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# Redditch Local Plan – Transport Network Analysis and Mitigation Report

Document: One. Version: Six.

Worcestershire County Council

May 2013

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Worcestershire County Council

May 2013

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## Document History

### Redditch Local Plan – Transport Network Analysis and Mitigation Report

Worcestershire County Council

This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
1.0	09/2012	Draft Final Report	TM	AB	AB
2.0	03/2013	Draft Final Report	TM	AB	AB
3.0	03/2013	Draft Final Report inc C-B Sites	TM	AB	AB
4.0	04/2013	Final Report	TM	AB	AB
5.0	04/2013	Final Report	TM	AB	AB
6.0	05/2013	Final Report	TM	AB	AB

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- Appendix B Bromsgrove and Redditch – Planning Data**
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- Appendix D Infrastructure Delivery Plan – Scheme Tables**

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# 1 Executive Summary

Redditch Borough Council (RBC) is preparing its Local Plan for residential and employment development up to 2030. To assist with the development of the Local Plan, Halcrow has been commissioned to support Worcestershire County Council (WCC) with identifying the impact on the transport network of the proposed growth and developing the transport related infrastructure and services needed to best accommodate and manage the growth in demand. Halcrow are also giving advice on and preparing the transport evidence to contribute towards the Infrastructure Delivery Plans (IDPs) that Redditch Borough Council and Bromsgrove District Council will be preparing as part of their evidence base in support of their Local Plan. The identified transport infrastructure (highway, public transport, cycle and pedestrian) and public transport service requirements to support the Local Plan are based on the planning assumptions set out in the Draft Redditch Borough Local Plan (RBLP), this will include all residential and employment generating land uses across Redditch Borough.

The transport elements of the (IDP) will give details of the transport infrastructure and services that are required to support the growth set out in the RBLP. It is envisaged that the information set out in the IDP will be used to develop a Community Infrastructure Levy (CIL), and to inform and support negotiations with developers about site specific s106 agreements. The IDP will also inform the development of the Local Transport Plan 3 (LTP3) package and associated schemes such that transport improvements are integrated with and take full account of planned land use changes. This will help to avoid a piecemeal and potentially poorly targeted approach to investment in transport which will do little to support economic growth or encourage sustainable development.

This report sets out the transport mitigation measures identified as being necessary to support the delivery of the RBLP; this includes walk, cycle and passenger transport infrastructure and services. The transport schemes identified through this study aim to manage the impacts on the performance of the transport network of the development assumptions put forward through the draft RBLP and draft Bromsgrove District Plan (BDP). These assumptions include the Cross Boundary development sites proposed for the Core Scenario across the two the authority areas p to 2030. Under guidance from the Local Planning Authorities the preferred cross-boundary development scenario is Scenario 7 (i.e. Cross Boundary Sites 4 and 6) located to the west and north west of Redditch.

A key premise of this work is to recognise that the quantum of development proposed for Redditch will not only have a local transport impact (immediately adjacent to an individual site) but also an impact on Worcestershire's and the Highways Agency's local and strategic transport network further afield. The local impacts of any development can be identified, assessed and mitigation measures implemented, however for locations further away from the proposed development sites, whilst the cumulative impact of planned development on the performance of the highway and transport network may be known, their cause can be more difficult to identify.

The nature of the transport network means that a development site (or the summation of a number of small development sites) can cause a significant adverse impact some distance from the traffic generation source (development site). The congestion that occurs at pinch points throughout the network, will be caused by trips generated by cumulated demand generated by all developments both local to and remote from the congestion point. However, once the origin of these trips has been identified, an assessment of the allocation of mitigation measure costs can be identified. The methodology adopted as part of this work has developed the necessary tools to enable the identification of the source of the cumulative demand.

In order to undertake a network wide assessment of the transport network in Redditch Borough, and specifically assess the cumulative transport impact on the transport networks resulting from development sites proposed through the draft RBLP, a Vehicle/Trip Generation modelling tool was developed. The modelling tool enables:

- The calculation of the numbers of trips that each proposed development site will generate;
- An assessment of the way in which those trips will route on the network; and
- The ability to sum the trips to establish an overall impact assessment.

The Vehicle/Trip Generation modelling tool, in the form of a strategic gravity model, draws upon existing evidence and previous related studies, namely:

- Redditch Town Development Spreadsheet Model;
- Accessibility Assessments; and
- WCC Officer Workshops

Where appropriate the Vehicle/Trip Generation Model was validated for consistency against the previous studies.

In proposing future year transport infrastructure schemes, the scheme listings have, where appropriate, drawn on existing Transport Packages.

Where additional issues have been identified in and around Redditch, this project has identified further locations and modes of transport where mitigation is required to overcome or reduce the impact of proposed development on the transport network. There are locations within the Borough that do not currently have the benefit of an existing identified package of measures. Furthermore, there are some development sites that were not considered at the time previous transport studies were completed. For these sites, analysis has been undertaken to identify schemes and other mitigation measures. These required schemes have been identified with the assistance of the Vehicle/Trip Generation Model.

The transport schemes proposed have been identified to mitigate against forecast future year transport issues. That is, the proposed highway infrastructure schemes aim to improve capacity at key junctions which are anticipated to incur additional delays in future years as a result of the proposed housing and employment growth proposed for the area covered by Redditch Borough.

The proposed sustainable transport infrastructure schemes and services aim to connect the proposed development sites to the existing transport network such that they can provide both a means of transport for those without access to a car and a realistic choice of travel for those with a car, in particular for journeys to/from/within congested areas (with consequent benefits in terms of delays, journey time reliability, the environment and the economy). Where appropriate, measures are proposed to improve the existing transport network with the objective of encouraging greater use of more sustainable transport modes to meet economic and environmental objectives.

In developing the required transport schemes to mitigate against additional demand on the transport network resulting from the proposed RBLP development, Policy/Strategy, Feasibility/Deliverability and the appropriate Design Standards and Guidelines have been considered. Each of the required transport schemes has a 'cost for implementation' identified. Costs include construction costs, relevant percentage uplifts to account for scheme preparation and development costs over and above the basic construction and materials and optimism bias.

The highways, passenger transport, walk and cycle infrastructure requirements for Redditch Borough are provided below.

The infrastructure costs include a contingency allowance and "optimism bias" which are consistent with the transport industry standard approach and Department for Transport Guidance to cost estimating which reflects the level of design detail, uncertainty and risk. As the majority of the schemes in this report are at an early stage in development (in terms of design etc.) the level of contingency and optimism bias is, necessarily high. This will reduce as and when the schemes are agreed and developed further (by the private sector as part of their developments and/or the public sector subject to funding availability).



Tables 1.1 and 1.2 – Costs associated with Improved Bus Service Provision in Redditch (Table 1.1) and Inter-Urban Routes through Redditch (Table 1.2) – these services are required to support the Redditch Local Plan. Costs are Gross Annual Costs before Revenue. The net costs will be less and in some cases the services may be commercial (i.e. Farebox exceeds Opex).

Table 1.1 – Redditch Bus Operations – Service Standards and Gross Annual Costs

<b>Redditch Bus Operations - Routes and Frequencies</b>		
Note: Gold and Silver Bus Routes/Roadside Infrastructure referenced as per Worcestershire County Council Passenger Transport Infrastructure Best Practice Report (November 2007)		
<b>Location</b>	<b>Potential Scheme</b>	<b>Costs</b>
Redditch Service 50 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 51 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 52 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 61 (Developments east of the town centre)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 667,000.00
Redditch - Webheath Service	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 134,000.00
<b>SUB TOTAL</b>		<b>£ 2,001,000.00</b>

Table 1.2– Redditch Bus Operations – Inter-Urban Service Standards and Gross Annual Costs

<b>Redditch Inter-Urban Bus Operations - Routes and Frequencies</b>		
Note: Gold and Silver Bus Routes/Roadside Infrastructure referenced as per Worcestershire County Council Passenger Transport Infrastructure Best Practice Report (November 2007)		
<b>Location</b>	<b>Potential Scheme</b>	<b>Costs</b>
Inter-Urban - Service 144 - Birmingham to Worcester (via Bromsgrove and Catshill)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 2,200,000.00
Inter-Urban - Service X3 - Kidderminster to Redditch (via Bromsgrove)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,320,000.00
Inter-Urban - Service 143 - Birmingham to Redditch (via Bromsgrove and Catshill)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,680,000.00
Inter-Urban - Service 145 - Bromsgrove to Redditch (via Longbridge)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,200,000.00
<b>SUB TOTAL</b>		<b>£ 6,400,000.00</b>

WCC's Standards for a 'Gold' Bus Stop include the following (Worcestershire County Council Passenger Transport Infrastructure Best Practice Report, November 2007);

- In excess of 500 users per week;
- Bus Shelter – mainly glass construction, with seating, preferably provided by a shelter advertising company;
- Shelter Location – Preferably located as close to the boarding point as possible;
- Pole and Flag – Flag to be clearly visible from the roadside and should be integral to the bus stop, to minimise unnecessary street clutter;
- Raised Kerbs – To provide level access for buggies and wheelchairs;
- Road markings – Comprising of yellow bus-stop clearway markings, sign and red or green surfaced carriageway box;
- Timetable Information – For all routes serving the stop;
- Crossing Point; A safe place to cross the road within 50 metres of the bus stop, to include dropped kerbs and tactile paving where appropriate;
- DDA Compliant – Fully accessible for disabled people; and

- Double Length Bus Stops – Where Gold Standard bus stops are located on Premium Routes, it may be necessary to provide double length bus stops to permit express services to overtake stopping services.

WCC's Standards for a 'Silver' Bus Stop include the following (Worcestershire County Council Passenger Transport Infrastructure Best Practice Report, November 2007);

- Moderate use (250 to 499 users a week);
- Shelter Location – Preferably located as close to the boarding point as possible;
- Pole and Flag – Flag to be clearly visible from the roadside and should be integral to the bus stop to minimise unnecessary street clutter;
- Raised Kerbs – To provide level access for buggies and wheelchairs;
- Road markings – Comprising of yellow bus-stop clearway markings, sign and red or green surfaced carriageway box;
- Timetable Information; For all routes serving the stop;
- Crossing Point; A safe place to cross the road within 50 metres of the bus stop, to include dropped kerbs and tactile paving where appropriate;
- DDA Compliant – Fully accessible for disabled people; and
- Bus Shelter – A bus shelter will be provided where funding allows, of mainly glass construction with seating.

Table 1.3 – Costs associated with future year Highway Infrastructure Schemes required to support Development Assumptions in Redditch Borough

Highway Infrastructure Schemes	Costs (£/millions)	
	Total (Construction)	Ongoing Maintenance (over duration of plan period) and/or Operating Costs (first year after construction)
TOTAL	£20.9m	£1.42m
Redditch	£19.1m	£1.30m
HGV Lorry Park	£1.8m	£125k

Table 1.4 – Costs associated with future year Sustainable Transport Infrastructure Schemes in Redditch Borough

Sustainable Transport Schemes (Walking and Cycling)	Costs (£/millions)	
	Total (Construction)	Ongoing Maintenance (over duration of plan period) and/or Operating Costs (first year after construction)
Redditch TOTAL	£1.8m	£44k

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## 2 Introduction

### 2.1 Background

Redditch Borough Council (RBC) is preparing its Local Plan. To assist with the development of this strategy, Halcrow has been commissioned to support Worcestershire County Council (WCC) with identifying the impact on the transport network of the proposed growth and developing the transport related infrastructure and services needed to best accommodate and manage the growth in demand. Halcrow is also giving advice on and preparing the transport evidence to contribute towards the transport elements of the Infrastructure Delivery Plans (IDPs) that Redditch Borough will be preparing as part of their evidence base in support of its Local Plan.

The transport infrastructure (highway, public transport, cycle and pedestrian) and public transport services identified are based on the assumptions set out in the Draft Redditch Borough Local Plan (RBLP). These assumptions include the Cross-Boundary development sites proposed for the Core Scenario across the two authority areas up to 2030. Under guidance from the Local planning Authorities the preferred cross-boundary development scenario is Scenario 7 (i.e. Cross Boundary Sites 4 and 6) located to the west and north west of Redditch.

This report focuses on the findings of the study relating to Redditch Borough Council.

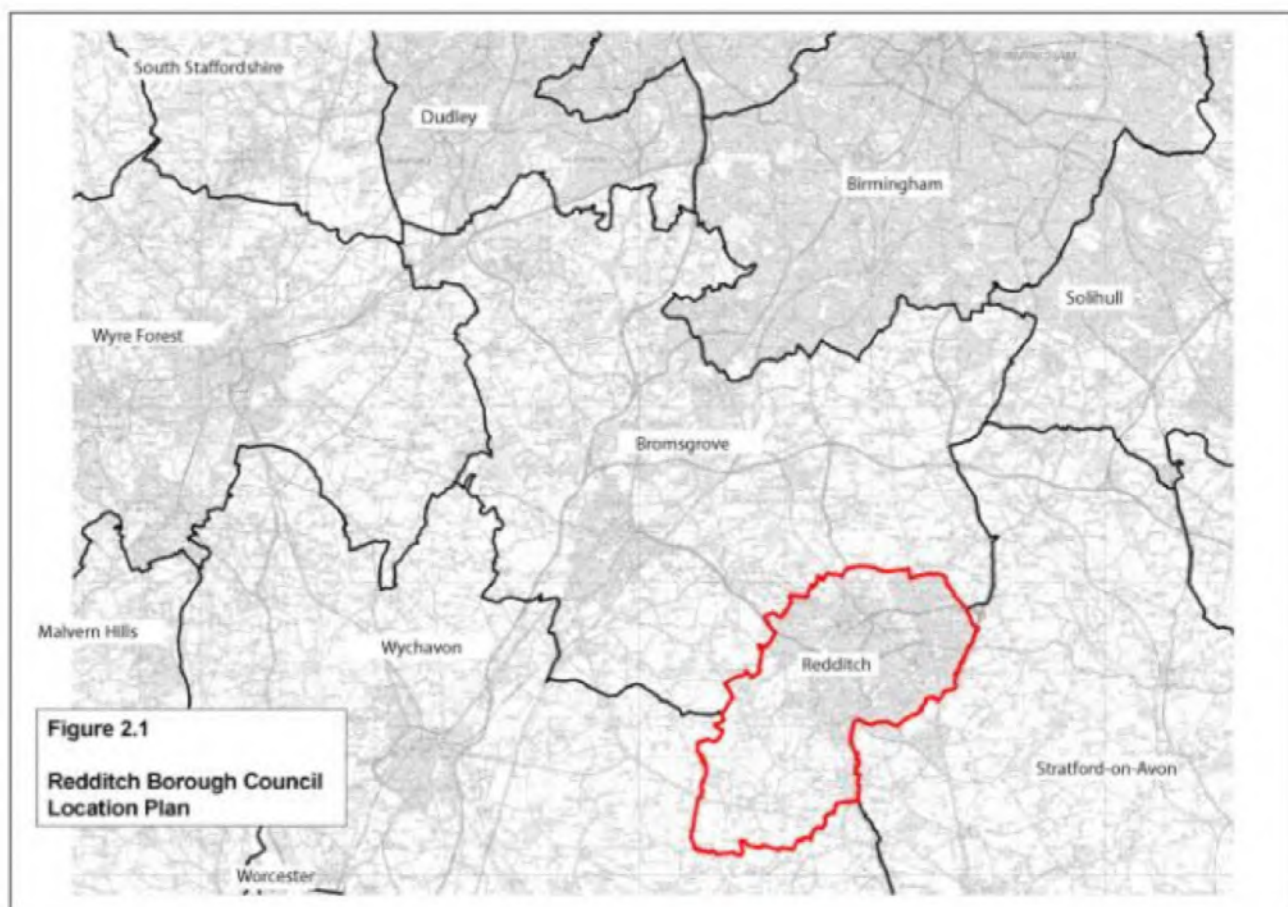
The Redditch Borough Local Plan (RBLP) considers the long term vision and objectives for Redditch Borough Council up to the year 2030, and includes the policies for delivering these objectives in a planned and cohesive manner, through:

- providing policies to ensure that all development is sustainable;
- allocating larger 'strategic' sites across Redditch Borough;
- identifying infrastructure requirements to support the delivery of the development plan, including transport, education, health, water and energy. This will be the Infrastructure Delivery Plan; and
- assessing all other potential development sites whether it is for housing, employment, retail, education, health, community use or indeed an open space use.

The RBLP will replace the existing Local Plan No.3 for Redditch Borough when it is adopted in September 2014.

Figure 2.1 shows the relationship of the Redditch Borough with Bromsgrove District.

Figure 2.1 – Redditch Borough Council Location Plan



## 2.2 Purpose of this report

This report and its appendices provide details of the infrastructure that is required to support the growth set out in the RBLP. As such it is expected that the findings of this report will be used to inform the transport elements of the Infrastructure Delivery Plan (IDP) for the RBLP. As such it provides supporting evidence to demonstrate the way in which the transport schemes contribute towards the wider aims of the RBLP.

