

Community Sports Regeneration Area Action Plan

Transport Assessment

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Executive Summary

Atkins Transport Planning was commissioned by Harrogate Borough Council to undertake an independent objective assessment of various development scenarios relating to the land around Harrogate Rugby Union Football Club (HRUFC) and Kingsley Drive.

There are five different development scenarios to assess in terms of traffic generation and effect on the highway network. The five scenarios included various combinations of rugby and football club facilities, a commercially-run five-a-side football centre, public open space to include informal sports pitches, and various degrees of residential development.

This report assesses the transport impact of each of the five development scenarios. It identifies if they are any likely adverse traffic impacts, including the forecast of development effect on accident rates at the main junctions. Within the report five main junctions have been assessed, involving Junction 1 - Claro Road/Skipton Road, Junction 2 - Skipton Road/Knaresborough Road Roundabout, Junction 3 – Birstwith Road/Knaresborough Road, Junction 4 – Leyland Road/Knaresborough Road, Junction 5 – Rydal Road/Knaresborough Road and Junction 6 – Kingsley Road/Knaresborough Road.

Development of the first two scenarios (1a and 1b) consists of combinations of sports facilities and residential use, scenarios 2 and 3 relate to sports developments, scenario 4 relates to residential development and public open space, and scenario 5 relates to public open space with sports pitches. Development induced traffic from scenarios 1a and 1b (sports and residential) will impact on Junctions 1 and 2. The modelling has shown that the junction of Claro Road and Skipton Road is already operating near its capacity limit in the morning peak hour. On a Saturday before a match the junction is also operating towards its limit of capacity. Without undertaking any improvements to this junction Scenarios 1A and 1B would result in the junction being overloaded. Scenario 2 does not have a material impact and scenario 3 would also result in the junction being overloaded, on match days only.

Junction 2 will operate within capacity at the opening year of 2010 for all scenarios but by 2025 will be operating over capacity.

In order to provide for these development options some form of capacity enhancement or acceptance of a lower level of operational service on the highway network would have to be made.

Development Scenario 4 is for the provision of residential development and public open space to the rear of the estate roads on the north side of the A59 Knaresborough Road. In addition to resulting in capacity issues at the Wetherby Road roundabout, Junction 2, the development induced traffic will lead to junctions 3 and 6 operating over design capacity in the design year of 2025.

Scenario 5 is for a public open space which, relative to a housing development generates little traffic. The modelling has shown that this development scenario would not have any detrimental affect on the road network above that of the base traffic.

Some highway capacity improvements are required to accommodate development, the main junctions being of concern are the Wetherby Road Roundabout and Claro Road junctions with the A59.

Generally, it is the use of the sites for residential development that has a material impact on the main junctions, and scenario 3 on match days when both the rugby and the football club both have home games.

1. Introduction

- 1.1 Atkins Transport Planning has been commissioned by Harrogate Borough Council to undertake an independent assessment of various development scenarios relating to the land around Harrogate Rugby Union Football Club (HRUFC) and Kingsley Drive.
- 1.2 In all five different development scenarios have been assessed in terms of traffic generation and effect on the highway network. The five scenarios are described in detail in Section 2, essentially each one involves different combinations of land uses, including the rugby club pitches and club house, the football club pitches and club house, a commercially-run five-a-side football centre, public open space to include informal sports pitches, and various degrees of residential development.
- 1.3 In this report the impact of each of the five development scenarios is assessed on the surrounding public highway network and adverse traffic impacts are identified.
- 1.4 As part of the option assessment, we have looked at the parking requirements for the public open space options, and also consulted with Football Club and Rugby Club with regard to the way the clubs operate, gate numbers and their future plans.
- 1.5 This report comprises of the following Chapters:
 - ◆ Chapters 2 and 3 – Description of development and highway network
 - ◆ Chapters 4 to 6 – Development of traffic flows
 - ◆ Chapter 7 – Assessment of Development impact
 - ◆ Chapters 8-10 – Sustainable Transport and Road Safety
 - ◆ Chapter 11 - Conclusions

2. Development Scenarios

LAND USE TYPES

2.1 The five development scenarios which have been assessed include a combination of the following :

- ◆ **Residential** – there are various levels of residential development proposed. The type of residential development has not been specified, only the number of residential units, but any residential development would include an element of affordable housing. For the purposes of this assessment we have assumed a residential development type similar to the surrounding residential area comprising of detached and semi detached properties.
- ◆ **HRUFC** – the rugby club has an existing facility accessed off Claro Road. It includes a first team pitch and training pitch, as well as a club house and car parking area. The development scenarios assume that this facility will remain unchanged.
- ◆ Atkins consulted with the Rugby Club who confirmed the minimum, maximum, and average attendance figures for the first team home games.
- ◆ **Harrogate Town Football Club** – the football club has an existing facility accessed off the A661 Wetherby Road. This includes the pitches and a club house with a car parking area.
- ◆ The football club confirmed the minimum, maximum, and average attendance figures for the first team home games. The club may be promoted which would increase attendance figures at the games. This possibility has been taken into account within the report. Although one of the scenarios (Scenario 3) includes a joint venue for the rugby club and the football club, the club stated that in their opinion, this scenario was highly unlikely to ever happen. It would not work because the two clubs would not be able to share pitches and stands.
- ◆ **Five-a-side football centre** - The Council envisages that this centre will be run by the Local Authority on a commercial basis (similar to the existing 5-a-side football facility called 'Goals' which is on Kirkstall Road just on the edge of Leeds city centre). The Council's Sports Officer confirmed that the facility is likely to have around 8 pitches which will be all-weather surfaced and floodlit. It is expected that the facilities will be most heavily used from 5pm – 9pm through the week and on weekends.
- ◆ **Public Open Space** – the public open space elements will be on the land to the north of Kingsley Drive. Option 4 includes some residential development as well as open space but option 5 is purely public open space. We understand that the open space will include senior and junior rugby and football pitches, 4 football pitches and 2 rugby pitches. The sports pitches will be run and managed on a similar basis to those at Killinghall Moor Community Park, in the north west of Harrogate. There are 6 pitches at Killinghall Moor. The public open space will include changing facilities for the sports teams (again, similar to the facilities at Killinghall Moor Community Park). Data was not available from the TRICS trip generation database for this type of public space. Data was collected at Killinghall Moor Community Centre to assess the amount of traffic generation this size and type of facility will create. We have assumed a similar amount of car parking to that provided at Killinghall Moor Community Park (88 spaces), as the

proposed facility in scenarios 4 and 5 is highly comparable to that at Killinghall Moor Community Park.

SCENARIO COMPOSITIONS

2.2 Summarised below are the details of the composition of each of the five scenarios.

2.3 A location plan is provided as Figure 2.1. Figures 2.2 – 2.7 show each of the development scenarios.

2.4 Scenarios 1 to 3 are developments which will be accessed via Claro Road.

Scenario 1A (figure 2.2)

- ◆ 143 residential units HRUFC
- ◆ A five-a-side football centre

Scenario 1B (figure 2.3)

- ◆ 50 residential units
- ◆ HRUFC
- ◆ A five-a-side football centre

Scenario 2 (figure 2.4)

- ◆ HRUFC
- ◆ A five-a-side football centre

Scenario 3 (figure 2.5)

- ◆ HRUFC
- ◆ Harrogate Football Club
- ◆ A five-a-side football centre

2.5 Options 4 and 5 are to be accessed via various roads between the A59 Knaresbrough Road, Kinglsey Drive and have no access via Claro Road.

Scenario 4 (figure 2.6)

- ◆ 465 residential units
- ◆ Public Open space to include senior and junior rugby (2 pitches for rugby) and football pitches (4 pitches for football) for informal use (with a small changing facility associated with the sports pitches)
- ◆ Around 88 off-street parking spaces associated with the public open space.

Scenario 5 (figure 2.7)

- ◆ Public Open space to include senior and junior rugby (2 pitches for rugby) and football pitches (4 pitches for football) for informal use (with a small changing facility associated with the sports pitches)
- ◆ Around 88 off-street parking spaces associated with the public open space.

Figure 2.1 - Site location plan, also showing the location of the six junctions which have been assessed

