1 - A65 / Gargrave Road / A629 / A59

6.2.1 The existing A65 / Gargrave Road / A629 / A59 junction is a roundabout with five arms. The westbound arm, Gargrave Road, is predicted to operate above capacity in the Local Plan scenario, and the northbound arm, the A629, is operating above capacity both in the Baseline and Local Plan scenario.

6.2.2 It is proposed to increase the widths of these two arms as follows to improve the operational capacity of the junction.

- For Gargrave Road, at the curve near the approach, widen by 1.5m. This adds enough width to add another lane.
- For the A629, widen the approach road half width by 0.5m and at the curve near the approach widen by 2m to provide additional room for vehicles to enter the junction and wait for circulatory traffic to pass.

6.2.3 There is land availability within the existing highway boundary to deliver these improvements.

6.3 Junction 4 - A6131 / A65

6.3.1 This junction has been modelled as a three arm priority junction with the A6131 as the minor arm. In the Local Plan scenario, the junction is expected to operate above capacity on the minor arm.

6.3.2 The vehicles from the major arm, A65 westbound, join the minor arm A6131 as a free left turn, which avoids any impact of these vehicles at the junction.

6.3.3 It is recommended that the widths of the minor arm (A6131) can be widened by 2m at an offset of 10m, 15m and 20m from the give way line. There is land availability within the existing highway boundary to do this.

6.3.4 Due to widening of the approach, the available road width would increase from 2 vehicles to 4 vehicles which will add enough capacity to allow the junction to operate below capacity in the Local Plan Scenario.

6.4 Assessment of Junction Improvements in Skipton

6.4.1 The mitigation measures identified were coded and assessed using the junction assessments for the 2032 Local Plan scenarios. This produced modified RFC figures, which demonstrated the effect of mitigation on the modelled junctions in the town. Results with mitigation measures are detailed in Table 6-1.

6.4.2 In summary, the junctions will all operate below or approaching theoretical capacity with improved junction operation when compared to the Baseline scenario. The junction improvements will therefore mitigate any additional congestion caused by the Local Plan development traffic.

Junction Number	Junction Name	Arm	Baseline Scenario	Local Plan Scenario (No Mitigation)	Local Plan Scenario (With Mitigation)
1	A65/Gargrave Road/A629/A59	A65 - North East Arm	0.72	0.72	0.73
		Gargrave Road	0.77	0.99	0.76
		A629	1.08	1.24	0.87
		A59	0.67	0.71	0.75
		A65-Northwest Arm	0.53	0.58	0.60
4	A6131/A65	A6131 Left	0.96	1.06	0.88
		A6131 Right	0.96	1.06	0.92
		A65W to A6131	0.22	0.23	0.23

Cells highlighted where Scenario RFC is greater than 0.85 and greater than Baseline RFC. **Red >1,** **Amber<1**.

Table 6-1 Junction Assessment Results – with Mitigation

6.5 Junction Improvement Costs

6.5.1 As described above the two junctions which will require mitigation measures to increase capacity and improve the junction are

- **Junction 1:** A65 (occasionally referred to as the A59 at this point) / Gargrave Road / A629 / A59 / A629
- **Junction 4:** A6131/A65

6.5.2 The estimated cost of these mitigation measures is as follows

Junction 1	£300,000
Junction 4	£170,000
Total	**£470,000**

6.5.3 These improvements are for mitigating additional congestion caused by Local Plan development traffic, i.e. where the max RFC is above 85% and is above the Baseline Scenario RFC.

6.5.4 The costs do not include any statutory undertaker's costs but do include an industry standard 44% Optimism Bias uplift.

6.5.5 These costs are comparable with and are based on other similar junction improvement estimates in other districts within the County.

6.6 Junction Improvement Phasing

6.6.1 The traffic model provides traffic flows for the final Local Plan year of 2032. To be able to estimate when the above junction mitigation measures would be required prior to 2032 the following methodology was adopted

1. Model the junction using 2015 traffic flows and calculate the maximum ratio of flow to capacity.
2. Model the junction using 2032 Local Plan traffic flows and calculate the maximum ratio of flow to capacity.
3. Look at 2032 flow through junction and separate into Background trips and Local Plan trips.
4. Extrapolate to work out the flow required to get a RFC of 0.85 or 1.00.
5. Keeping the Local Plan development flow the same calculate the background traffic which is required to achieve the flow to get RFC of 0.85 or 1.00.
6. Extrapolate the year in which these background trips will be present.