It is envisaged that the information set out in the IDP will be used to develop a Community Infrastructure Levy (CIL), and to inform and support negotiations with developers about site specific s106 agreements. The IDP will also inform the development of associated schemes such that transport improvements are integrated with and take full account of planned land use changes. This will help to avoid a piecemeal and potentially poorly targeted approach to investment in transport which will do little to support economic growth or encourage sustainable development. The report and its appendices contains a description of the adopted methodology used to derive the list of proposed transport schemes and sets the work in the context of other transport evidence work recently undertaken for Redditch. The methodology adopted through this study, agreed between Halcrow and WCC through Officer Meetings and Workshops, has created a means of providing an evidence base for the transport infrastructure (highway, public transport, cycle and pedestrian) and passenger transport services necessary to mitigate the transport (vehicle access and

movements, multi-modal trip generation) impacts of the planned (vehicle access and movements, multi-modal trip generation) of the development sites identified in the draft RBLP.

## 2.3 Structure of this report

Following this introductory chapter:

- Chapter 3 sets out the methodology followed to identify schemes. This includes an introduction to the spreadsheet based Vehicle/Trip Generation transport model used to assess future trip generation by all modes of transport;
- Chapter 4 considers previous transport evidence work undertaken in Redditch and how this comprehensive review has drawn upon and complemented the previous work undertaken;
- Chapter 5 describes the baseline performance of the transport network; and
- Chapter 6 introduces and contains the scheme tables.

The report contains four appendices:

- Appendix A: Modelling Assessment Tool: Contents and Description;
- Appendix B: Redditch Local Plan – Planning Data;
- Appendix C: Forecast number of trips from development sites by mode; and
- Appendix D: Infrastructure Delivery Plan – Transport Scheme Tables.

## 3 Methodology

### 3.1 Introduction

The methodology used to complete this project was agreed jointly between Halcrow, Worcestershire County Council and the Local Planning Authorities. Further details on the methodology are provided in Appendix A.

The methodology adopted has:

- Considered previous work, evidence and relevant policy guidance (including the Redditch Development Sites Highway Impact and Accessibility Modelling Report (May 2011), The Worcestershire Local Sustainable Transport Fund – ‘Choose how you move in Redditch’ and Redditch Borough Council – Town Centre Strategy (September 2009);
- Agreed parameters for the project with WCC and Redditch Borough Council;
- Established the transport network and infrastructure baseline conditions for Redditch (for both the existing base line situation and the forecast future year scenario using the Vehicle/Trip Generation Model – for full details refer to Appendix A) thereby understanding the network performance for all modes of transport and to identify potential key gaps in transport infrastructure and service provision across Redditch Borough;
- Developed a joint Vehicle/Trip Generation model the Bromsgrove and Redditch area to act as an assessment tool to assist with the identification of schemes to support proposed development contained in the draft RBCLP;
- Assessed the RBLP planning assumptions provided by Redditch Borough Council, this includes development quantum, types and locations; and
- Identified infrastructure schemes and services to mitigate against the impacts of proposed development.

Further details on the above are provided in Appendix A. The methodology adopted has ensured that the best use was made of existing data and tools available. It has set a clear foundation for the identification of schemes and has provided a means by which complex cumulative ‘knock on’ effects can be identified and assessed.

The way in which schemes have been identified has recognised environmental and deliverability factors as well as requirements to overcome identified problems and create opportunities for more sustainable travel choices.

The overall approach has been based on achievable interventions. Furthermore, it does not rely on an approach focussing on the delivery of a single or limited number of schemes that could be unrealistic in terms of funding and delivery.

### 3.2 Need for assessment

A key premise of this project is to recognise that the quantum of development planned for Redditch Borough will not only have a local transport impact (immediately adjacent to the site) but also an impact on the strategic transport network further afield. The local impacts of any development can be identified,



assessed and mitigation measures implemented, for locations further away from the proposed development sites, whilst the highway impact issues to address are all too readily obvious, their cause is more difficult to identify.

The identification of the source of issues away from the immediate environs of development sites can demonstrate that a relatively small development site (or the summation of a number of small development sites) can cause a significant issue on the transport network as a result of both local and long distances trips. In identifying the cumulative effects of growth it is possible to both develop adequate mitigation and to provide the evidence which underpins the requirement that the identified sources of additional traffic (vehicular and all person trips) should contribute appropriately toward the costs of delivering the necessary improvements to the wider transport infrastructure.

Thus a tool that provides the:

- calculation of the numbers of trips that each proposed development site will generate;
- the assessment of the way in which those trips will route on the network; and
- ability to sum the trips to establish an overall impact assessment

...will enable a network wide assessment to be conducted. Such an assessment tool has been prepared jointly for Bromsgrove District and Redditch Borough for the purposes of this project. Whilst the tool is necessarily strategic in nature, it does include all the key routes and most importantly key junctions. Without such a tool it is difficult to assess the cumulative impact of development sites over a large area.

Existing data, and recently undertaken transport network assessments for Redditch Borough also provides the means to identify the need for transport infrastructure and services resulting from the proposals in the Draft RBLP. This data includes accessibility assessments and individual spreadsheet models developed to assess Bromsgrove District and Redditch Borough planned growth. A review of previous studies informing the IDP and the associated transport scheme proposals is provided in Section 4 of this report.

### **3.3 Development of assessment tool**

The assessment tool is a Vehicle/Trip Generation spreadsheet model that combines a number of functions:

- Multi-modal trip generation model;
- Trip routeing model;
- Gravity model; and
- Presentation and analysis of results.

[See Appendix A for a Technical Note setting out assumptions and the methodology applied to develop the Vehicle/Trip Generation Modelling tool used to assess the impact of developments across Bromsgrove District and Redditch Borough. The Technical Note also contains comparison to other models being used for assessment in the area.]

In summary, the model provides a means of assessing the cumulative impact of proposed development on the highway network across Bromsgrove District and Redditch Borough. The development details provided by each authority and coded into the model are contained in Appendix B. The model covers the AM and PM peak periods and provides trip generation data for walk, cycle, bus and highway. In addition, for walk, cycle and public transport, a full 24 hour period assessment of trip generation is made.

The scope of the modelled network is the area covered by Bromsgrove District and Redditch Borough, but recognises key destinations for travel beyond the two local authority areas such as Birmingham, Solihull and Worcester. Highway (car) trips are assessed through a trip generation calculation and assigned to the modelled highway network. The assignment of highway trips is based on the strategic and main road network serving the area; motorways, the main 'A' roads and key 'B' class roads in the area. For further information on the trip origins and destinations as modelled through the Vehicle/Trip Generation Model refer to Figure 7.1 in the Modelling Assessment Tool Technical Note included as Appendix A of this report.

In terms of non-car trips (sustainable modes), the model contains a 'trip generation' element. The model calculates the likely number of trips by walk, cycle, rail and bus modes from each of the development clusters. The model takes account of relevant local mode share data and applies appropriate trip rates to indicate the number of additional trips on the transport network resulting from the proposed development sites. For further details regarding mode share and trip generation details please refer to the Modelling Assessment Tool included as Appendix A of this report.

### **3.4 Overview of assessment results**

The Vehicle/Trip Generation Model has been used to identify the impact of the RBLP on the transport network and assist the identification of the schemes set out in this Transport Network Analysis and Mitigation Report. Appendix C of this report contains the details of trip generations from each cluster/site by each model; walk, cycle, passenger transport (bus and rail) and the car.

The results have been analysed to identify the locations where schemes should be considered to overcome the pressure points identified in the network with an issue in the forecast year scenario. It is noted that the model has not been the sole source of scheme identification, other sources include:

- Bromsgrove Town Development Model and Redditch Town Development Model;
- Accessibility Assessments; and
- WCC Officer Workshops.

These sources have all combined to provide a comprehensive assessment of network requirements to accommodate forecast development proposals. The inputs from this assessment are set out in Section 4 of this report and Appendix A.

### 3.5 Overview: Redditch Borough Existing Highway Issues

The key highway routes of Redditch Borough are illustrated on Figure 3.1.

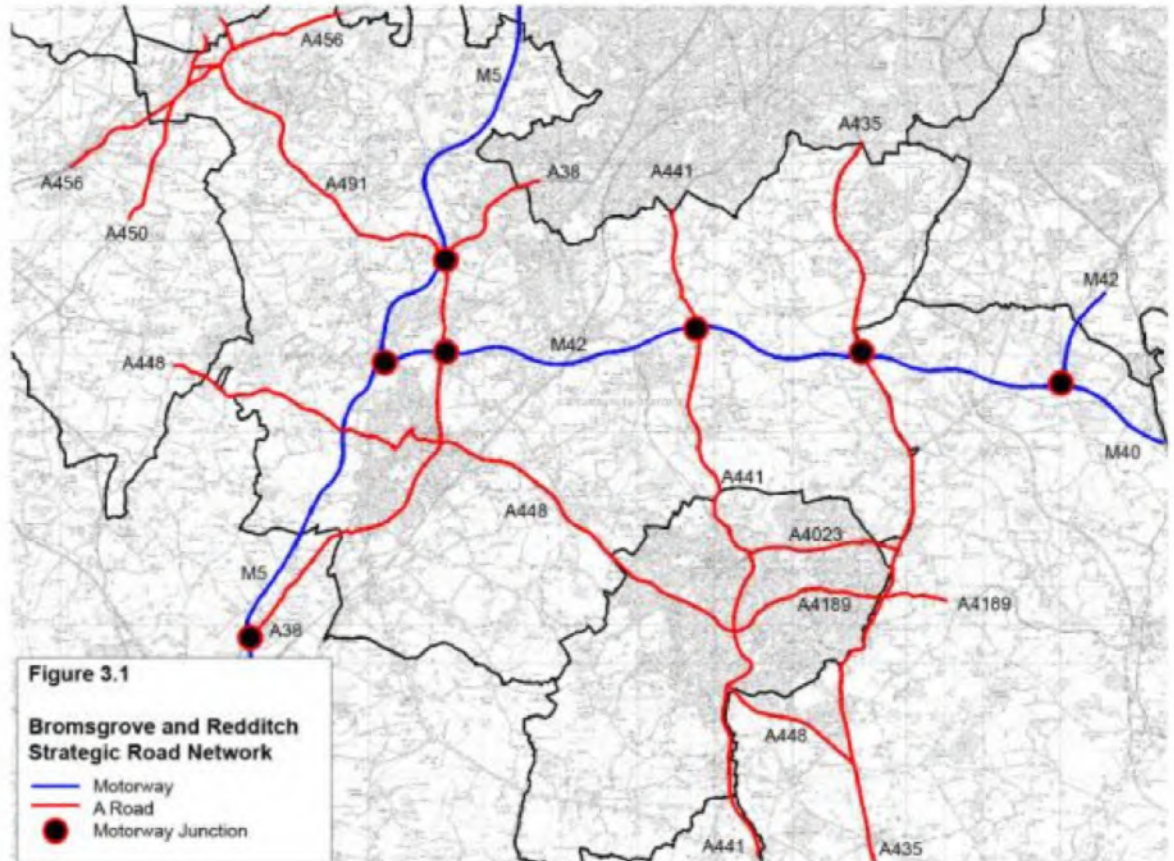


Figure 3.1 shows the main A Road serving the west of Redditch towards Bromsgrove and the M5 Motorway is the A448. This road, in the form of a dual carriageway, links into Redditch to a major intersect junction with the A441. The A441, also in the form of a dual carriageway runs north/south providing links north towards M42 Junction 2 and the Birmingham Conurbation and south towards Astwood Bank and onwards towards Evesham, becoming a single carriageway road in the south of Redditch.

East of Redditch the main north/south route is the A435 which provides links north to M42 Junction 3 and the Birmingham Conurbation and south towards Alcester and Evesham. The A435 operates as a dual carriageway north of the junction with the A4023 and single carriageway to the south. Access routes to the A435 from Central Redditch are provided by the A4023 and the A4189.

All of the major A Roads which pass through Redditch are in the form of dual carriageways, these being the A448, A441, A4023, and A4189. These roads are accessed from local residential, employment and commercial development sites via slip road junctions.

Access to the slip roads junction is provided by a myriad of B Road routes which pass through the residential, employment and commercial development sites.

The highway network in Redditch provides substantial capacity on the main strategic A Roads which pass through the town. The access points to those main A Roads are vital to ensuring the highway network functions without major congestion hotspots. The majority of the development sites proposed for RBC are located in or around the circumference of Redditch and therefore access to the main strategic highway network from these sites is via the B Roads which run through the town. Consideration must be given to how these roads, and more critically the junctions located along them, will operate with additional traffic flows sourcing from the proposed development sites.

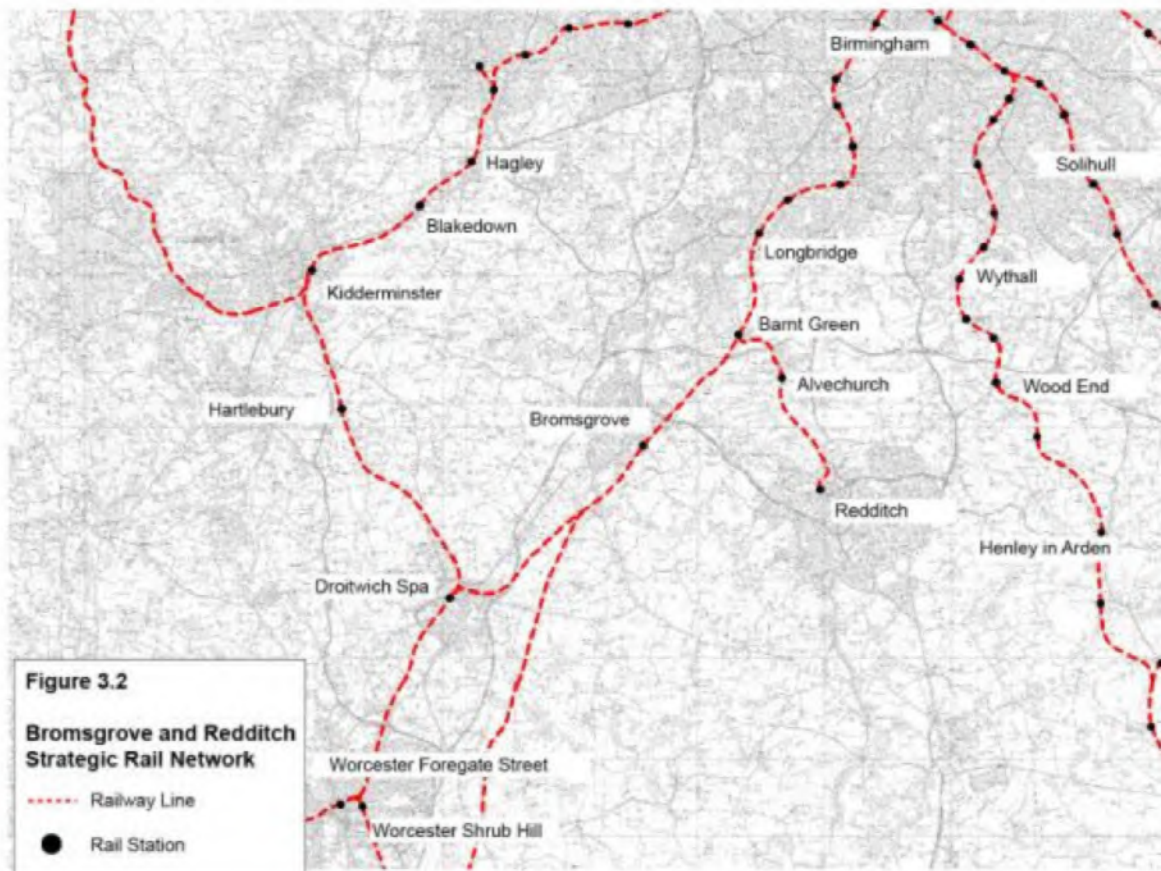
### **3.6 Overview of Public Transport (Rail) Issues**

The local rail network provides a valuable contribution towards local and longer distance travel. Indeed, Redditch benefits from being connected to regional and national destinations by the rail network. The local rail network is shown on Figure 3.2.

To increase patronage of the rail network within Redditch Borough and maximise the efficiency of the transport network, WCC has identified improving access to the railway stations by all modes of transport as a key requirement for investment.

The important role of attractive walking and cycling routes to the stations has been described in this report. Improving access to Redditch railway station for walking and cycling is critical from both existing and proposed development sites.

Figure 3.2 – Bromsgrove and Redditch Rail Network



Network Rail is currently consulting with stakeholders with a view to implementing a rail enhancement project on the section of line linking Redditch and Birmingham New Street. The proposals include the construction of a second section of railway track which will run from north of Alvechurch railway station for approximately 3km towards Redditch. The scheme would have a number of benefits for passengers from Redditch Borough including:

- Increased services between Redditch, Alvechurch and Barnt Green to Birmingham New Street;
- Additional capacity for passengers travelling between Redditch and Birmingham New Street; and
- A more flexible service.

Based on current timescales the scheme is due for completion by the end of 2014.

### 3.7 Overview: Existing Public Transport (bus) Issues

The existing bus network operating in Redditch Borough, in terms of its proximity to proposed development sites is described below. A plan showing the bus network

routes in Bromsgrove and Redditch and the inter-urban routes is shown on Figure 3.3.

The bus network (local and Inter-urban) in operation across Redditch Borough is concentrated on Redditch but does serve more rural, outlying, areas on routes operating between Redditch and surrounding towns.

In Redditch service patterns connect the outlying residential and employment areas on the edge of the town with the town centre.

