Stage 1 Assessment Report

Herefordshire Council
Hereford Relief Road

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Executive Summary

INTRODUCTION

Located at the heart of one of the country's most sparsely populated counties, Hereford serves as the main centre for an extensive rural area providing access to employment, health and leisure facilities.

The Herefordshire Transport Plan states that the City's transport problems are largely urban in nature: congestion, poor air quality, severance caused by traffic resulting in poor access and safety issues for vulnerable road users. These are to some extent compounded by the high levels of car dependence in the surrounding rural areas.

Further, Hereford is identified as a New Growth Point in the West Midlands Regional Spatial Strategy (WMRSS) with 8,500 houses allocated from 2006 to 2026. Herefordshire Council is developing a Core Strategy and have undertaken:

- an 'Issues Paper' consultation;
- a 'Developing Options Paper' consultation;
- a 'Place Shaping Paper' consultation;
- a Multi Modal Study.
- This Stage 1 Assessment Report considers the evidence to date on the transport options for Hereford

METHODOLOGY

This Stage 1 Assessment aims to assess the advantages and disadvantages of the broadly defined transport infrastructure improvements from the consultation and modelling work done to date. The assessment follows the guidance from DfT (WebTAG) to ensure that the study is compliant with the requirements for a later Major Scheme Business Case funding submission.

OBJECTIVES

Objectives have been set based on the national objectives relating to:

- Environment
- Economy
- Safety
- Accessibility
- Integration

Additional local objectives have been derived from the Place Shaping Paper and regional objectives relating to:

- Social Progress
- Economic Prosperity
- Environmental Quality

EXISTING CONDITIONS

The 2003 Hereford Transport Review (Local Multi-modal Study) and Edgar Street Grid study informed the policy adopted by the Unitary Development Plan 2007-2010. Essentially there are existing traffic problems in Herefordshire, and in particular to Hereford City, that relate to the remoteness of the County in regional terms, and relative remoteness of many of the rural areas in relation to the nearest towns. The transport focus on Hereford is mainly as a destination but also for through traffic, with resultant pressure on a few key transport arteries. The concentration of road traffic congestion is on and approaching the Wye crossings in Hereford, into which most north-south movement is funnelled. The A49 carries the north-south traffic movement; bisecting the City and contributing to community severance.

FUTURE CONDITIONS

Future traffic problems in Hereford City, assuming the current housing allocation from the Growth Points strategy, are identified in the Hereford Multi Modal Model 2009 (MMM). The findings of the Model reveal the trips associated with the additional housing have a significant detrimental effect on the operation of the Hereford highway network. Many junctions are forecast to be operating beyond their capabilities, link speeds are reduced and delays are commonplace.

Adding an outer relief road on either a west or east alignment is forecast to provide some relief from the adverse effects. The resulting network operation would be similar to that if the additional trips had not been introduced.

CONSULTATION, PARTICIPATION AND INFORMATION

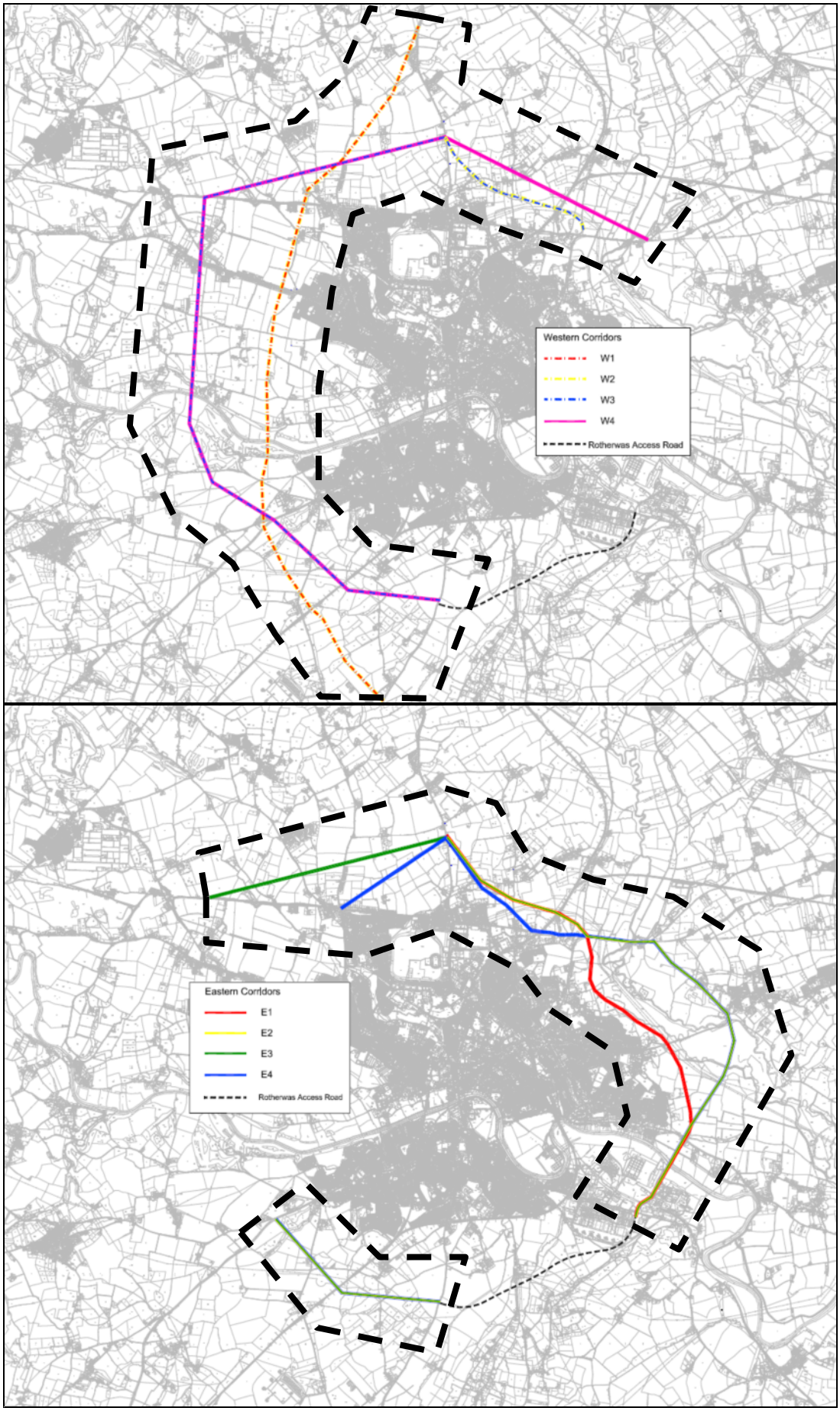
The public consultation undertaken to date for the Issues Paper, Developing Options Paper and Place Shaping Paper has been aligned against the guidance from DfT on consultation strategy.

The Stage 1 report considers the requirement for technical statutory consultation during the upcoming stage 2 Assessment and public consultation following publication of the Stage 2 report.

OPTIONS FOR SOLUTIONS

The Stage 1 assessment has considered wide route corridors based on broadly defined alignments, four to the west of the city and four to the east as shown on figure ES1. Constraints have been identified within these corridors to inform the selection of routes to take forward to the stage 2 assessment and to assist with defining alignments. Engineering constraints relating to Topography, Land Use and Statutory Undertaker and Environmental Constraints have been summarised in Chapter 6: Options for Solutions, figures 6.1 to 6.6, with more detailed constraints mapping shown in the technical reports in the appendices.

Figure ES1: Stage 1 Routes and Corridors Assessed



OPTION APPRAISAL

From the data collected for Stage 1, it appears there is no clear best environmental option as each of the route corridor options performs differently to the different Objectives. Landscape and ecological constraints are likely to be very significant for both the western and eastern options. Detailed analysis cannot be given at Stage 1 as the route corridors are only indicative.

The environmental impact of the proposed relief road options is generally adverse for Noise, Greenhouse Gases, Landscape, Biodiversity, Water Environment and Physical Fitness and beneficial for Townscape, Journey Ambience and Local Air Quality.

Table ES1 Preferred Options Based on Environmental Objectives.

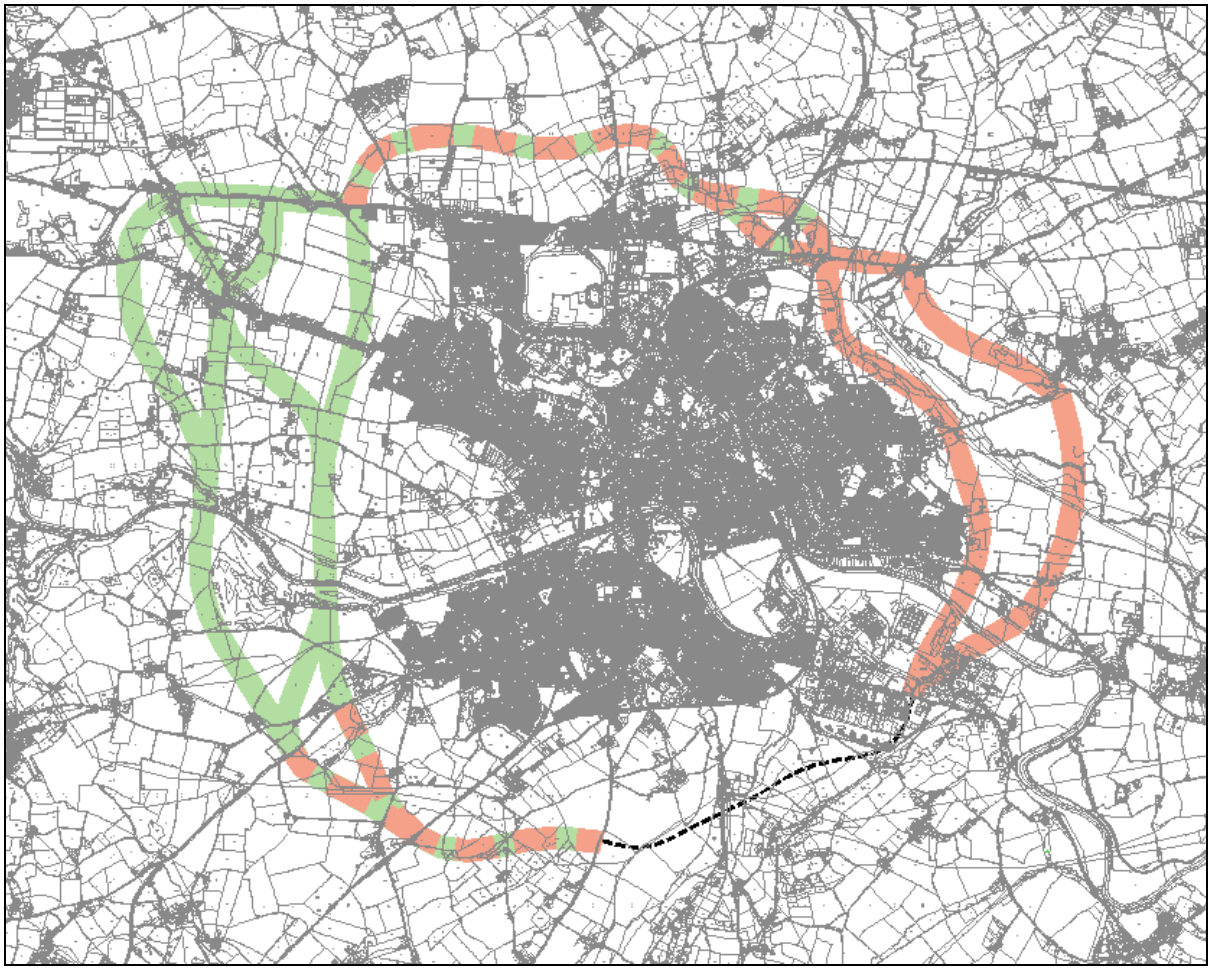
SUB OBJECTIVE	PREFERRED OPTIONS	LEAST FAVOURED OPTIONS
Noise	W1, E2	E1, E4
Local Air Quality	E1, E2	W5, E4
Greenhouse Gases	E1, W1	W4, W5, E3
Landscape	W4, E4	W2, E1
Townscape	Do-Something	Do-Nothing
Heritage of Historic Resources	W1, W3, W4	E4, E3, E2
Biodiversity	W1, W2, W3	E1, W4, E2, E3, E4
Water Environment	W1, W2	E3,E4
Physical Fitness	E1	W3, W4
Journey Ambience	Do-Something	Do-Nothing

RECOMMENDATIONS FOR STAGE 2 ASSESSMENT

The corridors assessed at Stage 1 were of varying length, each with the additional option of extra links to further serve specific zones around the city. However, this has made the corridors difficult to compare, particularly in relation to scheme costs as many aspects of cost are a function of link length. It is proposed that at Stage 2, all eastern and western corridors, for the purposes of assessment shall include the link from the A465 to the A49 to the Southwest of the City and the link from the A4103 Roman Road to the A49 then to the A4103 at Aylestone Hill.

The specific alignment of these links will require investigation to ensure the optimum solution. However, the main choice will be between inner and outer versions of the eastern corridor between Rotherwas and the A4103 at Aylestone Hill; and inner and outer versions of the western corridor between the A465 and the A4103 Roman Road as shown on Figure ES2

Figure ES2: Stage 2 Corridors for Assessment



West Corridor Recommendations

- It is recommended that both inner and outer corridors included in the Stage 1 assessment are refined and both considered in greater detail at Stage 2.

- The outer corridor should be moved further west, south of the A465, to avoid the woodland area, and the inner corridor continue to cut through the narrowest section of this woodland.
- All western corridors considered at stage 2 will tie into the B4399 Rotherwas Access Road.
- Additional corridors should be explored further west.
- The corridors should utilise the A4103 to reduce the length of new road required.
- The link from the A49 North of the City to the A4103 at Aylestone Hill needs to be considered in more detail at Stage 2.

East Corridor Recommendations

- Investigate both inner and outer eastern corridors in more detail at stage 2.
- Align the eastern corridor to avoid the heritage sites.
- Design the inner corridor in some detail to fully establish the impact of earthworks upon the Lugg floodplain and SSSI / SAC.
- The outer corridor should be moved west to avoid a heritage site.

Phasing

The phasing of the development of individual links and sustainable transport measures in the delivery of the eventual full scheme should be explored in the Stage 2 reporting as different opportunities may exist for delivery depending upon the chosen housing options.

Sustainable Transport Measures

The Stage 1 assessment has concentrated on the assessment of the 8 route corridor options east and west of the city. However, there has been little inclusion of other sustainable transport initiatives in the detailed assessments

The assessment needs to ensure these measures are accurately modelled and reflected in the Traffic and Economic assessment work. However, at Stage 2 fully detailed schemes are unlikely to be developed so broad assumptions will need to be made. This should include the following:

- Behavioural Change – A modal shift from car to walking, cycling and public transport with percentages to reflect all measures within the strategy.
- Reduced Car Capacity – Reduce the capacity on key links and junctions to reflect bus priority and road space re-allocation.

- Park and Ride – Reflect park and ride in the origin/destination matrices to alter the car loading on the network.

Consultation

To fully assess the engineering and environmental impacts of the scheme a technical consultation will be necessary. The consultation should not be a generic consultation to each of the statutory bodies but an opportunity to ask focused and specific technical questions.