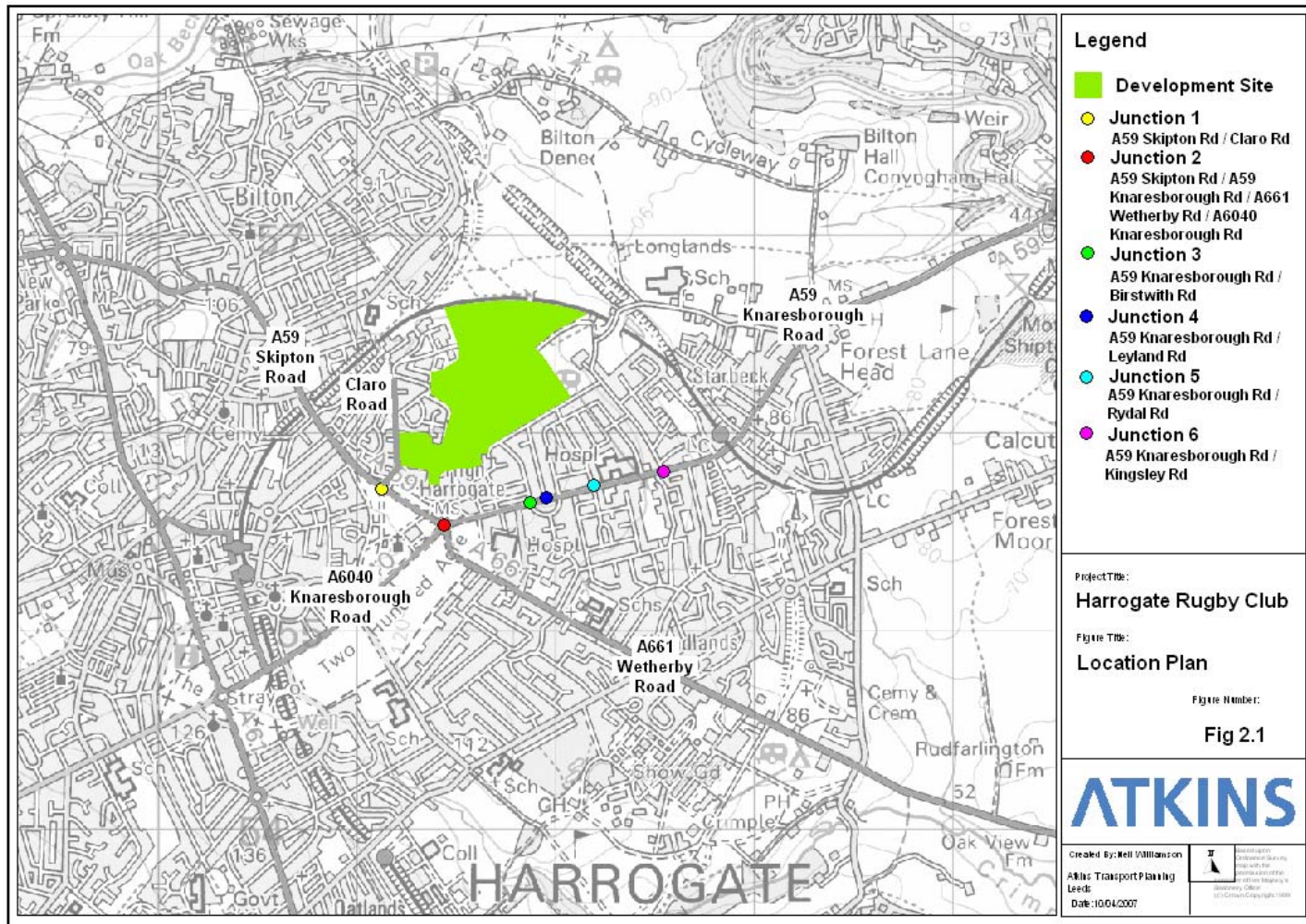


Figure 2.2

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 1A (Fig. 2.2)**

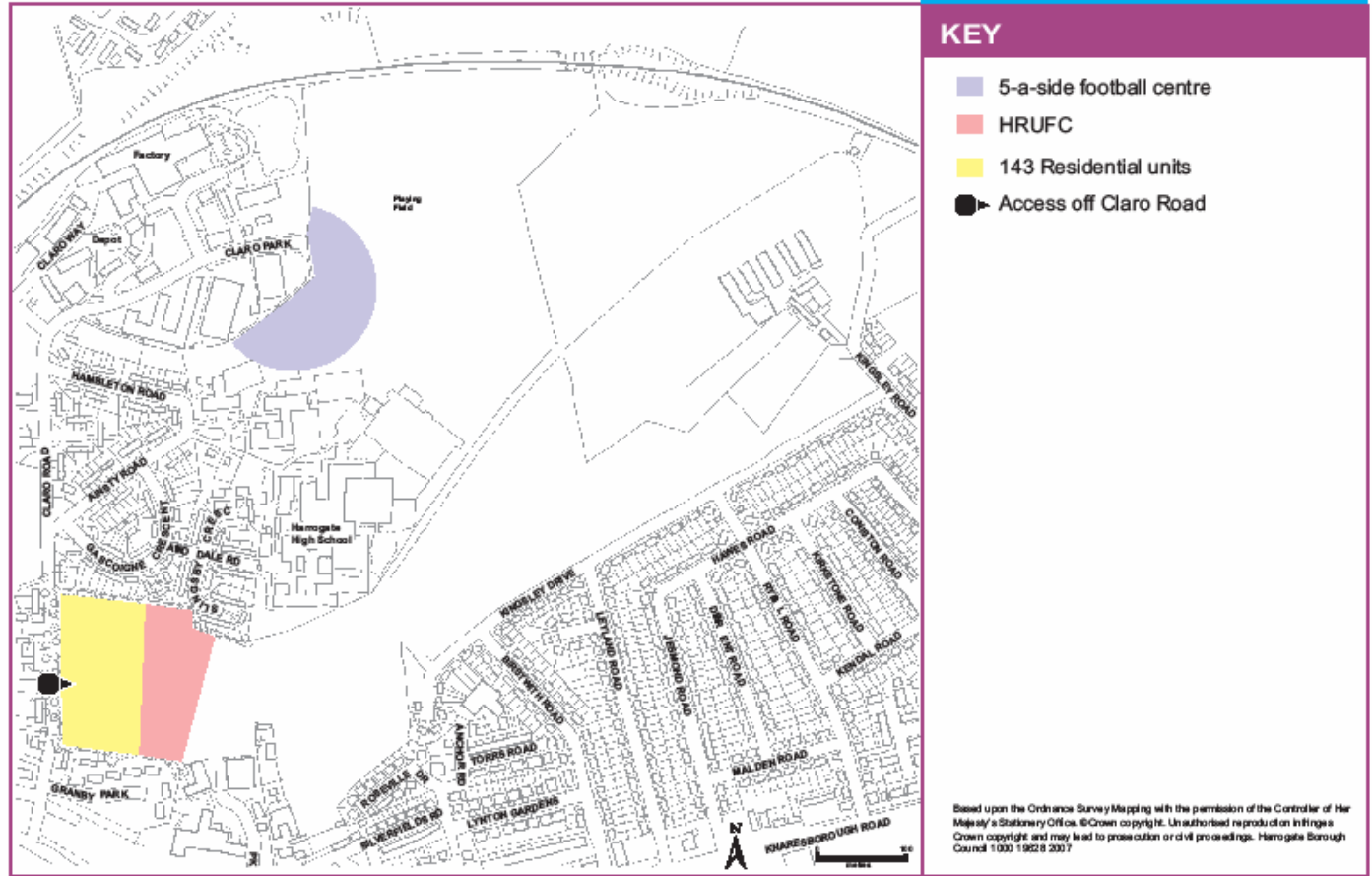


Figure 2.3 – Scenario 1B

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 1B (Fig. 2.3)**

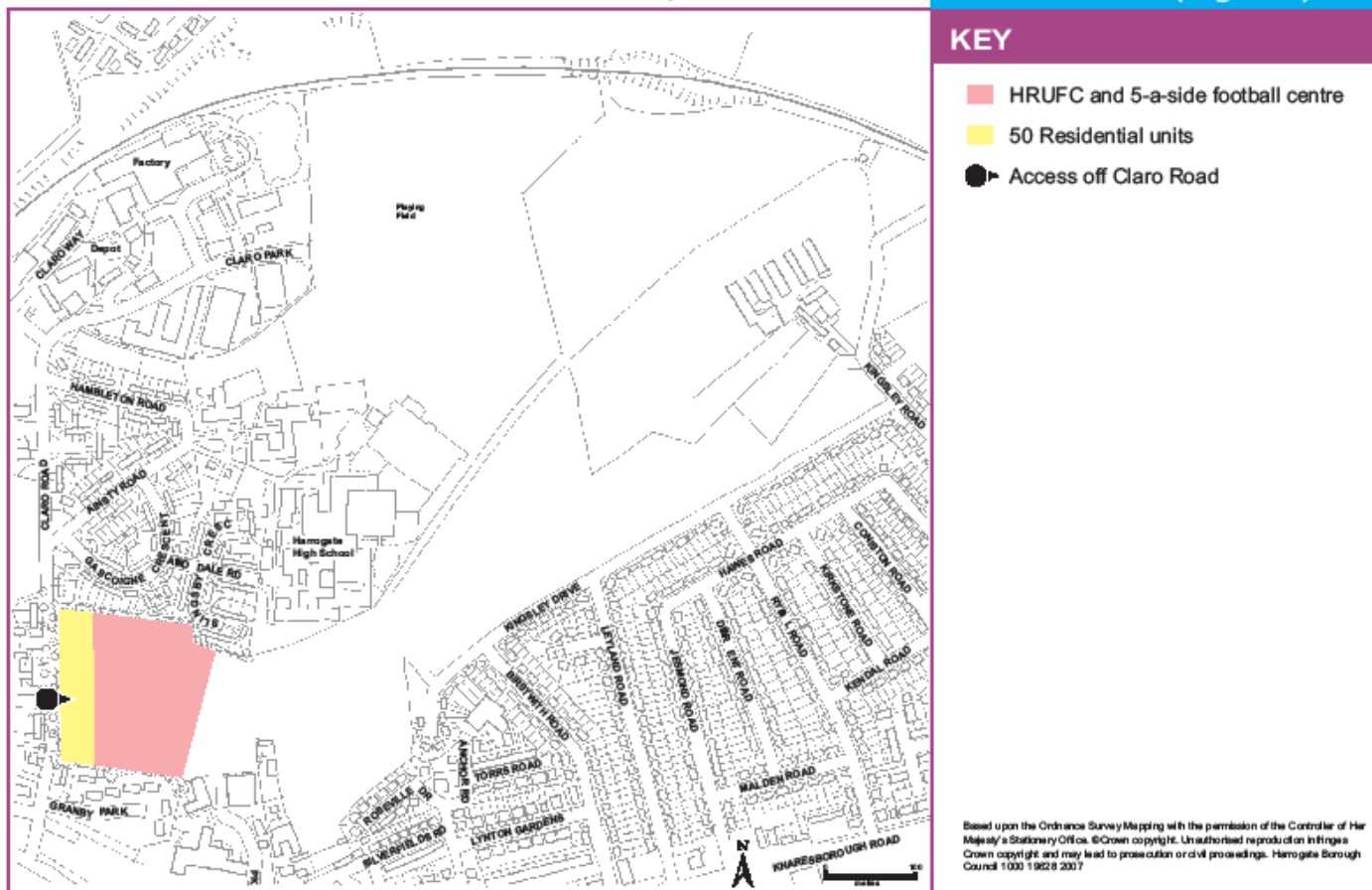


Figure 2.4 – Scenario 2

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 2 (Fig. 2.4)**

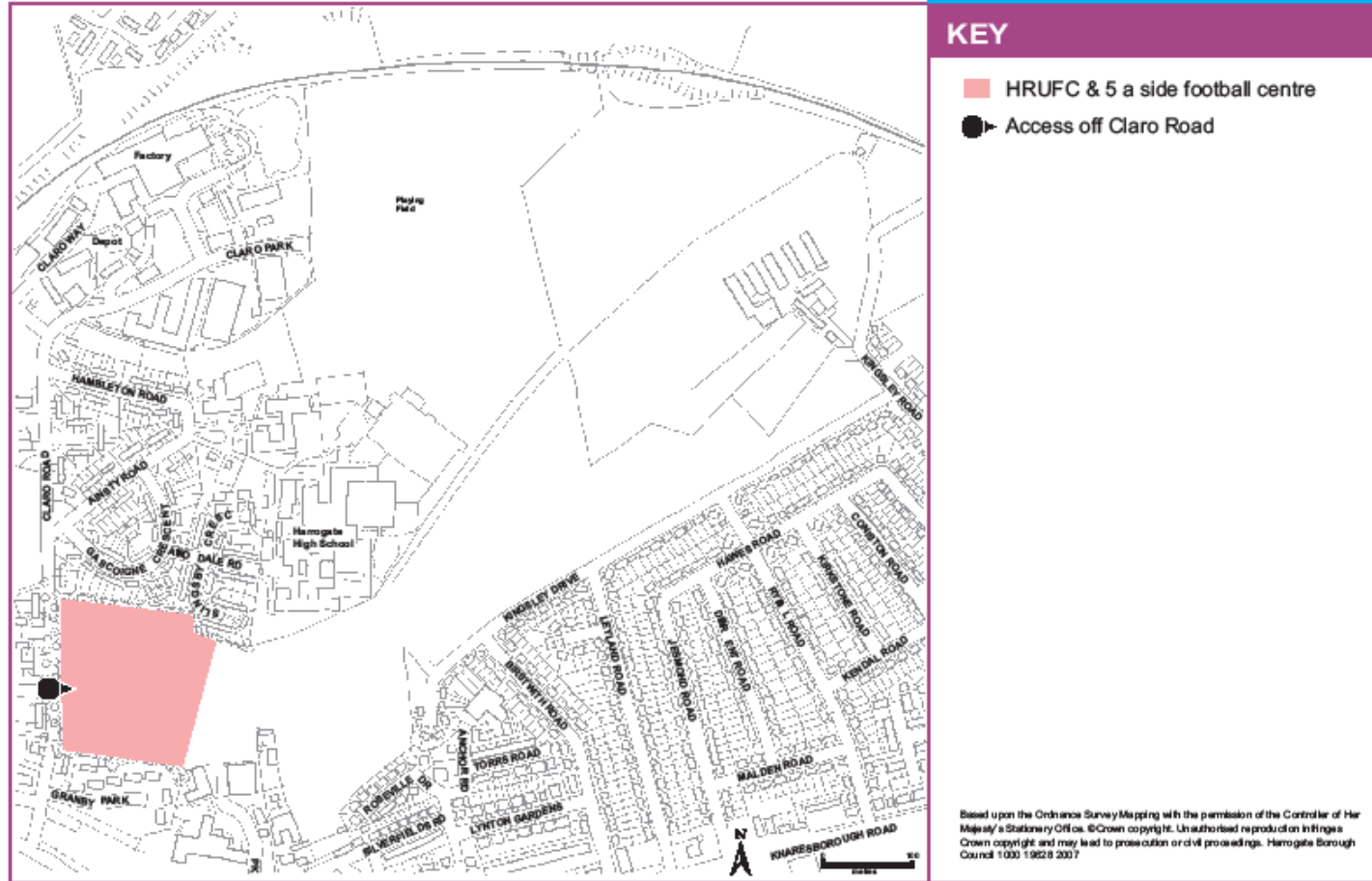


Figure 2.5 – Scenario 3

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 3 (Fig. 2.5)**

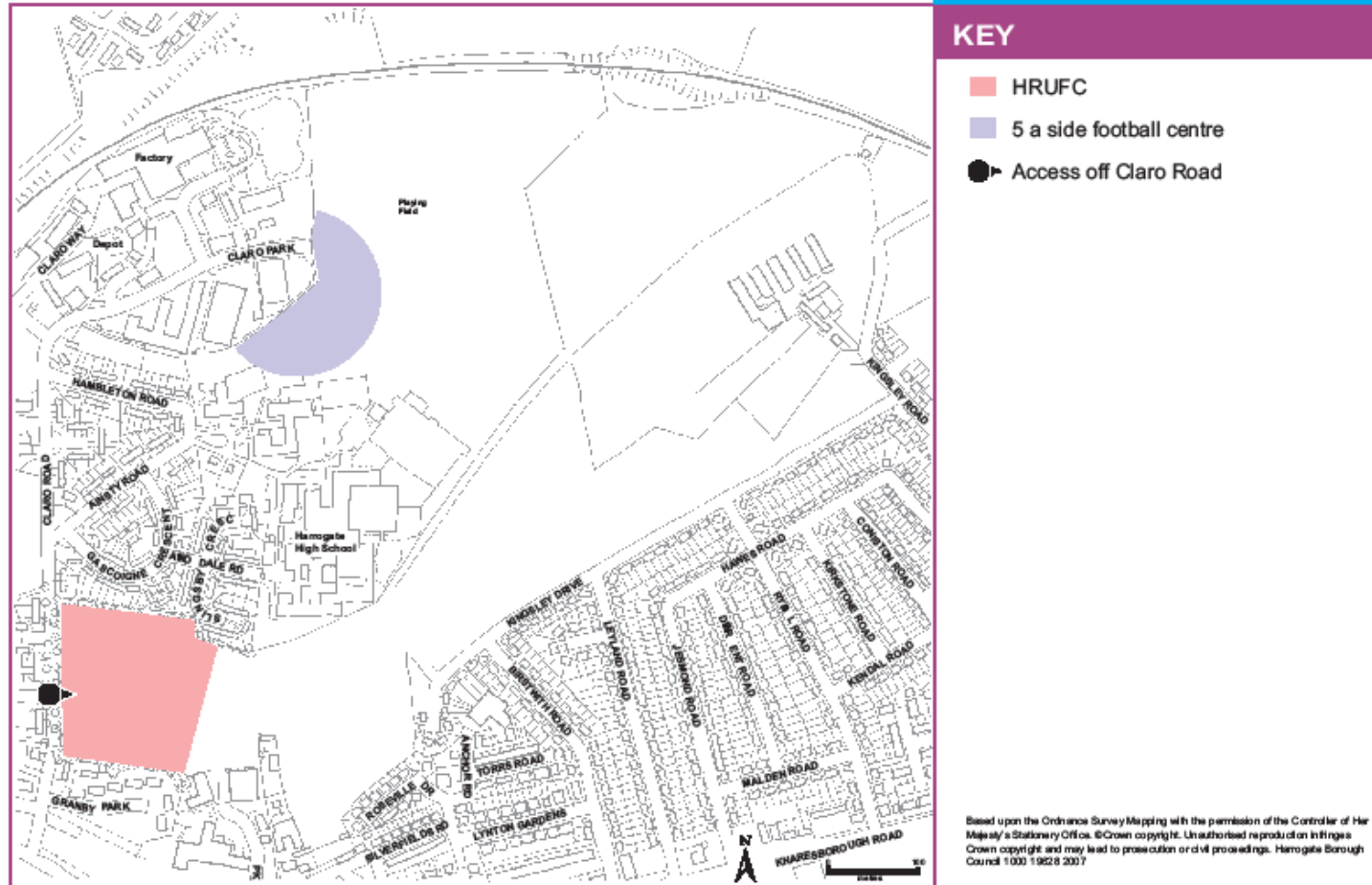


Figure 2.6 – Scenario 4

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 4 (Fig. 2.6)**

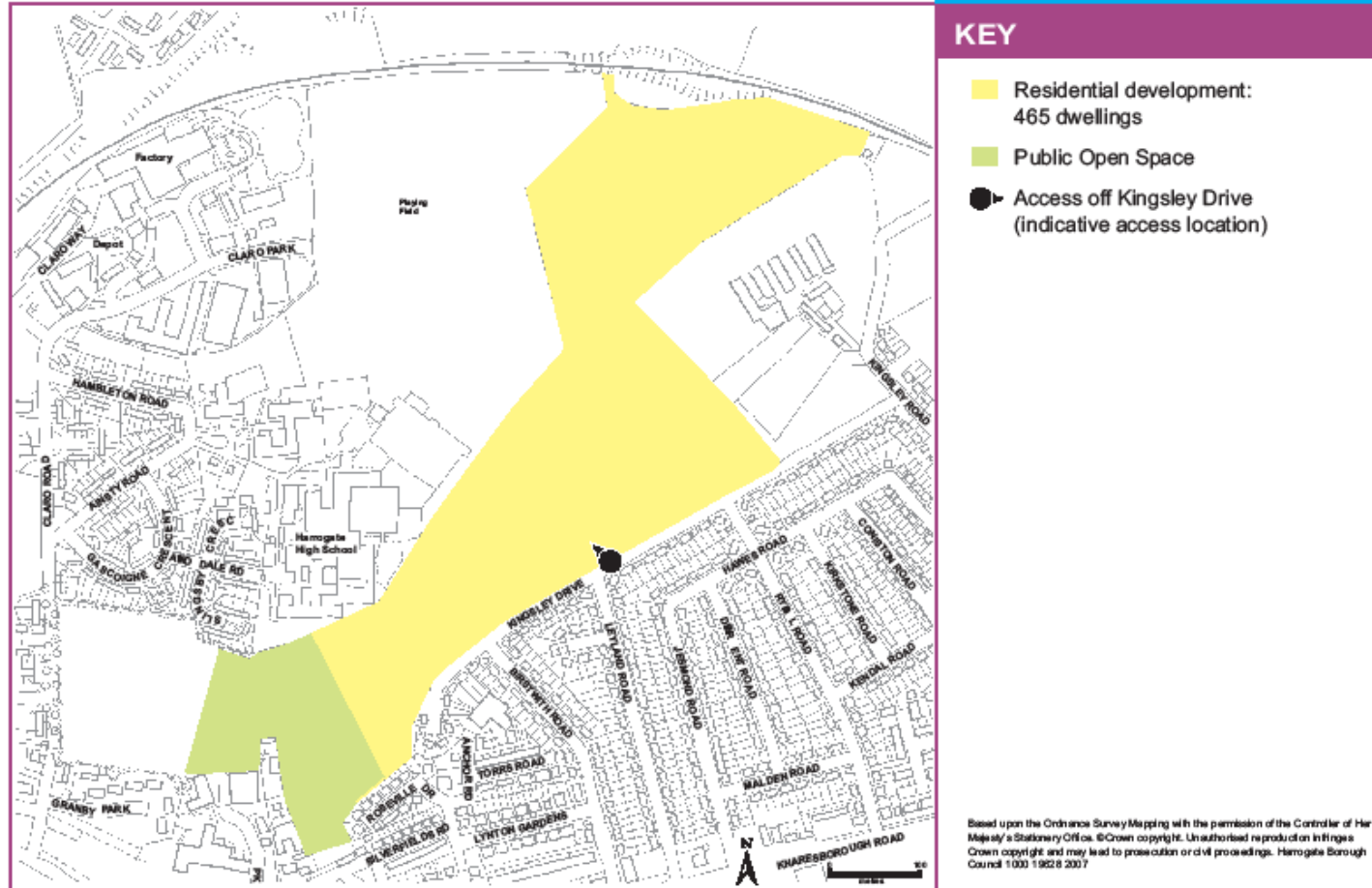
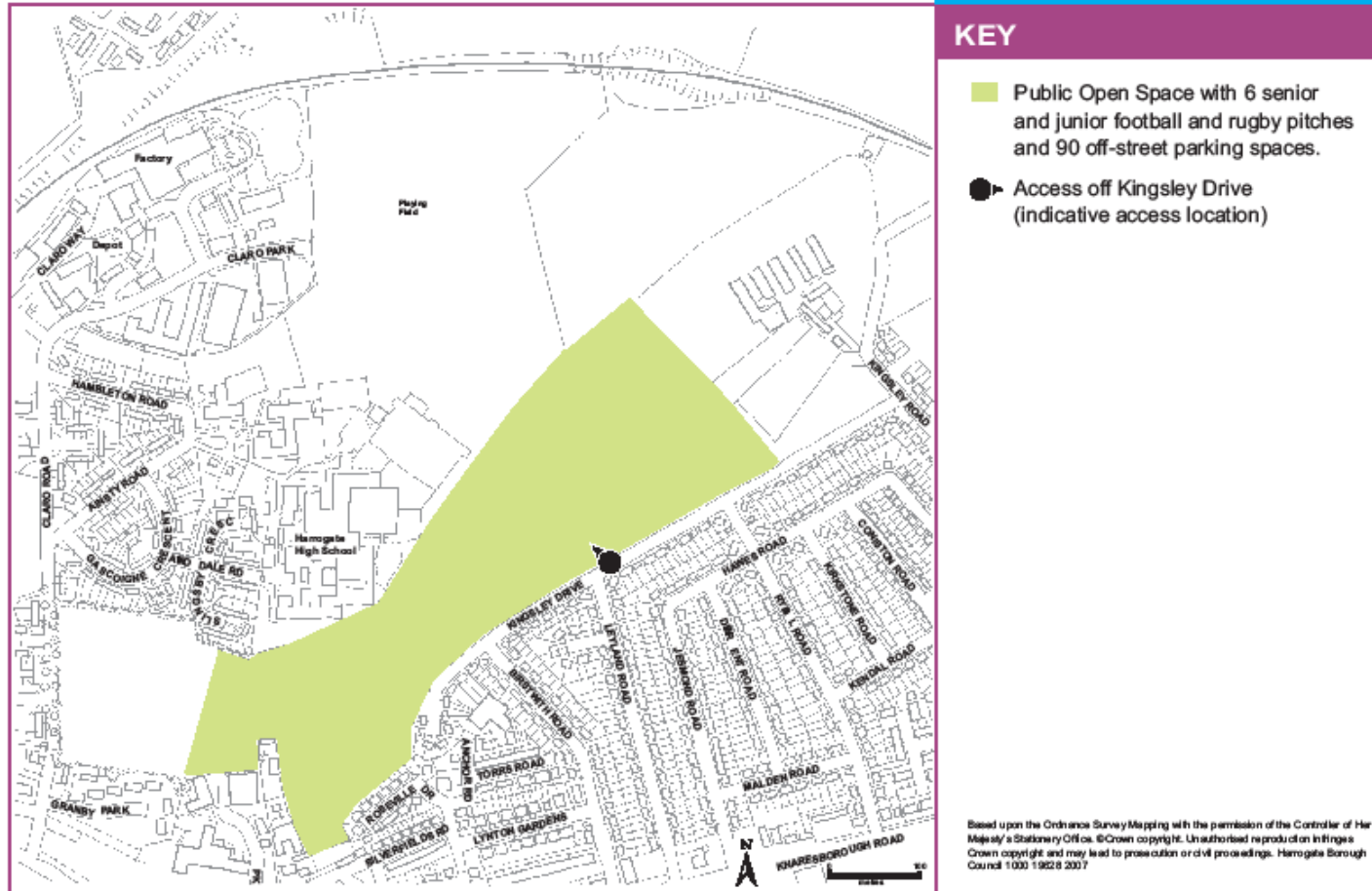


Figure 2.7 - Scenario 5

**A Community Sports Regeneration Area Action Plan
CLARO ROAD/KINGSLEY DRIVE AREA, HARROGATE**

**ATKINS Transport Study:
Scenario 5 (Fig. 2.7)**



3. Site Location and Existing Conditions

- 3.1 The Harrogate Rugby Union Football Club (HRUFC) is located off Claro Road. Claro Road is off the A59 Skipton Road, just to the north west of the roundabout known locally as Emperors Roundabout. This is the junction of the A59 Skipton Road / A59 Knaresborough Road / A661 Wetherby Road and the A6040 Knaresborough Road.
- 3.2 The site location plan and a plan showing the location of each junction (listed in paragraph 3.4 below) is shown at Figure 2.1.
- 3.3 The area around the HRUFC is a mixture of residential, light industrial and educational uses (St Roberts School and Harrogate Granby High School are also accessed via Claro Road). The Harrogate District Hospital is located to the east of the Emperors Roundabout.
- 3.4 Visibility has been calculated as per Appendix A1 of the North Yorkshire County Council Residential Highway Design Guide, with reference also to the Manual for Streets. The NYCC Residential Highway Design Guide states that an ' x ' distance of 9m is required '*at junctions of ACCESS ROADS and DISTRIBUTION ROADS and at other heavily trafficked junctions*'. The junctions of Birstwith Road, Leyland Road, Rydal Road and Kingsley Road with Knaresborough Road would be classed as Access Roads IF they were being used to serve a residential development of the size proposed in Scenario 4, comprising of 465 dwellings.
- 3.5 The visibility from the minor road should be 90m in both directions, for a road speed of 60kph.

Existing Conditions

- 3.6 The following road junctions have the potential to be directly affected by the development options :
- ◆ Claro Road/A59 Skipton Road (Junction 1)
 - ◆ A59 Skipton Road/A59 Knaresborough Road/A661 Wetherby Road (Junction 2)
 - ◆ Birstwith Road/A59 Knaresborough Road (Junction 3)
 - ◆ Leyland Road/ A59 Knaresborough Road (Junction 4)
 - ◆ Rydal Road/A59 Knaresborough Road (Junction 5)
 - ◆ Kingsley Road/A59 Knaresborough Road (Junction 6)

Claro Road/A59 Skipton Road (Junction 1)

- ◆ This is a traffic signal controlled junction.
- ◆ Visibility complies with the North Yorkshire County Council's design standards.

- ◆ During match days and during the peak hour there is some queuing at this junction.

A59 Skipton Road/A59 Knaresborough Road/A661 Wetherby Road (Junction 2)

- ◆ Skipton Road meets Knaresborough and Wetherby Roads at a roundabout junction immediately to the east of Harrogate District Hospital.
- ◆ This roundabout conforms to the Design Manual for Roads and Bridges (DMRB) TD16/93 with good visibility on all arms.
- ◆ A pelican crossing is situated approx. 60m west along the A6040 Knaresborough Road.

Birstwith Road/A59 Knaresborough Road (Junction 3)

- ◆ Birstwith Road is a residential road leading solely to the residential area to the north of Knaresborough Road and does not form any through route.
- ◆ This junction takes the form of a left - right staggered priority junction, the minor arms being Birstwith Road to the north and St Andrews Crescent to the south.
- ◆ There is a right turn ghost island on the A59 Knaresborough Road with a width of approx. 1.5m for both the minor arms.
- ◆ An uncontrolled crossing is situated to the east of St Andrews Crescent immediately followed by a bus-stop lay-by.
- ◆ Visibility eastwards from Birstwith Road is adequate however visibility westwards falls below standard (18.5m).

Leyland Road/ A59 Knaresborough Road (Junction 4)

- ◆ Leyland Road is a residential road leading solely to the residential area to the north of Knaresborough Road and does not form any through route.
- ◆ This junction is a simple priority junction.
- ◆ There is a right turn ghost island on the A59 Knaresborough Road with a width of approx. 2m.
- ◆ A pelican crossing is situated approx. 35m along Knaresborough Road east of Leyland Road.
- ◆ Visibility from the Leyland Road is adequate in both directions.

Rydal Road/A59 Knaresborough Road (Junction 5)

- ◆ Rydal Road is a residential road leading solely to the residential area to the north of Knaresborough Road and does not form any through route.
- ◆ This junction takes the form of a right-left staggered priority junction, the minor arms being Rydal Road to the north and Stanhope Drive to the south.
- ◆ There is a right turn ghost island on the A59 Knaresborough Road with a width of approx. 2m for both the minor arms.
- ◆ An uncontrolled crossing is situated to the east of Stanhope Drive.
- ◆ Visibility eastwards from Rydal Road is adequate however visibility westwards falls below standard (79.8m).

Kingsley Road/A59 Knaresborough Road (Junction 6)

- ◆ Kingsley Road is a residential road leading solely to the residential area to the north of Knaresborough Road and does not form any through route.
 - ◆ This junction takes the form of a right-left staggered priority junction, the minor arms being Kingsley Road to the north and Wedderburn Avenue to the south.
 - ◆ There is a right turn ghost island on the A59 Knaresborough Road with a width of approx. 2m for both the minor arms.
 - ◆ An uncontrolled crossing is situated to the east of Kingsley Road.
 - ◆ Visibility westwards from Kingsley Road is adequate however visibility eastwards falls below standard (19.7m).
- 3.7 In addition to the visibility splays, it would be necessary to take the environmental capacity of these roads into account, if they were to be considered as access roads to serve 465 dwellings.

4. Traffic Flows and Traffic Growth

ASSESSMENT PERIODS