Redditch is linked to surrounding outlying areas via the following bus services;

- 26 – Redditch to Stratford-on-Avon
- 70 – Redditch to Astwood Bank
- 142 – Redditch to Bromsgrove
- 143 – Redditch to Birmingham (via Bromsgrove and Catshill)
- 146 – Redditch to Birmingham
- 182 – Redditch to Lickey
- 183 – Redditch to Bromsgrove
- 247/248 – Redditch to Evesham
- 350 – Redditch to Worcester
- 519 – Redditch to Solihull
- X3 – Kidderminster to Redditch (via Bromsgrove)
- X50 – Redditch to Birmingham

Redditch is also served with a well connected bus network within the town. Bus Services link the key residential and employment developments with key trip attractors/generators such as the town centre and the hospital.

In order to accommodate the growth contained within the Draft RBLP a set of bus service and infrastructure standards have been developed by WCC. These are consistent with the policies set out in the Worcestershire LTP3.

An assessment of total cost to provide services to these standards on key corridors has been calculated. It is recognised that these services may be already supplied, either wholly or in part. Hence, the role of the IDP is to ensure that this minimum level of service is identified as a requirement and maintained in order to retain the attractiveness of services and to provide the necessary capacity to accommodate the forecast bus passenger demand.

If this level of service is not met, whilst some individuals may have the ability to transfer mode to use a car (resulting in increased pressure on the highway), for others, the potential to access employment, training and social opportunities by local passenger transport will be lost.

The bus service operation standards must be accompanied by infrastructure to deliver reliable and attractive bus services. This includes bus shelter provision and access arrangements to these shelters from the development sites, as well as priority measures at the most congested locations to address the identified reliability and punctuality issues. Bus shelter/stop provision is proposed to fit with WCC's 'Gold', 'Silver' and 'Bronze' standards for Bus Stops.

WCC's Standards for a 'Gold' Bus Stop include the following (Worcestershire County Council Passenger Transport Infrastructure Best Practice Report, November 2007);

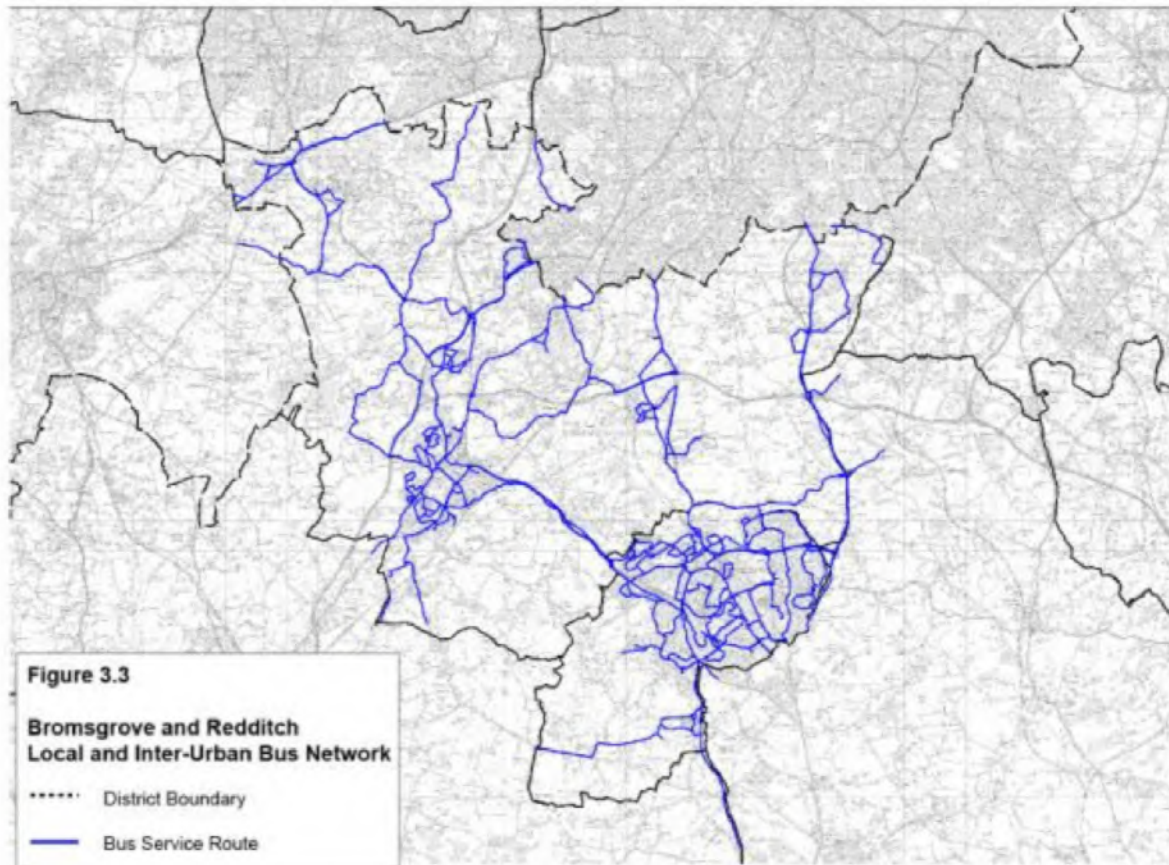
- In excess of 500 users per week;
- Bus Shelter – mainly glass construction, with seating, preferably provided by a shelter advertising company;
- Shelter Location – Preferably located as close to the boarding point as possible;
- Pole and Flag – Flag to be clearly visible from the roadside and should be integral to the bus stop, to minimise unnecessary street clutter;
- Raised Kerbs – To provide level access for buggies and wheelchairs;
- Road markings – Comprising of yellow bus-stop clearway markings, sign and red or green surfaced carriageway box;
- Timetable Information – For all routes serving the stop;
- Crossing Point; A safe place to cross the road within 50 metres of the bus stop, to include dropped kerbs and tactile paving where appropriate;
- DDA Compliant – Fully accessible for disabled people; and
- Double Length Bus Stops – Where Gold Standard bus stops are located on Premium Routes, it may be necessary to provide double length bus stops to permit express services to overtake stopping services.

WCC's Standards for a 'Silver' Bus Stop include the following (Worcestershire County Council Passenger Transport Infrastructure Best Practice Report, November 2007);

- Moderate use (250 to 499 users a week);
- Shelter Location – Preferably located as close to the boarding point as possible;
- Pole and Flag – Flag to be clearly visible from the roadside and should be integral to the bus stop to minimise unnecessary street clutter;
- Raised Kerbs – To provide level access for buggies and wheelchairs;
- Road markings – Comprising of yellow bus-stop clearway markings, sign and red or green surfaced carriageway box;
- Timetable Information; For all routes serving the stop;
- Crossing Point; A safe place to cross the road within 50 metres of the bus stop, to include dropped kerbs and tactile paving where appropriate;

- DDA Compliant – Fully accessible for disabled people; and
- Bus Shelter – A bus shelter will be provided where funding allows, of mainly glass construction with seating.

Figure 3.3 – Bromsgrove and Redditch Local and Inter-Urban Bus Network



### 3.8 Overview of Existing Pedestrian Issues

To identify pedestrian infrastructure requirements to support the development assumptions put forward through the Redditch Local Plan, each development site has been considered. The number of anticipated pedestrians travelling to and from each site over a 24 hour period has been calculated and used to inform the assessment. The analysis focussed on identifying links between the proposed development sites and the existing pedestrian network in terms of footways and pedestrian crossing facilities (where required) and links to key trip attractors/generators including railway stations.

The infrastructure requirements do not include pedestrian infrastructure within the RBLP development sites.



### 3.9 Overview of Existing Cycle Network

To identify cycle infrastructure requirements to support the development assumptions put forward through the Local Plan, each development site has been considered. The number of anticipated cyclists travelling to and from each site over a 24 hour period has informed the process. Analysis has focussed on identifying links from the proposed development sites to existing cycle infrastructure and links to key trip attractors/generators including railway stations.

The cycle network in Redditch comprises of a combination of recommended on-road routes (that have been assessed for suitability) and a series of dedicated off road routes, some of which form part of the National Cycle Network. The cycle route map for Redditch ([www.worcestershire.gov.uk/cms/cycling.aspx](http://www.worcestershire.gov.uk/cms/cycling.aspx)) has been used to assess linkages from proposed development sites to existing cycle infrastructure.

The cycle infrastructure included on the proposed list of schemes includes all aspects of cycle infrastructure including signage, on-road cycle marking and where appropriate dedicated off road cycle links.

Cycle infrastructure within the development sites will be considered by developers from the outset (planning and design stages) and will meet relevant LTP3 and other policy & design standards, this includes all cycle paths and the appropriate amount of cycle storage facilities.

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## 4 Review of previous work

### 4.1 Introduction

In order to ensure alignment between all transport studies highlighting requirements for future year transport infrastructure within Redditch Borough, the following studies have informed this project:

- Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011);
- The Worcester Local Sustainable Transport Fund – Choose how you move in Redditch; and
- Redditch Borough Council – Town Centre Strategy – (September 2009)

A brief discussion of how each of the studies was used follows.

### 4.2 Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011)

The Redditch Highway Impact and Accessibility Modelling Report provides an assessment of a number of proposed residential and employment development sites throughout Redditch Borough.

The work had two distinct aims. Firstly, to assess the highway impact of future development on the Redditch highway network. To highlight those junctions which are likely to require mitigation in order to accommodate future traffic growth and to ensure the development sites do not have a detrimental impact on the highway network both in the vicinity of the proposed sites and throughout the town on strategic highway junctions. Secondly, the report assessed the proposed development sites in terms of their accessibility to local services and to key destinations.

The report has been used as evidence to support the results of the modelling completed for the purposes of this Transport Network Analysis and Mitigation report. The outcomes from the Redditch Highway Impact and Accessibility Modelling Report also feed into the review of the baseline transport conditions in Section 5.

### 4.3 The Worcestershire Local Sustainable Transport Fund – “Choose how you move in Redditch”

Announced by Central Government in 2010, the Local Sustainable Transport Fund (LSTF) aims to help build strong local economies and address the urgent challenges of climate change. All English Local Authorities outside of London were eligible to bid for funding. WCC submitted a bid to the LSTF entitled ‘Choose how you move in Redditch’. The bid submitted for Redditch was for just over £3,500,000 and proposed the following initiatives:

- Enhancing access to broadband Internet and promotion of teleworking;
- Investment in information kiosks to improve access to travel information;
- A series of events to promote the use of sustainable modes;

- A programme of individual travel marketing and planning for up to 27,000 households;
- An intensive marketing campaign to promote sustainable modes of travel;
- Travel training for teens and young adults;
- Travel training for vulnerable adults;
- A school sustainable travel intervention programme for six schools and colleges;
- A workplace sustainable travel intervention programme for four workplaces;
- Improvements to walking and cycling routes (including signage) to improve safety and security;
- A scheme on Evesham Road, to stop rat running, congestion and deteriorating air quality and improve the reliability and commerciality of the bus network in western Redditch; and
- Passenger transport infrastructure enhancements.

#### **4.4 Redditch Borough Council – Town Centre Strategy – (September 2009)**

In 2009 Redditch Borough Council commissioned a study to deliver a Town Centre Strategy for Redditch. The strategy aimed to;

- Demonstrate the baseline position of Redditch Town Centre;
- Establish a vision for the town centre;
- Ensure the accessibility and connectedness of the Town Centre; and
- Improve the public realm of the Town Centre.

Recommendations resulting from the Town Centre Strategy included a Public Realm Framework which included updating frontages, co-ordinating street furniture, signage, landscaping and public art. Improved physical and visual connections between the town centre and surrounding areas was also considered key for to 'provide a sense of arrival' to the Town Centre. Recommendations to achieve this aim included signing strategies, traffic management schemes on Redditch Ringway and a car park naming strategy.

## 5 Baseline (2012) and Do-Minimum (2030) Network Problems/Issues

### 5.1 Introduction

This section of the report provides an overview of the existing and predicted future, (with further development) performance of the transport network in Redditch. The previous analysis undertaken into the identification of current and forecasting of future transport network performance has provided a comprehensive list of problems and issues. This section of the report draws on that work and the evidence produced from the Bromsgrove and Redditch Vehicle/Trip Generation Model.

### 5.2 Highway Network Performance

Evidence collated from Workshop Meetings held between Halcrow and WCC Planning Officers highlighted a number of issues currently being experienced on the highway network in Redditch.

It was agreed between Halcrow and WCC staff that the overriding issue of the highway network in Redditch is access to the main strategic highway A – Road network. It is a generally perceived view that the core strategic highway network has sufficient capacity to cope with additional demand resulting from the proposed development sites.

Analysis of the performance of the highway network across Redditch was undertaken for the purposes of the Redditch Development Site Highway Impact Report. This work was based on the evidence produced from a bespoke gravity vehicle/trip generation transport model developed specifically to assess the impact of proposed development sites in Redditch (For further details refer to Appendix A). The work identified a number of key links and junctions where uplifts in traffic flows resulting from the development sites were likely to impact on the Redditch highway network.

The assessment of the impact on the highway network, resulting from the additional trips from all the development sites combined into a single scenario identified a number of links where increases in traffic flows were subdivided into a number of separate categories of traffic increases, as summarised below;

- 0 to 5% uplift;
- 5 to 10% uplift;
- 10 to 50% uplift; and
- Over 50% uplift.

Junctions shown to have an increase in trips of greater than 5% as a result of the combined impact of the residential and development sites include the following:

- Ravensbank Drive/A4023/Alders Drive;
- A4189/A435;

- Alders Drive/Far Moor Lane;
- Alders Drive/A4189/Claybrook Drive;
- B4497/A4189;
- B4497/Claybrook Drive/Washford Drive;
- Studley Road/Washford Drive/Woodrow Drive;
- Studley Road/Redditch Road/Green Lane;
- Studley Road/Redditch Road/B4092;
- Greenlands Drive/Woodrow North/Woodrow Drive/Rough Hill Drive;
- B4504/Middle Piece Drive;
- A448/B4504;
- Heathfield Road/Blackstitch Lane/Green Lane/Church Road;
- Birchfield Road/Foxlydiate Lane;
- B4096/B4184/A448/Birchfield Road;
- B4184/Lily Green Lane/Parklands Close;
- Brockhill Lane/B4184/Salters Lane;
- B4184/Hewell Road;
- B4184/Birmingham Road;
- A441/Bordesley Lane/Middlehouse Lane;
- A441/B4101;
- A4023/B4497/Moons Moat Drive; and
- Ravensbank Drive/Lovage Road/Madeley Road.

### 5.3 **Passenger Transport and Sustainable Modes of Transport**

The Accessibility Assessment carried out for the purposes of the Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011) work completed by Halcrow and WCC considered a number of the proposed development sites in Redditch. It identified gaps in the existing network of public transport and sustainable transport provision to access proposed residential and employment sites and to link developments to the existing network. The main conclusions of this work are listed below, based on findings for pedestrian infrastructure, cycle infrastructure and public transport infrastructure.

The findings of the evidence collated from Workshop Meetings held between Halcrow and WCC Planning Officers in July 2012 are also included in the relevant sections below.

#### **Pedestrian infrastructure**

The Accessibility Assessment carried out for the purposes of the Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011) recommended a number of improvements to pedestrian links be completed in order to promote walking as a viable alternative to travelling by car. These improvement schemes included the extension of numerous footways to link development sites to key destinations, public transport infrastructure and the existing sustainable transport network.

The discussions between Halcrow and WCC Planning Officers replicated the findings of the Accessibility Assessment. It was agreed pedestrian links from development sites proposed for the north west of Redditch will require improved facilities for pedestrians to link to town centre and other local trip attractors and generators. Walking from outlying areas of Redditch to the town centre is unattractive due to the large distances involved, therefore pedestrian links should be provided to connect to bus service routes, as promoted through the Redditch – Choose How You Move Initiative. There are a number of locations around Redditch where the strategic highway networks create severance issues for pedestrians, a specific example being the A448 in the west of the town. There is a requirement for the provision a budget to upgrade a number of dropped kerb crossing around the town in the coming years.

#### **Cycle infrastructure**

The Accessibility Assessment carried out for the purposes of the Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011) recommended a number of improvements to Redditch cycle network be completed in order to promote cycling as a viable alternative to travelling by car. These improvement schemes included the extension of numerous cycle paths to link development sites to the existing Redditch cycle network.

It was agreed, through the discussions between Halcrow and WCC planning officers, there is a requirement for development sites located in out-lying areas of Redditch to be connected to the existing Redditch cycle network. There is a requirement for additional cycle parking infrastructure in Redditch town centre and at various local centres around the town. The severance issue caused by the strategic road network

and the potential difficulty in providing direct links between development sites and key trip attractors/generators is also an issue for cyclists.

### **Passenger transport infrastructure and services**

The Accessibility Assessment carried out for the purposes of the Redditch Development Sites – Highway Impact and Accessibility Modelling Report (May 2011) states the majority of development sites in and around Redditch will require either additional bus services or extensions to existing route services.

In accordance with the discussions between Halcrow and WCC staff regarding walking and cycling infrastructure provision, the bus network in Redditch must be capable of supporting additional trips resulting from the proposed development sites. Improving walking links to the bus network will increase bus patronage in Redditch and service provision in future years must support the additional demand.

### **Overall conclusion**

In conclusion, there are a number of issues to resolve in Redditch regarding both the sustainable modes of transport and the highway network.

In summarising the highway network the overriding issue is the ability of vehicles to access the core A-Road network via local distributor roads rather than the ability of the strategic highway network to deal with additional development trips.