1 Introduction

1.1 PURPOSE OF STUDY

1.1.1 There are advantages and disadvantages of the broadly identified transport infrastructure improvements from the public participation and modelling exercises undertaken by Herefordshire Council to date and described in more detail later in this report. The purpose of this study is to Identify environmental, engineering, economic, and traffic advantages and disadvantages associated with the introduction of a Hereford Relief Road along broadly defined corridors.

1.1.2 In this chapter the background and context for the study will be discussed, along with a detailed historical progression since 1987 towards the selection a solution for Hereford's transport problems, including identifying an appropriate relief road option along with other sustainable transport options. The chapter will conclude with a description of the methodology and scope of this study to establish its context within the transport study process.

1.2 BACKGROUND AND STUDY CONTEXT

1.2.1 Herefordshire covers a predominantly rural area of 842 square miles. Hereford is the main service centre and largest urban area, with a population of 54,850. The A49 strategic highway passes through the City from north to south and crosses the River Wye at Greyfriars Bridge close to the historic City Centre. The pattern of main roads in the County is focussed on Hereford itself and peak hour congestion is frequently experienced on the City's highway network and river crossing.

1.2.2 Hereford is identified as a 'Settlement of Significant Development' in the West Midlands Regional Spatial Strategy (WMRSS) with an allocation of 8,500 houses for the period 2006 to 2026. This allocation is supported by Herefordshire Council, however, adequate infrastructure must be provided to support it, as this level of growth represents an increase in size of over 30% for the City.

1.2.3 Herefordshire Council's Development Plan is currently the Unitary Development Plan (UDP) with a plan period to 2011. The Council is now preparing the Local Development Framework (LDF) Core Strategy to cover the same plan period as the WMRSS, i.e. 2006 to 2026.

1.2.4 The Core Strategy has been the subject of three formal rounds of public participation; an "Issues Paper" in 2007 and the "Developing Options" Paper in 2008 indicated broad public support for transport infrastructure improvements; a "Place Shaping Paper" consultation was completed in March 2010 to establish the preferred options for the Core Strategy.

1.2.5 To inform the Core Strategy the Hereford Multi Modal Study 2009 has been completed to assess the broadly defined transport and development strategies and identify if there is the need for a relief road.

1.2.6 Consideration of whether Hereford's transport problems may be resolved through developing sustainable transport options; if there is sufficient need for delivering a relief road for Hereford and whether this should go either to the east or west of Hereford has a long history. A history of events since 1987 follows:

1.3 HISTORY RELATING TO THE HEREFORD RELIEF ROAD

1.3.1 In 1987 following the appraisal of a number of route options the Department of Transport undertook a public consultation on two alternative routes for an A49 / A465 trunk road at Hereford, either to the west or the east.

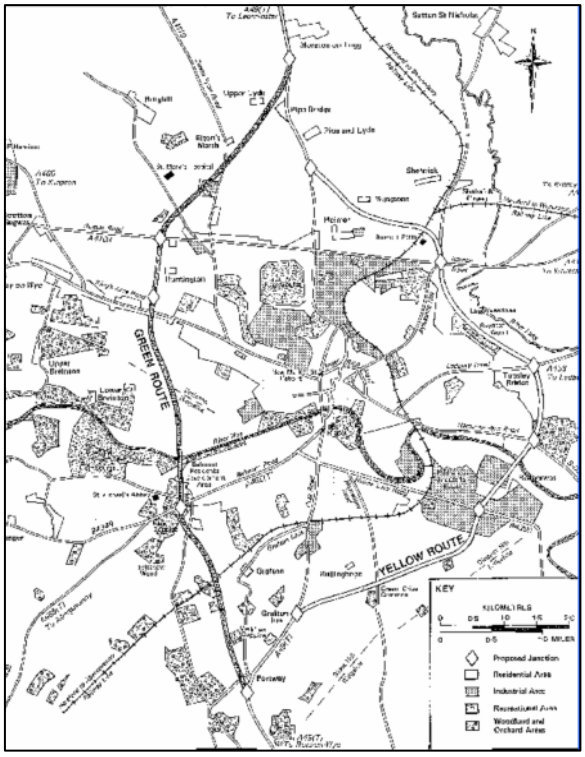


Figure 1.1: Highways Agency Trunk Road Improvement Proposals 1987

1.3.2 In 1988 following the consultation the Department of Transport announced a preferred route for a Hereford Relief Road to the East of the city.

1.3.3 Hereford & Worcester County Council and Hereford City Council commissioned a Hereford Transport Study in 1990 to define financing options and traffic management measures associated with building the relief road.

1991/1992 – A Public Inquiry for the proposed Eastern Relief Road.

1.3.4 As part of the Inquiry 14 alternative routes were considered. Within the early stages of assessment an internal relief road was considered for Hereford but this proved non-viable. Alternative Route 6 utilising the Great Western Way would in fact prove much more expensive than the preferred route to the East of the City.

1.3.5 There were 4507 responses received during the Inquiry and the results were finely balanced in overall terms with the Eastern Yellow Route having the stronger support with 56% majority. The Highways Authority set the reasons for needing a relief road, for choosing the yellow route and how it fitted in with Government policies and objectives.

1.3.6 Evidence including traffic surveys carried out at Greyfriars Bridge, these identified that between 5% and 13% of the traffic was through traffic. Instances of fog on the Lugg Meadows (Eastern Route) and Wye Gorge (Western Route) were recorded for visibility at less than 1000m and the findings identified that the difference between the two sites was not significant.

1.3.7 At the end of the inquiry the Inspector recommended that the Eastern Route should be rejected and that an alternative Western Route be accepted by the Secretary's of State and Environment. The main objections to the Eastern Preferred Route were on the effects on the Lugg Meadows area and environment and landscape through which the route would run. The Inspector considered that the objections were well founded, substantial and outweighs the financial benefits calculated by COBA.

1.3.8 In consequence the plans for the Eastern Route were withdrawn and the draft orders rejected. The debate for whether the route should go east of the city or west of the city was re-opened.

1.3.9 During 1993/1994 a public consultation, in addition to the normal statutory process, took place to investigate all options for relieving Hereford's traffic problems.

Hereford Traffic Conference 1993

1.3.10 The conference was held over a two week period and firstly established that Hereford had a traffic problem. It then considered non-road building options and the effect on traffic conditions for each option. The Hereford Traffic Conference considered proposals for traffic management and / or alternative relief road routes. The proposals considered included rail facilities, park and ride, bus measures, cycle measures, traffic management and road improvements.

1.3.11 Rail Options: The Conference found there is not enough bulk freight exiting Hereford to single destination points to make a freight terminal viable. There is the potential

for increasing passenger services but this requires prohibitively substantial capital investment to provide rolling stock, upgrade the signalling system and provide additional stops. The Herefordshire part of the line between Hereford and Birmingham is single track so frequency of service is an issue as most return passenger traffic is outbound this part of the service must take first priority leaving little flexibility for additional inbound local services.

1.3.12 Bus Options and Park and Ride: Effective Park and Ride would require a dedicated bus service and buses that are frequent and reliable with complimentary bus priority measures such as bus lanes. Four Park and Ride car park sites were discussed covering each radial route into the city. It was considered that traffic volume could be decreased by 2% if Park and Ride were introduced as part of a package.

1.3.13 The potential for providing bus lanes in the city is linked to the number of roads that could accommodate a dedicated bus lane. Most radial routes would have the traffic flow capacity reduced severely. The introduction of bus lanes would necessitate restricted on-street parking and restrictions to commercial delivery times. A bus route along the disused Great Western Railway Line was also considered, however this provoked considerable opposition as it is a popular green cycle/ pedestrian route and the bus companies could see no value in the scheme.

1.3.14 Cycling: The Conference considered that an increase in provision for cycling in the city would encourage a greater level of cycling; the opportunity for increased provision was restricted by a lack of road space available on the arterial roads into the city, or any safe alternative routes. A relief road that reduces traffic volume, particularly HGV, in the city was considered an improvement for cycling in the city.

1.3.15 A number of traffic management and calming schemes were tabled but the Conference considered that these measures would not significantly impact on the number of vehicle trips in the city or mode of travel.

1.3.16 Road Improvement Schemes considered:

1.3.17 The Conference considered potential routes for a road scheme within the city and around the perimeter of the city, identified in figure 1.2.

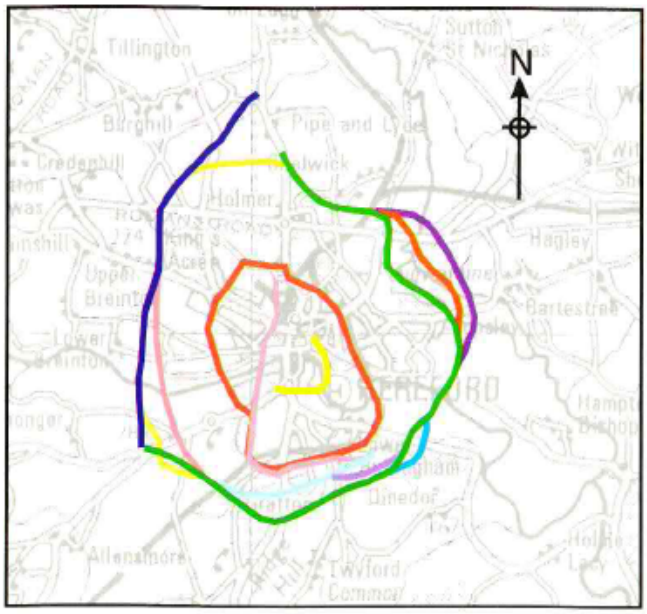


Figure 1.2: Highways Agency Trunk Road Improvement Proposals December 1993

1.3.18 Inner relief roads: Three options were discussed and all were considered to have significant detrimental impact on local people and amenity provision, with a high economic cost and poor economic performance. These schemes could only alleviate congestion on some city junctions but not on arterial routes. There was also considerable opposition for all inner relief road schemes.

1.3.19 Outer relief roads: The Department of Transport presented technical and environmental evaluations for three eastern options and three western options. The options included routes evaluated in previous consultations. Of the eastern options the most easterly option was considered the least damaging environmentally. Of the western options the most westerly at Belmont was considered the least damaging to Belmont Abbey. The preferred northern link to the A49 was the most northerly, at Pipe & Lyde.

1.3.20 Conclusions of the conference – No Road v East v West

1.3.21 The no road options were considered insufficient in themselves to solve Hereford's traffic problems, but they would be effective as part of a package of measures with a relief road. The opinions at the conference on whether the relief road should go to the east or the west of Hereford were mixed but generally the opinion favoured a route to the east.

1.3.22 In 1995 the Government announced a modified preferred route for the A49 to the east of Hereford (see figure 1.3).

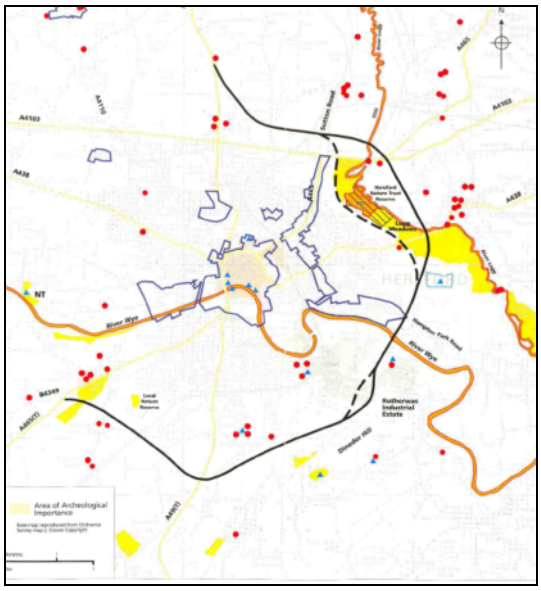


Figure 1.3: Highways Agency Trunk Road Improvement Proposals April 1995

1.3.23 In 1996 the Highways Agency included the Hereford Eastern Relief Road Scheme in the main Trunk Roads programme. Then in 1997 the Highways Agency announced that it had stopped working on the Eastern Route proposal.

1.3.24 In 1998 a number of separate events took place. Herefordshire Council came into existence in April 1998, taking over the responsibilities of a number of previous authorities - Leominster District Council, South Herefordshire District Council, Hereford City Council and Hereford-Worcester County Council. The newly formed Council protected part of the Eastern Route between the A465 and A438 from development during the preparation period for development of the Herefordshire Council Unitary Development Plan. The Highways Agency removed the Road Improvement Scheme from the national programme and added it to the Regional Planning Conference. "Accessibility and Mobility", an integrated transport action plan for the West Midlands Region was introduced.

1.3.25 Then in 2001 another set of separate events took place. The Hereford Outer Relief Road business case was produced after consultation with 52 local businesses and organisations. It concluded that an outer relief road would reduce the transport costs of firms based in Hereford but could not quantify the reduction. It highlighted a number of important factors about Hereford:

- Economy is fragile and companies starting afresh would not choose to locate in Hereford.
- An Outer Relief Road would directly reduce transport costs of all manufacturing and distribution firms serving national and international markets

- An improved quality of city centre environment would improve the city centre in respect of employment, its status as a regional shopping centre, and tourism and general services. All three elements are weaker than they should be as a result of congestion and a high percentage of HGV on the A49 through the city.
- As the population of Hereford grows then so congestion will worsen.

1.3.26 Also in 2001 a Report to the Regional Transport Group was produced providing detailed background to the draft Regional Planning Guidance and Transport Strategy, and LTP1, covering the period 2001/2 to 2005/6 was launched, it included recognition of the current transport provision in Hereford. It stated that the growing congestion particularly affected roads around the City Centre, where radial routes converge, with the associated impacts of poor air quality, and the intrusion of traffic into residential areas and concerns over road safety. It acknowledged that there was a lack of sustainable transport options and identified a Hereford Integrated Transport Strategy. The Hereford Integrated Strategy compared a set of proposals aimed at tackling the City's transport problems without a relief road. LTP1 focused on securing a sustainable and integrated transport system which was accessible to all. In 2005/06 a comprehensive upgrade of the SCOOT system which controls traffic signals in Hereford was completed and benefits have been clearly visible in terms of a more robust system and better managed traffic flows. LTP1 also saw the launch of a Park and Ride experiment and the introduction of residents' special parking areas.

Hereford Transport Review - Local Multi-Modal Study, February 2003 (TPi)

1.3.27 The Hereford Transport Review provided a comprehensive review of the strategy developed for the first LTP. The Review took into account a wide range of new and existing data to develop a multimodal transport model, that enabled various strategy options to be modelled to address the City's transport needs in the short (2006/07 to 20010/11) and longer term (to 2031). The Review considered predicted demographic changes, likely growth in housing, retailing and economic activity as guided by the Unitary Development Plan and Regional Spatial Strategy. The results from the Hereford Transport Review formed the basis for the strategy set out in the LTP2.

1.3.28 The study considered a blended package which included:

- A North Park and Ride site near the Racecourse and a site near the B4399 Rotherwas Access Road
- Maximum feasible bus priorities on all radial routes, Greyfriars Bridge and the Inner Relief Road
- Two additional Park and Ride sites at A49 South and A465 South and new railway stations at Withington and Rotherwas

- Further pedestrianisation of the city centre with continued access for cyclists and buses
- Improved facilities throughout the city for cyclists and pedestrians
- 20mph zones in residential areas off main roads
- School transport package
- A western outer distributor road

1.3.29 The evaluation indicated that in operational (traffic flow) and economic terms, the blended package with a western distributor performed significantly better than the same package without the new road.