- 4.1 The proposed opening year for the various developments is anticipated to be 2010. It is unlikely that each element of the various development scenarios will be fully occupied at the opening year, but will become occupied during the succeeding years. In order to provide a robust assessment however, it has been assumed that the development will be fully occupied at the opening year.
- 4.2 A design year of 2025, agreed with Harrogate Borough Council, has been used in this assessment, to represent a 15 year design horizon for studying the impacts of the various developments on the surrounding highway network.
- 4.3 Traffic surveys of the various junctions were undertaken on the following dates:
- ◆ Saturday 2nd September 2006
 - ◆ Thursday 22nd February 2007

TRAFFIC GROWTH

- 4.4 It is necessary to factor the background traffic data to the opening and future design years. National Road Traffic Forecasts (NRTF) Central Growth adjusted using local district level trip end data have been employed.
- 4.5 The growth factors that have been used in this report are shown in Table 7.1.

Table 4.1 – Growth Rates

	From/ To	Car (all vehicles except Buses)						Bus					
		AM		PM		Saturday		AM		PM		Saturday	
		2010	2025	2010	2025	2010	2025	2010	2025	2010	2025	2010	2025
TEMPRO Local	2006	1.0445	1.1389	1.0451	1.1421	1.0444	1.142	0.9955	0.9619	1.0001	0.9774	0.9988	0.988
	2007	1.033	1.1263	1.0334	1.1294	1.033	1.1294	0.9966	0.963	1.0001	0.9774	0.9991	0.9883
TEMPRO National	2006	1.0419	1.1506	1.0416	1.152	1.0406	1.1521	0.9882	0.9547	0.987	0.952	0.982	0.9482
	2007	1.0311	1.1386	1.0309	1.1402	1.0301	1.1406	0.9911	0.9576	0.9902	0.9551	0.9864	0.9525
NRTF	2006	1.0626	1.2773	1.0626	1.2773	1.0626	1.2773	1.0279	1.1673	1.0279	1.1673	1.0279	1.1673
	2007	1.0466	1.2581	1.0466	1.2581	1.0466	1.2581	1.0208	1.1593	1.0208	1.1593	1.0208	1.1593
Principal Road Factor	2006	1.0652	1.2644	1.0662	1.2663	1.0665	1.2661	1.0355	1.176	1.0415	1.1984	1.0455	1.2163
	2007	1.0485	1.2445	1.0492	1.2462	1.0495	1.2458	1.0265	1.1658	1.031	1.1863	1.034	1.2029

5. Traffic Generation

- 5.1 This section describes the methodology adopted for determining the expected traffic generation of the development.

HARROGATE RUGBY UNION FOOTBALL CLUB

- 5.2 A traffic survey was undertaken on Saturday 2nd September 2006, a match day at the rugby club. Traffic Flows were collected at the junction of Claro Road and Skipton Road, together with a survey of the number of vehicles parked on the rugby club's car park. On this match day there was an attendance figure of 471 spectators. The table below summarises parking activity before and after the start of the match.

Table 5.1 – Match Day Parking Activity

Time Period			Parked	Arrivals	Departures
Before		13:30	83	83	
13:30	to	15:00	169*	86	
16:30	to	17:30	85		84

*Figures are vehicles, * figure is vehicles parked at 3.30pm.*

- 5.3 Site observations indicate that the 86 arrivals between 13:30 and 15:00 were spectators whilst those earlier arrivals are believed to be rugby club team members and staff. A trip rate for spectator arrival and departures is obtained by dividing the vehicle numbers (86 per 1.5 hours and 84 per hour) by the numbers of spectators (471) which gives hourly trip rates of 0.12 and 0.18 per spectator respectively. This shows that arrivals are spread over a longer period, but once the match is finished people tend to depart rather than stay longer.
- 5.4 To obtain a traffic flow for a maximum attendance of 1,100 spectators the arrivals and departures rates is obtained by increasing the car park flows proportionally ($1,100 / 471$), however to take account of on street parking, assumed to be 20%, in the vicinity of the ground the flows have been multiplied by a further factor of 1.2 This shows that 161 vehicles will arrive in the hour before kick off and 235 leave in the hour after the close of play.

HARROGATE TOWN FOOTBALL CLUB

- 5.5 The football pitches are expected to have a maximum gate attendance of 2,000 spectators. As the football pitches would be next to the rugby club the trip generation of the rugby club at 1,100 spectators has been used and factored (by $2,000/1,100$) to obtain the flows for 2,000 football spectators. This indicates there would be 292 pre match arrivals 2.00pm to 3.00pm and 428 departures between 4.15pm and 5.15pm.

Five a Side Football

- 5.6 The national TRICS trip generation database has been used to obtain flows for the Five a Side football pitches. The TRICS database consists of a national collection of traffic surveys for various different types of developments such as superstores,

offices or in this case, five-a-side football pitches. By inputting the size of the proposed development the TRICS database is able to calculate the expected traffic generation.

5.7 The TRICS output for the five-a-side football pitches is shown in Appendix A.

RESIDENTIAL HOUSING

5.8 The TRICS database has been used to obtain traffic flows for the proposed housing developments. The 85th percentile traffic flow for private residential housing developments was used.

5.9 By multiplying the number of houses in each development scenario with the trip rates per house the traffic flows are obtained. This is shown in Appendix A.

PUBLIC OPEN SPACE

5.10 The TRICS database does not contain details of trip rates for public open spaces and thus could not be used. A traffic count was therefore undertaken at Killinghall open space on a Saturday. From these counts peak hour figures are obtained for the busiest arrival and departure hours as shown in the Table below.

Table 5.2 – Killinghall Open Space Survey Results

(Vehicles)	IN	OUT
13:00-14:00 ("AM Peak")	52	4
16:00-17:00 ("PM Peak")	0	69

5.11 As no traffic counts were undertaken on the local highway network on Saturday the impact of the public open space traffic has been assessed using the weekday traffic flows, which gives a very much worse case scenario. The Saturday lunch time peak of 1.00pm to 2.00pm has been used as a "AM" peak hour flow and the Saturday late afternoon peak as an equivalent "PM" peak hour flow.

5.12 The table below gives a summary of the trip rates for each Scenario and time period.

Summary Table of Trip Rates

Scenario	AM Peak		PM Peak		Sat Pre Match		Sat Post Match	
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep
1a	45	86	117	68	163	63	93	232
1b	19	30	65	30	129	34	53	203
2	4	0	37	10	111	18	31	187
3	4	0	37	10	403	48	74	615
4	187	283	260	255	0	0	0	0
5	52	4	0	69	52	4	0	69

Figures are vehicles per hour.