In terms of the provision of sustainable transport in Redditch there is a requirement to build upon the existing, walk, cycle and bus network around the town to link proposed development sites to key trip destinations and generators around the town via the existing sustainable transport network.

## 6 Scheme Identification

### 6.1 Introduction

This section of the Report sets out the mitigation measures identified as a result of the analysis of previous work and the Vehicle/Trip Generation Model developed for this study. The mitigation measures have been presented in tabular form, with a description of location, issue, the mitigation required and cost (See Appendix D for the list of schemes required to support the 2030 development assumptions).

The following sections set out the assumptions that have formed the basis of the scheme assessment and costs.

### 6.2 Scheme Identification Methodology

Where appropriate the study has drawn on existing Transport Packages (See Section 4). For example, proposals identified through the previous work undertaken in Redditch have been taken as the core requirements for Redditch Borough.

However, this study has identified additional issues in Redditch through the use of a Vehicle/Trip Generation Model. Thus further locations where mitigation is required to overcome or reduce the impact of proposed development have been identified.

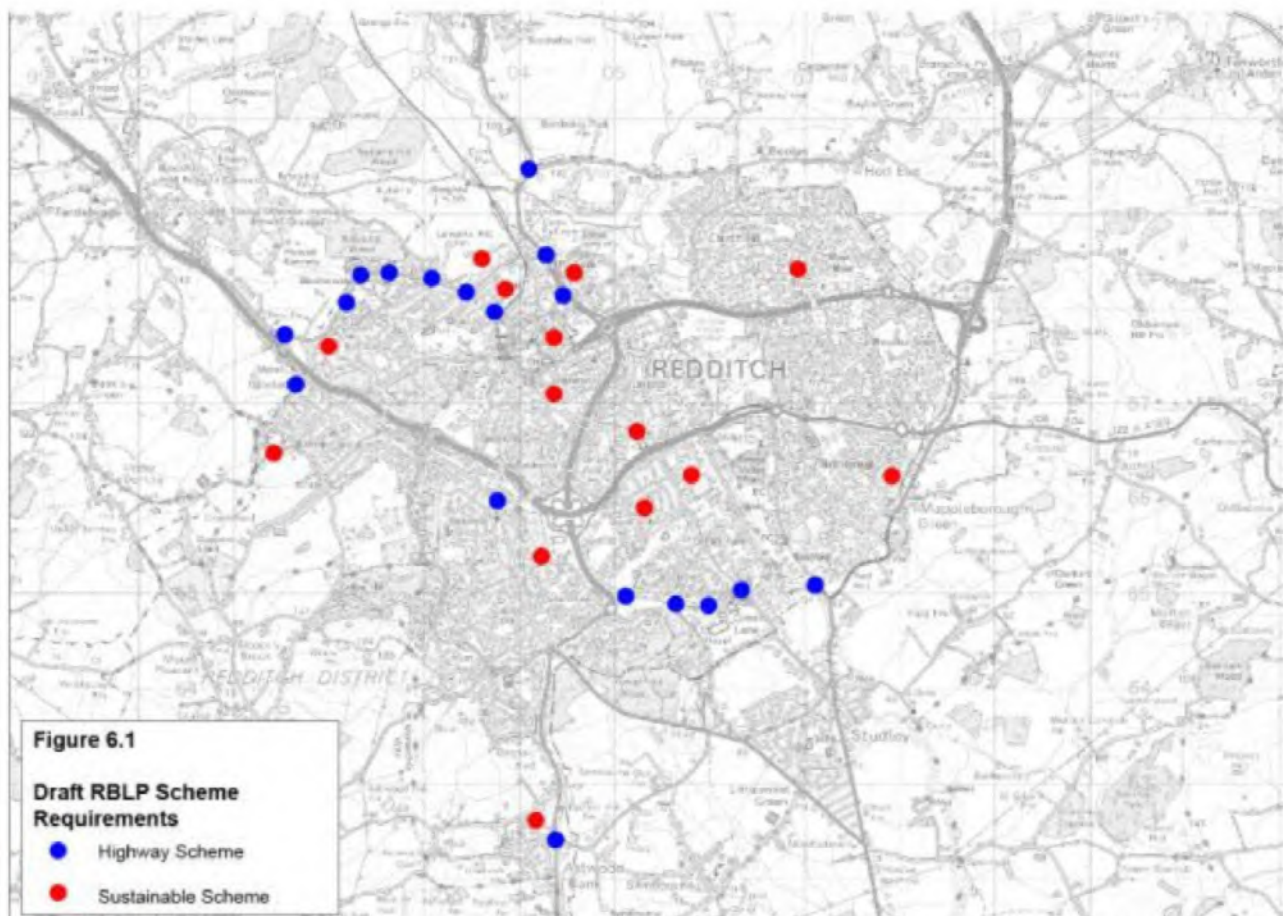
Required transport schemes have been identified to mitigate against predicted future year transport issues. The required highway infrastructure schemes aim to improve capacity at key junctions which are predicted to incur additional delays in future years as a result of the housing and employment growth in the RBLP. These junctions have been identified through the use of the Vehicle/Trip Generation Model. The Vehicle/Trip Generation Model looks at the predicted forecast year traffic flows and compares these with the junction capacities on the identified links to calculate volume over capacity ratios. For more detailed information refer to section 10 of the Modelling Assessment Tool Technical Note included as Appendix A of this report.

The required sustainable transport infrastructure schemes aim to connect the proposed RBLP development sites to the existing transport network and where appropriate improve the existing transport network to encourage greater use of more sustainable transport modes. These schemes have been identified through consideration of the results of the Vehicle/Trip Generation Model to determine where additional infrastructure and services are required to complete the sustainable transport network to support trips by sustainable modes to and from these development sites.

The required transport schemes are shown on Figure 6.1. These plans show the locations of the schemes identified as a result of the Vehicle/Trip Generation Model. These plans can also be related to the plans shown in Section 5 where the main issues were identified (individual junctions and corridors).



Figure 6.1. –Highway and Sustainable Schemes – Redditch Borough



Each of the required transport infrastructure schemes have also been considered against the following;

- Policy/Strategy – proposals have recognised the policies and strategies put forward through WCC’s Local Transport Plan and to be consistent with the general approach to transport schemes in the area;
- Feasibility/Deliverability – consideration has been given to the deliverability of the proposed transport schemes. That is, the proposed schemes have considered potential land constraints, proximity to existing obstructions (e.g. railway lines), topography and overground services and utilities; and
- Design Standards and Guidelines – good practice design guidelines have been considered against all of the proposed transport schemes. Only schemes that could meet appropriate design guidelines have been proposed, subject to detailed design.

All of the proposed transport schemes have been priced using the approach set out in Section 6.4.

### 6.3 Overview of Schemes

The different characteristics of locations within the RBLP area have been taken into consideration when identifying schemes. That is, though there is always an emphasis on the provision of sustainable alternatives, there is also an acknowledgement that the measures identified need to be appropriate for the journey being made and their origin.

In Redditch a balanced approach has been adopted, identifying both highway and more sustainable measures. In the rural areas, whilst the use of sustainable modes is to be encouraged, it is acknowledged that highway capacity issues also need to be addressed to enable both car and bus trips to use the network efficiently.

### 6.4 Scheme Tables

The Scheme Tables are presented in Appendix D.

Cost estimates for each of the proposed schemes were prepared primarily using construction rates used by WCC through the costing of schemes associated with the Worcester Transport Strategy (WTS). It should be noted that where some items fell outside the scope of the WTS, assumptions were made using costs incurred from other similar schemes carried out for other local authorities and by using the SPONS Handbook. Costs can vary considerably from site to site and supplier to supplier. More detailed cost estimates will be determined when the precise details of each scheme are known during further design stages. Subsequent to the initial construction cost estimates, construction cost uplifts (cost contingencies) (as presented in Table 6.1 for highway schemes and Table 6.2 for sustainable scheme) and optimism bias were applied. Optimism bias is explained following Table 6.2.

These construction cost uplifts are summarised in Table 6.1 (Highways) and Table 6.2 (Sustainable Modes)

Table 6.1: Uplifts to Highway Scheme base construction costs (Cost Contingencies)

Preparation	12%
Supervision	5%
Evaluation	0%
Drainage	10%
Preliminary	5%
Site Supervision	5%
Design	10%
Services and Utilities	30%
Landscape	10%
Highway Network Traffic Management (Normal Road)	10%
Highway Network Traffic Management (Strategic Road)	20%
Groundworks/Earthworks	2%
Maintenance	25%
Consultation	10%
Ecology	10%

The uplifts included in Table 6.1 are based upon values used for WTS costing purposes and previous work undertaken for other local authorities.

These uplifts are calculated based on the construction cost and prior to the optimism bias being added. The uplifts cover the additional costs above and beyond the actual cost of construction. That being items including site preparation, site supervision and evaluation. A generic drainage cost is included along with design, landscaping and ecology. Different uplifts are applied for traffic management dependent on the local road network, i.e. a greater allowance is provided for on the strategic highway network.

Table 6.2: Uplifts to Sustainable Mode base construction costs (Cost Contingencies)

Preparation	0%
Supervision	2%
Evaluation	0%
Drainage	3%
Preliminary	5%
Site Supervision	3%
Design	10%
Services and Utilities	3%
Landscape	3%
Highway Network Traffic Management (Normal Road)	2%
Groundworks/Earthworks	2%
Maintenance	5%
Consultation	5%
Ecology	2%

The uplifts for sustainable mode schemes are generally less than those applied for the highway schemes. This is because the proposed schemes are generally smaller schemes which are less intrusive and have fewer associated risks. Allowances for Ecology and Drainage are often less as the proposed schemes pose less risk to local environments and Sustainable Urban Drainage Systems (SUDs) and surface drainage can often be applied. The design uplift costs remain the same for both the highway and sustainable schemes.

Optimism Bias is a risk contingency built in to the forecast costs of transport schemes. The Optimism Bias is calculated by referring to 'The British Department for Transport Procedures for Dealing with Optimism Bias in Transport Planning Guidance Document – June 2004'. It is noted that all the uplift items have been added to the cost of construction prior to the 44% Optimism Bias Uplift. The Optimism Bias uplift is based upon the maximum applied rate for standard civil engineering works at this preliminary stage. This percentage, when applied, suggests an 80% probability of staying within the budget.

The cost estimates do not include Land Costs (if required).

## 7 Conclusions and Next Steps

### 7.1 Conclusions

The report has set out the context, methodology and tabulated results of a strategic assessment of the impact of development proposals in the Local Plan. The schemes identified have been chosen based on the degree to which additional demand to travel impacts on the surrounding road network and the policy and design requirements of central and local government.

The list is comprehensive, but contains no very major proposals to accommodate the increase in demand. It is noted that the scale of infrastructure proposed is significantly less than that which has been introduced to the network over the past 20/30 years. There are no new town bypasses, major improvements to inter-urban routes or new major river crossings. In terms of the criteria used to identify mitigation measures, the schemes were considered against cost, environmental and deliverability criteria as well as mitigation of transport impacts.

Hence, there is an expectation that some change in mode share will occur as a result of increased attractiveness of more sustainable modes, as well as increased congestion on the highway network.

The schedule of schemes presented, and the associated costs, have taken into account the additional costs associated with scheme design and an allowance made for scheme maintenance over a 30 year period. These added allowances mean that if the scheme costs are simply compared to construction costs they appear high, but the additional costs have been derived through experience and represent the total cost to deliver the individual schemes.

Overall, the inputs provide a comprehensive schedule of infrastructure interventions to mitigate the transport impacts of the proposed Local Plan development.

### 7.2 Potential future activities

This report has set out a comprehensive listing of infrastructure and public transport service requirements in order to mitigate against the impact of the 2030 development assumptions (including the core scenario sites and the cross boundary sites) contained in the Local Plan. These requirements have been identified through reference to policy statements and work to assess the impact of additional journeys on the highway network.

The work has been based on information on proposed developments as identified in the RBLP in summer 2012 and guidance provided by Redditch Borough Council and Bromsgrove District Council regarding the proposed cross boundary sites to be taken forward in March 2013. It is recognised that this document has subsequently been the subject of consultation as a result of this there are likely to be changes going forward.

#### **How will we deal with changes to development assumptions?**

Under guidance from Planning Officers at RBC, changes to the development assumptions for the area may be necessary over the course of local plan period. Assuming any changes to these assumptions fit the 'development clusters', as used in the Vehicle Trip Generation Model, any changes to these assumptions can be

relatively easily incorporated into the model and the associated impact on the transport network assessed. Halcrow proposes no action to update the model is undertaken until guidance is received from Bromsgrove and Redditch planning authorities.

### **Feeding viability assessments into the transport elements of the IDP and assessment of “priorities”**

Halcrow could assist with the final wording to go forward into the IDP if required. Halcrow recognises that if the final document is structured in a different way, some assistance may be required to present our methodology and results in a consistent manner to other infrastructure requirements.

### **Phasing and delivery issues**

Iterations between planning data and the transport infrastructure requirements.

### **Which development sites are most likely to occur first?**

The list of proposed transport schemes focuses on key transport corridors in Redditch Borough. The results of the modelling provide indications of the key schemes required to support each of the proposed development sites. A further piece of analysis work, using the Vehicle/Trip Generation Model, could be carried out to provide an assessment of the transport schemes required to support each of the development sites in turn. The schemes proposed through the existing study aim to meet the cumulative demands on the transport network included in the 2030 core scenario and the inclusion of the cross boundary sites. A further stage would be to provide a breakdown of the schemes required to support each of the development sites in turn. However, it should be noted in some cases justification of large schemes may be more difficult when considering individual development sites compared to the total cumulative impact.

### **Funding opportunities**

This report has identified and costed a comprehensive schedule of transport infrastructure requirements. In providing these costs, no allowance has been made for any scheme that may already have funding secured, or schemes where funding has been allocated through LTP or other sources.

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# Appendix A

Modelling Assessment Tool; Contents and  
Description

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## Technical note

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<b>Project</b>	<b>Bromsgrove and Redditch IDP</b>	<b>Date</b>	12 April 2013
<b>Subject</b>	Draft – Bromsgrove and Redditch IDP – Modelling Assessment Tool; Contents and Description – Appendix A	<b>Ref</b>	CTWALY600
<b>Author</b>	Halcrow Group Ltd		

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### 1 Introduction

- 1.1 This Technical Note forms Appendix A of the final Bromsgrove Development Plan – Transport Network Analysis and Mitigation Report and the Redditch Development Plan – Transport Network Analysis and Mitigation Report produced by Halcrow. This Technical Note sets out the development and assumptions used to develop the modelling tool (Vehicle/Trip Generation Model) used to assess and recommend transport infrastructure requirements to support housing and employment growth proposed through the Bromsgrove District Core Strategy (BDCS) and the Redditch Borough Core Strategy (RBCS).
- 1.2 This Technical Note focuses on the modelling work used to assess the development assumptions put forward in the BDCS and RBCS. Vehicle/Trip Generation Spreadsheet Highway models were developed for the AM and PM peak periods and development trip numbers were calculated for a 24 hour period in order to assess the number of trips made from proposed BDCS and RBCS development sites by sustainable modes of transport. A commentary of each of the major sections of the Vehicle/Trip Generation Model is provided as part of this Technical Note through the use of model screenshots.
- 1.3 This Technical Note describes the development of the Vehicle/Trip Generation Model used to assess the ‘Core Development’ Scenario and six ‘Cross Boundary’ scenarios. The ‘Cross Boundary’ scenarios include all of the development sites put forward through the ‘Core Development’ scenario and different combinations of additional sites on the north and west fringes of Redditch

### 2 Overview

- 2.1 To meet the transport infrastructure objective of the BDCS and RBCS a means of identifying transport infrastructure required to mitigate the adverse impacts of traffic generated by the proposed development was required. WCC and Halcrow agreed that the most appropriate tool that could be available within the programme to contribute to the development of IDP recommendations is a spreadsheet gravity model (termed Vehicle/Trip Generation Model). The model is capable of assessing the trip generation and distribution from a large number of development sites in the Bromsgrove and Redditch Districts and producing a forecast year assessment scenario.