1.3.30 The consultants recommended that the blended package with a western distributor road should be adopted as the preferred strategy. The bus priority, cycle provision and most of the behavioural change should be implemented in the period 2006-2016 before the western distributor is constructed.

1.3.31 2004 – Regional Planning Guidance 11 (RPG 11) to evolve into the Regional Spatial Strategy 2006.

1.3.32 2005 – Highways Agency public consultation for an A49 Edgar Street Hereford designated lane. An experimental lane on Edgar Street with use restricted for HGV over 7.5 tonne, bus and cycle was proposed for inbound traffic between the hours of 7 am to 7 pm. The lane was proposed to begin opposite Moor Street junction and conclude at the Cattle Market entrance. The scheme was abandoned due to the low level of public support, reduced public service vehicle (PSV) traffic flow along the route, and conflict with redevelopment proposals for Edgar Street.

1.3.33 2006 - LTP2 identified the need for Herefordshire Council to work closely with the Highways Agency to ensure the trunk road network serves both local and regional objectives and to work towards making better use of the route. It identified the A49 within Hereford as an Air Quality Management Area (AQMA) and identified the need to improve the environment within the AQMA. Together with a sustainable transport strategy it was identified that as part of the outer distributor road proposal that a scheme be developed for an A49(T) Ross Road to A465(T) Abergavenny Road Link Road.

1.3.34 2006 – UDP identified the need to constrain housing within Hereford in response of the identified traffic problems.

1.3.35 2007 & 2009 - Regional Funding Allocations formal submissions

1.3.36 2009 – West Midlands Regional Spatial Strategy Phase 2 Revision - Inspectors Report states “The view that there might or should be a public transport-based solution rather than one involving road building was advocated by CPRE, FoE and

Rail for Herefordshire. However, Hereford Civic Society supports the need for an additional river crossing. They highlighted the problems for the operation of the bus station as it is located close to the inner relief road near the single city centre bridge over the River Wye and how matters might be made worse by necessary urban regeneration to increase retail, employment and housing potential just to the north of the town centre. The importance of the historic heritage was also stressed.

1.3.37 "We witnessed the extent of congestion in the town centre at an inter-peak time. We heard in other sessions about the problem of enhancing rail accessibility for Hereford as a result of single-tracking through tunnels that might not be able to accommodate twin-track to loading gauges that would now be sought. Given such issues and the limited scale of the town, we are far from convinced that transport packages without a relief road and new river crossing would be likely to be satisfactory."

1.3.38 2009 - Hereford Multi-Modal Study commissioned by Herefordshire Council and Highways Agency considered future network traffic conditions as a consequence of the RSS proposals with no relief road, and the addition of a road to the east or west of Hereford. The network was tested for minimal traffic growth and for four Growth Point housing and employment development options. Of the options tested a north south focused housing and employment option and an eastern relief road alignment produced the best overall highway network performance in terms of overall total cost of travel.

1.3.39 2009 – DaSTS Study for the West Midlands (Phase 1): Delivering a Sustainable Transport System (DaSTS) is the Governments agreed approach to identify transport needs from 2014 onwards. DaSTS set out a coordinated national approach to providing sustainable solutions to identified transport issues in the West Midlands. It focuses on Telford, Shrewsbury and Hereford. It recognises the major challenge for Hereford is to cope with the traffic impacts of the substantial growth proposed, given that Hereford has a much less developed road network, whilst further developing existing characteristics conducive to sustainable travel behaviour. The initial results of the Study indicate that in Hereford, a Relief Road would address existing congestion on the A49, by providing a new river crossing; the extent and phasing needs to be considered in relation to the planned growth.

1.3.40 Current ongoing projects and policies are the Regional Spatial Strategy, Local Development Framework place shaping consultation, and development of Local Transport Plan 3 (LTP3).

1.3.41 Historical evidence therefore suggests that developing a sustainable transport network alone is limited by the lack of available space. A relief road to the east has been promoted a number of times, and a relief road to the west has been progressed

as an option. Sustainable transport options have been identified and pursued but to date have affected limited progress. The development of the sustainable transport network may be facilitated through the corresponding development of a relief road.

1.4 STUDY METHODOLOGY

1.4.1 The ultimate purpose of the study is to take the scheme towards having a fully assessed preferred route with a supporting Major Scheme Business Case. The study therefore needs to be carried out to follow the Department for Transport (DfT) Transport Analysis Guidance (WebTAG).

1.4.2 WebTAG provides guidance on conducting transport studies and on how to:

- set objectives and identify problems;
- develop potential solutions;
- create a transport model for the appraisal of the alternative solutions;
- conduct an appraisal which meets the Department's requirements.

1.4.3 The overall study delivery stages in chronological order are:

- **Stage 0** – Preliminary Investigatory Works (Complete – Historic Studies, Issue Paper and Developing Options Paper).
- **Stage 1** – Identify environmental, engineering, economic and traffic advantages and disadvantages associated with broadly defined strategies (Complete – Multi Modal Study and Stage 1 Engineering and Environmental Assessments (This Study).
- **Stage 2** – Identify engineering, environmental and Traffic and Economic advantages and disadvantages of proposed route corridors to inform the planning strategy (Future Study).
- **Stage 3** – Clearly identify advantages and disadvantage in environmental, engineering, economic and traffic terms of the preferred route or scheme including a full environmental statement (Future Study).
- **Major Scheme Business Case** – Presentation to the Government or funding body encapsulating the evidence of the previous stages.

1.5 STAGE 1 LAYOUT

1.5.1 This **Stage 1** Assessment Report includes the following process in appraising scheme options.

- Chapter 2 - National and Local objectives and policies analysed to set specific objectives for this study.

- Chapter 3 – The existing conditions in terms of traffic, engineering and environmental conditions.
- Chapter 4 – The future conditions including the traffic, engineering and environmental conditions relating to a Do Nothing and Do Minimum Scenario.
- Chapter 5 – Consultation, participation and information; An assessment of the preliminary Investigation works (Stage 0) done to date including all consultations associated with the Developing Options Paper.
- Chapter 6 – The options for solutions in line with the New Approach to Transport Appraisal (NATA) culminating in the Appraisal Summary Table (AST).
- Chapter 7 – Option appraisal
- Chapter 8 – The conclusions of the Stage 1 assessment and recommendations to take to the Stage 2 assessment.

2 Objectives

2.1 CENTRAL GOVERNMENT OBJECTIVES

2.1.1 DfT guidance on the appraisal of transport schemes sets five key objectives in WebTAG required by studies. These are:

- Environment
- Economy
- Safety
- Accessibility
- Integration

2.1.2 Environment

2.1.3 The Environment Objective aims to protect the built and natural environment. This includes reducing the direct and indirect impacts of transport facilities and their use on the environment of both users and non-users. The environmental impacts of concern include noise, atmospheric pollution of differing kinds, vibration, formal intrusion, severance, and impacts on the countryside and wildlife, ancient monuments and historic buildings and so on. While some of these can be readily quantified, others such as severance are much more difficult to define and analyse. More recently, the Environment Objective has been defined more widely to include reduction of the impact of transport on the global environment, particularly through emission of carbon dioxide, but also by consumption of scarce and non-renewable resources.

2.1.4 The Environment Objective has 10 sub-objectives that reflect the various impacts of concern:

- to reduce noise
- to improve local air quality
- to reduce greenhouse gases
- to protect and enhance the landscape
- to protect and enhance the townscape
- to protect the heritage of historic resources
- to support biodiversity
- to protect the water environment
- to encourage physical fitness
- to improve journey ambience

2.1.5 Economy

2.1.6 The Economy Objective is concerned with improving the economic efficiency of transport. The Economy Objective was developed from the principles of A New Deal for Transport (DETR, 1998), the Government's White Paper on transport. Congestion and unreliability of journeys add to the costs of business, undermining competitiveness particularly in our towns and cities where traffic is worst. The cost to the British economy is estimated to run into billions of pounds every year and is rising.

2.1.7 The Economy Objective has 5 sub-objectives:

- to get good value for money in relation to impacts on **public accounts**
- to improve transport economic efficiency for **business users and transport providers**
- to improve **transport economic efficiency for consumer users**
- to improve **reliability**
- to provide beneficial **wider economic impacts**

2.1.8 Safety

2.1.9 To reduce the loss of life, injuries and damage to property resulting from transport accidents and crime.

2.1.10 It has been common practice for some time in the UK to place money values on casualties and accidents of differing severity, and to include these within a cost/benefit analysis. These values include the direct costs of accidents, such as loss of output, hospital, police and insurance costs, and damage to property and, more controversially, an allowance for the pain, grief and suffering incurred. However, in some cases there is concern with the direct safety performance of the system; it is therefore helpful to estimate accident numbers directly as well. This aspect of safety is reflected in the Accidents Sub-Objective.

2.1.11 The safety objective is also concerned with improving the personal security of travellers and their property. The security of public transport passengers increases with the provision of surveillance, design features which reduce the opportunities for attackers to surprise travellers and facilities for making emergency calls. The security of car users increases when the instances when they are required to stop or travel very slowly are reduced, vehicles can be parked in safety and facilities for making emergency calls are increased. These considerations are reflected in the Security Sub-Objective.

2.1.12 The Safety Objective has 2 sub-objectives:

- to reduce accidents
- to improve security

2.1.13 Accessibility

To improve access to facilities for those without a car and to reduce severance

2.1.14 In general terms, accessibility can be defined as ‘ease of reaching’. The accessibility objective is concerned with increasing the ability with which people in different locations, and with differing availability of transport, can reach different types of facility. The term ‘accessibility’ has been used in the past in several different, often overlapping ways, including the following:

- measurement of ease of access to the transport system itself in terms of, for example, the proportion of homes within x minutes of a bus stop or the proportion of buses which may be boarded by a wheel-chair user;
- measurement of ease of access to facilities, with the emphasis being on the provision of the facilities necessary to meet people’s needs within certain minimum travel times, distances or costs;
- measurement of the value which people place on having an option available which they might use only under unusual circumstances (such as when the car breaks down) - ‘option value’ - or even the value people place on simply the existence of an alternative which they have no real intention of using - ‘existence value’; and
- measurement of ease of participation in activities (for personal travel) or delivery of goods to their final destination (for goods travel), provided by the interaction of the transport system, the geographical pattern of economic activities, and the pattern of land use as a whole.

2.1.15 These aspects of accessibility are expressed as:

- to increase option values
- to reduce severance
- to improve access to the transport system

2.1.16 Integration

2.1.17 To ensure that all decisions are taken in the context of the Government's integrated transport policy.

2.1.18 More specifically, this means:

- integration within and between different types of transport, so that each contributes its full potential and people can move easily between them;
- integration with the environment, so that the transport choices available support a better environment;
- integration with land-use planning, at national, regional and local level, so that transport and planning work together to support more sustainable travel choices and reduce the need for travel; and
- integration with policies for education, health and wealth creation, so that transport helps make a fairer, more inclusive society.

2.1.19 The Integration Objective has 3 sub-objectives:

- to improve transport interchange
- to integrate transport policy with land-use policy
- to integrate transport policy with other Government policies

2.2 REGIONAL OBJECTIVES

2.2.1 West Midlands Regional Spatial Strategy, revision 2008

2.2.2 The following strategic objectives provide a context for the policies in the topic Chapters:

- to make the Major Urban Areas (MUAs), within the West Midlands increasingly attractive places where people want to live, work and invest;
- to secure the regeneration of the rural areas of the Region;
- to create a joined-up multi-centred Regional structure where all areas/centres have distinct roles to play;
- to retain the Green Belt, but to allow an adjustment of boundaries where this is necessary to support urban regeneration;
- to support the cities and towns of the Region to meet their local and sub-regional development needs;
- to support the diversification and modernisation of the Region's economy while ensuring that opportunities for growth are linked to meeting needs and reducing social exclusion;
- to ensure the quality of the environment is conserved and enhanced across all parts of the Region;

- to improve significantly the Region's transport systems;
- to promote the development of a network of strategic centres across the Region; and
- to promote Birmingham as a world city

2.2.3 The major shire towns and cities beyond the MUAs continue to act as a focus for new investment to support wider regeneration and help meet the economic, social and cultural needs of surrounding rural areas building upon their traditional strengths of historic heritage and high quality environment, particularly in the cathedral cities of Worcester, Hereford and Lichfield and important county towns such as Shrewsbury, Stafford and Warwick/ Leamington.

2.2.4 Key policies within the Regional Spatial Strategy to consider:

2.2.5 POLICY RR3: Market Towns

2.2.6 Hereford is identified as a County town and as such has a key role in helping to regenerate rural areas (RR3), as a focus for sustainable economic and housing development and by providing services and other facilities to their rural hinterlands. In fulfilling these roles, it is important that the distinctiveness and character of each individual town is maintained and where possible enhanced. Market towns which are to have a role in rural regeneration should be identified in development plans; in particular, having regard to existing or potential for a planned and co-ordinated local transport network.

2.2.7 POLICY CF2: Housing beyond the Major Urban Areas

2.2.8 Beyond the MUAs, longer-term strategic housing development should be in those locations which are capable of balanced and sustainable growth. The five towns identified in the Spatial Strategy (Worcester, Telford, Shrewsbury, Hereford and Rugby) will fulfil this role as sub-regional foci for development. These towns:

i) act as sub-regional service centres;

ii) have the opportunity of balancing new housing and employment developments that will be consistent in terms of affordability and job skills;

iii) avoid the congested parts of the Regional transport network and have good accessibility by public transport;

iv) have the capacity to accommodate additional development without harm to local communities; and

v) have the potential to link areas of need with areas of opportunity.

2.2.9 POLICY QE9: The Water Environment

A. Development plan policies and plans of the Environment Agency and other agencies should be coordinated, where necessary across local authority and Regional boundaries,

B. Development that poses an unacceptable risk to the quality of groundwater or surface water in this or other regions should therefore be avoided.

2.2.10 POLICY T9: The Management and Development of National and Regional Transport Networks

A. The Primary Route Network (PRN) within the Region will consist of motorways, trunk roads and other primary routes, and includes the A49.

B. Local authorities and the Highways Agency will give high priority to investment in the maintenance, management and selective improvement of this network in order to maintain accessibility for essential movements, including freight, within and through the Region.

C. Local authorities, the Highways Agency, transport operators and other agencies should work together to provide and maintain a strategic transport system which:

i) enhances the competitiveness of the Region by providing journey time reliability;

ii) provides improved links and accessibility both within the Region and to other UK and European regions and beyond; and

iii) supports the Spatial Strategy, particularly by providing improved accessibility in those parts of the Region in greatest need of regeneration.

D. In bringing forward detailed policies, proposals and programmes, consideration should be given to:

i) optimising the use of existing infrastructure across all modes;

ii) ensuring capacity is safeguarded by appropriate selection of development location, minimising the need for local movements to use the strategic network;

iii) adopting the priorities for investment in strategic networks to support the objectives and policies of RSS, and ensuring the investments are not undermined by inappropriate development;

iv) ensuring that motorways and trunk roads are managed and improved to operate effectively as part of the national transport network, including the use of appropriate demand management techniques to improve journey time reliability;

v) road building only after all other solutions have been examined and where proposals support other objectives of the RSS; and

vi) ensuring the Region is provided with an improved and integrated rail network to encourage greater use of rail, particularly for longer distance travel both within the Region and beyond.