6. Traffic Assignment

- 6.1 The traffic generated from the five development scenarios is assigned along the road network of the A59 Skipton Road and A59 Knaresborough Road between Claro Road and Kingsley Road junctions. For Scenarios 1A, 1B, 2 and 3 only the Claro Road and Whetherby Road junctions were modelled and hence development traffic has only been assigned to these two junctions. The assignment method used in this study is to split the development flows in the same proportion as the existing traffic surveyed in the traffic surveys at the intermediate road junctions.
- 6.2 The actual assignments were undertaken for each quarter hour period, hence the within the hour the assignment varies as per the existing traffic flows. To produce an overall picture of the assignment these quarter hourly assignments have been aggregated together to form hourly assignments.

Scenarios 1A, 1B, 2 and 3

- 6.3 Traffic leaving Claro Road is split turning left and right onto the A59 Skipton Road in the same proportion as existing traffic. The proportion of traffic that has turned left onto Skipton Road is then proportioned again at the Wetherby Road roundabout in the proportions of existing turning traffic. Similarly the same in reverse is undertaken for development traffic entering Claro Road.
- 6.4 Figures 6.1 to 6.4 show the percentage split of the development traffic on the network for each time period (weekday AM and PM, Saturday pre and post match). For ease of clarity the percentages in the figures have been rounded to the nearest whole percentage, however in the modelling work the full decimal percentages were used.

Junction 1 Skipton Road/Claro Road

- 6.5 The development traffic for Scenarios 1A, 1B, 2 and 3 is assigned onto the network at Claro Road and into the junction with Skipton Road.
- 6.6 During the weekday period 93%-96% of the traffic enters Claro Road from the south, however there is an approximately 39%- 45% north, and 55% - 61% south split exiting Claro Road. On a Saturday match day the in bound split is more balanced at 40% from the north and 60% from the south. The development traffic has been assigned in these proportions, Figures 6.1 to 6.4.

Junction 2 Whetherby Road Roundabout

- 6.7 During the weekday most traffic along Skipton Road towards Claro Road arrives at this junction from the A59 Knaresborough Road (East) (40%) and Whetherby Road (43%). The relatively low proportion from Knaresborough Road west is logical as traffic would travel along the parallel A61 to travel north from the town centre. Travelling south along Skipton Road to the junction the split is more even (30% left, 45% straight on and 25% right).

Junctions 3 to 6 Knaresborough Road Junctions

6.8 Junctions 3 to 6 are the residential streets leading off the A59 Knaresborough Road. Again the assignment is based on the existing traffic flows and very little traffic is assigned to turn off onto the residential streets. These junctions are not modelled on a Saturday and hence figures are not shown at these junctions.

Figure 6.1 Weekday AM Peak Assignment Scenarios 1A, 1B, 2 and 3

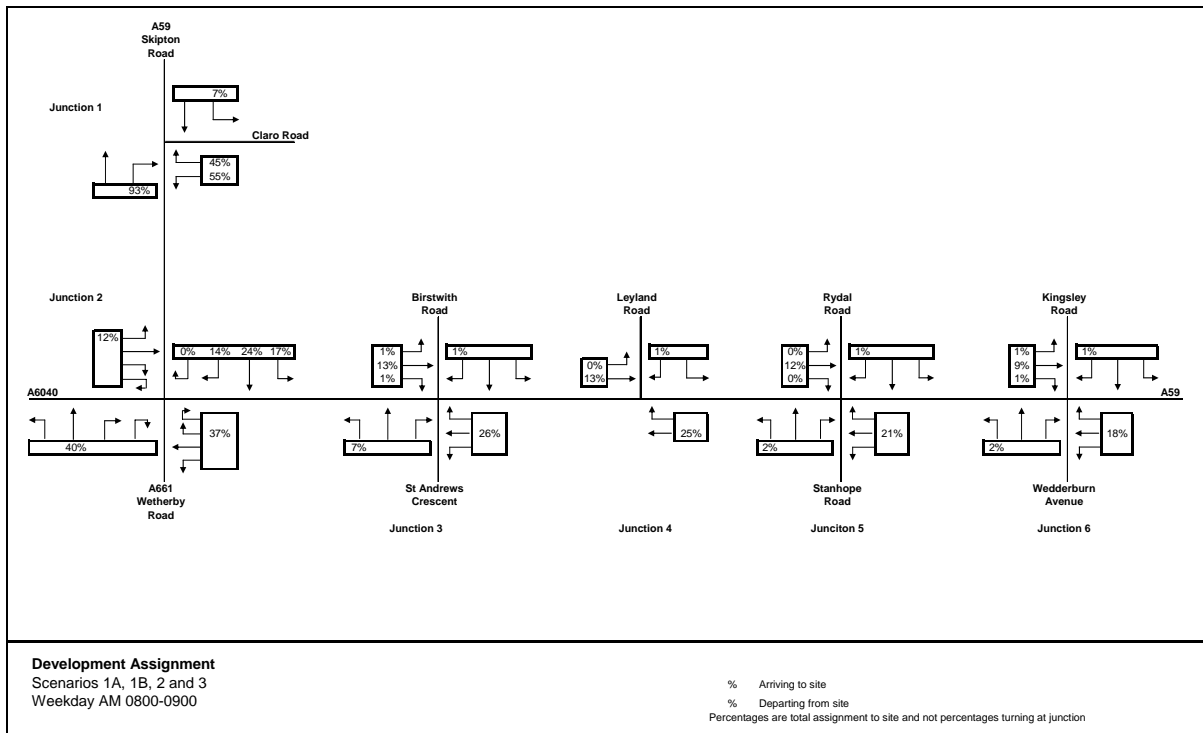


Figure 6.2 Weekday PM Peak Assignment Scenarios 1A, 1B, 2 and 3

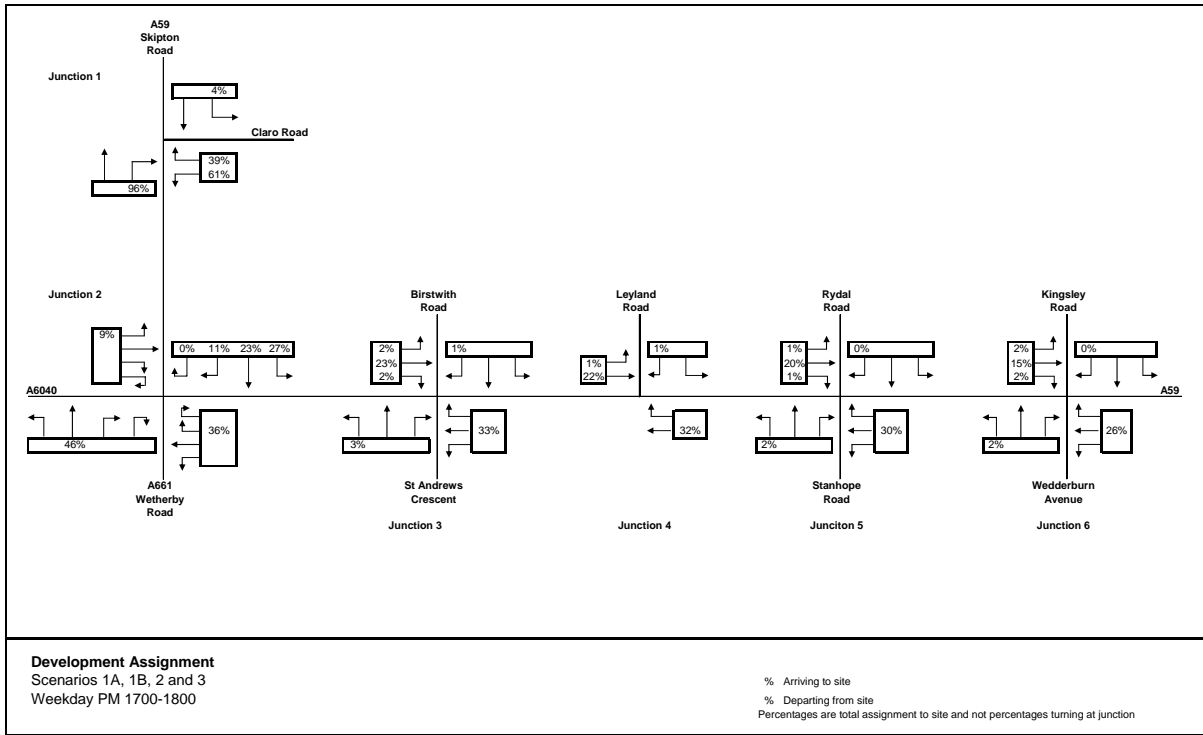


Figure 6.3 Saturday Pre Match Assignment Scenarios 1A, 1B, 2 and 3

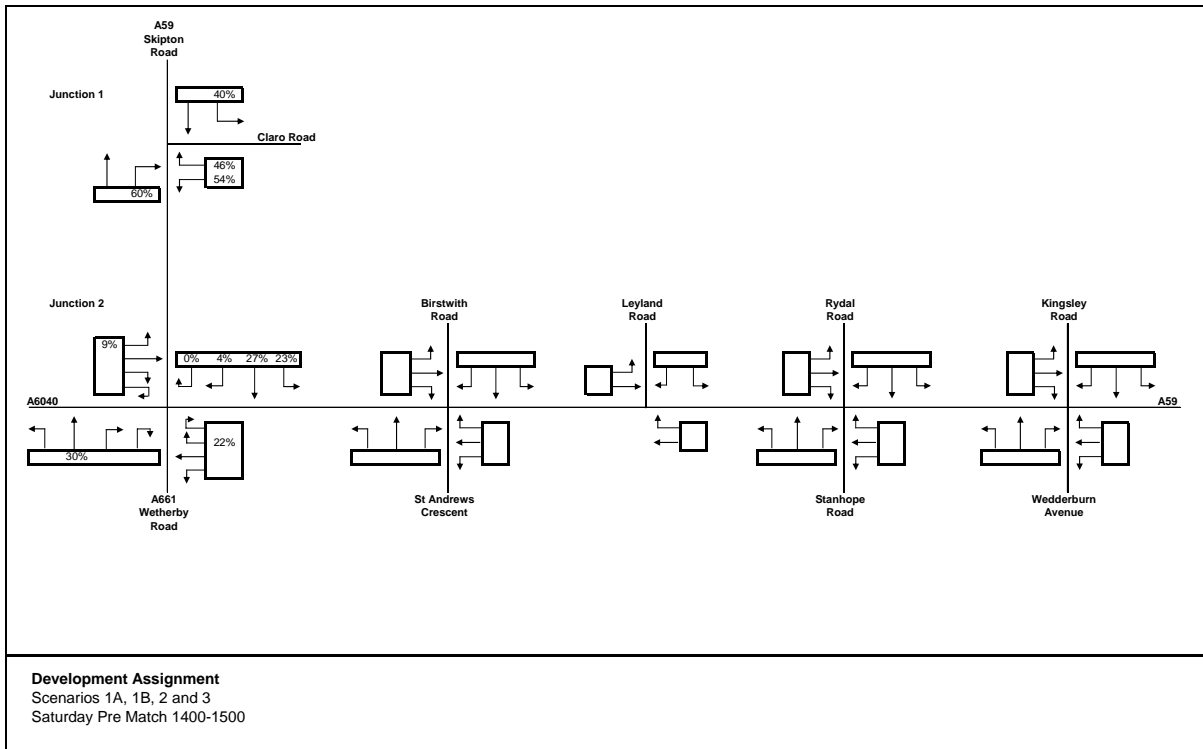
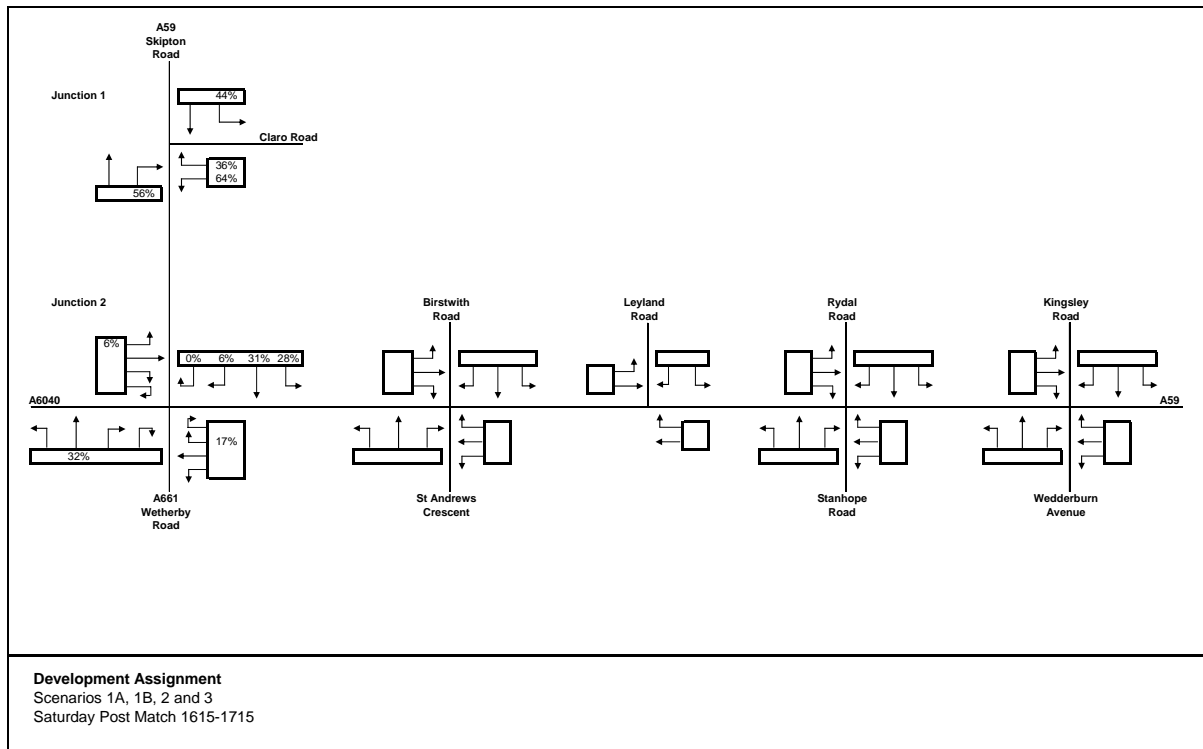


Figure 6.4 Saturday Post Match Assignment Scenarios 1A, 1B, 2 and 3



Scenarios 4 and 5

- 6.9 The traffic generated by Scenarios 4 and 5 accesses the A59 Knaresborough Road from Birstwith Road, Leyland Road, Rydal Road and Kingsley Road. The proportion of development traffic assigned to these roads is assigned in the same proportion as the surveyed volumes of existing traffic in each of these roads entering and leaving Knaresborough Road.
- 6.10 The busiest of the roads used is Kingsley Road, carrying between 31% to 50% of the development traffic depending on the time of day. The next busiest is Birstwith Road with between 19% and 30% of the traffic. This is shown in the tables below.