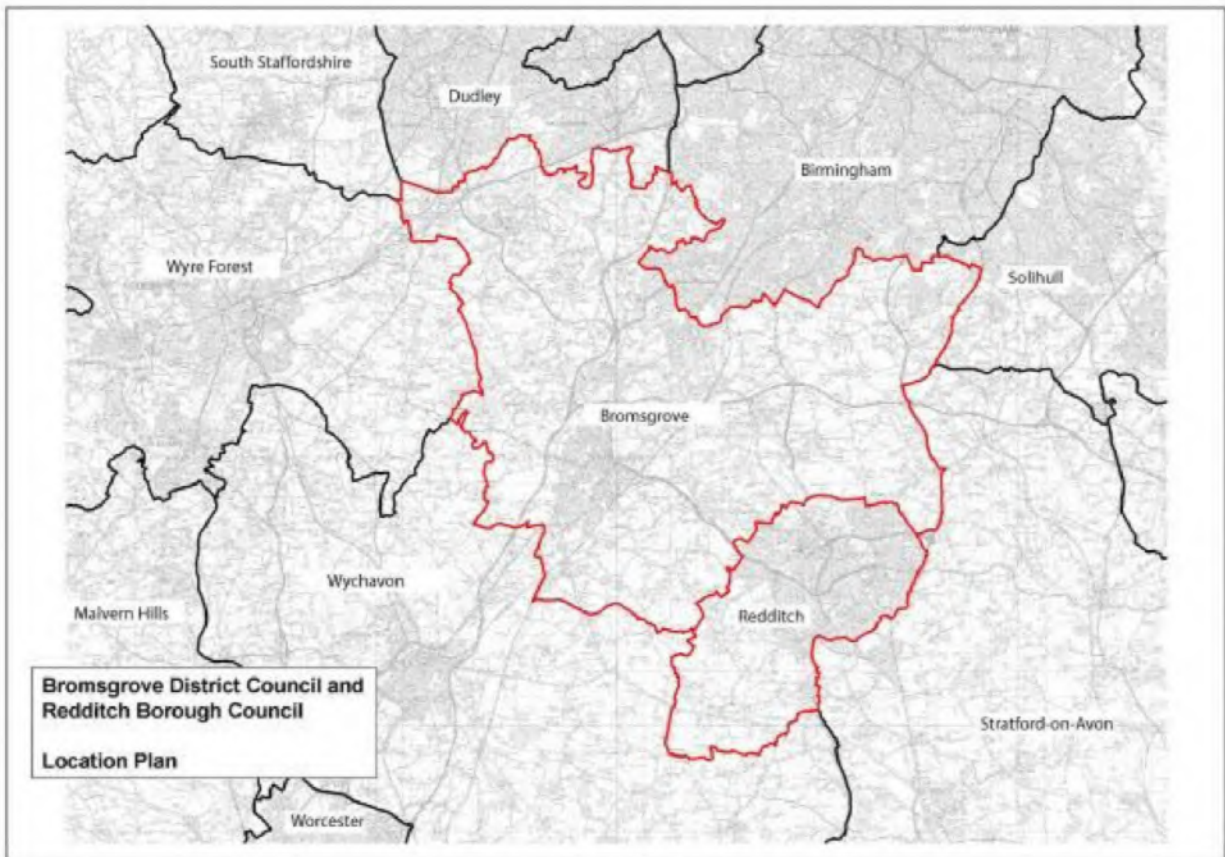
- 2.2 This Technical Note summarises the modelling work undertaken to gather the data required to build such a model and the model development process based on the 2030 development assumptions. It describes the content of the Vehicle/Trip Generation Model and the relevant assumptions agreed between Halcrow and WCC.
- 2.3 The Vehicle/Trip Generation Model assigns vehicle trips between each of the proposed development sites in Bromsgrove and Redditch Districts to a number of destinations, either located in Bromsgrove or Redditch Districts or in the towns/cities located around the circumference of the Bromsgrove and Redditch area. The destinations were agreed with WCC. The assignment of the trips was based upon the population size and employment numbers of each of these origins and destinations. The trip distribution of all development trips in the gravity model was calculated in line with current WebTAG guidance (TAG Unit 3.5.6 Values of Time and Vehicle Operating Costs, August 2012). All trips were assigned a route between each of the origin and destination zones. The routeing was assumed a single, fixed, assignment.
- 2.4 The AM peak and PM peak gravity models provide a means to assess the number of development trips predicted to be on the strategic highway network in Bromsgrove and Redditch Districts. The development trips assignment result, when combined with the existing traffic data, allows the assessment of individual link and junction performance with the additional development traffic. Thus, the results provide an indication of areas of the highway network in receipt of greatest impact (in terms of capacity, journey times and performance) as a result of the developments assumptions for Bromsgrove and Redditch.
- 2.5 In addition, the 24 hour spreadsheet model provides a tool to forecast the number of trips made by sustainable modes of transport from development sites to assist the appropriate identification of infrastructure. Sustainable modes of transport include walking, cycling and public transport.

### **3 Development Assumptions**

- 3.1 WCC provided Halcrow with a list of 'core' development sites for Bromsgrove District Council (BDC) and Redditch Borough Council (RBC) in 2012 (09/07/2012). See Figure 3.1 for a location plan of Bromsgrove and Redditch Districts.
- 3.2 Details of the six 'Cross Boundary' scenario tests and the associated development assumptions associated with those sites were supplied to Halcrow on 14/09/2013. Details of the 'Cross Boundary' scenario tests are shown on Table 3.1 and Figures 3.4 and 3.5.



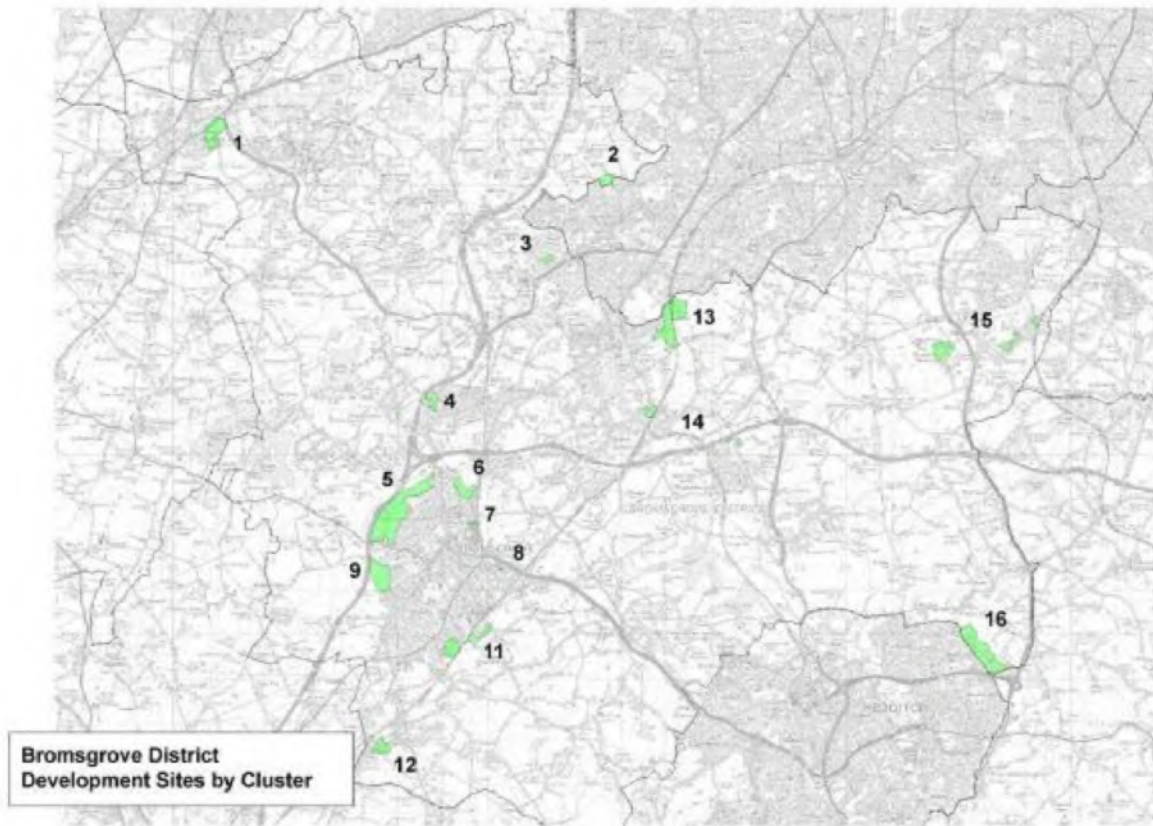
Figure 3.1 – Bromsgrove District Council and Redditch Borough Council Location Plan



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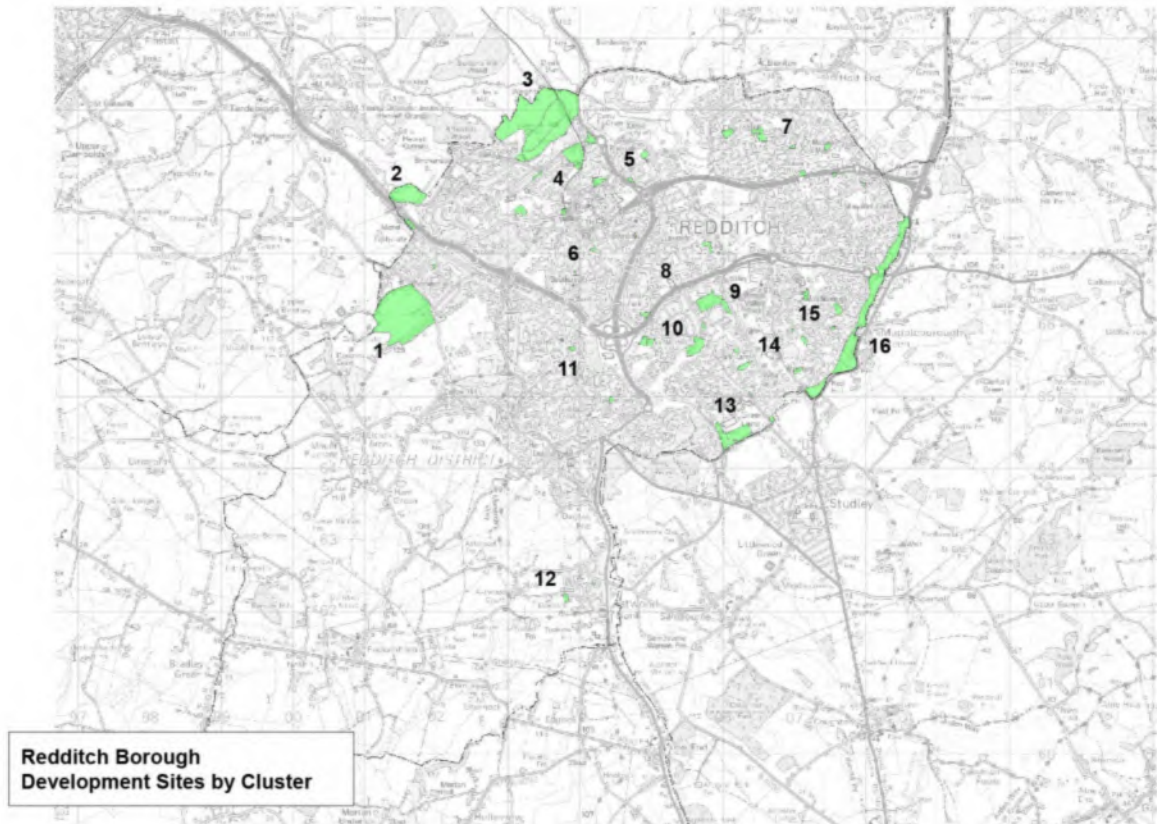
- 3.3 In order to keep the number of development locations to a manageable size, the individual sites were combined into 'clusters'. 'Clusters' were either taken as a single large development or as a combination of two or more development sites. The developments were grouped into 'clusters' based on their location in relation to the strategic road network, that being, 'clusters' loading onto the strategic road network at the same location/area were placed into a 'cluster' to represent that area. Large developments located away from, and likely to access the strategic road network away from, other development sites/clusters were not grouped with other development sites and were considered as a 'single site cluster'.
- 3.4 The designation of 'Clusters' was agreed between WCC and Halcrow. A detailed list of all the development sites proposed for Bromsgrove District Council and Redditch Borough Council and the designated 'clusters' is provided in Appendix D. The 'Clusters' are shown on Figures 3.2 to 3.3.

Figure 3.2 – Bromsgrove District Development Clusters – ‘Core Scenario’



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Figure 3.3 – Redditch Borough Development Clusters – ‘Core Scenario’



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Figure 3.4 – Bromsgrove and Redditch – ‘Cross Boundary Sites’ – Site Locations

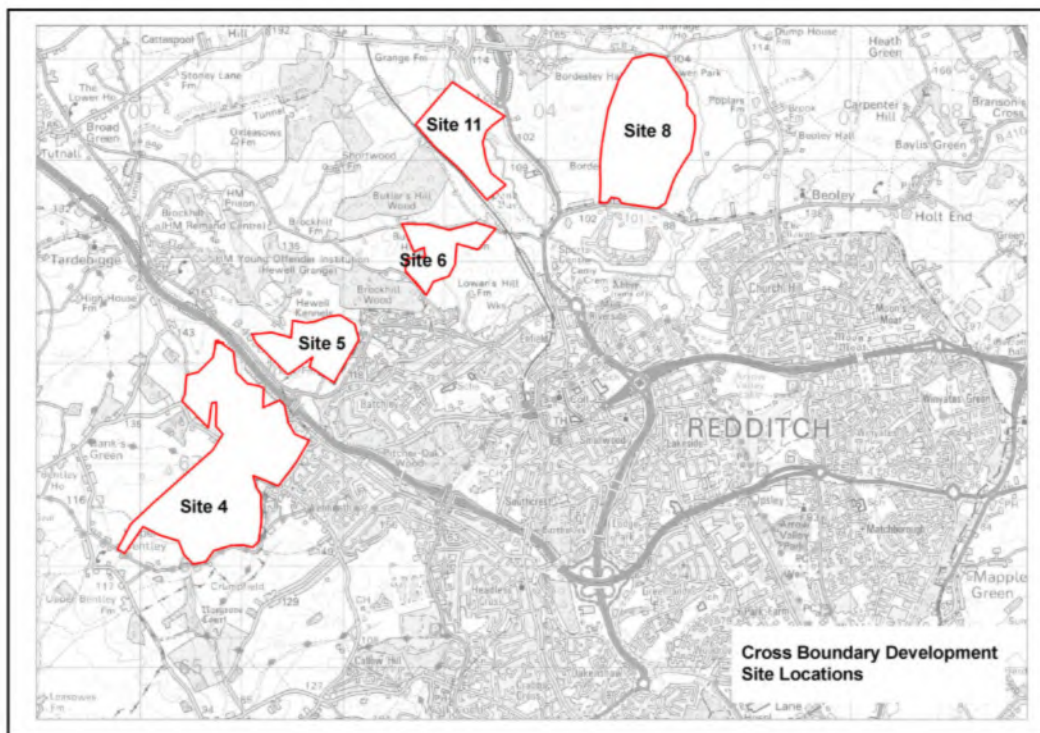
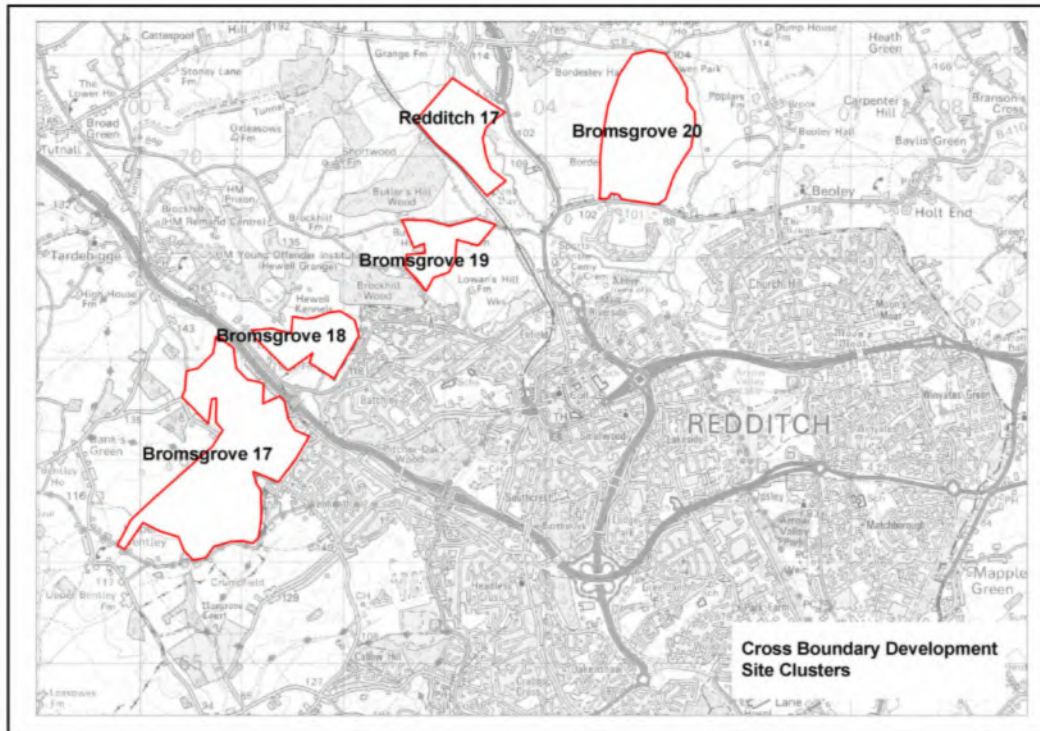


Table 3.1 - Bromsgrove and Redditch – ‘Cross Boundary Sites’ – Site details

Scenarios	Residential Dwellings	Employment (ha)
1) Sites 4 & 5	3843	1.85
2) Sites 5, 6, 11 & 4 (Heyford only)	3229	1.85
3) Site 8	4053	3.7
4) Site 4 & 5 *	3200	
5) Site 8*	3200	
7) Sites 4 & 6	3400	
8) Sites 6 & 8	3400	

Figure 3.5 - Bromsgrove and Redditch Development Clusters – ‘Cross Boundary Sites’



3.5 WCC also provided Halcrow with ‘windfall’ and ‘commitment’ figures for the two districts. The development being allowed for as windfalls and commitments was added to the Clusters included in the Bromsgrove District and Redditch Borough development allocations in order to reflect the magnitude of development planned for the area.