E. New accesses on the PRN will not be encouraged and should not inhibit the strategic function of these routes. Where development proposals impact on the PRN, local planning authorities should ensure that transport and environmental impact assessments are undertaken to ensure that the function of the network is maintained and appropriate financial contributions to improvements are made.

2.3 LOCAL OBJECTIVES

2.3.1 Local (Herefordshire Council) objectives have been developed from the Developing Options Paper in June 2008 and are included in the Place Shaping Paper (January 2010). These are:

2.3.2 Social Progress

2.3.3 Objective 1: To meet the housing needs of all sections of the community (especially those in need of affordable housing), by providing a range of quality, energy efficient homes in the right place at the right time.

2.3.4 Objective 2: To improve the health, well-being and quality of life of all residents by ensuring new developments positively contribute towards better access to, provision and use of, improved public open spaces, sport and recreation, education, cultural and health facilities.

2.3.5 Objective 3: To support existing education, life-long learning and the retention of our young people through the provision and/or improvement of higher education, skills development and training facilities.

2.3.6 Objective 4: To reduce the need to travel and lessen the harmful impacts from traffic growth, promote active travel and improve quality of life by locating significant new development where access to employment, shopping, education, health, recreation, leisure and other services are, or could be made available by walking, cycling or public transport.

2.3.7 Objective 5: To improve access to services in rural areas and movement and air quality within urban areas by ensuring new developments support the provision of an accessible, integrated, safe and sustainable transport network and improved traffic management schemes.

2.3.8 Economic Prosperity

2.3.9 Objective 6: To provide more local, better paid job opportunities to limit out-commuting and strengthen the economy by attracting higher value-added, knowledge based industries and cutting-edge environmental technologies to new/existing employment land and enabling existing businesses to grow and diversify, facilitated by the universal provision of a high bandwidth broadband service.

2.3.10 Objective 7: To strengthen Hereford's role as a sub-regional focus for the county, through city centre expansion as part of wider city regeneration and through the provision of a balanced package of transport measures including park and ride, bus priority schemes and a relief road including a second river crossing.

2.3.11 Objective 8: To improve the economic viability of the market towns, villages and their rural hinterlands by facilitating employment generation and diversification, improving delivery and access to services (including affordable housing and improved ICT) and realising the value of the environment as an economic asset.

2.3.12 Objective 9: To develop Herefordshire as a destination for quality leisure visits and sustainable tourism by enabling the provision of new, as well as enhancement of existing tourism infrastructure in appropriate locations.

2.3.13 Environmental Quality

2.3.14 Objective 10: To achieve sustainable communities and protect the environment by delivering well-designed places, spaces and buildings, which use land efficiently, reinforce local distinctiveness and are supported by the necessary infrastructure including green infrastructure.

2.3.15 Objective 11: To address the causes and impacts of climate change by ensuring new development: uses sustainable design and construction methods to conserve natural resources, does not increase flood risk to new or existing property, increases the use of renewable forms of energy to reduce carbon emissions, minimises waste and pollution, manages water supply and conservation and conserves and protects biodiversity and geodiversity.

2.3.16 Objective 12: To conserve, promote, utilise and enjoy our natural, built, historic and cultural assets for the fullest benefits to the whole community by safeguarding the county's current stock of environmental assets from loss and damage, reversing negative trends, ensuring best condition and encouraging expansion, as well as appropriately managing future assets.

2.4 STUDY SPECIFIC OBJECTIVES

2.4.1 The study specific objectives will mirror the objectives of the DfT and these form the basis of the detailed methodology used for the Environmental Assessment Report, Engineering Assessment Report and Traffic and Economic Assessment Report appended to this report. A review of these objectives is included within this assessment report and summarised on the Appraisal Summary Tables.

2.4.2 In addition, the assessment report appraises the options against additional specific objectives derived from the local objectives outlined above. A separate Appraisal Summary Table is provided for these specific objectives.

2.4.3 The objectives assessed and displayed on the appraisal summary table are therefore as shown in Table 2.1. The objectives shaded yellow are those define by the DfT study objectives and those in green are those derived from Herefordshire Council's local objectives.

Table 2.1: Appraisal Objectives

Objective	Sub-Objective
ENVIRONMENT - To protect the built and natural environment	To reduce **Noise**
	To improve **Local Air Quality**
	To reduce **Greenhouse Gases**
	To protect and enhance the **Landscape**
	To protect and enhance the **Townscape**
	To protect the **Heritage of Historic Resources**
	To support **Biodiversity**
	To protect the **Water Environment**
	To encourage **Physical Fitness**
	To improve **Journey Ambience**
SAFETY - To reduce the loss of life, injuries and damage to property resulting from transport accidents and crime.	To reduce **Accidents**
	To improve **Security**
ECONOMY	To get good value for money in relation to impacts on **Public Accounts**
	To improve transport economic efficiency for **Business Users and Providers**
	To improve transport economic efficiency for **Consumer Users**
	To improve **Reliability**
	To provide beneficial **Wider Economic Impacts**
ACCESSIBILITY - To improve access to facilities for those ith t d t d	To increase **Option Values**
	To reduce **Severance**
	To improve **Access to the Transport System**
INTEGRATION - To ensure that all decisions are taken in the t t f th G t'	To improve **Transport Interchange**
	To integrate transport policy with **Land-Use Policy**
	To integrate transport policy with **Other Government Policies**
SOCIAL PROGRESS	To Meet Housing Needs
	To Provide Access to Public Spaces and Health Facilities
	To Provide Access to Services and Facilities Via Walking, Cycling and Public Transport
	To Provide an Accessible, Integrated, Safe Transport Network
ECONOMIC PROSPERITY	To Provide a Package of transport measures to include relief road and second river crossing
ENVIRONMENTAL QUALITY	To Contribution to Green Infrastructure
	To use Sustainable Design and Construction Methods
	Not to Increase Flood Risk
	To use Renewable Energy and Reduced Carbon Emissions
	To Minimise Waste and Pollution Protection
	To Protect Biodiversity and Geodiversity
	To Promote and Utilise Natural, Built, Historic and Cultural Assets
	To Improve Urban Air Quality

3 Existing Conditions

3.1 CURRENT TRANSPORT AND OTHER POLICIES

3.1.1 Unitary Development Plan

3.1.2 **Historical role and regional orientation:** Herefordshire was disadvantaged during the early industrial revolution by the absence of coal (except in the Dean fringe), and encouraged the development of tram-roads as the supply routes from South Wales. The later railways reinforced Hereford's central role in the County, creating a network radiating in most directions. The City's commercial and administrative importance grew accordingly, making it a gateway and service centre for a sub-region extending well beyond the County boundary – a role that continues today. Subsequent road developments have largely replicated the rail network, with the exception of the M50 motorway which cuts across the radial grain in the south-east corner, to link South Wales with the Midlands.

3.1.3 **Patterns of economic activity:** The narrow economic base inherited from pre-industrial times largely persists. Dependency on food production and processing, rural resource management, administrative services and tourism is still evident and a potential source of economic vulnerability, especially in the remoter rural areas. Hereford and the market towns have diversified to some extent into specialised manufacturing and service sectors.

3.1.4 This historical lack of industrial diversification and development reflects poor access both to the main markets and also from sources of raw or partly-processed materials. This situation has not significantly changed and as a consequence, the attraction of significant numbers of footloose or new industries is unlikely to be a major component of economic development in the County.

3.1.5 **Distinctive Herefordshire:** Lone self employment features strongly in the Herefordshire economy, partly reflecting the prevalence of small-scale farming. The business size profile is characterised by a few large employers, mainly in the vulnerable food processing sector, very few medium sized enterprises and a great number of small firms.

3.1.6 The greatest pressures for modernisation have been felt most keenly in Hereford, where tensions arise between protecting the historic fabric and accommodating the commercial, service and transport developments needed to support its role as a sub-regional shopping, service and administrative centre. Issues arise now as to whether or not the City has the physical capacity to expand significantly without incurring major penalties such as severe traffic congestion.

3.1.7 Local Transport Plan

3.1.8 **Accessibility and transport issues identified by the LTP**, (2006/7 – 2010/11):

3.1.9 Located at the heart of one of the country's most sparsely populated counties, Hereford serves as the main centre for an extensive rural area providing access to employment, health and leisure facilities.

3.1.10 The City's transport problems are largely urban in nature: congestion, poor air quality, severance caused by traffic resulting in poor access and safety issues for vulnerable road users. These are to some extent compounded by the high levels of car dependence in the surrounding rural areas.

3.1.11 The problems, which are reflected in feedback gained through consultation with stakeholders, analysis of Census data and identified through the Hereford Transport Review are summarised as follows:

- Congestion particularly affecting roads around the City Centre
- Poor access to industrial areas which constrain economic development
- Intrusion of traffic into residential areas
- Poor reliability of bus and rail services
- Poor quality of the bus fleet
- Need for improved road safety for vulnerable road users
- Poor pedestrian facilities in parts of the City centre
- Lack of facilities for cyclists
- Too many journeys to school by car

3.1.12 Transport limitations at Hereford, highlighted by the Transportation Study of Development Options undertaken for the UDP, have led to only limited greenfield housing land release being proposed in the Plan.

4 Future Conditions

4.1 LAND USE AND POLICIES

4.1.1 Herefordshire is currently undergoing consultation on its future strategies for the Local Development Framework. The core vision for Herefordshire is to create a sustainable future for the county based on interdependence of the themes of social progress, economic prosperity and environmental quality with the aim of increasing the county's self-reliance and resilience.

4.1.2 There is a regional requirement to provide 18,000 new homes within Herefordshire by 2026 and a balanced, rolling portfolio of 37 hectares of employment land which is readily available as well as an overall total of 148 hectares of employment land. The preferred spatial strategy is to focus half of all new homes (including affordable) with associated employment, retail, leisure, education and cultural development as well as new transport and green infrastructure in and around the main urban area of Hereford to support its regeneration and status as a Growth Point.

4.1.3 Hereford is identified in the regional plan panel report as a Strategic Sub-Regional Centre providing the main focus for higher level retail, commercial, cultural and service activities. Below this level the market towns of Kington, Ledbury, Leominster, Ross-on-Wye and Bromyard form the non-strategic centres meeting local needs referred to in regional planning policy PA12B. The place shaping paper consultation states that the transport and other infrastructure capacity currently restrict the extent to which Hereford can accommodate new development.

4.1.4 Central Hereford is subject to a large brownfield regeneration programme known as the Edgar Street Grid (ESG). It is anticipated that a significant proportion of the required retail growth will take place within this regeneration area. The key to its success will be retaining the historic and distinct character of the existing retail core and linking the expanded retail quarter to it.

4.1.5 The A49 in central Hereford is subject to increasing congestion and has been formally declared an Air Quality Management Area (AQMA) due to the extent of vehicle pollution derived from the level of congestion. It is envisaged that the scale of new homes will need to be supported by a package of balanced transport measures. These measures are considered necessary to enable Hereford to fulfil its role as a Settlement of Significant Development in accordance with the regional plan panel report.

4.1.6 Local Transport Plan Policies; Summary of Strategy to Tackle Congestion

4.1.7 The current LTP2 covers the period 2006/7 to 2010/11 and explains Herefordshire Councils strategy for tackling congestion in Hereford, which has two key elements:

■ Measures to manage demand and improve efficiency of the network

- A targeted strategy to effect behavioural change
- Parking Strategy;
- Hereford Intelligent Transport System including Bus Priority;
- Network Management Duty;
- Rotherwas Access Road - Major Scheme Proposal; and
- Hereford Outer Distributor Road - development of the A49(T) Ross Road to A465 Abergavenny Road Link Road.

■ Measures to provide attractive alternatives to single occupancy car travel

- Park and Ride;
- Public Transport Improvements;
- Cycle Network Development;
- Pedestrianisation and Pedestrian Access Improvements in the City Centre; and
- Safer Routes to School.

4.1.8 LTP2 does not expect the development of the Hereford Relief Road within the plan period. Development of LTP3 is now underway and will set out the policies concerning the Hereford Relief Road in more detail.

4.1.9 The Transport Study (2003) confirmed by the Multi Modal Model Forecasting Report (2009), from now on referred to as the MMM, indicated that a balanced package of transport improvements including a relief road, park and ride, walking and cycling links and bus priority schemes would be required to accommodate growth in the city. The measures to be included in the sustainable transport package are currently under consultation. There are three possible options for the sustainable transport package detailed in the place shaping paper consultation (January 2010):

- Option 1 – Sustainable improvements
- Option 2 – Sustainable transport improvements linked to measures for ‘demand management’ of car use
- Option 3 – Significant sustainable transport improvements linked to measures for ‘demand management’ of car use.

4.1.10 **Committed Transport Changes**

4.1.11 The Place Shaping Paper Consultation (January 2010) states that a transport hub is planned for the area around Hereford Railway Station as part of the central Hereford regeneration project. This will provide more integrated facilities for rail and bus passengers, pedestrians and cyclists as well as taxis, pedi-cabs and car parking. The hub is considered to be of strategic importance as it will improve sustainable access to the city and surrounding areas and is therefore a preferred proposal within the Core Strategy of the LDF.

4.1.12 **Do Minimum Scenario (Committed schemes only)**

4.1.13 Within the MMM the "Do Minimum" future scenario includes committed housing development at Edgar Street Grid (ESG), Whitecross and other urban areas. A potential housing option for Hereford based on Herefordshire Council's emerging Strategic Housing Land Availability Assessment (SHLAA) was included in the TEMPRO growth scenario, shown in table 4.4.1:

Table 4.4.1 Housing Assumption in TEMPRO Scenario

Location	Number of Dwellings in TEMPRO Scenario
Whitecross	980
Edgar Street Grid (ESG)	1000
Other Urban areas	500
Total	**2480**

4.1.14 The TEMPRO scenario assumed 500 additional houses would be distributed across the existing built up area of Hereford.

4.1.15 The Scenario also includes additions to all transport networks (highway, pedestrian, cycling and public transport) to incorporate the proposed ESG link road and an access junction for the Whitecross housing development within the Model. Further, the highway network includes a Park & Ride site located close to the Hereford Racecourse, with access taken from a signalised junction on the A4103 (Roman Road).

4.1.16 The Do-Minimum Case represents a situation where the changes in demand for travel are in line with the TEMPRO forecasts.

4.1.17 For the Public Transport modelling within the MMM rail and coach fares were assumed to rise at a rate of 1% per annum in real terms as growth in regulated rail

fares is capped at 1% per annum by the DfT and it was assumed that coach fares would grow at a similar rate, as coach travel is usually in competition with rail for inter-urban journeys.

4.1.18 **Do Something Scenarios**

4.1.19 Two scenarios were assessed:

- The addition of a Relief Road to the west of Hereford or
- The addition of a Relief Road to the east of Hereford

4.1.20 **Housing & Employment Options**

4.1.21 The Place Shaping Paper Consultation (January 2010) identified five locations in Hereford with potential for housing and employment development. The Do-Something (DS) Options were based on four different combinations of these by varying the size of allocation for each, creating four different urban expansion patterns for future development in Hereford. Each of the three scenarios above was tested against five options.

- DM Option - No further housing or employment commitment, and
- DS Option 1 – Northwest focus for housing and employment growth
- DS Option 2 – Southwest focus for housing and employment growth
- DS Option 3 – South north focus for housing and employment growth
- DS Option 4 - Dispersed housing and employment growth

4.1.22 The Scenarios included additions to all transport networks (highway, pedestrian, cycling and public transport) to incorporate one relief road option and access junctions for the housing developments within the Model. No further changes were made to the Public Transport services, or Walking and Cycling Networks.