Figure 6.5 Weekday AM Peak Arrivals Assignment Scenarios 4 and 5

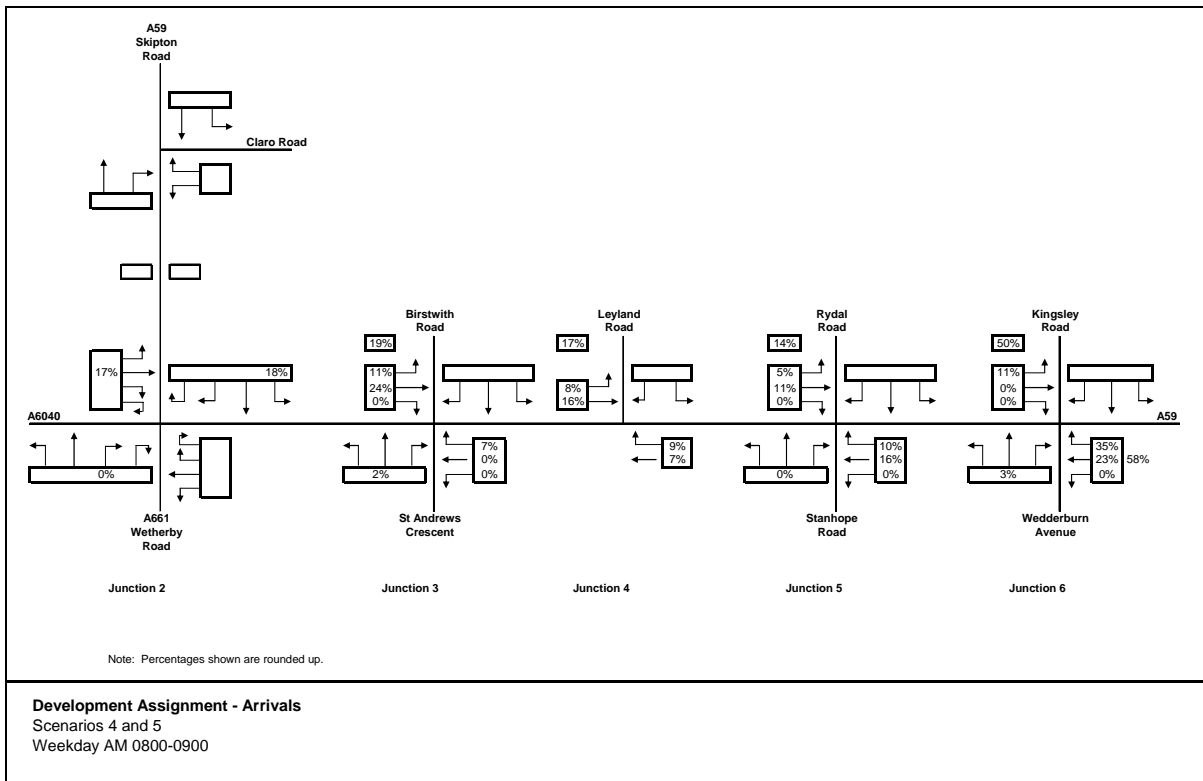


Figure 6.6 Weekday PM Peak Arrivals Assignment Scenarios 4 and 5

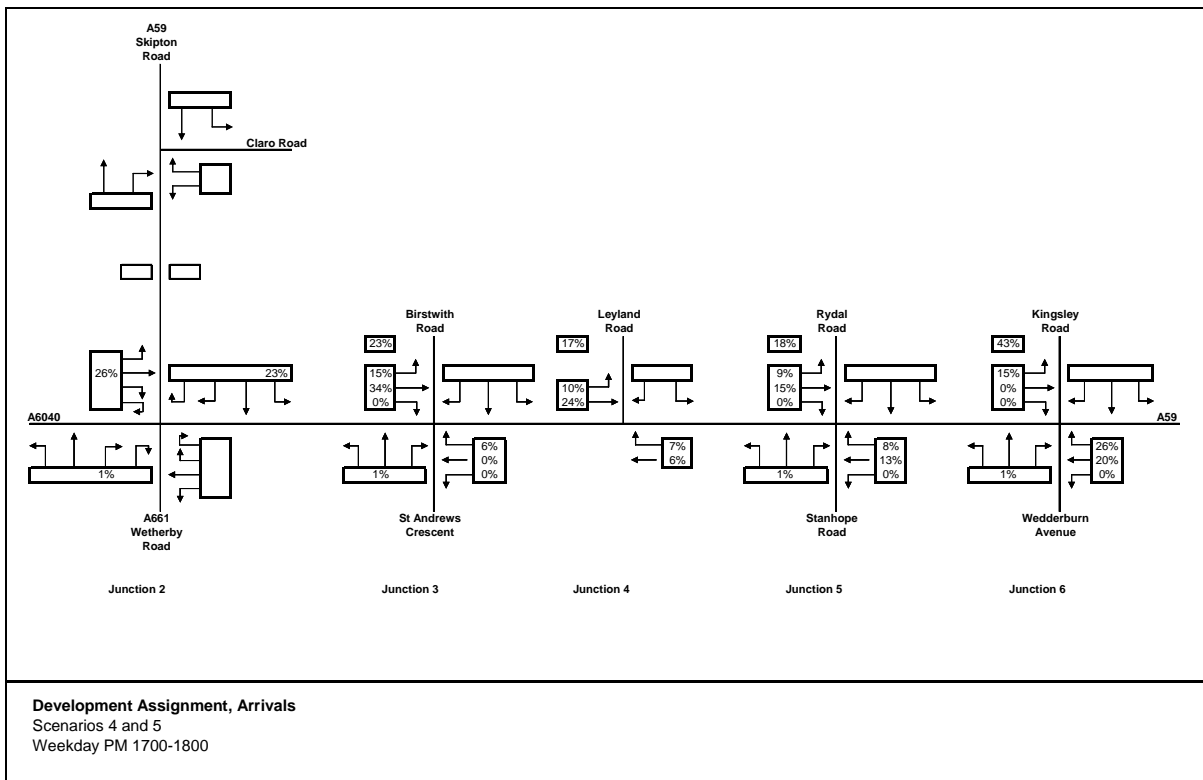


Figure 6.7 Weekday AM Peak Departures Assignment Scenarios 4 and 5

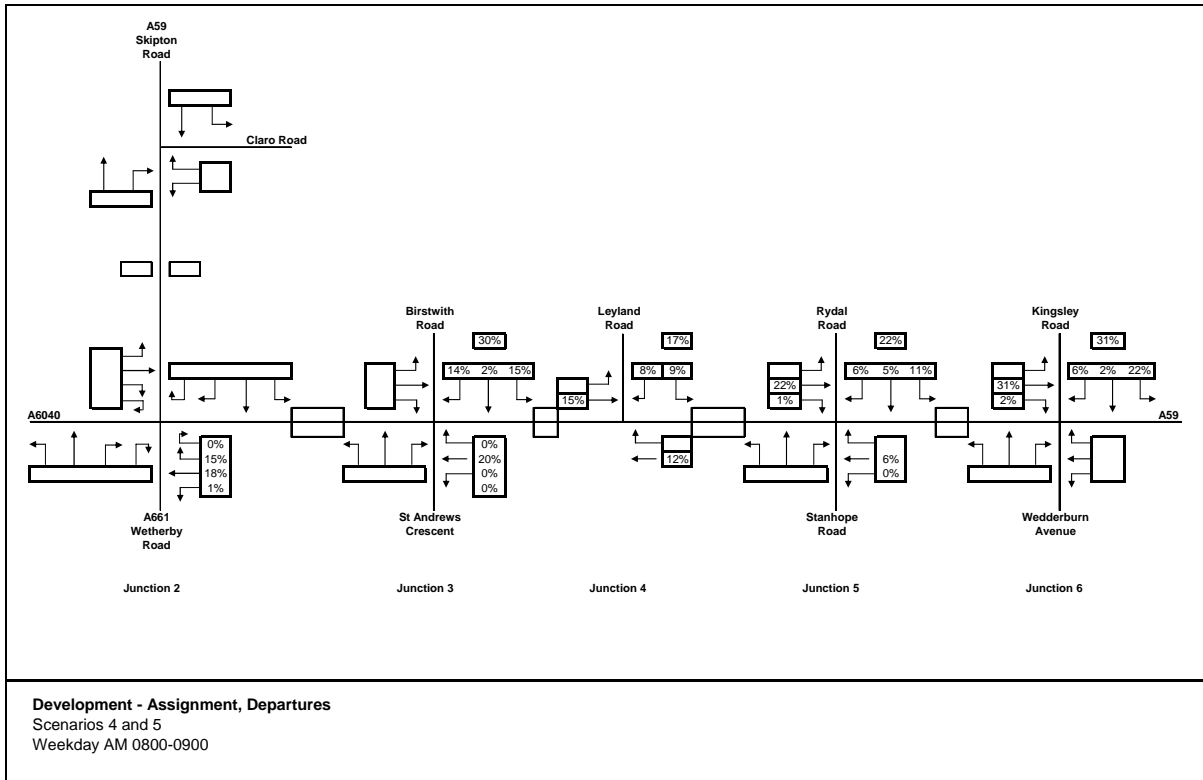
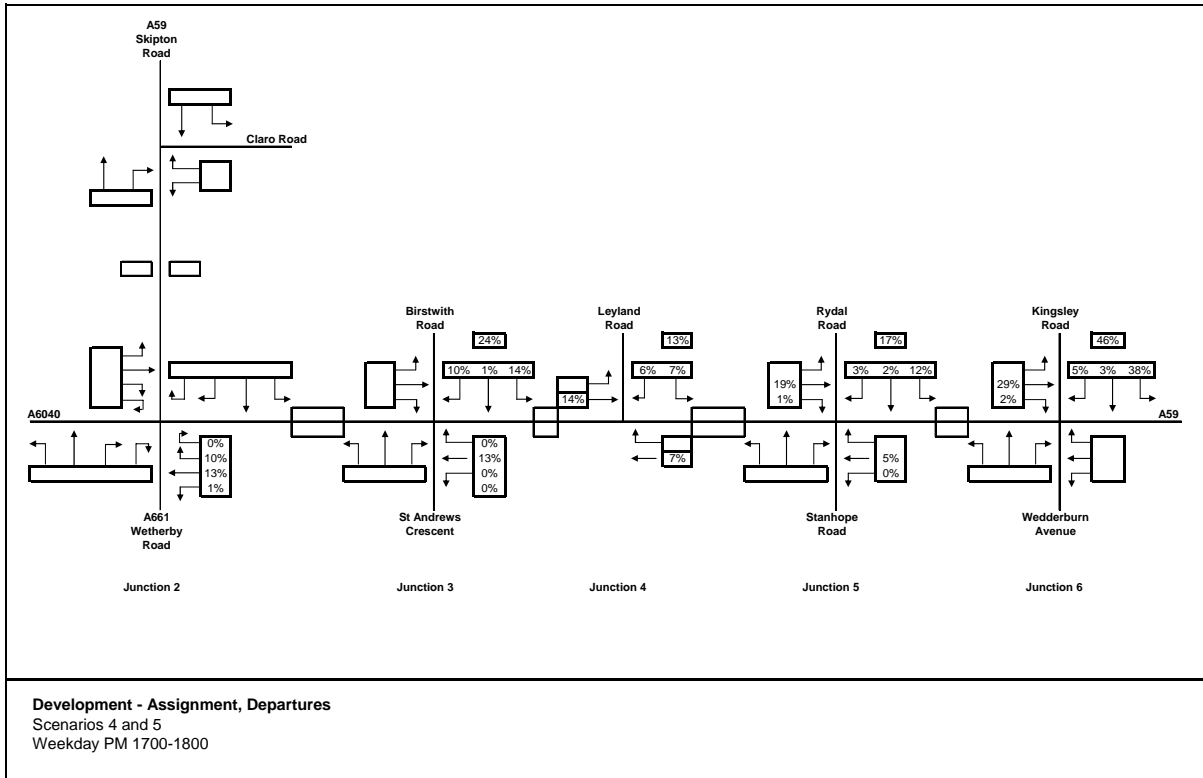


Figure 6.8 Weekday PM Peak Departures Assignment Scenarios 4 and 5



Assignment of Development Flows

- 6.11 The traffic generated by the development scenarios as detailed in Chapter 5 is assigned to the network for each quarter hour period as discussed in the above section. The traffic flows in vehicles per hour are shown in Appendix.
- 6.12 The total traffic flows for each Scenario are obtained by adding the development induced traffic flows from the traffic assignment to the existing traffic flows growthed to the opening year of 2010 or design year of 2025. This then completes the process for determining the traffic levels to be assessed.

7. Operational Assessment

INTRODUCTION

- 7.1 This section of the report details the findings of the operational assessment carried out, and is presented on a scenario by scenario basis highlighting the impacts of each, against the base scenario of no development.
- 7.2 The assessments have been carried out for an opening year of 2010 and the design year of 2025, for am and pm weekday peaks, and pre and post match periods on Saturday, unless stated otherwise.

BASE SCENARIO

- 7.3 Junction 1 is forecast to operate close to capacity in the weekday morning peak on the Claro Road arm and the A59 Skipton Road West arm at 2010. By 2025 these arms are over capacity, with queues of over 100 vehicles predicted on the A59 Skipton Road West. By 2025 the right turn on A59 Skipton Road East is also over capacity.
- 7.4 On Saturday match days Junction 1 is forecast to be close to capacity on the A59 Skipton Road West arm at 2010 and by 2025 this arm is over capacity with queues over 110 vehicles.
- 7.5 Junction 2 is forecast to operate satisfactorily in both the am and pm weekday peaks and on match day Saturdays. By 2025 however the A59 Skipton Road arm is over capacity in the morning weekday peak with queues of around 35 vehicles predicted on this arm.
- 7.6 At the junctions along Knaresborough Road with Birstwith Road, Leyland Road, Rydal Road and Kinglsey Road the analysis shows that these junctions operate within capacity during both the morning and evening weekday peak periods at both opening year and design year. The only junction which operates close to capacity is the Birstwith Road junction 3, during both the morning and evening peak periods in 2025, however the maximum queue predicted in Birstwith Road is 6 vehicles.

Summary

- 7.7 In the base situation Junction 1 is at capacity in the opening year in the morning peak, and is over capacity by the design year of 2025 with all arms over capacity in the morning peak, to varying degrees. The maximum queue of 100 vehicles is predicted on A59 Skipton Road West.
- 7.8 On match days, Junction 1 is close to capacity on the A59 Skipton Road West arm in the opening year and is over capacity by 2025, with queues of over 110 vehicles predicted.

- 7.9 Junction 2 operates within capacity at 2010 both during the week day peaks and the Saturday match day peak. By 2025 however it is the morning peak the A59 Knaresborough Road and A59 Skipton Road arm over capacity.
- 7.10 Along A59 Knaresborough Road all the junctions considered operate satisfactorily, other than the Birstwith Road junction which is approaching capacity by 2025, albeit the queues produced are less than 6 vehicles.

SCENARIO 1A

- 7.11 The impacts of scenario 1A on Junctions 1 and 2 exacerbate the problems which have been highlighted in the base scenario. At Junction 1 during weekday peaks, the impacts are most significant on the Claro Road arm of the junction, impacts on the other arms are marginal with only modest increases in queues. At weekends while the impacts on Claro Road are significant, the arm xxx within capacity and the queues on the arm are modest, no ore than 6 vehicles.
- 7.12 The most significant impacts on Saturday are on the A59 Skipton Road West arm, which is over capacity in the base. On this arm, queues are predicted to extend from 112 vehicles to 147 vehicles by 2025.
- 7.13 At junction 2 the impacts are marginal with only modest increases in degrees of saturation and queues, no arms are over capacity at 2010 and by 2025 only those arms over capacity in the base are over capacity in Scenario 1A. This scenario does have an impact, albeit on movements which are predicted to be over capacity in the base.

SCENARIO 1B

- 7.14 The level of development in 1B is less than that in 1A and therefore the impacts are less. Nevertheless, as with 1A, Scenario 1B exacerbates those movements at Junctions 1 and 2 which were over capacity in the base situation. As with 1A this scenario does have an impact but again this is on movements which are over capacity in the base.