6.6.2 The results of this assessment show that the mitigation measures for

- **Junction 1** would need to be implemented in **2028** and
- **Junction 4** would need to be implemented in **2029**.

7 Consideration of Supplementary Junctions

7.1 Introduction

7.1.1 This section of the report discusses parts of the network which do not require improvement due to additional congestion caused by the Local Plan development traffic but do have perceived congestion issues or congestion not related to the Local Plan.

7.1.2 In particular, these junctions are

- Junction 3: A6131 / A6069 Roundabout (bottom of High Street)
- A6131 / B6265 / High Street Roundabout (top of High Street)

7.2 Junction 3: A6131 / A6069 Roundabout (bottom of High Street)

7.2.1 The traffic model and the individual junction model for this junction show that there will not be any congestion, particularly congestion caused by the Local Plan traffic. There is however perceived congestion at this junction and congestion can occur as a result of misuse of lanes, pedestrians crossing and slower moving heavy traffic.

7.3 A6131 / B6265 / High Street Roundabout (top of High Street)

7.3.1 The main problem identified at the roundabout at the top of the High Street is that there are no clear lanes for traffic coming down the Bailey turning right, straight down the High Street or for traffic turning left into Jerry Croft.

7.3.2 62% of the traffic from The Bailey turns down the High Street and 38% turns right into Mill Bridge. A clear lining system could be established to ensure this traffic does not use the wrong lane.

8 Summary & Conclusion

8.1 Summary

8.1.1 The aim of this report is to produce a strategic transport assessment detailing the impacts of the Local Plan housing and employment allocations in Skipton on the operation of existing highway network. In doing so this report has taken into account forecast increases in car usage up to the end of the plan period in 2032 and the likely growth in traffic from those planning permissions regarded as 'committed development' and thus likely to be built during the plan period but after the traffic survey was undertaken in 2015.

8.1.2 The Skipton Traffic Model commissioned by North Yorkshire County Council, as the Local Highway Authority, has been utilised to assess the traffic impacts of the Local Plan development sites.

8.1.3 The primary output of the study is an assessment of the impact on eleven junctions across the Skipton highway network. This assessment forecast that, without improvement, two of these junctions will operate with more congestion than in the baseline scenario and so will require additional capacity.

8.1.4 Indicative mitigation options are available as measures to be implemented at the two junctions. Section 6 of this report sets out the position in relation to the others, which are over capacity at 2032. The mitigation measures proposed are discussed in Section 6.

8.2 Development Sites

8.2.1 A total of 14 Submission Draft Plan development sites which are without planning permission or soon to be granted planning permission have been modelled in Skipton.

8.2.2 The modelling demonstrates that the Local Plan traffic will cause some additional congestion on the existing junction layouts but with limited junction improvements in place it is possible to accommodate the planned level of growth in Skipton.

8.3 Mitigation Measures

8.3.1 To add capacity to the highway network in order to reduce the congestion caused by the Local Plan development traffic improvement measures have been proposed at two junctions. The cost for these improvements is estimated to be £470,000.

8.3.2 The improvement measures are:-

- Widening of Gargrave Road by 1.5m near the curve;
- Widening of A629 by 2m near the curve and 0.5m for the stretch beyond (i.e. approach road half width);
- Widening of A6131 at A65 by 2m at an offset of 10m, 15m and 20m from the give way line;

8.4 Scenario Testing Results

8.4.1 The modelling work has shown that the Local Plan in Skipton will cause additional congestion on the highway network when compared to the Baseline congestion.

8.4.2 With the above mitigation measures in place the assessment shows that the junctions in the Local Plan scenario will operate below capacity.

8.5 Conclusion

8.5.1 The modelling work undertaken on the impact of the Local Plan traffic shows that the proposed level of development associated with Local Plan sites in Skipton can be accommodated within Skipton if the proposed improvement measures are implemented.

8.5.2 Work to date on the preliminary design for the necessary changes to key junctions on the network indicates that improvements to the traffic flows at these junctions are achievable. Further potential improvements as part of or related to new development would enable further mitigation of key junctions as well as wider benefit to the local network.