## 4 Phasing and Likelihood

4.1 The Bromsgrove and Redditch development assumptions were tested as an ‘all development’ scenario. That is, all sites were included in the modelling work to create one future year scenario.

4.2 This scenario was assessed against a ‘Do- Minimum base case’, as taken from observed ATC and Turning Count data from 2008-2012 in order to determine the impact of the specific Bromsgrove and Redditch proposed development growth.

4.3 An assessment of background growth and the relationship between the cumulative impact of development and background growth was considered. A means of comparing the calculated traffic flows from the Vehicle/Trip Generation Model against Temprow growth factors was developed and is discussed later in this Technical Note.

## 5 Trip Generation

5.1 The Vehicle/Trip Generation Model includes functions to calculate the anticipated number of trips for all modes of transport and takes into account the geographical location of each of the sites in applying appropriate trip rates. Total (all modes) trip generation rates were sourced

from the TRICS database. Table 5.1 shows the trip generation rates to be used for the residential development sites.

Table 5.1 – Residential Trip Rates (all modes)

	Arrivals		Departures	
	AM Peak	PM Peak	AM Peak	PM Peak
Bromsgrove	0.235	0.636	0.837	0.377
Redditch	0.246	0.636	0.842	0.381
Hagley	0.250	0.724	0.820	0.372
Catshill	0.250	0.724	0.820	0.372
Barnt Green	0.279	0.760	0.926	0.382
Astwood Bank	0.279	0.760	0.926	0.382
Wythall	0.258	0.679	0.829	0.371
Longbridge	0.235	0.636	0.837	0.377

- 5.2 The functionality to test a range of multiple employment types within each of the modelled development ‘clusters’ was built into the Vehicle/Trip Generation model. As a result, a number of additional Vehicle Trip Rates were required and sourced from the TRICS database and are shown in Table 5.2.

Table 5.2 – Employment Trip Rates (all modes)

	Arrivals		Departures	
	AM Peak	PM Peak	AM Peak	PM Peak
B1 (Bromsgrove)	2.861	0.319	0.305	2.499
B2 (Bromsgrove)	0.915	0.240	0.512	0.685
B8 (Bromsgrove)	0.077	0.009	0.012	0.034
B1 (Redditch)	1.961	0.204	0.176	1.709
B2 (Redditch)	0.594	0.198	0.344	0.498
B8 (Redditch)	0.179	0.062	0.054	0.175
A3	2.444	10.286	0.889	9.714
A1	3.476	3.776	3.167	3.638
C1	0.424	0.78	0.825	0.529
A1	3.476	3.776	3.167	3.638
D2	0	4.582	0	4.335

- 5.3 The ‘Cross Boundary’ sites were applied the same trip generation factors as those sites put forward through the ‘Core Development’ Scenario.

## 6 Mode Split

- 6.1 The total number of trips from each of the development sites was calculated using the trip rates set out in Section 5. The trip totals were then distributed between the origins and destinations using the gravity model functions as set out in Section 7. Once the number of trips between origins and destinations were calculated, relevant mode split factors for that particular origin and destination pairing were applied to calculate the number of trips by each mode.

6.2 Census Journey to Work data was used as a reference for the percentage of trips by each mode between each of the origins and destination pairings.

6.3 The mode split factors applied for the origin and destination pairs are shown in Table 6.1.

Table 6.1 – Origin and Destination Mode Split Ratios

	Light Rail	Train	Bus	Taxi	Car Driver	Car Passenger	Motorcycle	Bicycle	On Foot	Other
Bromsgrove - Bromsgrove	0%	0%	2%	0%	54%	7%	0%	5%	32%	
Bromsgrove - Central Redditch	0%	0%	7%	0%	84%	5%	0%	2%	0%	2%
Bromsgrove - Outer Redditch	0%	0%	7%	0%	84%	5%	0%	2%	0%	2%
Bromsgrove - Central Birmingham	0%	14%	3%	0%	78%	2%	0%	1%	0%	2%
Bromsgrove - Outer Birmingham Conurbation	0%	14%	3%	0%	78%	2%	0%	1%	0%	2%
Bromsgrove - Worcester	0%	7%	6%	0%	75%	6%	0%	6%	0%	
Bromsgrove - other surrounding towns	0%	7%	7%	0%	75%	11%	0%	0%	0%	
Hagley - Birmingham/Dudley/Kidderminster/Worcester/Sandwell	0%	13%	4%	0%	79%	4%	0%	0%	0%	
Hagley - other surrounding towns	0%	10%	1%	0%	73%	12%	0%	4%	0%	
S Birmingham Conurb - Central Birmingham	0%	12%	4%	0%	77%	4%	0%	2%	0%	1%
S Birmingham Conurb - Outer Birmingham Conurb	0%	12%	4%	0%	77%	4%	0%	2%	0%	1%
S Birmingham Conurb - Other Surrounding Towns	0%	8%	7%	0%	77%	6%	0%	2%	0%	
S Birmingham Conurb - Other Surrounding Towns	0%	8%	7%	0%	77%	6%	0%	2%	0%	
Outer Redditch - Central Redditch	0%	0%	15%	0%	53%	8%	1%	4%	19%	
Outer Redditch - Outer Redditch	0%	0%	15%	0%	53%	8%	1%	4%	19%	
Central Redditch - Bromsgrove	0%	0%	5%	0%	79%	15%	0%	1%	0%	
Outer Redditch - Bromsgrove	0%	0%	5%	0%	79%	9%	2%	3%	0%	2%
Redditch - Central Birmingham	0%	22%	4%	0%	72%	2%	0%	0%	0%	
Redditch - Outer Birmingham Conurbation	0%	22%	4%	0%	72%	2%	0%	0%	0%	
Redditch - other surrounding towns	0%	0%	5%	0%	81%	10%	0%	4%	0%	

## 7 Trip Distribution

7.1 The trip distribution was calculated using the Vehicle/Trip Generation gravity model functionality. The gravity model uses data on the size of destination zones (population and employment data) and time and distance between origin and destination sites to assess the relative attractiveness of different locations.

7.2 The generalised cost functions, used by the gravity model to calculate the number of trips between all origins and destinations, were calculated according to WebTAG guidance. The population and employment numbers were calibrated to determine the number of trips between origins and destinations on the basis of relative attractiveness of different locations.

7.3 The WebTAG guidance equation used to distribute the development trips between origins and destinations calculates the generalised cost of trips through a function of the Value of Time and Vehicle Operating Cost. In order to inform these functions, the time and distance between all origins and destinations was taken from the Multimaps website to ensure a consistent approach. As the distance and time functions were used to distribute the development trips around the network, to ensure consistency, the same method for obtaining the distance and time taken to route between all the origins and destinations was utilised.

7.4 An example of the assignment table of the origin and destination zones in the gravity model is shown in Figure 7.1.

Table 7.1 – Vehicle/Trip Generation Model Assignment Trip Matrix Example (Note: Numbers shown are for indicative purposes only)

Trip Assignment: Destination of Residential Trips in AM Peak		DESTINATION							
ORIGIN	Total	Bromsgrove Town Centre	Bromsgrove Technology Park	Bromsgrove Birmingham Rd	Bromsgrove Perryfields	North East Redditch Ravensbank	Longbridge	Redditch Town Centre	
	Trips								
Bromsgrove - Cluster 1	324	3	1	4	0	1	10	5	
Bromsgrove - Cluster 2	85	1	0	1	0	0	6	1	
Bromsgrove - Cluster 3	57	1	1	2	0	0	7	1	
Bromsgrove - Cluster 4	100	6	1	8	1	0	5	3	

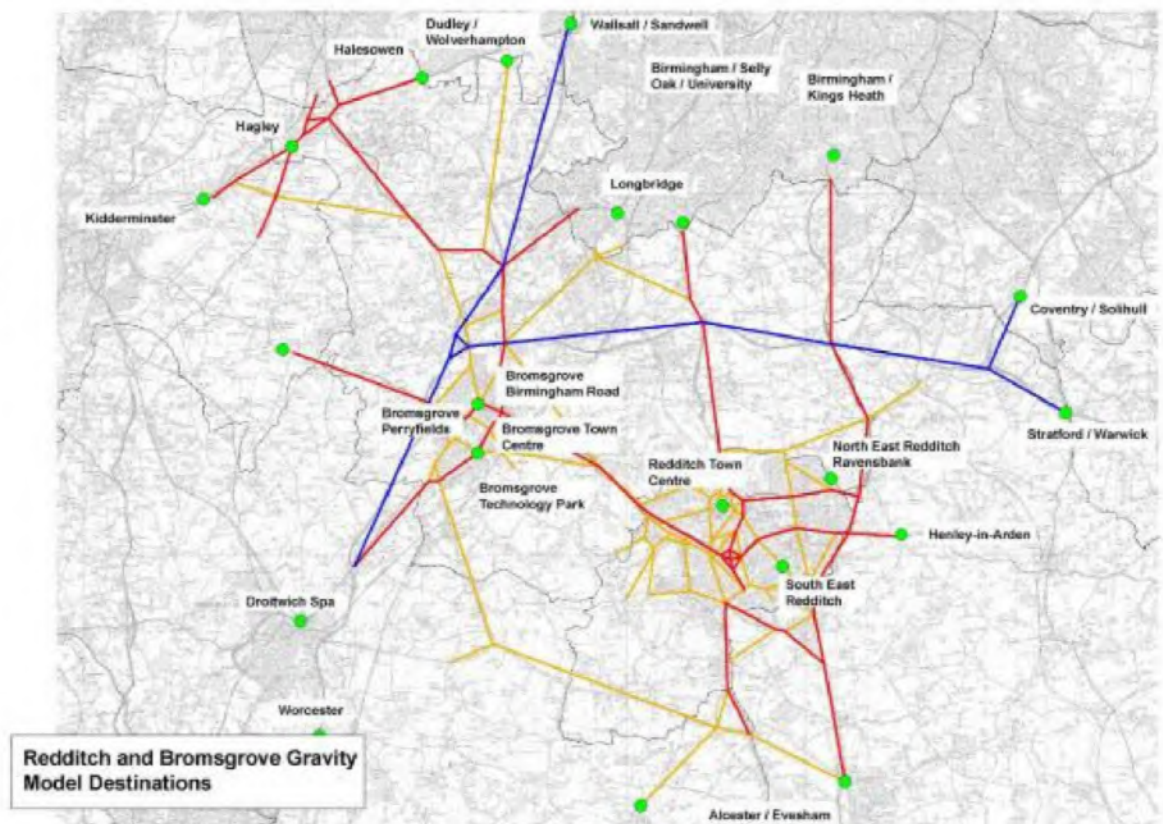
7.5 The origin zones are the series of 'clusters' made up of the development sites. These 'clusters' include either one large development site or a combination of smaller development sites.

7.6 The number of clusters by each district is as follows for the 'Core Development' Scenarios:

- Bromsgrove – 16 development clusters (Figure 3.2); and
- Redditch – 16 development clusters (Figure 3.3).

7.7 The 'Cross Boundary' Development Clusters were allocated into five additional clusters as shown on Figure 3.5. The destination zones are the larger populated towns within Bromsgrove and Redditch Districts and key attractors beyond the District boundaries but within reasonable journey time/commutable distance. These are shown on Figure 7.1.

Figure 7.1 – Vehicle/Trip Generation Model Destination Zones



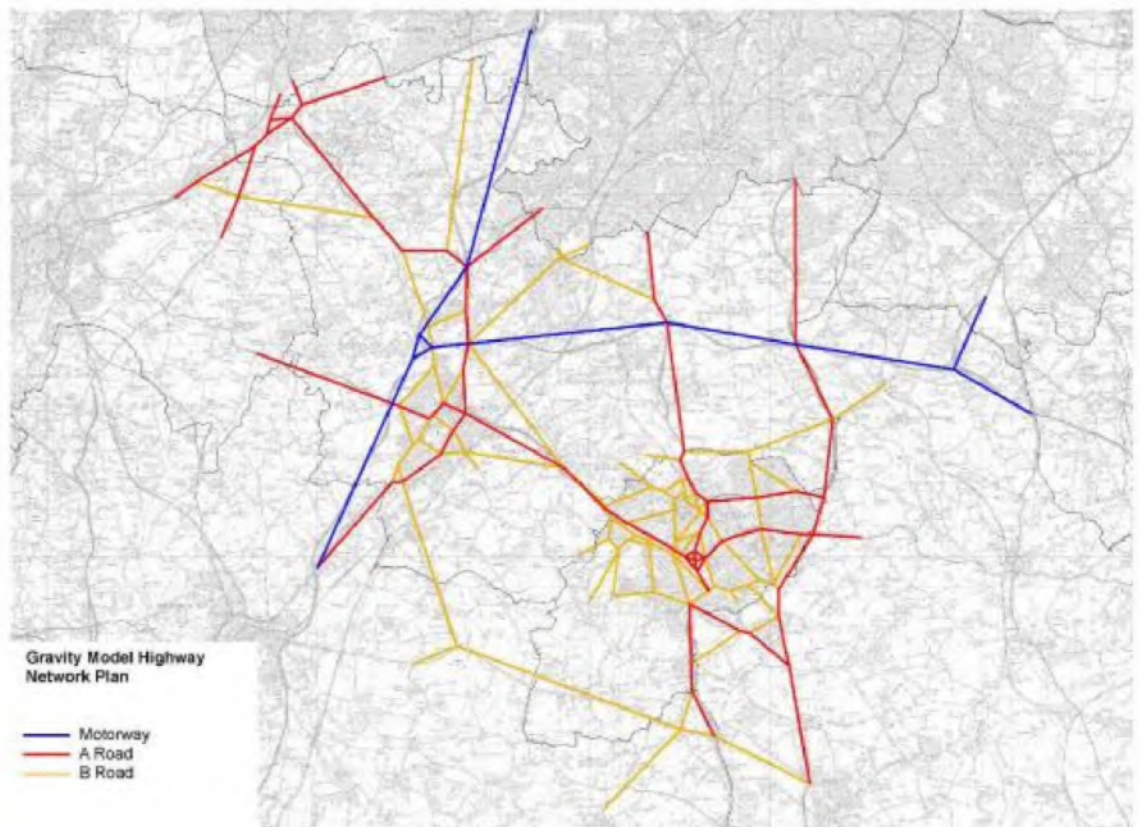


- 7.8 Four trip distribution matrices were calculated for both the AM and PM peak models. The four trip matrices were for the following;
- Residential Site Departure Trips;
  - Residential Site Arrival Trips;
  - Employment Site Departure Trips; and
  - Employment Site Arrival Trips.
- 7.9 The Bromsgrove and Redditch Local Plan development clusters were referred to as 'origins', and the major population and employment centres within and surrounding Bromsgrove and Redditch Districts were referred to as 'destinations'. However, to accommodate the relevant trip rates, the origins and destinations were reversed in the trip matrices where necessary. The 'Departure' trip matrices have assumed the Bromsgrove and Redditch Districts development sites are the 'origins', and the major population and employment centres within and surrounding Bromsgrove and Redditch Districts are the 'destinations'. The 'Arrival' trip matrices have assumed the major population and employment centres within and surrounding Bromsgrove and Redditch Districts are the 'origins' and the Bromsgrove and Redditch Districts development sites are the 'destinations'.
- 7.10 For the AM peak model, trips included in the Residential Site Departure Trip Matrix were calculated using the employment numbers trip attractor at their destinations as the appropriate balancing factor. The Employment Site Arrival Trip Matrix was calculated using the population number as a function of their origin as the balancing factor. For the AM peak 'counter movements', these being Residential Site Arrival Trips and Employment Site Departure Trips, an average of the population size and employment number functions was used to calculate the trip distribution.
- 7.11 For the PM peak model, the assumptions used in the AM peak model were transposed. That is, trips included in the Residential Site Arrival Trip Matrix were calculated using the employment numbers at their origin and trips included in the Employment Site Departure Trip Matrix were calculated using the population size of their destination. For the PM peak 'counter movements', these being Residential Site Departure Trips and Employment Site Arrival Trips, an average of the population size and employment number functions were used to calculate the trip distribution.
- 7.12 WebTAG guidance was applied to calculate a generalised cost for all trips between all origins and destinations based on Value of Time and Vehicle Operating Costs. For further information regarding the generalised cost calculations refer to WebTAG guidance (TAG Unit 3.5.6 Values of Time and Vehicle Operating Costs, August 2012).

## 8 Single, Fixed, Route Assignment

- 8.1 The trips between all origin and destination zones were calculated using the Vehicle/Trip Generation Model. The sum of all four trip matrices for each time period were summed up and applied to the strategic highway network in Bromsgrove and Redditch Districts. The highway links included, as agreed, between Halcrow and WCC are as shown in Figure 8.1.
- 8.2 The routeing pattern between origin and destination zones was based on an all or nothing assignment. That is, all trips between an origin and a destination will follow the same route on a single, fixed, assignment routeing pattern. Routes between all origins and destinations which make the journey in the reverse direction will be assumed to follow in same routeing pattern but in reverse.

Figure 8.1 – Gravity model highway network



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## 9 Background Growth

- 9.1 Background growth for the AM and PM peak periods was considered through an analysis of Temprow Data. Temprow data provides a predicted background growth and is available for sub-

areas within the area covered by the Bromsgrove and Redditch Districts, as shown in Tables 9.1 and 9.2.