SCENARIO 2

- 7.15 The impact of scenario 2 is marginal at both Junctions 1 and 2 with only modest increases in degrees of saturation and queues. The development does not cause over capacity on any arms of the junctions which are not already over capacity in the base. This scenario does not have a material impact on the junctions assessed.

SCENARIO 3

- 7.16 The impact of Scenario 3 is confined to match days, which is not surprising as a worst case has been assumed of both the Rugby Club and the Football Club having home games on the same day. With scenario 3 Claro Road and A59 Skipton Road East are over capacity in 2010, a situation which does not occur in the base situation, queues are increased from only a handful of vehicles to over 50 vehicles. While A59

Skipton Road West is over capacity in the base this is made significantly worse in scenario B with traffic queues almost doubling to around 200 vehicles.

- 7.17 Albeit confined to weekdays, this scenario does have a material impact on the local highway network.

SCENARIO 4

- 7.18 The impacts of Scenario 4 have been assessed at Junctions 2,3,4,5 and 6. At Junction 2 the impact is most significant on the A59 Knaresborough Road arm as would be expected. At 2010 the junction operates within capacity by 2025 however the junction is over capacity on both the A59 Skipton Road and A59 Knaresborough Road arms, the queue on the A59 Knaresborough Road arm doubles in length from around 20 vehicles to over 40 vehicles.
- 7.19 At Junctions 4 and 5, while the impact in percentage change terms is significant the junctions continue to operate within capacity both at 2010 and 2025 and queues are modest.
- 7.20 At Junctions 3 and 6 the impact is again significant in percentage terms and while the junctions do not go over capacity in 2010 the junctions are over capacity by 2025.
- 7.21 In addition to the operation of the junctions, the design standards of Junction have been assessed in section 3 of this report. Only the Leyland Road junction fully meets design standards, all other junctions are deficient to varying degrees.
- 7.22 Given the nature of the development proposal in this scenario and its location in relation to the adjacent residential area it is also relevant to assess the magnitude of change in traffic flows as a proxy for the likely environmental impact of the additional traffic. Below is a table which shows the base flow at 2010, together with the predicted change in flow both in absolute terms and as a percentage. This clearly demonstrates that in all instances traffic in the peak periods is almost doubled. A doubling in flow is equivalent to a 3dB change in noise level, which is perceivable and therefore is likely to constitute a detrimental impact.
- 7.23 This development scenario does have a material impact on the operation of the local highway network and also on the local environment.

Table 7.1 - Base flow at 2010, together with the predicted change in flow both in absolute terms and as a percentage

Junction	AM - 2010			PM - 2010		
	Base	Dev	%age	Base	Dev	%age
Birstwith Road	131	122	93	136	121	89
Leyland Road	89	79	89	91	77	85
Rydal Road	96	88	92	103	89	86
Kingsley Road	218	181	83	260	228	88

SCENARIO 5

- 7.24 The development scenario 5 does not have a material impact on any of the junctions assessed, namely Junctions 2, 3, 4, and 5. This is not surprising given the low level of trip generation associated with this scenario.

Table 7.2 – Junction 1 – LINSIG Results – Base Flows

Scenario – Base Flows	Link	Deg Sat (%)					Mean Max Queue (PCU)					Total Network Delay (PCUhr)	Worst PRC (%)	Worst PRC (Link)
		1/1	1/2	2/1	2/2	3/1	1/1	1/2	2/1	2/2	3/1			
Weekday 2010 AM Peak	51	96	52.2	70.5	91.6	0.5	11.4	8.4	6.2	36.1	27.71	-6.65	1/2	
Weekday 2010 PM Peak	44.6	72.5	57.5	29.3	77.2	0.4	5.8	10	1.1	23.1	13.93	16.57	3/1	
Weekday 2025 AM Peak	57.9	104.7	61.9	104.7	108.6	0.7	17.1	11.7	24.2	101	106.76	-20.65	3/1	
Weekday 2025 PM Peak	52.7	79.1	68.2	36.6	91.6	0.6	6.8	14.8	1.2	36.1	22.74	-1.83	3/1	
Saturday 2010 Pre-Match	14.9	29.1	59.7	33.4	93	0.1	1.9	11	1	38	17.45	-3.36	3/1	
Saturday 2010 Post-Match	21.9	29.1	62	10.9	77.9	0.1	1.9	11.7	0.4	23.6	10.26	15.54	3/1	
Saturday 2025 Pre-Match	17	31.7	70.9	48.9	110.4	0.1	2.1	16	1.8	112.2	87.51	-22.66	3/1	
Saturday 2025 Post-Match	25.9	31.7	73.6	15.9	92.5	0.2	2.1	17.7	0.4	37.2	17.96	-2.79	3/1	

Table 7.3 – Junction 1 – LINSIG Results Scenario 1A

Scenario 1A	Link	Deg Sat (%)					Mean Max Queue (PCU)					Total Network Delay (PCUhr)	Worst PRC (%)	Worst PRC (Link)
		1/1	1/2	2/1	2/2	3/1	1/1	1/2	2/1	2/2	3/1			
Weekday 2010 AM Peak	60.9	115.4	52.2	81.6	91.9	0.8	27.5	8.4	8.8	36.3	45.83	-28.21	1/2	
Weekday 2010 PM Peak	52.9	86.3	57.5	53.5	77.6	0.6	8.2	10	4.1	23.5	17.88	4.31	1/2	
Weekday 2025 AM Peak	68.2	124.1	61.9	118.9	108.9	7.7	37	11.7	45.4	103.1	149.67	-37.85	1/2	
Weekday 2025 PM Peak	61.4	92.9	68.2	66.3	92.2	0.8	10.1	14.8	5.4	36.8	28.81	-3.24	1/2	
Saturday 2010 Pre-Match	22.7	43.4	59.7	72	98.5	0.1	3	11	5.2	50.4	28.92	-9.48	3/1	
Saturday 2010 Post-Match	51.7	71.5	62	23.3	81.4	0.5	5.7	11.7	0.8	26.1	14.75	10.54	3/1	
Saturday 2025 Pre-Match	24.2	45.9	70.9	81.6	115.9	0.2	3.2	16	6.9	147	125.71	-28.77	3/1	
Saturday 2025 Post-Match	58.2	74	73.6	31.7	96	0.7	6	17.7	0.9	43.5	26.53	-6.70	3/1	

Table 7.4 – Junction 1 – LINSIG Results Scenario 1B

Scenario 1B	Link	Deg Sat (%)					Mean Max Queue (PCU)					Total Network Delay (PCUhr)	Worst PRC (%)	Worst PRC (Link)
		1/1	1/2	2/1	2/2	3/1	1/1	1/2	2/1	2/2	3/1			
Weekday 2010 AM Peak	54.8	102.6	52.2	75	91.7	0.6	15.4	8.4	7.2	36.1	32.45	-14.02	1/2	
Weekday 2010 PM Peak	48.4	78.6	57.5	42.6	77.5	0.5	6.7	10	1.7	23.5	15.63	14.47	1/2	
Weekday 2025 AM Peak	61.9	111.3	61.9	110.3	108.8	0.8	23.3	11.7	32	102.1	121.75	-23.67	1/2	
Weekday 2025 PM Peak	56.5	85.3	68.2	52.9	91.9	0.6	7.9	14.8	3.3	36.3	25.20	-2.12	3/1	
Saturday 2010 Pre-Match	19.1	36.8	59.7	62.1	97.4	0.1	2.5	11	3.9	47.1	25.34	-8.23	3/1	
Saturday 2010 Post-Match	47.6	66.4	62	17.6	79.9	0.5	5.1	11.7	0.6	24.9	13.58	12.68	3/1	
Saturday 2025 Pre-Match	20.9	39.3	70.9	74.6	114.8	0.1	2.7	16	5.5	139.9	117.31	-27.53	3/1	
Saturday 2025 Post-Match	53.7	68.9	73.6	24.5	94.5	0.6	5.4	17.7	0.7	40.3	23.55	-4.99	3/1	

Table 7.5 – Junction 1 – LINSIG Results Scenario 2

Scenario 2	Link	Deg Sat (%)					Mean Max Queue (PCU)					Total Network Delay (PCUhr)	Worst PRC (%)	Worst PRC (Link)
		1/1	1/2	2/1	2/2	3/1	1/1	1/2	2/1	2/2	3/1			
Weekday 2010 AM Peak	52.2	96	52.2	71.3	91.6	0.5	11.4	8.4	6.4	36.1	27.88	-6.65	1/2	
Weekday 2010 PM Peak	46	74.5	57.5	37	77.4	0.4	6.1	10	1.4	23.4	14.68	16.31	3/1	
Weekday 2025 AM Peak	59.2	104.7	61.9	106	108.7	0.7	17.1	11.7	25.9	101.6	109.06	-20.75	3/1	
Weekday 2025 PM Peak	54	81.2	68.2	46.1	91.8	0.6	7.1	14.8	2.3	36.2	23.81	-2.02	3/1	
Saturday 2010 Pre-Match	17.3	33.2	59.7	56.5	96.8	0.1	2.2	11	3.3	45.2	23.70	-7.56	3/1	
Saturday 2010 Post-Match	45.5	63.3	62	14.8	79.1	0.4	4.8	11.7	0.5	24.4	13.02	13.78	3/1	
Saturday 2025 Pre-Match	19	35.7	70.9	71.3	114.2	0.1	2.4	16	4.9	136	112.97	-26.86	3/1	
Saturday 2025 Post-Match	51.4	65.9	73.6	21	93.7	0.5	5.1	17.7	0.6	39.1	22.25	-4.13	3/1	

Table 7.6 – Junction 1 – LINSIG Results Scenario 3

Scenario 3	Link	Deg Sat (%)					Mean Max Queue (PCU)					Total Network Delay (PCUhr)	Worst PRC (%)	Worst PRC (Link)
		1/1	1/2	2/1	2/2	3/1	1/1	1/2	2/1	2/2	3/1			
Weekday 2010 AM Peak	52.2	96	52.2	71.3	91.6	0.5	11.4	8.4	6.4	36.1	27.88	-6.65	1/2	
Weekday 2010 PM Peak	46	74.5	57.5	37	77.4	0.4	6.1	10	1.4	23.4	14.68	16.31	3/1	
Weekday 2025 AM Peak	59.2	104.7	61.9	106	108.7	0.7	17.1	11.7	25.9	101.6	109.06	-20.75	3/1	
Weekday 2025 PM Peak	54	81.2	68.2	46.1	91.8	0.6	7.1	14.8	2.3	36.2	23.81	-2.02	3/1	
Saturday 2010 Pre-Match	21.1	39.8	59.7	121.5	106.8	0.1	2.7	11	49.7	90.2	105.56	-35.05	2/2	
Saturday 2010 Post-Match	99.9	141.4	62	20.5	80.7	28	56.6	11.7	0.7	25.5	76.22	-57.14	1/2	
Saturday 2025 Pre-Match	22.4	42.4	70.9	129.5	124.1	0.1	2.9	16	64.2	200.5	109.06	-20.75	3/1	
Saturday 2025 Post-Match	110.1	144	73.6	28.1	95.3	61.8	59.6	17.7	0.8	42	109.58	-59.97	1/2	

Table 7.7 – Junction 2 – ARCADY Results, Base Flows

Junction 2		Base Traffic Flow		RFC				Queue (Vehs)			
Year	Time	Scenario	A	B	C	D	A	B	C	D	
2010	Weekday AM Peak 08:30-08:45	Base	74%	59%	53%	82%	2.7	1.4	1.1	4.2	
2010	Weekday PM Peak 17:30-17:45	Base	62%	54%	63%	73%	1.6	1.2	1.7	2.7	
2010	Sat Pre Match 14:15-14:30	Base	67%	50%	58%	58%	2.0	1.0	1.4	1.4	
2010	Sat Post Match 16:45-17:00	Base	52%	45%	54%	59%	1.0	0.8	1.2	1.4	
2025	Weekday AM Peak 08:30-08:45	Base	99%	78%	68%	103%	19.4	3.3	2.0	35.8	
2025	Weekday PM Peak 17:30-17:45	Base	82%	70%	73%	90%	4.1	2.3	2.7	7.7	
2025	Sat Post Match 16:45-17:00	Base	67%	57%	67%	74%	2.0	1.3	2.1	2.8	
2025	Sat Pre Match 14:30-14:45	Base	66%	66%	76%	71%	2.0	1.9	3.0	2.5	

Table 7.8 – Junction 2 – ARCADY Results, Scenario 1A

Junction 2			Scenario	RFC				Queue (Vehs)			
Year	Time	Scenario		Arm				Arm			
				A	B	C	D	A	B	C	D
2010	Weekday AM Peak	08:30-08:45	1A	74%	57%	48%	79%	2.7	1.3	0.9	3.7
2010	Weekday PM Peak	17:30-17:45	1A	66%	58%	67%	76%	1.9	1.4	2.0	3.0
2010	Sat Pre Match	14:15-14:30	1A	70%	54%	61%	60%	2.2	1.1	1.5	1.5
2010	Sat Post Match	16:45-17:00	1A	55%	46%	55%	68%	1.2	0.9	1.2	2.1
2025	Weekday AM Peak	08.30-08.45	1A	101%	79%	68%	106%	17.8	3.5	2.1	41.3
2025	Weekday PM Peak	17.30-17.45	1A	86%	76%	78%	93%	5.5	3.0	3.3	9.3
2025	Sat Pre Match	14.30-14.45	1A	70%	70%	80%	72%	2.3	2.3	3.8	2.7
2025	Sat Post Match	16.45-17.00	1A	72%	59%	68%	85%	2.5	1.4	2.2	5.3

Table 7.9 – Junction 2 – ARCADY Results, Scenario 1B

Junction 2			Scenario	RFC				Queue (Vehs)			
Year	Time	Scenario		Arm				Arm			
				A	B	C	D	A	B	C	D
2010	Weekday AM Peak	08:30-08:45	1B	75%	60%	54%	83%	2.9	1.5	1.2	4.5
2010	Weekday PM Peak	17:30-17:45	1B	64%	56%	65%	75%	1.8	1.3	1.8	2.8
2010	Sat Pre Match	14:15-14:30	1B	69%	52%	60%	61%	2.2	1.1	1.5	1.6
2010	Sat Post Match	16:45-17:00	1B	55%	47%	55%	67%	1.2	0.9	1.2	2.0
2025	Weekday AM Peak	08.30-08.45	1B	100%	79%	68%	104%	21.9	3.5	2.1	40.6
2025	Weekday PM Peak	17.30-17.45	1B	84%	73%	76%	91%	4.8	2.7	3.0	8.3
2025	Sat Pre Match	14.30-14.45	1B	69%	69%	78%	73%	2.3	2.2	3.5	2.8
2025	Sat Post Match	16.45-17.00	1B	72%	60%	69%	84%	2.5	1.5	2.3	5.0

Table 7.10 – Junction 2 – ARCADY Results, Scenario 2

Junction 2			RFC				Queue (Vehs)				
Year	Time	Scenario	Arm				Arm				
			A	B	C	D	A	B	C	D	
2010	Weekday AM Peak	08:30-08:45	2	74%	59%	54%	82%	2.8	1.4	1.2	4.2
2010	Weekday PM Peak	17:30-17.45	2	63%	55%	64%	74%	1.7	1.2	1.8	2.7
2010	Sat Pre Match	14:15-14:30	2	67%	52%	60%	59%	2.1	1.1	1.5	1.5
2010	Sat Post Match	16:45-17:00	2	54%	45%	54%	66%	1.2	0.8	1.2	1.9
2025	Weekday AM Peak	08.30-08.45	2	99%	78%	68%	103%	19.7	3.3	2.0	35.9
2025	Weekday PM Peak	17.30-17.45	2	83%	72%	75%	91%	4.5	2.5	2.9	7.9
2025	Sat Pre Match	14.30-14.45	2	89%	68%	76%	75%	6.7	2.1	3.0	3.1
2025	Sat Post Match	16.45-17.00	2	71%	58%	68%	83%	2.3	1.4	2.1	4.7