4.2 FUTURE TRAVEL DEMANDS AND LEVELS OF SERVICE

4.2.1 The MMM analysed the link flow, junction stress (volume / capacity), and link speed on the highway network for each scenario. Journey time implications around the network and the affects on the A49 trunk road were also analysed.

4.2.2 The following traffic link-flow diagrams 4.1 – 4.2 show the predicted impact on traffic flows in the Do-Minimum Demand Option with no relief road in the AM and PM network peaks.

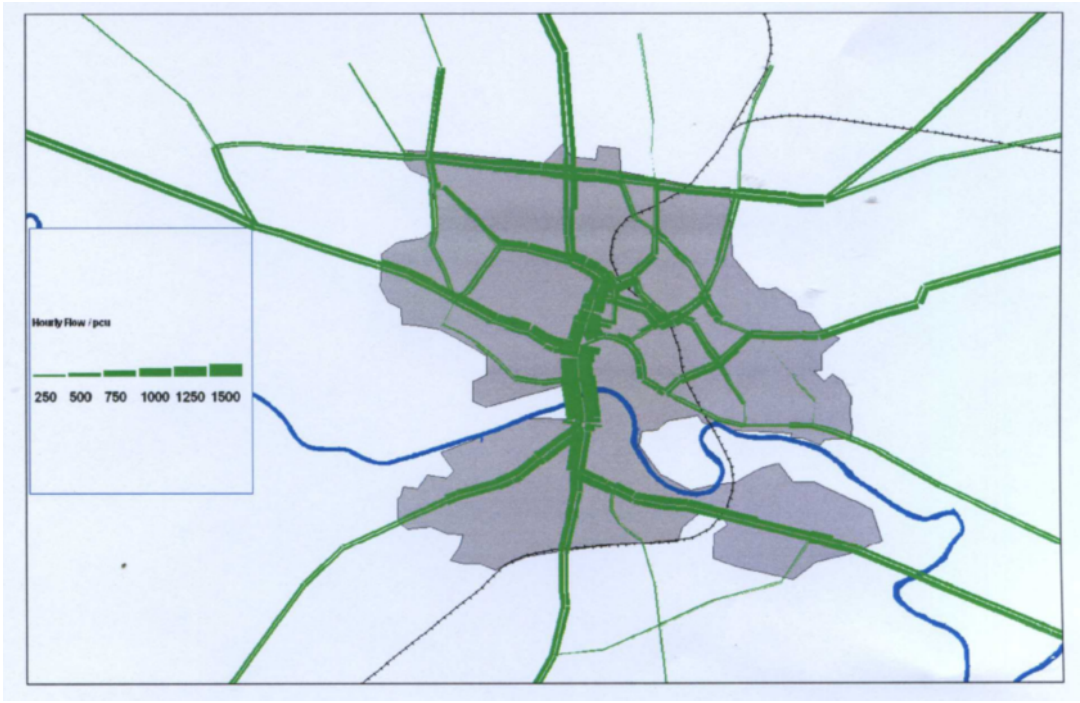


Figure 4.1: Link Flows Do-Minimum Demand Option- no Relief Road in AM Peak

4.2.3 Figure 4.1 shows the A49 at Greyfriars Bridge has the highest link flow in the AM peak with heavy flows on all main arterial roads with intrusion of traffic onto alternate routes evident within north Hereford.

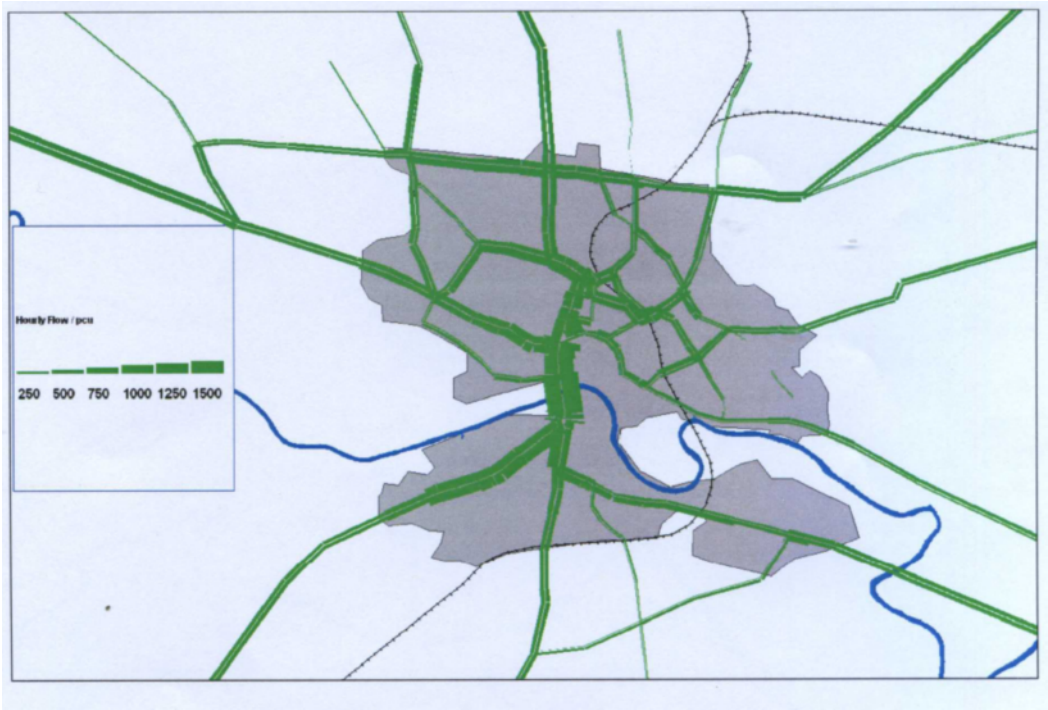


Figure 4.2: Link Flows Do-Minimum Demand Option – no Relief Road in PM Peak

4.2.4 Figure 4.2 shows the A49 at Greyfriars Bridge again has the highest link flow in the PM peak with heavy flows on all main arterial roads with intrusion of traffic onto alternate routes evident within north Hereford. Most notably the A465 Belmont Road, extending to the bottom left of the picture has a much heavier flow in the PM peak.

4.2.5 Link-flow diagrams in figures 4.3 and 4.4 show how the traffic flows on the Do-Minimum Demand Option are altered with the addition of an outer relief road.

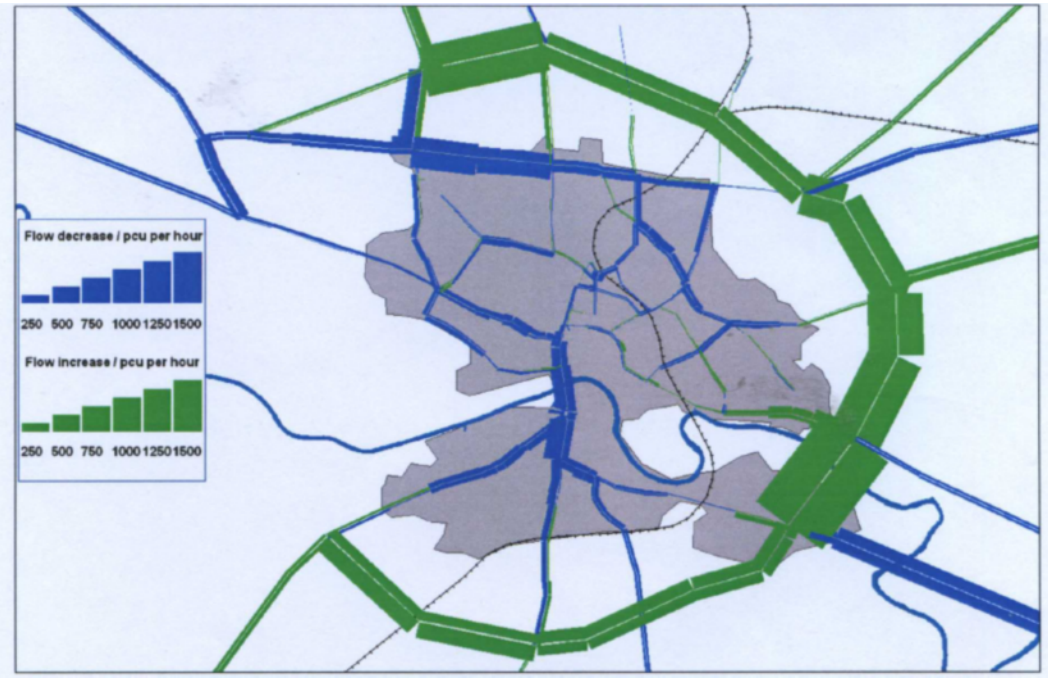


Figure 4.3: Link Flows Comparison HRR East vs No HRR Do Minimum Demand PM Peak

4.2.6 In Figure 4.3 Traffic flow is seen to increase on the new relief road (HRR) and decrease on the radial roads and alternative routes within the city; this includes sections of the A4103 Roman Road, which is the road that runs along the top edge of the city, and Holme Lacy Road, which is the road in the bottom right of the picture.

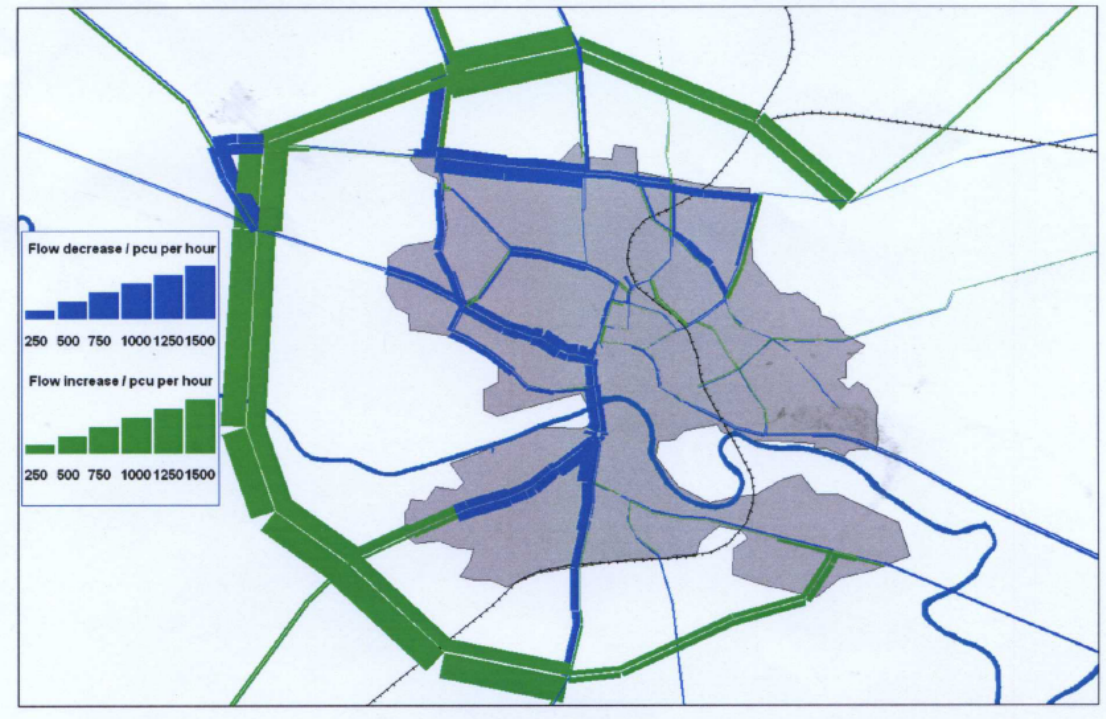


Figure 4.4: Link Flows Comparison HRR West vs No HRR Do Minimum Demand PM Peak

4.2.7 In Figure 4.4 Traffic flow is seen to increase on the new relief road (HRR) and decrease on the radial roads and alternative routes within the city; this notably includes sections of the A4103 Roman Road, which is the road that runs along the top edge of the city, and roads in the west of the city.

4.2.8 Greater detail analysis of all the Options is available in the MMM.

4.3 FUTURE TRANSPORT RELATED PROBLEMS

4.3.1 In the Do Minimum case of the MMM, demand for travel by car in the modelled area in the forecast year of 2026 is estimated to be around 10% higher than at present. This will lead to a worsening of congestion and a reduction in network speeds.

4.3.2 The number of junctions operating at over capacity within the network was identified using the SATURN models. The volume-to-capacity ratio is often used to denote how close to capacity a junction is. A junction operating at 85% of its calculated capacity is generally considered to be congested, as although it might appear to be operating within its calculated capacity its actual capacity could be somewhat lower.

4.3.3 Junctions operating at 85% of capacity and above are divided into three bands:

- 85% to 100% - operating close to capacity, delays are expected
- 100% to 120% - operating over capacity, delays are likely to be considerable; and

- 120% and over – operating significantly over-capacity, delays will be considerable and could lead to widespread queuing

4.3.4 The numbers of modelled junctions within each volume-to-capacity band are shown in Table 4.2

Table 4.2: Over Capacity Junctions – Both Peaks

Volume to Capacity Ratio (%)	Do Minimum			Option 1			Option 2			Option 3			Option4		
	No HRR	West HRR	East HRR	No HRR	West HRR	East HRR	No HRR	West HRR	East HRR	No HRR	West HRR	East HRR	No HRR	West HRR	East HRR
85-100	40	32	32	61	47	44	63	43	42	57	43	39	62	44	41
100-120	22	9	5	46	23	20	43	24	24	42	21	15	41	18	21
120 +	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0
Total	62	41	37	108	70	64	107	67	66	99	64	54	104	62	62

Source: SATURN model, MMM

HRR: Hereford Relief Road

4.3.5 Table 4.2 shows the impact of the Demand Options tested for 2026 in the 'do minimum' scenario and each of the Growth Options. The table identifies the total number of junctions at over capacity for both the AM and PM peaks.

4.3.6 Demand Option 1 with a northwest development focus and no HRR appear to produce the highest number of junctions at over-capacity. Figure 4.5 shows the location of the junctions at over-capacity during the PM peak with Option 1.