9.2 Tables 9.1 and 9.2 also show, by way of example, selected main highway links from the spreadsheet model and the growth experienced on the links as a result of the assessment of impact of development traffic.

Table 9.1 – AM Peak Background Growth Analysis

<b>AM Peak Background Growth Analysis</b>			
<b>Name</b>	<b>Tempro AM Growth Factor</b>	<b>Spreadsheet Gravity Model Network Link</b>	<b>Spreadsheet Gravity Model Network Growth</b>
Bromsgrove	1.0410	A38 Birmingham Road (NB)	1.492
		Fininstall Road (EB)	1.091
		Perryfields Lane (SB)	3.710
		Whitford Road/Fox Lane (NB)	1.919
Redditch	1.0009	A441 Birmingham Road (NB)	1.363
		B4497 Battens Drive (NB)	1.196
		A441 Evesham Road (Astwood Bank) (NB)	1.084
		B4184 Windsor Road (EB)	2.007

Table 9.2 – PM Peak Background Growth Analysis

<b>PM Peak Background Growth Analysis</b>			
<b>Name</b>	<b>Tempro AM Growth Factor</b>	<b>Spreadsheet Gravity Model Network Link</b>	<b>Spreadsheet Gravity Model Network Growth</b>
Bromsgrove	1.0470	A38 Birmingham Road (NB)	1.982
		Fininstall Road (EB)	1.047
		Perryfields Lane (NB)	3.104
		Whitford Road/Fox Lane (NB)	1.199
Redditch	1.0202	A441 Birmingham Road (NB)	1.650
		B4497 Battens Drive (NB)	1.270
		A441 Evesham Road (Astwood Bank) (NB)	1.133
		B4184 Windsor Road	2.511

9.3 Comparing the two increase proportions it can be seen that the development related increase is greater than the TEMPRO increase. This means that the increase in demand as a result of Bromsgrove and Redditch development exceeds the TEMPRO increase. Increases contained in TEMPRO are largely a function of the summation of additional development, with a smaller proportion a result of, for example, longer journeys and mode change. Also, it is noted that the highway impact assessment work undertaken has focussed on the main routes. It is recognised that local routes will act as feeder routes to this network, and on these location routes (if the same analysis was undertaken) TEMPRO could, but not always, exceed development growth.

9.4 It is therefore considered, as this analysis was conducted at sufficient a strategic level, that the development traffic increases adequately reflect overall traffic increases.

## 10 Cumulative Impact

- 10.1 The cumulative impact of the development trips will be assessed at key junctions, as identified and agreed between WCC and Halcrow, using the Vehicle/Trip Generation Model trip matrices and the result of applying these to highway network included in the model using the single, fixed, assignment process. The Vehicle/Trip Generation model outputs traffic flows for each of the links approaching the key junctions for both the AM and PM peak periods. A comparison of these link flows against current traffic flow data provides an indication of the anticipated future year performance of the junctions.
- 10.2 A generic capacity was assumed for each junction type based on those used the development of the Worcester Transport Model (WTM). This capacity was included in the model to allow the comparison of the model flows against the capacity of the junction thus providing an indication of whether the junction will operate either below, at, or above capacity. Table 10.1 shows the assumed capacities applied across the network. These capacities were assessed with reference to the WTM.

Table 10.1 – Junction Capacities per Junction Type

Junction Type	Capacity
Priority Junction Mainline 1 Lane Approach	1200
Priority Junction Mainline 2 Lane Approach	2500
Priority Junction Give Way Approach 1 Lane	300
Priority Junction Give Way Approach 2 Lane	500
Signal Junction Mainline 1 Lane Approach	600
Signal Junction Mainline 2 Lane Approach	1000
Signal Junction Mainline 3 Lane Approach	1400
Signal Junction Give Way Approach 1 Lane	400
Signal Junction Give Way Approach 2 Lane	800
Roundabout Junction 1 Lane Approach	800
Roundabout Junction 2 Lane Approach	1200
Roundabout Junction 3 Lane Approach	1500
Roundabout Junction 4 Lane Approach	1800
Mini - Roundabout Junction 1 Lane Approach	400
Motorway Mainline 3 Lanes	5700

- 10.3 The requirement for a mitigation measure (scheme) was driven by the identification of junctions which are shown to operating at, or over capacity in the gravity model in the AM peak and PM peak periods, based upon the data parameters included in Table 10.1.

## 11 Concluding remarks

- 11.1 The Vehicle/Trip Generation Model developed provides an area wide assessment tool showing the transport impacts for Bromsgrove and Redditch Districts. This Technical Note has described the methodology adopted to build the Model and has noted the assumptions made during this process.
- 11.2 In terms of analysis of the highway network, the Vehicle/Trip Generation Model was used to identify the junctions predicted to be under pressure as a result of the development proposals

put forward for the Bromsgrove and Redditch areas. In order to further the design of any mitigation measures it is recommended that more detailed assessments are undertaken on a more local basis.

- 11.3 In terms of analysis of the sustainable modes, the model demonstrates requirements for walk, cycle and PT infrastructure and services to accommodate forecast demand and mitigate/limit impact of forecast vehicle trips generation.

DRAFT

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# Appendix B

Bromsgrove and Redditch Development Plan –  
Planning Data

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GIS Ref	SiteRef	Location	Development Quantum	
			Residential Dwellings Units	Employment Hectares
	ALV6	Alvechurch, Land adj Crown Meadow		27
	BDC102	7 & 9 Worcester Road, Hagley		12
	BDC163	Finstall Training Centre, Stoke Road, Birmingham		12
	BDC168A	The Council House Burcot Lane, Bromsgrove		51
	BDC136A	Alvechurch, Birmingham Rd/Old Rectory Lane		27
	BDC189	Hagley ADR BDC356, BDC51, BDC188, BDC189		311
	BDC192	All Saints Vicarage, Burcot Lane, Bromsgrove		12
	BDC195	Banner Foods, 6 Finstall Road, Bromsgrove		12
	BDC199	Polymerlatex, Westonhall Road, Stoke Prior		200
	BDC20	BROM 2 Perryfields	1350	5
	BDC201	Regents Park Road, The Oakalls, Bromsgrove		39
	BDC221	Longbridge Cofon Centre		0
	BDC222	Bromsgrove Technology Park		5.3
	BDC223	Wythall Green Business Park		6.1
	BDC224	Ravenbank ADR		1.18
	BDC65	The Avenue, Rubery		0
	BDC66	Wythall, Bleakhouse Farm		14.48
	BDC73	Longbridge East Works		68
	BDC80	BROM 3 Whitford Road		176
	BDC81A	BROM1 Norton Farm		750
	BDC85	Wagon Works, Bromsgrove		500
	BDC86	Wythall, Selsdon Close		318
	BDC9	45-47 Woodrow Lane, Catshill		212
	BDC92	Bart Green, Kendal End Road		76
	BDC93	Catshill, Church Lane		8
	BDC95	50, 52 & 54 Red Lion Street, Alvechurch		88
	FR4	Frankley, Egghill Lane		80
	LP02 - Brush factory, Evesham Road, Cra	LP02	Brush Factory, Evesham Road, Crabbs Cross (LP124)	10
	LP03 - Rear of 144-162 Easemore Road	LP03	Rear of 144-162 Easemore Road (LP135)	66
	LP05 - Windsor Gas Works (LP147)	LP05	Windsor Gas Works (LP147) **see completions**	4
	LP06 - Mayfield Works	LP06	Mayfields Works	19
	LP13 - Land off Torns Close	LP13	Land off Torns Close	6
	LPX02 - Adjacent Castleitch Lane / Pheas	LPX02	Adjacent Castleitch Lane / Pheasant Lane	23
	LPX04 - Former Claybrook School, Matchb	LPX04	Former Claybrook School, Matchborough	6
	LPX05 - Land at Millfields, Fire Station & LPX05	LPX05	Land at Millfields, Fire Station and RO Fire Station	36
	LPX06 - Former Ipsley School Playing Field	LPX06	Former Ipsley School playing field	35
	LPX07 - South of Scout Hut, Oskenshaw	LPX07	South of scout hut, Oskenshaw Road	31
	CS01 - Church Hill District Centre	CS01	Church Hill District Centre	32
	CS03 - Matchborough District Centre	CS03	Matchborough District Centre	57
	WYG04 - Marfield Farm School	WYG04	Marfield Farm School	17
	WYG06 - High Trees, Dark Lane (09/259)	WYG06	High Trees, Dark Lane (09/259)	79
	R803 - Widney House, Bromsgrove Road	R803	Widney House, Bromsgrove Road	5
	LA102 - Land off Wirehill Drive (08/305)	LA102	Land off Wirehill Drive (08/305)	58
	UCS 2.16 - Rear of Sandygate Close	UCS 2.16	Rear of Sandygate Close	15
	UCS 8.38 - Dingleside Middle School & Pl	UCS 8.38	Dingleside Middle School & playing field and land rear of 1-11 Auxerre A	8
	2010/03 - Loxley Close	2010/03	Loxley Close	220
	2010/05 - Clifton Close	2010/05	Clifton Close	10
	2010/07 - Prospect Hill	2010/07	Prospect Hill	6
	2010/09 - Rear of Alexandra Hospital	2010/09	RO Alexandra Hospital	71
	2010/10 - A435 ADR	2010/10	A435 ADR	145
	2010/11 - Brockhill ADR	2010/11	Brockhill ADR	184
	2010/12 - Webtheath ADR	2010/12	Webtheath ADR	582
	2010/13 - Brockhill Green Belt	2010/13	Brockhill East Green Belt	600
	2010/14 - Foxydate Green Belt	2010/14	Brockhill West Green Belt	400
	2010/27 - Sandycroft, West Avenue	2010/27	Sandycroft, West Avenue	150
	2011/02 - St Stephen's School Playing Fie	2011/02	St Stephen's School Playing Field (part)	10
	2011/03 - Brockhill East	2011/03	Brockhill East (10/008)	22
	2011/04 - Dorothy Terry House	2011/04	Former Dorothy Terry House, Evesham Road (10/137)	14
	2011/05 - Wellington Works	2011/05	Wellington Works, Astwood Bank (10/154)	41
	2011/06 - Birchfield Road	2011/06	Birchfield Road	7
	2012/01 - Hewell Road Baths	2012/01	Former Hewell Road swimming baths	22
	2012/02 Lowan's Hill Farm	2012/02	Lowan's Hill Farm, Brockhill (11/087)	14
	IN 15	IN 15	Woolaston Road, Park Farm North	6
	IN 19	IN 19	Studley Road (Aeroupp), Park Farm (N)	
	IN 20	IN 20	Old Forge Drive, (BACO) Park Farm North	0.4
	IN 24	IN 24	Windsor Road Gas Works, Enfield	1.44
	IN34	IN34	Merse Road, Moons Moat North	0.9
	IN 37	IN 37	Bartlett Road, Washford	0.65
	IN 38	IN 38	A4, 47, 52 Heming Road, Washford	0.62
	IN 52	IN 52	Shawbank Road, Lakeside	0.22
	IN 54	IN 54	Palmers Road, Moons Moat East	1.03
	IN 58	IN 58	Crossgate Road, Park Farm North	0.29
	IN59	IN59	A9, Greenlands Business Centre, Studley Road, Park Farm North	1.1
	IN 61	IN 61	Studley Road, Green Lane, Park Farm South	0.38
	IN 67	IN 67	Land at Brockhill	0.43
	IN 69	IN 69	Land to the Rear of the Alexandra Hospital Strategic Site	6.6
	IN 73	IN 73	Land at Union Street	2
	IN 80	IN 80	Land At Winyates Way And Moons Moat Drive	0.19
	IN 81	IN 81	Land at Brockhill, East of Railway (Eastern Section of ADR)	0.64
	IN 82	IN 82	A435 Segment 2	3.5
	IN 83	IN 83	Land bound by Kingham Close and Far Moor Lane	10.44
	IN 84	IN 84	Land off Pipers Road	0.19
	IN 85	IN 85	Land Fronting Matchborough Way	0.22
	IN 87	IN 87	Edward Street	0.6
			Winyates Green Triangle (Stratford)	0.48
			Land at Gorcott (Stratford)	12
				7.47
	RA1	KFC - 2012/025/FUL	Maclellan House, Clews Road	
	RA2	Astwood Farm - 2012/148/COU	Building F, Astwood Business Park, Astwood Farm, Astwood Lane	
	RA3	Sainsbury's extension - 2011/219/FUL	Alvechurch Highway, Redditch	
	RA4	Patrol Station - 2011/258	Land at Teardrop Site, Bordesley Lane, Redditch	
	RA5	Pub & Hotel - 2011/296	Land at Teardrop Site, Bordesley Lane, Redditch	
	RA6	Town Centre (additional retail)	Town Centre	
	BA1	Sainsburys	Birmingham Road	
	BA2	New Fire & Police Station	Slideslow Drive	
	BA3	Former Market Hall Site (TC8)	St Johns Street	
	BA4	Birmingham Road / Stourbridge Road (TC15)	Junction of Birmingham Rd/Stourbridge Rd	
	<b>WINDFALL DISTRIBUTION</b>	<b>Residential Dwellings per Annum</b>		
	Alvechurch			2
	Bart Green			36
	Belbroughton			2
	Bentley Pauncefoot			18
	Booley			0
	Bournheath			0
	Bromsgrove			18
	Catshill and North Marlbrook			14
	Client			2
	Cofton Hackett			1
	Dodford with Gratton			18
	Finstall			0
	Frankley			0
	Hagley			2
	Hunnington			0
	Lickey and Blackwell			1
	Romsley			18
	Rubery			0
	Stoke Prior			1
	Tutnall and Cobley			18
	Wythall			0
	ABBEY			2
	ASTWOOD BANK & FECKENHAM			36
	BATCHLEY & BROCKHILL			0
	CENTRAL			18
	CHURCH HILL			18
	CRABBS CROSS			1
	GREENLANDS			18
	HEADLESS CROSS & OAKENSHAW			1
	LODGE PARK			18
	MATCHBOROUGH			1
	WEST			18
	WINYATES			1
	<b>CROSS BOUNDARY SITES</b>			
	Site 4			2800
	Site 6			600



## Appendix C

Predicted number of trips from development sites by  
mode

DRAFT



<b>24 Hour Trip Totals</b>	<b>VEHICLE TRIPS</b>	<b>BUS TRIPS</b>	<b>BICYCLE TRIPS</b>	<b>PED TRIPS</b>
Bromsgrove - Cluster 1	2872	123	37	36
Bromsgrove - Cluster 2	681	59	21	27
Bromsgrove - Cluster 3	444	37	15	32
Bromsgrove - Cluster 4	841	78	0	0
Bromsgrove - Cluster 5	11033	774	303	1655
Bromsgrove - Cluster 6	1946	134	60	327
Bromsgrove - Cluster 7	375	25	14	79
Bromsgrove - Cluster 8	238	16	8	43
Bromsgrove - Cluster 9	3060	212	93	512
Bromsgrove - Cluster 10	3876	254	145	834
Bromsgrove - Cluster 11	3808	260	122	674
Bromsgrove - Cluster 12	2153	201	0	0
Bromsgrove - Cluster 13	6588	487	310	1233
Bromsgrove - Cluster 14	1643	149	37	0
Bromsgrove - Cluster 15	3378	307	88	0
Bromsgrove - Cluster 16	5252	850	260	863
Bromsgrove - Cluster 17	16849	2047	638	1672
Bromsgrove - Cluster 18	0	0	0	0
Bromsgrove - Cluster 19	3500	486	146	444
Bromsgrove - Cluster 20	0	0	0	0
Redditch - Cluster 1	3767	458	143	374
Redditch - Cluster 2	1124	147	44	128
Redditch - Cluster 3	12964	1729	517	1535
Redditch - Cluster 4	1372	212	62	210
Redditch - Cluster 5	1933	287	85	276
Redditch - Cluster 6	351	54	16	52
Redditch - Cluster 7	2791	460	135	471
Redditch - Cluster 8	885	135	40	132
Redditch - Cluster 9	1145	189	57	194
Redditch - Cluster 10	1701	268	83	267
Redditch - Cluster 11	820	121	38	115
Redditch - Cluster 12	4352	476	239	336
Redditch - Cluster 13	2139	351	104	359
Redditch - Cluster 14	805	155	45	172
Redditch - Cluster 15	854	166	49	185
Redditch - Cluster 16	15234	2934	860	3251
Redditch - Cluster 17	0	0	0	0
Redditch - Cluster 18	0	0	0	0
Redditch - Cluster 19	0	0	0	0
Redditch - Cluster 20	0	0	0	0



# Appendix D

## Infrastructure Delivery Plan – Scheme Tables

## Redditch Development Plan

### Sustainable Transport Schemes

#### **Redditch Bus Operations - Routes and Frequencies**

Note: Gold and Silver Bus Routes/Roadside Infrastructure referenced as per Worcestershire County Council Passenger Transport Infrastructure Best Practice Report (November 2007)

Location	Potential Scheme	Costs
Redditch Service 50 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 51 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 52 (Brockhill Development)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 400,000.00
Redditch Service 61 (Developments east of the town centre)	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 667,000.00
Redditch - Webheath Service	Silver Standard Bus Route, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 134,000.00
<b>SUB TOTAL</b>		<b>£ 2,001,000.00</b>