Table 7.11 – Junction 2 – ARCADY Results, Scenario 3

Junction 2			RFC				Queue (Vehs)				
Year	Time	Scenario	Arm				Arm				
			A	B	C	D	A	B	C	D	
2010	Weekday AM Peak	08:30-08:45	3	74%	60%	54%	82%	2.8	1.5	1.2	4.2
2010	Weekday PM Peak	17:30-17.45	3	63%	55%	64%	74%	1.7	1.2	1.8	2.7
2010	Sat Pre Match	14:15-14:30	3	57%	61%	68%	56%	1.4	1.5	2.1	1.3
2010	Sat Post Match	16:45-17:00	3	60%	47%	54%	83%	1.5	0.9	1.2	4.6
2025	Weekday AM Peak	08.30-08.45	3	99%	78%	68%	103%	19.7	3.3	2.0	35.9
2025	Weekday PM Peak	17.30-17.45	3	83%	72%	75%	91%	4.5	2.5	2.9	7.9
2025	Sat Pre Match	14.30-14.45	3	73%	76%	87%	72%	2.8	3.1	6.1	2.6
2025	Sat Post Match	16.45-17.00	3	78%	59%	68%	101%	3.3	1.5	2.2	27.4

Table 7.12 – Junction 2 – ARCADY Results, Scenario 4

Junction 2			RFC				Queue (Vehs)				
Year	Time	Scenario	Arm				Arm				
			A	B	C	D	A	B	C	D	
2010	Weekday AM Peak	08:30-08:45	4	80%	61%	56%	84%	3.8	1.5	1.2	4.8
2010	Weekday PM Peak	17:30-17.45	4	70%	56%	67%	78%	2.2	1.3	2.0	3.5
2025	Weekday AM Peak	08.30-08.45	4	105%	79%	69%	106%	43.2	3.6	2.2	49.0
2025	Weekday PM Peak	17.30-17.45	4	86%	72%	78%	96%	5.6	2.6	3.4	12.9

Table 7.13 – Junction 2 – ARCADY Results, Scenario 5

Junction 2			RFC				Queue (Vehs)				
Year	Time	Scenario	Arm				Arm				
			A	B	C	D	A	B	C	D	
2010	Weekday AM Peak	08:30-08:45	5	74%	59%	54%	82%	2.8	1.4	1.2	4.4
2010	Weekday PM Peak	17:30-17:45	5	63%	54%	64%	73%	1.7	1.2	1.7	2.7
2025	Weekday AM Peak	08:30-08:45	5	99%	78%	68%	104%	18.9	3.3	2.1	39.2
2025	Weekday PM Peak	17:30-17:45	5	83%	71%	73%	90%	4.5	2.4	2.7	7.7

Table 7.14 – Junction 3 –PICADY Results, Base Flow

Junction 3 Base Flows		Ratio of Flow to Capacity						Queue Lengths					
Year	Period	Movement						Movement					
		B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B	B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B
2010	08:30-08:45	49%	30%	2%	5%	21%	9%	0.9	1.2	0.0	0.1	0.3	0.1
2010	17:30-17:45	12%	43%	3%	5%	20%	20%	0.1	4.0	0.0	0.1	0.2	0.2
2025	08:00-08:15	31%	53%	2%	4%	33%	6%	0.4	14.9	0.0	0.0	0.5	0.1
2025	17:30-17:45	14%	51%	3%	7%	31%	21%	0.2	13.3	0.0	0.1	0.4	0.3

Table 7.15 – Junction 3 –PICADY Results, Scenario 4

Junction 3 Scenario 4		Ratio of Flow to Capacity						Queue Lengths					
Year	Period	Movement						Movement					
		B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B	B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B
2010	08:00-08:15	27%	50%	4%	6%	61%	6%	0.4	7.7	0.0	0.1	1.5	0.1
2010	17:45-18:00	10%	43%	3%	9%	58%	14%	0.1	4.4	0.0	0.1	1.3	0.2
2025	08:00-08:15	33%	58%	4%	7%	85%	7%	0.5	26.2	0.0	0.1	3.6	0.1
2025	17:45-18:00	12%	50%	3%	12%	93%	15%	0.1	20.3	0.0	0.1	5.3	0.2

Table 7.16 – Junction 3 –PICADY Results, Scenario 5

Junction 3		Ratio of Flow to Capacity						Queue Lengths					
Scenario 5		Movement						Movement					
Year	Period	B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B	B-ACD	A-BC	A-D	AB-D	D-ABC	CD-B
2010	08:00-08:15	26%	45%	2%	4%	25%	5%	0.3	4.7	0.0	0.0	0.3	0.1
2010	17:30-17.45	12%	44%	3%	5%	26%	20%	0.1	4.3	0.0	0.1	0.3	0.2
2025	08:00-08:15	31%	54%	3%	5%	35%	6%	0.4	15.0	0.0	0.1	0.5	0.1
2025	17.30-17.45	15%	52%	3%	7%	40%	21%	0.2	15.1	0.0	0.1	0.6	0.3

Table 7.17 – Junction 4 –PICADY Results, Base Flows

Junction 4		Ratio of Flow to Capacity			Queue Lengths		
Base Flows		Movement			Movement		
Year	Period	B-AC	C-A	C-B	B-AC	C-A	C-B
2010	08:00-08:15	10%	46%	46%	0.1	0.8	0.9
2010	17:30-17.45	11%	46%	47%	0.1	0.8	0.9
2025	08:00-08:15	15%	55%	55%	0.2	1.2	1.2
2025	17.30-17.45	15%	54%	54%	0.2	1.2	1.2

Table 7.18 – Junction 4 –PICADY Results, Scenario 4

Junction 4		Ratio of Flow to Capacity			Queue Lengths		
Scenario 4		Movement			Movement		
Year	Period	B-AC	C-A	C-B	B-AC	C-A	C-B
2010	08:00-08:15	24%	50%	50%	0.3	1.0	1.0
2010	17:30-17.45	26%	51%	52%	0.3	1.0	1.1
2025	08:00-08:15	38%	59%	58%	0.6	1.4	1.4
2025	17.30-17.45	39%	59%	59%	0.6	1.5	1.4

Table 7.19 – Junction 4 –PICADY Results, Scenario 5

Junction 4 Scenario 5		Ratio of Flow to Capacity			Queue Lengths		
Year	Period	Movement			Movement		
		B-AC	C-A	C-B	B-AC	C-A	C-B
2010	08:00-08:15	10%	46%	46%	0.1	0.8	0.9
2010	17:30-17.45	11%	46%	47%	0.1	0.8	0.9
2025	08:00-08:15	15%	55%	55%	0.2	1.2	1.2
2025	17.30-17.45	15%	54%	54%	0.2	1.2	1.2

Table 7.20 – Junction 5 –PICADY Results, Base Flows

Junction 5 Base Flows		Ratio of Flow to Capacity						Queue Lengths					
Year	Period	Movement						Movement					
		B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC
2010	08:00-08:15	19%	46%	47%	16%	2%	0.2	0.8	0.9	0.2	0.0	19%	46%
2010	17:30-17.45	15%	47%	48%	4%	10%	0.2	0.9	0.9	0.0	0.1	15%	47%
2025	08:00-08:15	24%	55%	56%	22%	2%	0.3	1.2	1.2	0.3	0.0	24%	55%
2025	17.30-17.45	19%	56%	56%	6%	11%	0.2	1.3	1.3	0.1	0.1	19%	56%

Table 7.21 – Junction 5 –PICADY Results, Scenario 4

Junction 5 Scenario 4		Ratio of Flow to Capacity						Queue Lengths					
Year	Period	Movement						Movement					
		B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC
2010	08:00-08:15	21%	50%	51%	40%	3%	0.3	0.9	1.0	0.7	0.0	21%	50%
2010	17:30-17.45	16%	53%	53%	10%	11%	0.2	1.1	1.1	0.1	1.0	16%	53%
2025	08:00-08:15	27%	59%	59%	53%	3%	0.4	1.4	1.4	1.1	0.0	27%	59%
2025	17.30-17.45	21%	62%	62%	13%	12%	0.3	1.6	1.6	0.2	0.1	21%	62%

Table 7.22 – Junction 5 –PICADY Results, Scenario 5

Junction 5		Ratio of Flow to Capacity					Queue Lengths						
Scenario 5		Movement					Movement						
Year	Period	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC
2010	08:30-08:45	26%	54%	56%	30%	13%	0.3	1.1	1.2	0.4	0.1	26%	54%
2010	17:30-17:45	15%	47%	48%	6%	10%	0.2	0.9	0.9	0.1	0.1	15%	47%
2025	08:00-08:15	25%	56%	56%	23%	2%	0.3	1.2	1.3	0.3	0.0	25%	56%
2025	17:30-17:45	19%	57%	57%	7%	11%	0.2	1.3	1.3	0.1	0.1	19%	57%

Table 7.23 – Junction 6 –PICADY Results, Base Flows

Junction 6		Ratio of Flow to Capacity					Queue Lengths						
Base Flows		Movement					Movement						
Year	Period	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B		
2010	08:00-08:15	36%	47%	51%	11%	8%	0.5	0.8	1.0	0.1	0.1		
2010	17:30-17:45	62%	48%	51%	28%	22%	1.5	0.9	1.1	0.4	0.3		
2025	08:00-08:15	46%	57%	60%	14%	10%	0.8	1.2	1.5	0.2	0.1		
2025	17:30-17:45	80%	58%	60%	36%	24%	3.1	1.4	1.6	0.6	0.3		

Table 7.24 – Junction 6 –PICADY Results, Scenario 4

Junction 6		Ratio of Flow to Capacity					Queue Lengths						
Scenario 4		Movement					Movement						
Year	Period	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B		
2010	08:00-08:15	45%	57%	63%	27%	10%	0.8	1.2	1.6	0.4	0.1		
2010	17:15-17:30	15%	64%	66%	68%	25%	0.2	1.7	1.8	2.0	0.3		
2025	08:00-08:15	60%	69%	72%	35%	11%	1.4	2.0	2.4	0.5	0.1		
2025	17:30-17:45	48%	72%	72%	94%	26%	0.9	2.6	2.7	7.9	0.4		

Table 7.25 – Junction 6 –PICADY Results, Scenario 5

Junction 6		Ratio of Flow to Capacity					Queue Lengths				
Scenario 5		Movement					Movement				
Year	Period	B-ACD	A-BC	A-D	D-ABC	C-B	B-ACD	A-BC	A-D	D-ABC	C-B
2010	08:30-08:45	38%	50%	54%	11%	8%	0.6	0.9	1.2	0.1	0.1
2010	17:15-17:30	12%	53%	55%	37%	23%	0.1	1.1	1.2	0.6	0.3
2025	08:00-08:15	49%	60%	63%	14%	10%	0.9	1.4	1.7	0.2	0.1
2025	17:15-17:30	15%	64%	64%	48%	26%	0.2	1.8	1.7	0.9	0.3

8. Road Safety

8.1 The accident history of the highway network adjacent to the potential development sites for the six year period January 2002 to December 2006 has been analysed to identify if any increase in development related traffic would be likely to lead to an increase in accidents.

8.2 At the six junctions assessed in the modelling there have been 56 recorded personal injury road traffic accidents in the last six years and a further 12 between the junctions. Details of these accidents are shown in the Appendix C.

Junction 1 – Claro Road/Skipton Road

8.3 The accident rate is slightly greater than one accident a year which is well below levels that would warrant particular concern. There is no predominant accident pattern. The anticipated increases in vehicle flows are unlikely to affect the accident rate at this junction.

Junction 2 – Wetherby Road Roundabout

8.4 There are 14 recorded accidents at this site over the six year period which equates to three accidents per year. A further 4 accidents were on the links leading to this junction. Again the accident rate is not one of great concern. The accident types are mainly shunts and failure to conform, which are common at this type of junction.

8.5 Of concern are the three loss of control accidents indicating that motorists are either entering the roundabout too fast for their abilities, or there could be an issue with the surfacing. The number is however very low and no such accidents were recorded in 2006.

Junction 3 – Knaresborough Road/Birstwith Road

8.6 This junctions has a good safety record with only three recorded injury accidents in the last six years, two of which involved pedestrians crossing Knaresborough Road.

Junction 4 – Leyland Road/Knaresborough Road

8.7 As with junction three, pedestrian accidents dominate with three out of the four accidents involving pedestrians or bus passengers. This relatively low accident rate is not of a level to warrant any great concern.

Junction 5 – Ryland Road/Knaresborough Road

8.8 There are no recorded accidents at this junction although there are a small number of shunt type accidents along Knaresborough Road on the approaches to this junction.

Junction 6 – Kingsley Road/Knaresborough Road

8.9 There have been five accidents in the period in the vicinity of this junction, two of which involved pedal cyclists. The accident rate is not significant and does not warrant any priority action.

Summary

- 8.10 The highway network in the vicinity of the potential developments has a relatively good safety record. There are a number of shunt type accidents along Knaresborough Road which may be attributable to queuing for the level crossing rather than just turning traffic. The level and movements of development induced traffic is not expected to lead to any change in the accident patterns.
- 8.11 Although no accident problems have been identified and accident levels are below the level at which intervention should be made, any future development accessed via Birstwith Road, Rydal Road, or Kingsley Road could give rise to problems. Leyland Road is the only junction which has adequate visibility in both directions.

9. Sustainable Transport

- 9.1 This section of the report looks at how the sites (both Claro Road and Kingsley Drive) can be accessed by sustainable modes of travel. It looks at all available modes which link to the Claro Road and Kingsley Drive area and the links within the site. The focus of this section is on public transport provision, walking and cycling.

INFORMAL CAR SHARING

- 9.2 In relation to the use of the Football Club, the Rugby Club and the informal sports pitches at the public open space (at least one is included in each scenario), anecdotal evidence of this type of land use suggests a fairly high level of car sharing with both home teams and visiting teams tending to arrive in shared cars. This is supported by observations during the traffic counts undertaken at Killinghall Moor Community Park., where people commonly arrived with 2, 3 and 4 people in one car.

BUS SERVICES

- 9.3 Harrogate Rugby Club is well served by buses on Claro Road and Knaresborough Road. Figures 9.3, 9.4 and 9.5 show the route and frequency of these services and the bus stops are which located within the vicinity of the rugby club along Knaresborough Road and Claro Road.

Knaresborough Road

- 9.4 Knaresborough Road, which is a five minute walk from the rugby club, is served by services 100, 101, 102 which run between Harrogate and Knaresborough. These services provide a 7-8 minute frequency service during the day and a 15 minute service during evenings. A reduced Sunday service of 15 minute daytime and 30 minute evening frequency is provided. The stop facilities are good, with modern, covered shelters and real time information displays. See figure 9.1.
- 9.5 The local service 104 also runs along Knaresborough road and provides a limited hourly daytime circular service between Harrogate town centre, the district hospital and Wedderburn. This service does not run on Saturdays or Sundays.

Claro Road

- 9.6 Claro Road is less well served than Knaresborough Road but retains a local service 111 which stops adjacent to the club. Service 111 is a limited hourly service and runs during the daytime Mondays to Saturdays between the Bus Station and Claro Road. An additional 16:35 service is run on Saturdays. There is no service on Sundays.
- 9.7 Service information relating to appropriate buses should be made available at the sports clubs, five-a-side centre and at the public open space facilities.