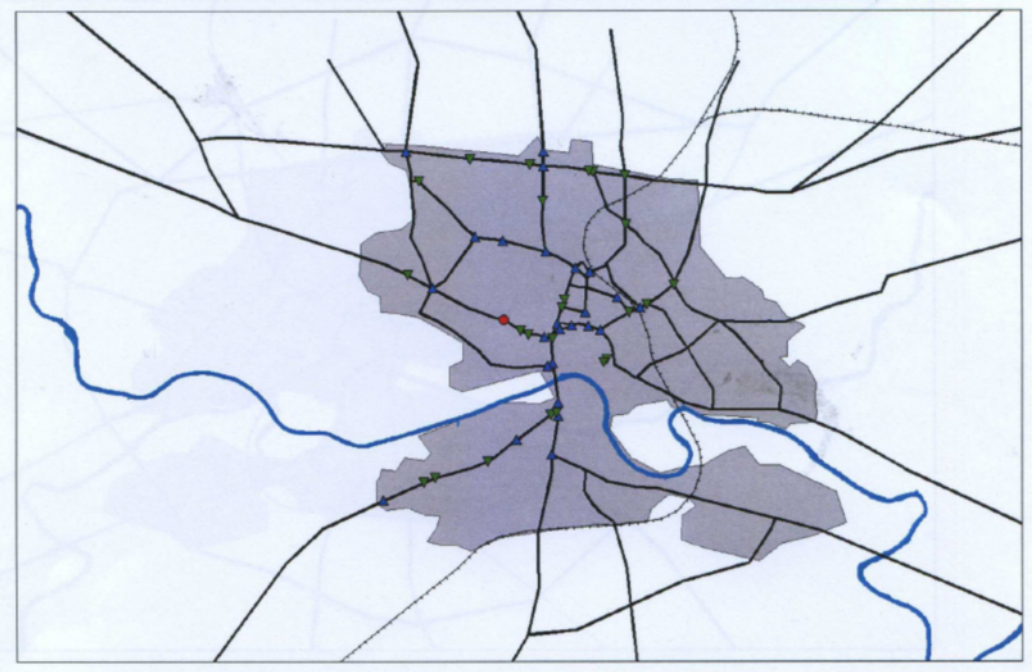


Figure 4.5: Volume-Capacity Ratio at Junctions – No HRR Demand Option 1 PM Peak

4.3.7 When the additional demand associated with the Growth Point housing and employment allocations is added to the model with no highway improvement, the highway conditions are forecast to become much worse, with widespread congestion and low network speeds. This is not unexpected, as the allocations are forecast to increase demand for travel by car by around 20% in each peak period.

5 Consultation, Participation and Information

5.1.1 A well defined and inclusive consultation and participation strategy is necessary for the successful delivery of the 'Core Strategy'. Herefordshire Council have already undertaken significant consultation in defining the issues and setting the broad strategies necessary to deliver the national, regional and local objectives for growth.

5.1.2 The Issues Paper helped shape the vision and objectives for the core strategy; the Developing Options Paper sought views on the specific ways to address the issues identified; and the Place Shaping Paper aims to build upon this towards a preferred strategy.

5.1.3 This Stage 1 Assessment report aims to identify the statutory bodies to be consulted during the Stage 2 assessment. In identifying the consultation strategy consideration will be given to the DfT guidance which suggests the following:

- Regional Partners (Regional Planning Conferences; Regional Assemblies, Regional Development Agencies, Regional Chambers);
- Local Authorities;
- Transport Providers (Highways Agency, Highways Authority, Strategic Rail Authority, Network Rail, train operating companies, bus and coach operators, and car park operators);
- Representatives of business (Regional Chambers of Commerce, CBI, Freight operators);
- Transport users (rail passengers, disabled travellers, freight interests, motorists, cyclists and walkers);
- Environmental Interests (Transport 2000, CPRE, etc);
- Statutory Bodies (English Heritage, Environment Agency, Natural England)
- The general public of the study area;
- The travelling public who would be a subset of the general public in the study area but who would also include people from outside the study area; and
- Land owners and occupiers

5.1.4 DfT also suggest a programme for Consultation and Participation which is considered against this study's delivery strategy in Table 5.1.

Table 5.1: DfT Guidance and Herefordshire Consultation Strategy

DfT Guidance on Consultation Strategy	LDF and Relief Road Strategy
Prior to the start of the study so that views can be sought on the terms of reference;	Issues Paper Consultation **Completed in 2007**
At the start of the study so that views can be sought on local and regional objectives;	
In the early stages so that current perceptions of problems on or with the transport system can be established;	
After the analysis of current transport problems so that the perceived problems can be used to validate and, if necessary, adjust the computational procedures used to identify problems;	Developing Options Paper Consultation **Completed in 2008**
After the analysis of the future transport problems so that views can be sought on the relative importance of the different kinds of problem;	
At the start of the option development step so that views can be sought on the kind of solution which should be considered;	Place Shaping Paper Consultation **Completed in March 2010**
As part of the appraisal process (e.g. involvement of the statutory bodies in assessing the environmental aspects of particular options)	Stage 2 Assessment Report (Technical Statutory Consultation) **May – June 2010**
After the options have been tested and appraised so that views of respondents can be taken into account when making a decision about the preferred transport strategy or plan.	Public consultation to be completed following completion of the Stage 2 Assessment, through the Core Strategy Consultation. **To be Confirmed**

6 Options for Solutions

6.1 SOURCES OF OPTIONS

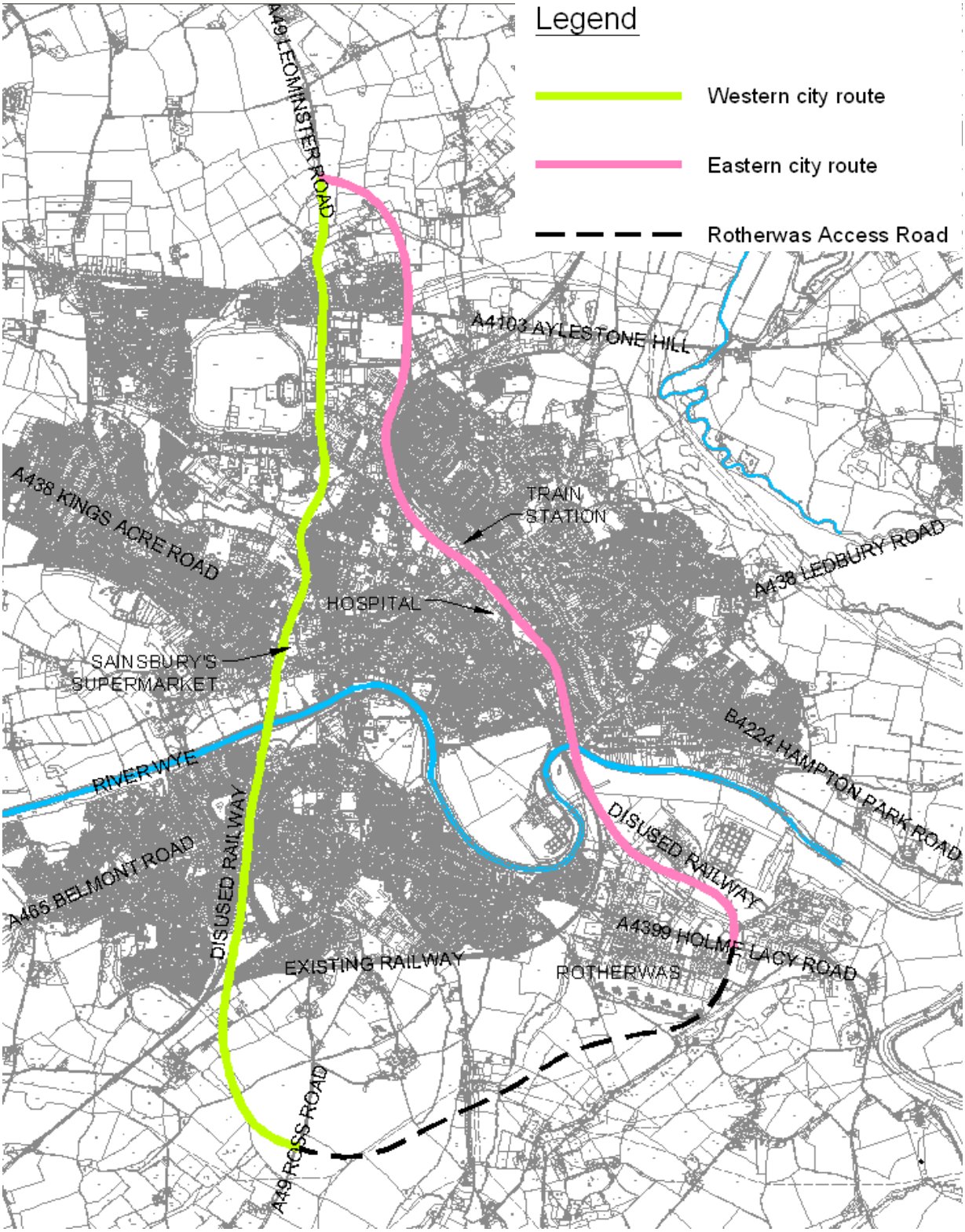
6.1.1 Wide and broadly defined corridors were set at the beginning of the Stage 1 Assessment to reflect the work undertaken to date on the Hereford Multi Modal Study. As recommended by the study, both East and West corridors have been considered and the corridors initially assessed are those from that study. To ensure that the Stage 1, 2 and 3 scheme assessment process identifies the optimum corridor and then alignment, a wide study area has been considered from the outset. As such for each strategy, East or West, an inner option and an outer option has been considered. The inner options are corridors as close as is reasonable to the existing developed city limits. The outer options are corridors further away from the existing city but limited by what is considered to be economically sensible. A corridor too far outside of the city would not provide a short enough route to attract traffic use from bypassing or local trips.

6.1.2 The corridors E1, E2, E3 and E4 on the east of the city and W1, W2, W3 and W4 to the west have been proposed. Note these are not designed alignments and the lines are for the purposes of defining broad corridors for assessment only. Many sections of the corridors are common to several corridors. For example E3 is an extended version of E2. As such in the detailed assessments within the Appendices and in the summaries within the main body of this report there is a certain amount of repetition with each corridor being assessed independently.

6.1.3 Two further options shown on Figure 6.1 have been identified and are referred to in Section 7 as the 'City Routes', one on the west (Western City Route) and one on the east (Eastern City Route). The Western City Route follows the disused railway, currently a well established pedestrian and cycle route. The Eastern City Route follows the live railway; to the West of the railway; North of the hospital and to the East of the Railway from the Hospital to the Rotherwas Estate.

6.1.4 Historically a number of options for a relief road around Hereford have been considered. These options and the outcomes of assessments have been considered during this Stage 1 Assessment. However care has been taken to ensure that this assessment takes an independent view of options to meet the scheme objectives without being distracted by what has gone before.

Figure 6.1: City Routes



6.2 CONSTRAINTS

6.2.1 Broad engineering and environmental constraints have been investigated and are mapped on the following figures:

Figure 6.2 and 6.3 – Land Topography

Figure 6.4 – Land Use

Figure 6.5 and 6.6 – Major Statutory Undertakers Equipment

Figure 6.7 – Environmental Constraint

Figure 6.2: Land Topography (Western Corridors)

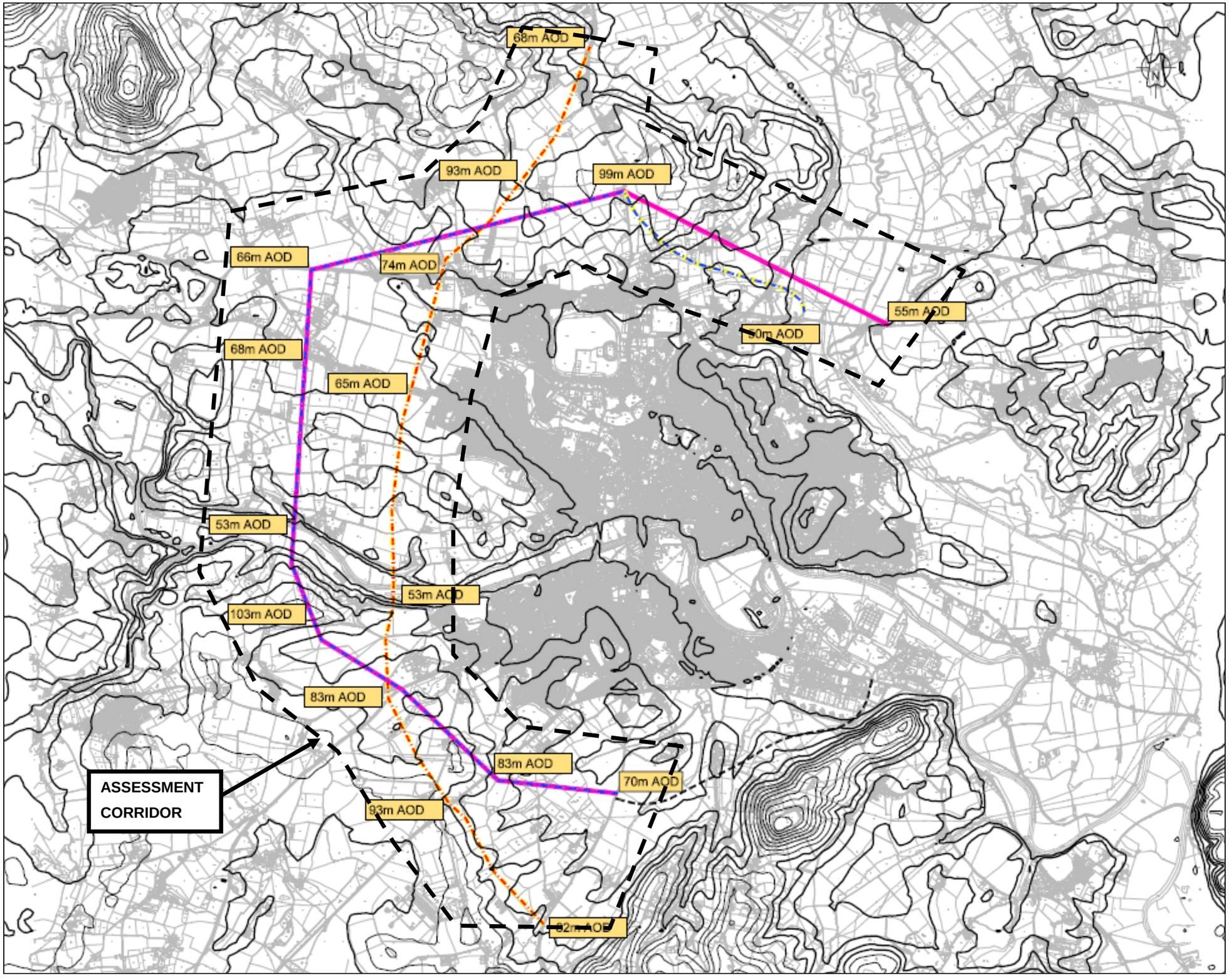


Figure 6.3: Land Topography (Eastern Corridors)