#### **Redditch Inter-Urban Bus Operations - Routes and Frequencies**

Note: Gold and Silver Bus Routes/Roadside Infrastructure referenced as per Worcestershire County Council Passenger Transport Infrastructure Best Practice Report (November 2007)

Location	Potential Scheme	Costs
Inter-Urban - Service 144 - Birmingham to Worcester (via Bromsgrove and Catshill)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 2,200,000.00
Inter-Urban - Service X3 - Kidderminster to Redditch (via Bromsgrove)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,320,000.00
Inter-Urban - Service 143 - Birmingham to Redditch (via Bromsgrove and Catshill)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,680,000.00
Inter-Urban - Service 145 - Bromsgrove to Redditch (via Longbridge)	Gold Standard Bus Routes, Service Frequency; Mon-Sat (15 mins), Evenings and Sundays; min half hourly Periods of Operation; Mon-Sat (0600-1900), Evenings (1900-2300), Sundays (0800-2000)	£ 1,200,000.00
<b>SUB TOTAL</b>		<b>£ 6,400,000.00</b>

## Redditch Development Plan Local Development Plan

## Sustainable Transport Schemes

## Redditch

Location	Context	Magnitude	Consequence	Potential Scheme	Costs	With Contingencies	Total Cost (inc OB)
Cluster 1	Cycle Route 5 routes through Webbeath providing an access route for pedestrians and cyclists to Redditch town centre and the railway station via an on road cycle route	Potential for approximately 370 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 140 cycle trips to and from development cluster over 24 hour period Potential for approximately 460 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Signing strategy to link development site to appropriate local cycle routes Provision for 2 Gold Standard Bus Stops	£ 38,000.00	£ 55,100.00	£ 80,000.00
Cluster 2	The proposed development site west of Brockhill lies to the north west of Cycle Route 5. The development site is linked to Cycle Route 5 by residential streets, namely Brockhill Drive, Lilly Green Lane, Foxydiatle Crescent, Hawthorn Road, Rowan Road and Poplar Road	Potential for approximately 130 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 40 cycle trips to and from development cluster over 24 hour period Potential for approximately 150 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Improved access from the Foxydiatle Development site to Cycle Route 5 through the residential streets through appropriate route signage Provision for 2 Gold Standard Bus Stops	£ 38,000.00	£ 55,100.00	£ 80,000.00
Cluster 3	The proposed development site north of Brockhill is linked to an on road cycle link on Brockhill Lane. There are short, uncontinuous sections of cycle route between the site and Redditch town centre alongside Hewell Road. Off road cycle/pedestrian routes run east west alongside Batchley Road and Windsor Road. The cycle path adjacent to Windsor Road links to a route recommended for cyclists on Birmingham Road which provides a direct access to Redditch town centre.	Potential for approximately 1500 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 520 cycle trips to and from development cluster over 24 hour period Potential for approximately 1730 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Connecting the cycle route on Brockhill Lane and Hewell Road to the cycle path running adjacent to Batchley Road and Windsor Road to provide a continuous recommended route for cyclists from the development site to Redditch town centre. (include dropped kerbs, road markings, signage and a toucan crossing) Provision for 6 (50,51,52 Bus Service Routes) Gold Standard Bus Shelters	£ 138,000.00	£ 154,560.00	£ 230,000.00
Cluster 4	The development sites are located in proximity to Cycle Route 5 on Bromsgrave Road and the recommended route for cyclists on Hewell Road and Clive Road which provides links to Redditch town centre	Potential for approximately 210 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 80 cycle trips to and from development cluster over 24 hour period Potential for approximately 210 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage Provision for 2 Silver Standard Bus Stops	£ 23,000.00	£ 33,350.00	£ 50,000.00
Cluster 5	The development sites are located in proximity to the recommended route for cyclists on Hewell Road and Clive Road which provides links to Redditch town centre	Potential for approximately 280 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 90 cycle trips to and from development cluster over 24 hour period Potential for approximately 290 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	No Scheme required Provision for 2 Silver Standard Bus Stops	£ 15,000.00	£ 21,750.00	£ 40,000.00
Cluster 6	The development cluster lies in a residential area south of the town centre, bounded by the Redditch Ringway, Bromsgrave Highway (A448) and Alvechurch Highway (A441). Routes from the site to the town centre, railway station, bus station and other cycle/pedestrian routes are provided by Plymouth Road, Beley Road and Holloway Lane	Potential for approximately 50 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 20 cycle trips to and from development cluster over 24 hour period Potential for approximately 50 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage on the surrounding residential streets, namely, Mount Pleasant, Parsons Road, Union Street and Burton Lane Provide additional pedestrian crossing on Mount Pleasant in proximity to Parsons Road Provision for 2 Silver Standard Bus Stops	£ 53,000.00	£ 76,850.00	£ 120,000.00
Cluster 7	The development sites are located in close proximity to the cycle route which runs north south through Redditch on Park Way, Church Hill Way, Winyates Way and Matchborough Way. The cycle route provides links to the town centre and the employment districts in the east of the town	Potential for approximately 470 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 140 cycle trips to and from development cluster over 24 hour period Potential for approximately 460 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage Provision for 2 Silver Standard Bus Stops	£ 23,000.00	£ 33,350.00	£ 50,000.00
Cluster 8	The development sites are located in the Lodge Park and Lakeside districts of Redditch. Cycle links north and south are provided by the on road cycle route on Holloway Road. A pedestrian footpath provides a link to Arrow Valley Country Park	Potential for approximately 130 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 40 cycle trips to and from development cluster over 24 hour period Potential for approximately 130 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage Provide pedestrian crossing on Studley Lane in proximity to Woodfield Middle School Provision for 2 Silver Standard Bus Stops	£ 53,000.00	£ 76,850.00	£ 120,000.00
Cluster 9	The development sites are located in the Greenlands district of Redditch. Cycle links north and south are provided by the on road cycle route on Studley Road.	Potential for approximately 190 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 60 cycle trips to and from development cluster over 24 hour period Potential for approximately 190 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage and provide linkages from Ipsley Church Lane to NCNS (dropped kerbs, road markings, cycle signs) Provision for 2 Silver Standard Bus Stops	£ 28,000.00	£ 40,600.00	£ 60,000.00
Cluster 10	The development sites are located in the Greenlands district of Redditch. Cycle links north and south are provided by the on road cycle route on Studley Road.	Potential for approximately 270 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 80 cycle trips to and from development cluster over 24 hour period Potential for approximately 270 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage Provision for 2 Silver Standard Bus Stops	£ 23,000.00	£ 33,350.00	£ 50,000.00
Cluster 11	The proposed development sites are located in Crabbs Cross are in proximity to the off road pedestrian/cycle path which runs adjacent to Windmill Drive and provides a link to Yvonne Road and Swinburne Road in Headless Cross.	Potential for approximately 120 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 40 cycle trips to and from development cluster over 24 hour period Potential for approximately 120 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	The development sites must have adequate connectivity to cycle route network through appropriate route signage Improve uncontrolled pedestrian crossing facilities at Yvonne Road junction with pedestrian footpath Provision for 2 Silver Standard Bus Stops	£ 28,000.00	£ 40,600.00	£ 60,000.00
Cluster 12	The development site is located in the village of Astwood Bank south of Redditch. The village is linked to the Redditch cycle network via Jill Lane which is a recommended cycle link which provides access to Brickyard Lane in the south east of the town.	Potential for approximately 340 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 240 cycle trips to and from development cluster over 24 hour period Potential for approximately 480 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Provide toucan crossing over the A441 Provision for 2 Gold Standard Bus Stops	£ 65,000.00	£ 94,250.00	£ 140,000.00
Redditch	Provision for additional dropped kerbs at various locations around the town centre and residential areas	Potential to increase the number of cycle and pedestrian trips in Redditch	Existing pedestrian and cycle infrastructure in poor condition can prevent use	Providing additional crossing facilities in the form of controlled / dropped kerbs will increase the attractiveness of travelling by sustainable modes on certain routes and at key junctions and in turn increase the connectivity across the town	£ 50,000.00	£ 72,500.00	£ 110,000.00
Redditch	Poor cycle parking provision in town centre	Potential to increase the number of cycle trips to Redditch Town Centre	Lack of adequate cycle storage facilities in Town Centre may prevent cycle trips to Redditch and in turn increase trips into the Town Centre by non-sustainable modes	Provide additional cycle parking infrastructure in Redditch town centre	£ 9,000.00	£ 13,050.00	£ 20,000.00

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Redditch	Need for improved cycle / pedestrian signage to the railway station	Potential to increase the number of cycle trips to Redditch Railway Station	Lack of appropriate facilities for non sustainable transport users at the Rail Station will not increase the number of non-car trips made to the site	Improved signing of cycle / pedestrian network across the town to encourage trips to the rail station by sustainable mode	£ 75,000.00	£ 108,750.00	£ 160,000.00
Redditch	Lack of information for cyclists and pedestrians around the town	Potential to increase the number of cycle and pedestrian trips in Redditch	Lack of appropriate facilities for sustainable transport users will not increase the number of non car trips	Installation of information kiosks displaying cycle route maps, suggested pedestrian routes etc at key locations in redditch. Suggest: at cycle storage facility in town centre, bus station and railway station.	£ 60,000.00	£ 87,000.00	£ 130,000.00
Redditch	A number of subways in Redditch are in poor condition and pedestrians feel intimidated when using them	Potential to increase the number of cycle and pedestrian trips in Redditch	Lack of appropriate facilities for sustainable transport users will not increase the number of non car trips	Upgrade to a number of existing subways		£ -	£ -
Redditch	Lack of at-grade crossing facility for cyclists and pedestrians on the Redditch Ringway	Potential to increase the number of cycle and pedestrian trips in Redditch	Lack of appropriate facilities for sustainable transport users will not increase the number of non car trips	Toucan crossing at a suitable location on the Redditch Ringway	£ 35,000.00	£ 50,750.00	£ 80,000.00
Redditch / Alvechurch / Bant Green / Birmingham	Redditch - Birmingham Railway Line/Service	Potential to increase the number of rail trips from Redditch	Investment to rail service will increase patronage	Enhancements to the existing rail infrastructure and service			
<b>SUB TOTAL</b>					£ 754,000.00	£ 1,047,760.00	£ 1,580,000.00

**Cross Boundary Sites**

Location	Context	Magnitude	Consequence	Potential Scheme	Costs	With Contingencies	Total Cost (inc OB)
Cross Boundary Site 4	Cycle Route 5 routes through Webheath providing an access route for pedestrians and cyclists to Redditch town centre and the railway station via an on road cycle route. Existing quiet walking routes are provided to link to Batchley and Brookhill over the A448	Potential for approximately 1670 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 640 cycle trips to and from development cluster over 24 hour period Potential for approximately 2050 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Costs only include for schemes outside the developer boundary Developer to provide links to Local Cycle Network Route 5 Additional signage for pedestrians and cyclists on Church Lane Improve signage to quiet walking route under Bronsgrove Highway and formalise footpath (improved footway and provision of lighting) Provision of an additional 2 Gold Standards Bus Stops	122000	£ 176,900.00	£ 260,000.00
Cross Boundary Site 6	Cross Boundary Site 6 is located adjacent to Redditch Development Cluster 3. The schemes identified for Redditch Development Cluster 3 are sufficient to support Cross Boundary Site 6	Potential for approximately 440 pedestrian trips to and from development cluster over 24 hour period Potential for approximately 150 cycle trips to and from development cluster over 24 hour period Potential for approximately 490 PT trips to and from development cluster over 24 hour period	Not providing links to existing sustainable transport networks from proposed development sites can prevent trips due to a lack of connectivity	Costs only include for schemes outside the developer boundary Schemes proposed for Cluster 3 are sufficient to support the additional development proposed at Cross Boundary Site 6			No additional costs above and beyond those associated with Cluster 3
<b>SUB TOTAL</b>					£ 122,000.00	£ 176,900.00	£ 260,000.00

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## Redditch - Proposed Highway Schemes

Location	Existing Situation	Context	Magnitude	Consequence	Optimum Scheme	Costs	With Contingencies	Total Cost (inc OB)
A441 / B4101 Dagnall End Road Bromsgrove Highway / Brockhill Drive (North Roundabout)	Signalised Junction	Junction located on A441 linking Redditch with the Birmingham Conurbation	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from Redditch to the Birmingham Conurbation	Add additional approach lane on the eastern arm and put on MOVA	£ 141,215.13	£ 359,392.50	£ 520,000.00
Birchfield Lane / Foyladyate Lane	Priority Junction	Junction located on Birchfield Road linking residential areas to south west of Redditch with the key A448 corridor towards Bromsgrove	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from Redditch to Bromsgrove	Add Additional lane approach lane on Brockhill Drive TRO to protect the junction	£ 76,215.13	£ 193,967.50	£ 280,000.00
Brockhill Drive (B4184) / Hewell Road (B4184) / Brockhill Lane	Roundabout	Junctions located on key Brockhill Drive (B4184) corridor linking residential areas with the wider highway network	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from residential areas to Redditch town centre and the wider highway network	Additional lane on west and north approaches	£ 161,944.20	£ 412,148.00	£ 600,000.00
Hewell Road / Windsor Road (B4184)	Roundabout	Junction located on key Brockhill Drive /Hewell Road (B4184) corridor linking residential areas with Redditch town centre and the wider highway network	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from residential areas to Redditch town centre and the wider highway network	Convert to a 4 arm signal junction	£ 405,000.00	£ 1,030,725.00	£ 1,490,000.00
Alvechurch Highway (A441) / Middlehouse Lane (B4184)	Roundabout	Junction located on A441 linking Redditch with the Birmingham Conurbation	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential areas and Redditch town centre to the wider highway network	Signalise approaches from north, south and west	£ 385,000.00	£ 979,825.00	£ 1,420,000.00
Alvechurch Highway (A441) / Redditch Ringway (B4160)	Signalised Junction	Junction located on A441 linking Redditch with the Birmingham Conurbation and Redditch town centre with the wider highway network	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from Redditch town centre to the wider highway network	Install MOVA	£ 15,000.00	£ 38,175.00	£ 60,000.00
Headless Cross Drive / Evesham Road	Signalised Junction	Junction located on Birchfield Road linking residential areas to south west of Redditch with the key A448 corridor towards Bromsgrove	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential areas to the wider highway network	Install MOVA	£ 15,000.00	£ 38,175.00	£ 60,000.00
Rough Hill Drive / Woodrow Drive / Greenlands Drive	Roundabout	Junction located on key distributor route linking residential and employment areas to the wider highway network and in proximity to the hospital site	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential/employment areas to the wider highway network and on routes towards the hospital site	Additional approach lane on main 3 approaches (not Woodrow N)	£ 346,804.71	£ 882,617.99	£ 1,280,000.00
Woodrow Drive / Quinneys Lane (hospital access)	Roundabout	Junction located on key distributor route linking residential and employment areas to the wider highway network and in proximity to the hospital site	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential/employment areas to the wider highway network and on routes towards the hospital site	50m additional approach lane on western arm - right turn into the hospital	£ 76,215.13	£ 193,967.50	£ 280,000.00
Woodrow Drive / Washford Drive / Studley Road	Roundabout	Junction located on key distributor route linking residential and employment areas to the wider highway network and in proximity to the hospital site	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential/employment areas to the wider highway network and on routes towards the hospital site	40m additional approach lane on south and eastern approach arm	£ 141,944.20	£ 361,248.00	£ 530,000.00
Washford Drive / Old Forge Drive	Roundabout	Junction located on key distributor route linking residential and employment areas to the wider highway network and in proximity to the hospital site	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential/employment areas to the wider highway network and on routes towards the hospital site	Signaling and lining improvement	£ 30,000.00	£ 76,350.00	£ 110,000.00
Icknield St Dr (B4497) / Washford Drive / Claybrook Drive	Roundabout	Junction located on key distributor route linking residential and employment areas to the wider highway network	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on key routes from residential/employment areas to the wider highway network and on routes towards the hospital site	Signaling and lining improvement	£ 30,001.00	£ 76,352.55	£ 110,000.00
Ashwood Bank - Evesham Road (A441) / Feckenham Road / Sambourne Lane (B4092)	Signals	Junction located on A441 corridor between Redditch and Evesham	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from Redditch to Evesham	Install MOVA	£ 15,000.00	£ 38,175.00	£ 60,000.00
Brockhill Drive Corridor	4 x Roundabout Junctions	Junctions located on key Brockhill Drive (B4184) corridor linking residential areas with the wider highway network	Model indicates junction to be performing over capacity in 2030	Congestion at this junction will impact on a key route from residential areas to Redditch town centre and the wider highway network	Replace 4 existing Roundabout Junctions with Signalised Junctions all operating using MOVA	£ 3,340,000.00	£ 8,500,300.00	£ 12,250,000.00
<b>SUB TOTAL</b>						<b>£ 5,167,339.50</b>	<b>£ 13,201,779.02</b>	<b>£ 19,080,000.00</b>

## HGV - Lorry Park

Location	Existing Situation	Context	Magnitude	Consequence	Optimum Scheme	Costs	With Contingencies	Total Cost (inc OB)
To be confirmed	Lack of suitable overnight parking facility for HGV's				Provision of an overnight parking facility for approx 25 HGVs	£ 500,000.00	£ 1,272,500.00	£ 1,840,000.00
<b>SUB TOTAL</b>						<b>£ 500,000.00</b>	<b>£ 1,272,500.00</b>	<b>£ 1,840,000.00</b>