Figure 9.1 – View east down Knaresborough Road



WALKING

- 9.8 Claro Road and Knaresbrough Road are close to the town centre and within walking distance of it. The walking distance from the town centre and train station is approximately 15 minutes from Claro Road and 20 minutes to Kingsley Drive. This is considered to be a reasonably short walk. It is not known how many people visiting the sorts clubs and public open space would walk from the town centre. If however any of the site was develop for residential use, as some of the scenarios indicate, the good links with the town centre, train station and bus station would become very important. To walk from the town centre it would be quickest to cut through the residential area and use Westmorland Street and East Parade.
- 9.9 During the site visits it was noted that school children from Harrogate Granby High School used informal routes across the land to the north of Kingsley Drive. The land is currently unkept grass. (See Figure 9.2 below which shows a view looking east down Kingsley Drive). The land is criss-crossed by informal mud paths which indicate that there is a high level of pedestrian activity here. This area is close to residential areas and therefore if it was to be used (formally) as public open space, it is likely that quite a high level of people would walk there from the surrounding residential estates.

Figure 9.2 – Open space, looking east down Kingsley Drive.

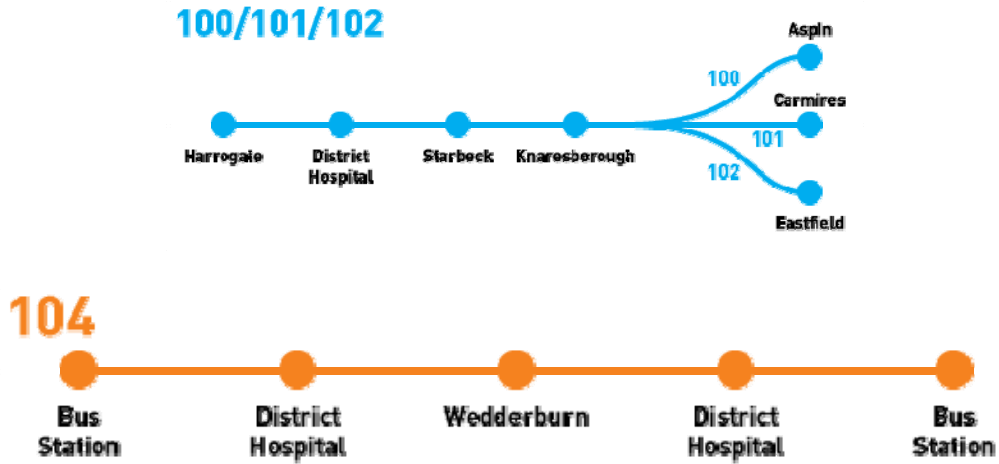


- 9.10 School children also use various routes through from Kingsley Drive to Knaresbrough Road (mainly Birstwith Road) to access the bus routes on Knarebrough Road. The High School operates a lockable gate system which allows children access out of the rear of the school towards Birstwith Road and Slingsby Crescent, at certain times of the day.

CYCLING

- 9.11 Kingsley Drive is promoted as an advisory cycle route and provides a link to a traffic free disused railway line to the east that provides access to Starbeck station where there are cycle storage facilities.
- 9.12 The sports clubs, the five-a-side centre and the use of the public open space for informal sports pitches are places where cycling facilities should be provided to encourage cycling. If any development scenario is carried forward, the inclusion of safe secure and covered cycle parking facilities should be included in the design of the sports facilities and public open space changing facilities.

Figure 9.3- Buses Running on A59 Knaresborough Road



Source: www.harrogateanddistrict.co.uk

No.	Route	Mon-Fri Frequency	Sat Frequency	Sunday Frequency
100,101,102	Harrogate-Knaresborough	7-8mins Daytime 15mins Evenings	7-8mins Daytime 15mins Evenings	15mins Daytime 30mins Evenings
104	Bus Station-District Hospital-Wedderburn-Bus Station	1-2 hours (10:05, 11:05, 12:05, 14:05)	No Service	No Service

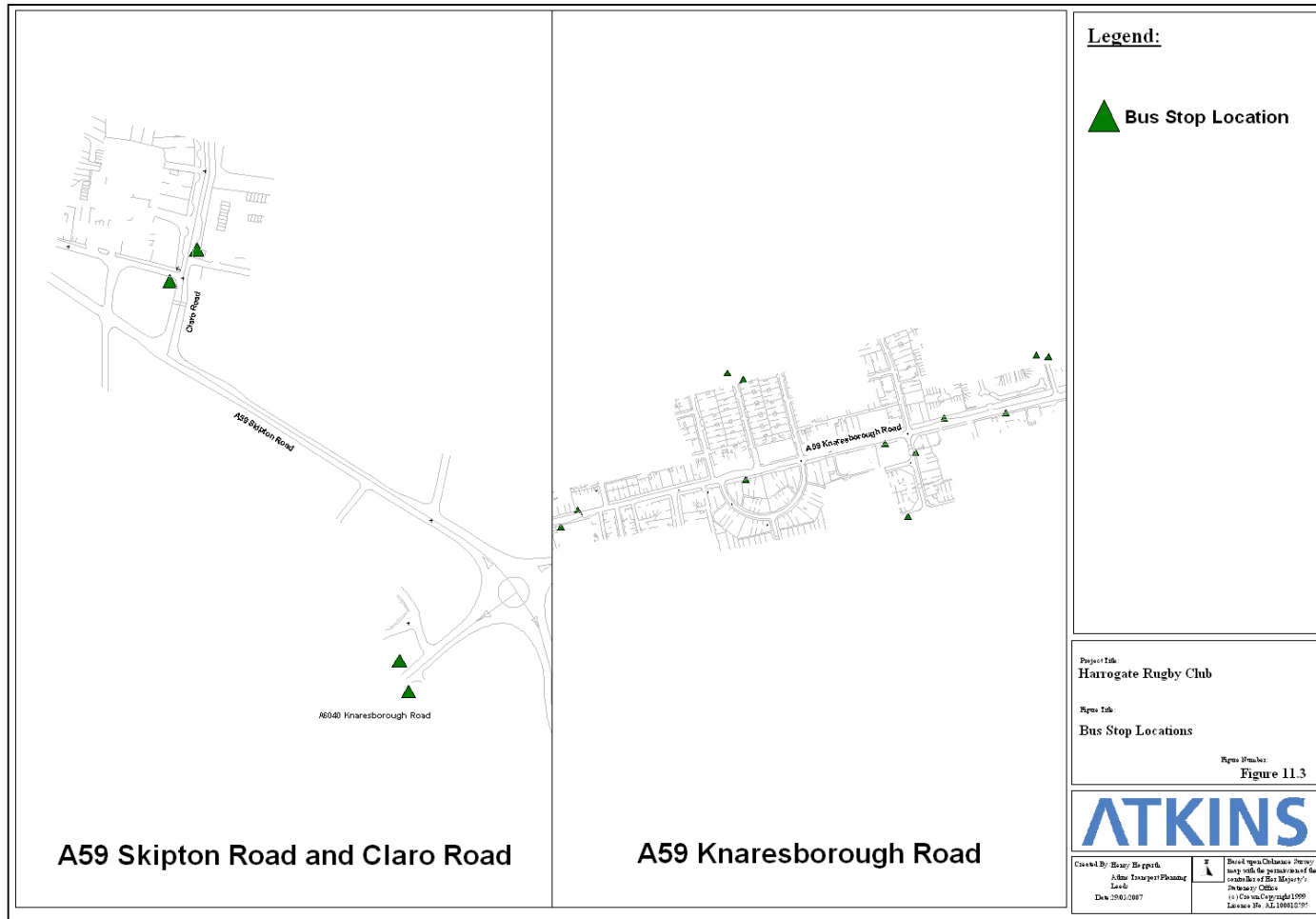
Figure 9.4 – Bus Service Running on Claro Road



www.harrogateanddistrict.co.uk

No.	Route	Mon-Fri Frequency	Sat Frequency	Sunday Frequency
111	Harrogate Bus Station-Claro Road-Harrogate Bus Station	1-2hours (10:35, 11:35, 12:35, 14:35)	1-2hours (10:35, 12:35, 14:35, 16:35)	No Service

Figure 9.5 – Bus Stop Locations on Claro Road and Knaresborough Road



10. Car Parking in association with public open space at Kingsley Drive

- 10.1 This section relates to the car parking facilities which would be required in association with the public open space included in Scenarios 4 and 5.
- 10.2 Scenarios 4 and 5 are to be accessed via various roads between the A59 Knaresborough Road and Kingsley Drive (these options will not be accessed via Claro Road).

Option 4

- ◆ 465 residential units
- ◆ Public Open space to include senior and junior rugby and football pitches for informal use (with a small changing facility associated with the sports pitches)
- ◆ Off-street parking spaces associated with the public open space.

Option 5

- ◆ Public Open space to include senior and junior rugby and football pitches for informal use (with a small changing facility associated with the sports pitches)
- ◆ Off-street parking spaces associated with the public open space.

- 10.3 As discussed in Chapter 2, we understand that the open space will include senior and junior rugby and football pitches. The Council sports officer confirmed that it is likely that there will be 4 football pitches and 2 rugby pitches and the expected traffic generation has been based on these numbers of pitches.
- 10.4 The sports pitches will be run and managed by the Council on a similar basis to those at Killinghall Moor Community Park, in the north west of Harrogate. There are 6 pitches at Killinghall Moor i.e. the same number of pitches proposed for the land off Kingsley Drive. It is therefore reasonable to assume that a similar amount of car parking will be required at Kingsley Drive, to that provided at Killinghall Moor Community Park. Based on this assumption, around 90 car parking spaces will be required at the open space / informal sports pitch provision at Kingsley Drive.
- 10.5 During the site visit and traffic counts, there was no evidence of on-street parking taking in association with the sports pitches, taking place in the residential area around Killinghall Moor. Every car which came into the car park found a space. This suggests that a sufficient number of spaces are provided.
- 10.6 We understand that the residents of the streets between Knaresborough Road and Kingsley Drive, and including Kingsley Drive are concerned about an increase in on-street parking as a result of formalised use of the public open space. They are concerned that on-street parking could take place within the residential area if the land to the north of Kingsley Drive is developed as formal public open space including sports pitches. To overcome these concerns it would be necessary to provide adequate off street parking as part of any development proposal, including development of the area as public open space. Close consideration would also need to be paid to the design of the public open space to discourage on street parking.

10.7 Some of the southern ends of the streets closest to Kingsley Drive are controlled parking zones. See figure 10.1. These streets include Hurstleigh Terrace, Roseville Road and Roseville Avenue. These areas of controlled parking are mainly to prevent parking in association with Harrogate District Hospital. An extension to the controlled parking scheme is not currently planned, and any such scheme would need to be developed following full consultation with local residents.

Figure 10.1 – Controlled parking zone on Roseville Road



11. Conclusions and Recommendations

General

- 11.1 There are a number of potential development options for the area around the Harrogate Rugby Union Football Club. This report has detailed the traffic modelling of the highway network in the vicinity of the Rugby Club for a number of scenarios that include provision of rugby and football club facilities, public open space, a five-a-side football centre, and various levels of residential development.
- 11.2 The five development scenarios described in this report have been modelled on the following junctions:
- ◆ Junction 1 - Claro Road/Skipton Road
 - ◆ Junction 2 - Skipton Road/Knaresborough Road Roundabout
 - ◆ Junction 3 – Birstwith Road/Knaresborough Road
 - ◆ Junction 4 – Leyland Road/Knaresborough Road
 - ◆ Junction 5 – Rydal Road/Knaresborough Road
 - ◆ Junction 6 – Kingsley Road/Knaresborough Road

Impact of Scenario 1A

- 11.3 Development Scenarios 1A and 1B consist of combinations of sports facilities and different levels of private housing.
- 11.4 The impacts of scenario 1A on Junctions 1 and 2 exacerbate the problems which have been highlighted in the base scenario.
- ◆ At Junction 1 during weekday peaks, the impacts are most significant on the Claro Road arm of the junction, at weekends the most significant impacts are on the A59 Skipton Road West arm, which is over capacity in the base.
 - ◆ At junction 2 the impacts are marginal with only modest increases in degrees of saturation and queues, no arms are over capacity at 2010 and by 2025 only those arms over capacity in the base are over capacity in Scenario 1A.
- 11.5 This scenario does have an impact, albeit on movements which are predicted to be over capacity in the base. In order to provide for this development option some form of capacity enhancement or acceptance of a lower level of operational service on the highway network would have to be made.

Impact of Scenario 1B

- 11.6 The level of development in Scenario 1B is less than that in Scenario 1A and therefore the impacts are less. Nevertheless, as with Scenario 1A, Scenario 1B exacerbates those movements at Junctions 1 and 2 which were over capacity in the base situation.

- 11.7 This scenario does have an impact, albeit on movements which are predicted to be over capacity in the base. In order to provide for this development option some form of capacity enhancement or acceptance of a lower level of operational service on the highway network would have to be made.

Impact of Scenario 2

- 11.8 The impact of scenario 2 is marginal at both Junctions 1 and 2 with only modest increases in degrees of saturation and queues. The development does not cause over capacity on any arms of the junctions which are not already over capacity in the base.

- 11.9 This scenario does not have a material impact on the junctions assessed

Impact of Scenario 3

- 11.10 The impact of Scenario 3 is confined to matchday Saturdays. In scenario 3 Claro Road and A59 Skipton Road East are over capacity in 2010, a situation which does not occur in the base situation, queues are increased from only a handful of vehicles to over 50 vehicles. While A59 Skipton Road West is over capacity in the base this is made significantly worse in scenario 3 with traffic queues almost doubling to around 200 vehicles.

- 11.11 This scenario does have a material impact on the local highway network. In order to provide for this development option some form of capacity enhancement or acceptance of a lower level of operational service on the highway network would have to be made.

Impact of Scenario 4

- 11.12 The impacts of Scenario 4 have been assessed at Junctions 2,3,4,5 and 6. Junction 2 is over capacity by 2025 on both the A59 Skipton Road and A59 Knaresborough Road arms, the queue on the A59 Knaresborough Road arm doubles in length from around 20 vehicles to over 40 vehicles.

- 11.13 Junctions 4 and 5 operate within capacity and queues are modest. Junctions 3 and 6 on the other hand are over capacity by 2025.

- 11.14 In addition to the operation of the junctions, the design standards of Junction have been assessed in section 3 of this report. Only the Leyland Road junction fully meets design standards, all other junctions are deficient to varying degrees.

- 11.15 Traffic flows in the peak periods almost double on Birtswith Road, Leyland Road, Rydal Road and Kingsley Road. A doubling in flow is equivalent to a 3dB change in noise level, which is perceivable and therefore is likely to constitute a detrimental impact.

- 11.16 This development scenario does have a material impact on the operation of the local highway network and also on the local environment.

Impact of Scenario 5

- 11.17 The development scenario 5 does not have a material impact on any of the junctions assessed, namely Junctions 2, 3, 4, and 5. This is not surprising given the low level of trip generation associated with this scenario

Summary

- 11.18 Some highway capacity improvements are required to accommodate development, the main junctions being of concern are the Wetherby Road Roundabout and Claro Road junctions with the A59.
- 11.19 An analysis of the accident records has been undertaken at each of the six junctions. With regard to the six junctions, no accident problems have been identified. Accident levels are below the level at which intervention should be made.
- 11.20 This situation could change however, if the access roads off Knaresborough Road were used to serve any more dwellings, it should be noted that 3 of the 4 junctions are sub-standard in terms of visibility and only Leyland Road has adequate visibility splays.
- 11.21 The site is relatively well served by public transport, with frequent bus services along Knaresborough Road, and to a lesser extent, Claro Road. The site is also within walking distance of Harrogate Town Centre, the bus station and the railway station.