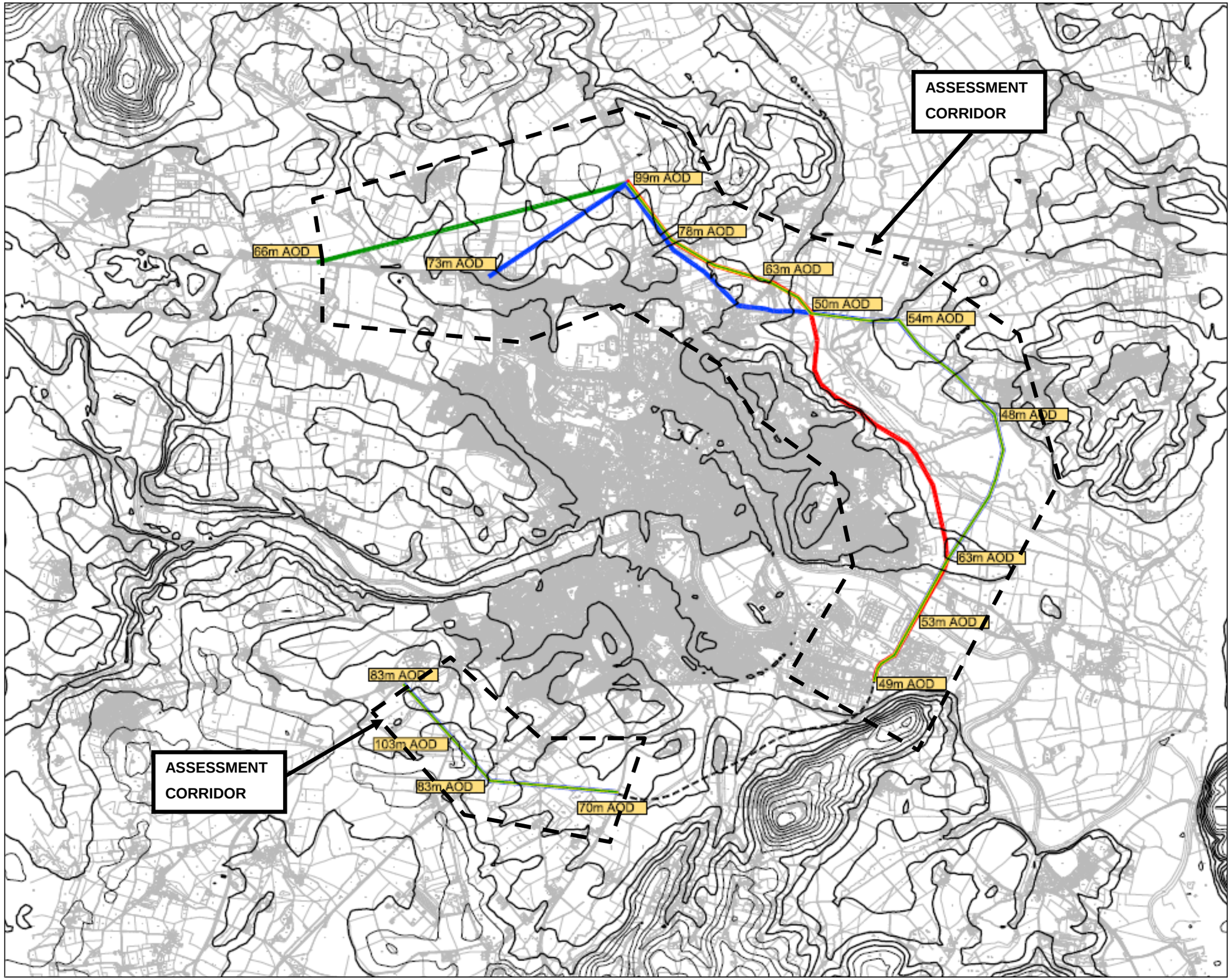
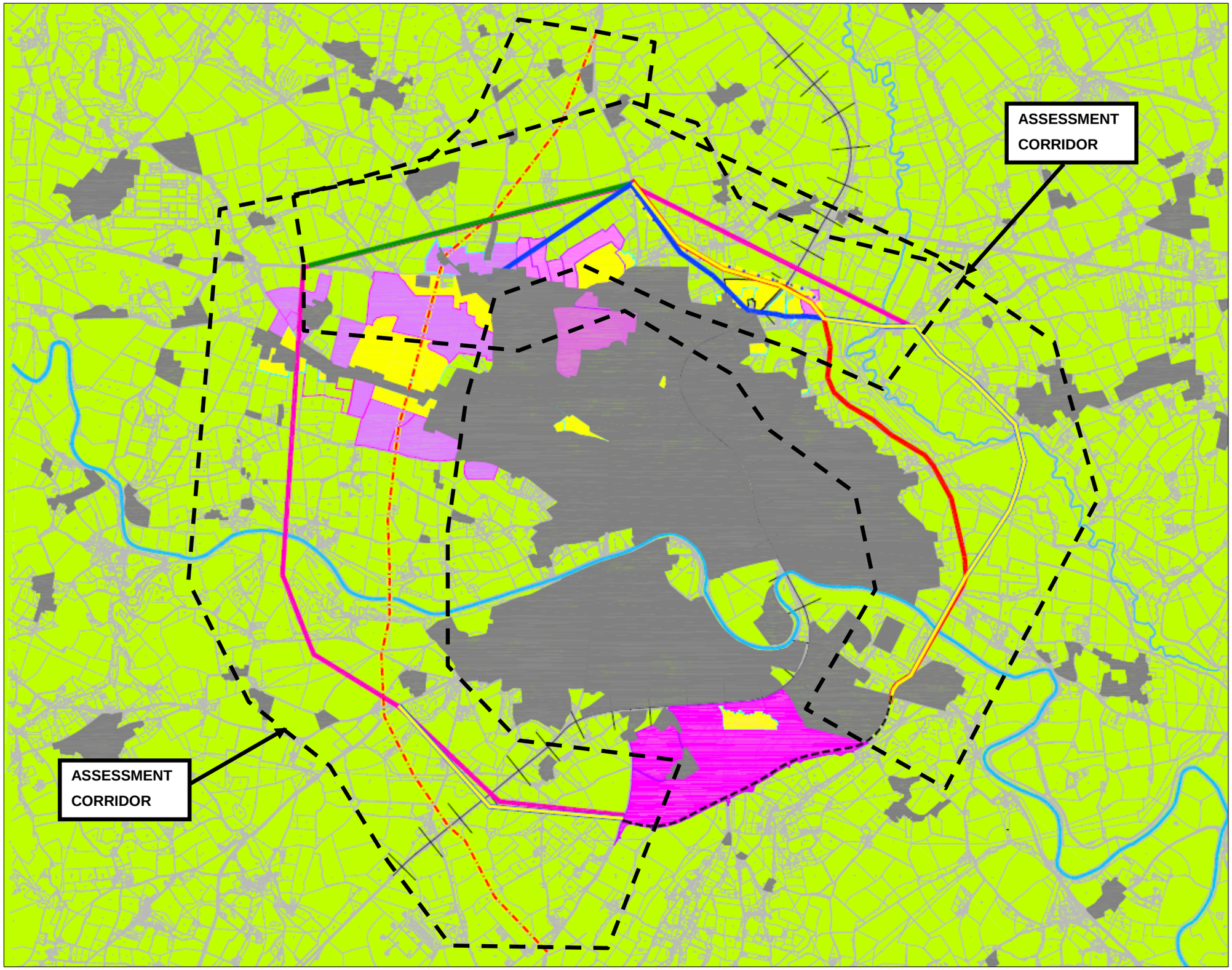


Figure 6.4: Land Use



Green – Undeveloped Land

Grey – Developed Land

Yellow – Higher Potential Development Land

Pink - Lower Potential Development Land

Figure 6.5 Major Statutory Undertakers (Western Corridors)

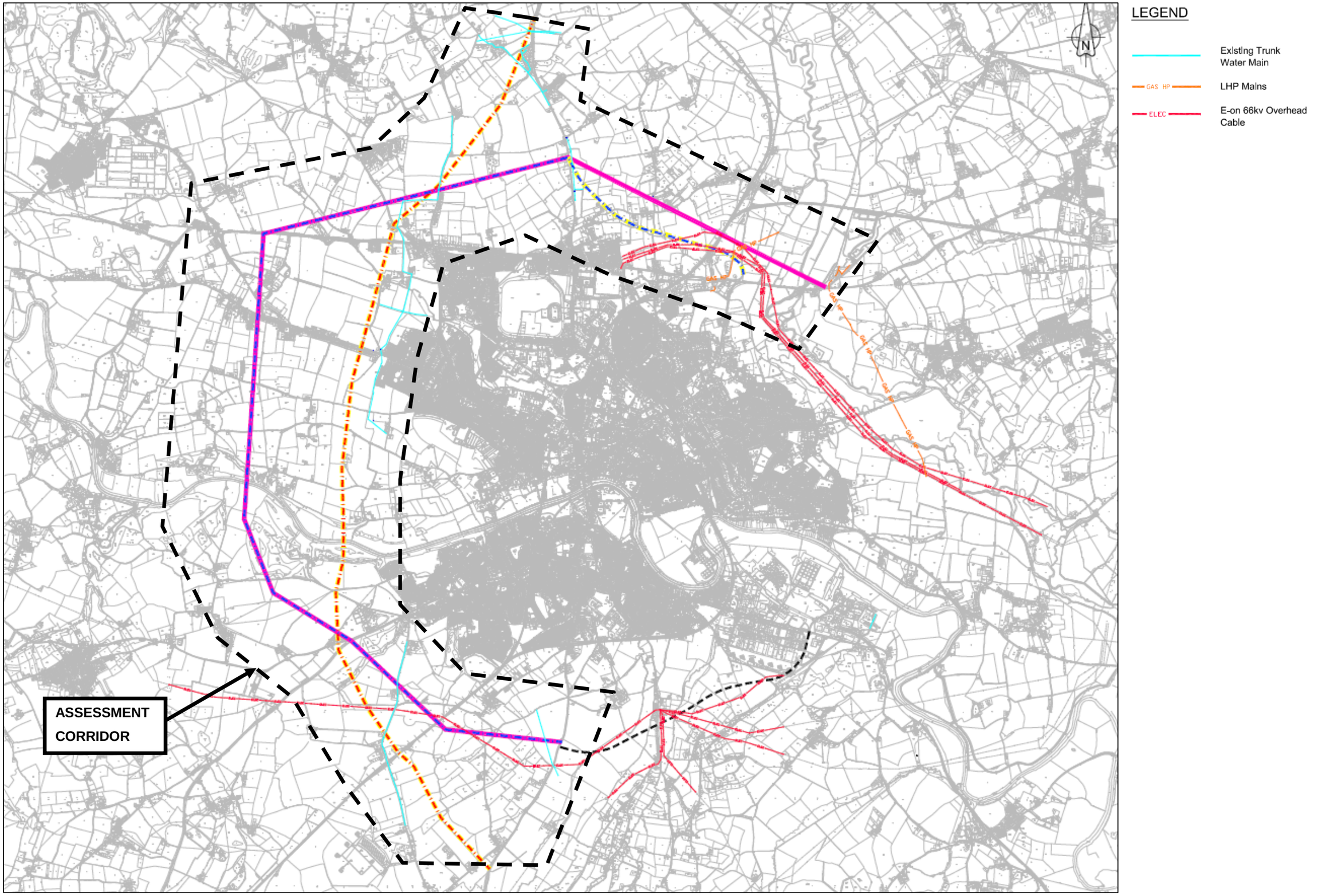


Figure 6.6 Statutory Undertakers (Eastern Corridors)

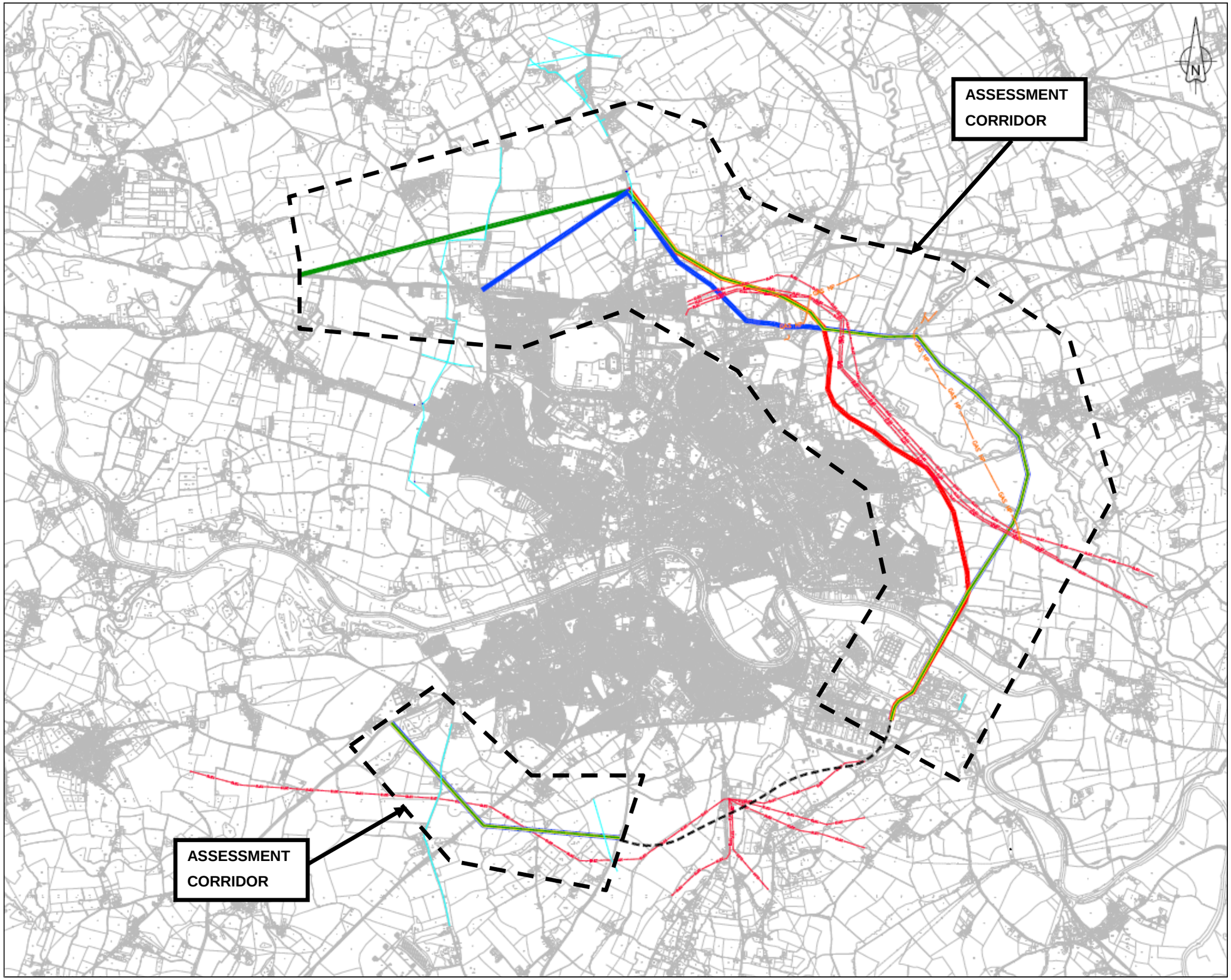
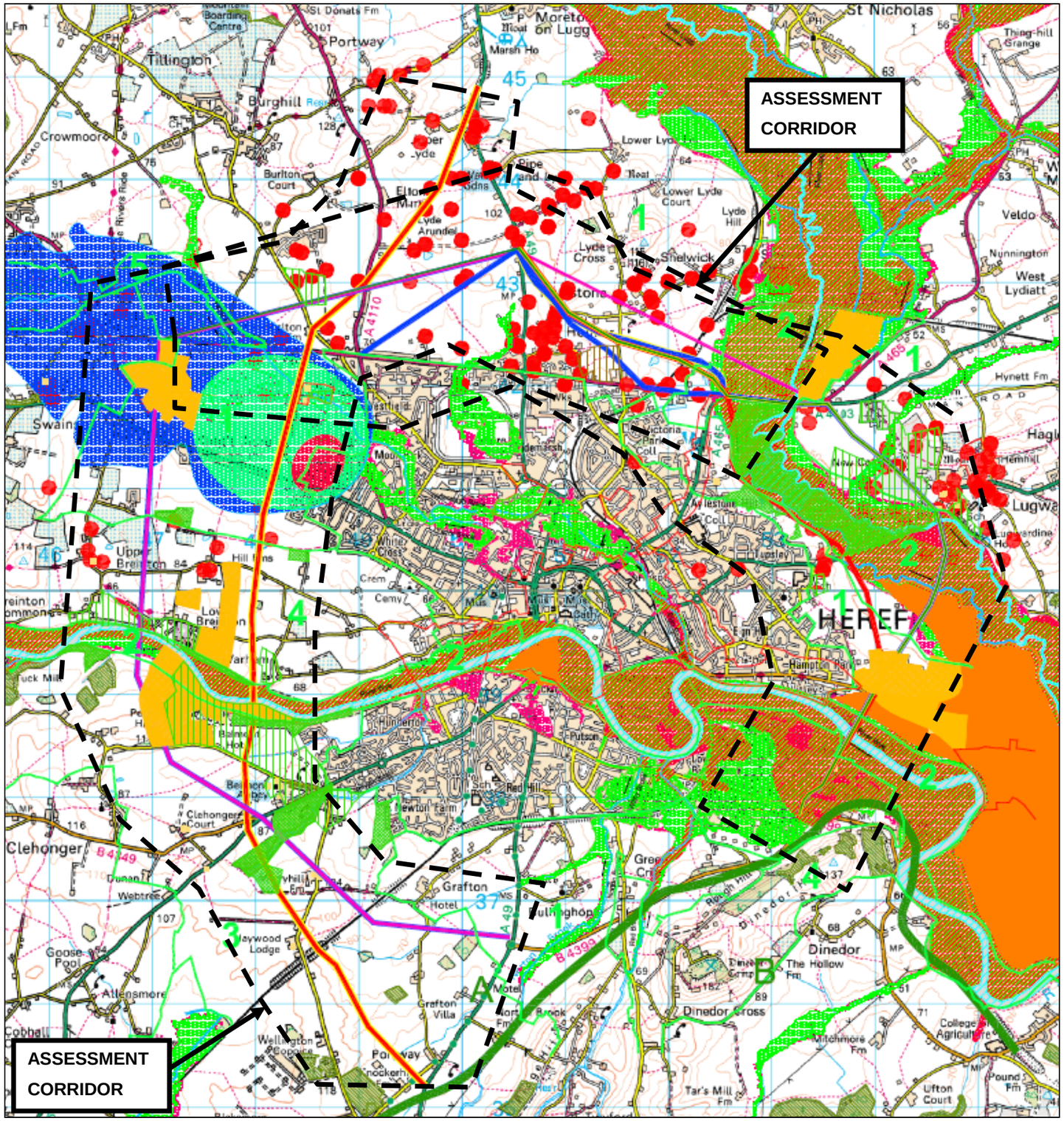


Figure 6.7 Environmental Constraints (See Appendix B for Higher Quality and Separate Maps)



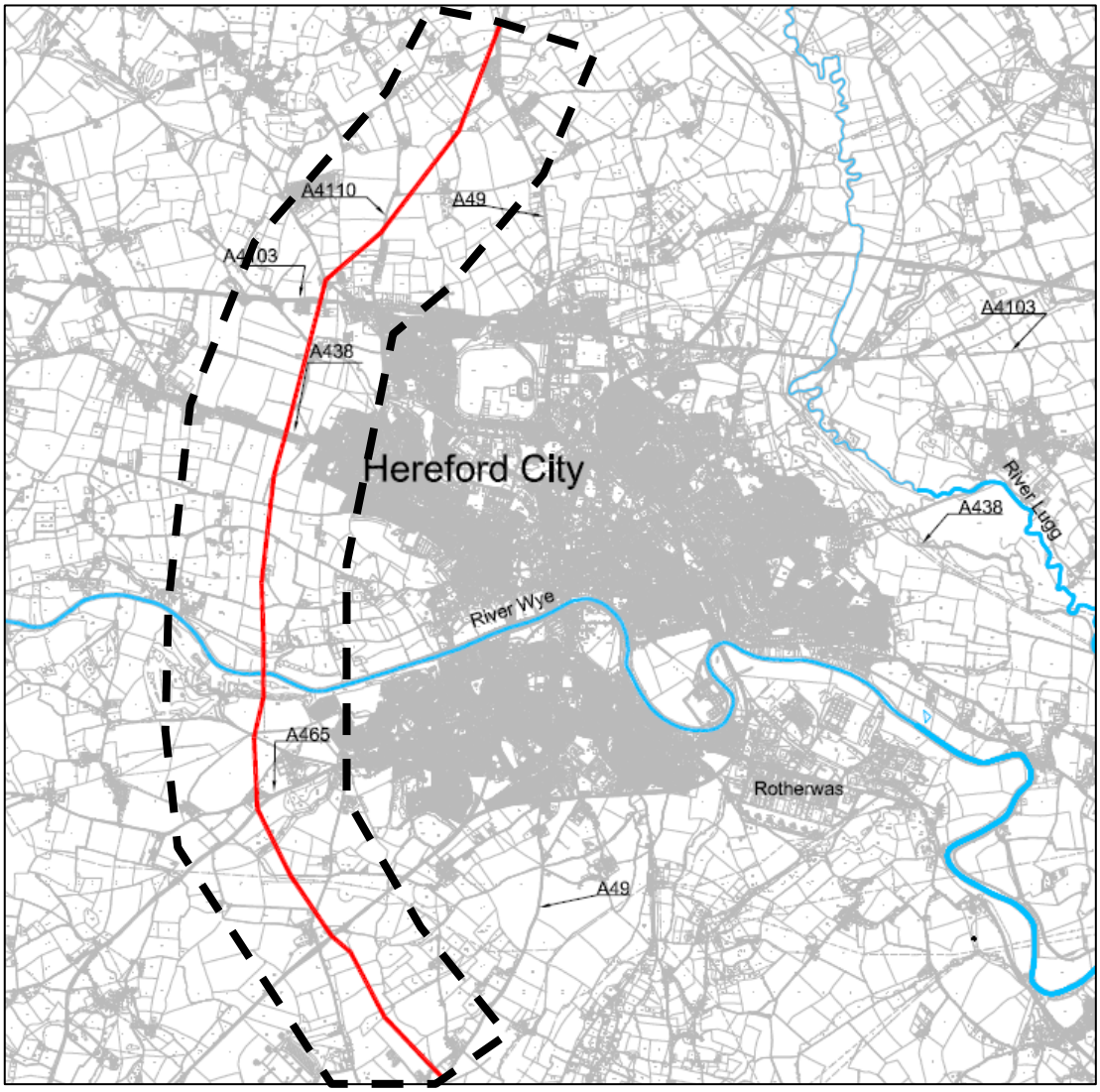
7 Option Appraisal

7.1 WESTERN CORRIDOR OPTION W1

7.1.1 Route Description

7.1.2 This corridor commences at the A49 south of Hereford just east of Knockerhill Farm, see figure 7.1. It proceeds in a generally north western direction where it intersects the Hereford to Newport Railway Line (HNL), the A465 Belmont Road and B4349 before proceeding northwards across the River Wye just west of St. Michael's Abbey and through Belmont Golf Course land, intersecting Breinton Road and Upper Breinton Road. The corridor then crosses the A438 King's Acre Road and runs adjacent to Huntington Lane before crossing the Yazor Brook, the A4103 Roman Road and Tillington Road. At Tillington Road the route then proceeds in a north easterly direction traversing the A4110 Canon Pyon Road and tying in with the A49 Holmer Road to the north of Hereford.

Figure 7.1: Option W1



7.1.3 The total length of this route corridor is approximately 10,887m.

7.1.4 Engineering Assessment

7.1.5 The following engineering assessment is split into sections for clarity and summarised in Table 7.1. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A49 to Railway Line

7.1.6 The corridor commences from the south at an existing ground level of approximately 82m AOD (Above Ordnance Datum) rising to 103m AOD near Merryhill Farm where it crosses the Railway. The crossing is just east of an existing highway bridge which crosses the railway via an over-bridge in a location where the railway is in a deep cutting. Consideration will be required during Stage 2 when testing vertical alignments to minimise steep inclines, excessive earthworks, reduce structures costs and minimise visual and noise impacts of a new road.

7.1.7 An existing culverted watercourse on the A49 could provide the outfall for the highway drainage system subject to a SUDs (Sustainable Drainage) design. Management of surface water runoff will be required so as not to interfere with the existing hydrology through the creation of any cuttings.

Railway Line to A465

7.1.8 The ground levels fall through farmland as the corridor commences north then through a block of woodland to meet the A465 at the junction with the B4349 at a level of approximately 87m AOD. At this junction, the alignment severs an area of residential housing to the west and playing fields to the east.

7.1.9 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and qualities are carefully managed.

A465 to River Wye

7.1.10 Ground levels continue to fall over arable and grazing land as the corridor travels north to approximately 77m AOD. The corridor crosses Belmont Lodge Golf Club before the river gorge where river bank levels are down to 53m AOD. The river banks include areas of mature and semi mature woodland and walking trails. The vertical alignment is likely to require a high river bridge crossing creating significant visual impact although little impact on river flows.

7.1.11 A likely crest in the vertical alignment will necessitate a discharge into the River Wye via an existing stream and Newtown Brook. Attenuation to prevent any flood risk to the residential Belmont area will be required.

7.1.12 Any structures within the River Wye floodplain will be subject to a full Flood Risk Assessment.

River Wye to A438 Kings Acre Road

7.1.13 The corridor crosses agricultural land as it commences north and ground levels rise again to 70m AOD at Lower Breinton Road and 83m AOD at Upper Breinton Road. Ground levels then fall again down to 65m AOD at the intersection with the A438 which is populated with residential properties on its south side.

A438 Kings Acre Road to A4103 Roman Road

7.1.14 The corridor continues north adjacent to Huntington Lane, through farm land and buildings. It crosses Yazor Brook, requiring culverting before reaching the A4103 at a level of 74m. The Yazor brook is currently subject to flooding and the cause of significant flood damage within the City Centre. However, a flood alleviation scheme is scheduled for completion in 2012 so the mechanics of the watercourse will need to be re-assessed including its use as a possible outfall for surface water.

A4103 Roman Road to A49

7.1.15 The corridor turns north-east and crosses the A4110 which is at a level of 93m AOD. Again vertical alignment considerations are required as levels fall back down to 68m at the junction with the A49. This section is generally agricultural but with small areas of woodland with paths and walking trails.

7.1.16 The lakes between the A4110 and the A49 should be avoided. They appear to be spring fed and flow into two streams which are crossed by the route corridor.

Table 7.1: W1 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A49 to Railway	82 – 103	1680	Agricultural	Predominantly Raglan Mudstone Fault line at A49	
Railway to A465	103 – 87	1420	Predominantly agricultural with some woodland	Predominantly Raglan Mudstone Head deposits at MerryHill farm	Welsh Water Trunk Main North of Railway. 66KV Overhead north of railway crossing.

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A465 to River	87 – 53	1240	Predominantly agricultural with some residential, some woodland a golf course and the river gorge.	Predominantly Glacial deposits Alluvium at river. Fault line 1km to the west.	
River to A438	53 – 85 – 65	2250	Predominantly agricultural with some residential.	Glaciofluvial sand and gravel and Glacial Till. Raglan Mudstone at Hill farm	
A438 to A4103	65 – 74	1270	Predominantly agricultural with some farm settlements.	Glacial deposits, undifferentiated; includes morainic sandy tills, gravels and clays	
A4103 to A49	74 – 93 – 68	3030	Predominantly agricultural with some residential and some woodland	Head deposits	Welsh Water Trunk Main West of A49, on the A4110 and North of A4103.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.1.17 Environmental Assessment

7.1.18 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix B. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.1.19 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed route, including schools, monuments and designated sites. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings but are included in the quantitative assessment. Whitecross school within 600 m.

Local Air Quality

7.1.20 Increase in level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA reducing the number of receptors exposed to exceedances of the National Objective for NO2

Greenhouse Gases

7.1.21 An increase in CO_2 emissions is expected as extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted largely dependent on corridor length. W1 is the second shortest of the western corridors.

Landscape

7.1.22 Main adverse effects are at Huntington and around River Wye. Section to north of A4103 less sensitive, though road may be more visible in the more open landscape.

7.1.23 Alignment refinements, especially around Huntington, Belmont Abbey and the River Wye, should be explored to minimise impacts.

Townscape

7.1.24 More attractive and historic elements of city centre tend to be set back from main through routes and would therefore not be directly affected by relief of traffic flows and congestion.

7.1.25 Relief road should facilitate urban renewal proposals and enable traffic calming and other improvements alongside main through routes.

Heritage and Historic Resource

7.1.26 W1 would have an adverse impact on the settings of many sites, mainly Listed Buildings within Breinton village and the Scheduled Ancient Monuments of St. Peters Church, Bullingham and the moated site close to the church in Breinton village. Direct impacts would occur upon a site where prehistoric stone tools have been recovered from Grafton and also the site of a post-medieval house in the same parish

Biodiversity

7.1.27 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other route option east or west of Hereford) to cross. A wide-span crossing should be used to minimise

impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on alignment at Stage 2 and beyond include bats, dormice and great crested newts; Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.1.28 Option W1 requires crossing the River Wye, Yazor Brook and Newton Brook, and potentially other un-named drainage ditches and water courses. This corridor crosses some 380m of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and Yazor Brook catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.1.29 The western routes are not considered to represent desirable connectivity to amenity and employment areas and are not expected to contribute to a significant increase in active mode transport compared to the existing routes likely to be utilised by walk/cyclists. The interventions also dissect many rural rights of way likely to be of high recreational value. As such adoption of the western interventions may result in a decrease in recreational usage. However, the scheme could result in an improvement to air quality within the city centre AQMA thus leading to improved levels of health.

Journey Ambience

7.1.30 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the corridor is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do

minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.1.31 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.1.32 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the route will be encouraged during construction in order to avoid sterilisation of the mineral deposit. W1 is likely to be the most sustainable of the western options to construct as it has the shortest length and therefore should require the least materials and energy in construction of the western options.

Flood Risk

7.1.33 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.1.34 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.1.35 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.1.36 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the

possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.1.37 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.1.38 No Local Geological Sites will be affected by the proposed corridor.

7.1.39 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.1.40 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.1.41 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.1.42 Traffic and Economic Assessment of a Western Relief Road

7.1.43 For more detail and background to the methodology see the Stage 1 Traffic and Economic Report, and Multi Modal Study 2009 in Appendix C. This summary is split into firstly the traffic scenario modelling and then the economic assessment

Model Performance

7.1.44 The latest multi-modal highway models have assessed different housing and employment allocation scenarios (DS1 – 4) with the provision of a Relief Road to the west. The comparison has been based on network conditions using such measures as average speed, delays and queues in the network for a future year of 2026.

7.1.45 The models included the implications of urban expansion on highway usage, public transport usage, and cycling and walking usage. TEMPRO was used to establish growth factors, and a DIADEM model choice component allowed for a prediction in modal shift.

7.1.46 A summary of the average modal split across the transport network within and around Hereford for the four Demand Scenarios following expansion is shown in table 7.2

Table 7.2 Modal Split on network with a Western Relief Road

Mode	Period	Demand Scenario Average		Period	Demand Scenario Average	
		Number	%'age		Number	%'age
Car	AM Peak	27,218	71%	PM Peak	28,241	69%
PT		3,013	8%		2,203	5%
Cycle		1,203	3%		1,177	3%
Walk		6,816	18%		9,397	23%
Total		38,249			41,017	

7.1.47 Table 7.2 identifies that network usage is taken up primarily by car, then walking, public transport and finally cycling. The car has a network usage share of 71% in the AM peak and 69% in the PM peak. After this walking is the most popular with a share of 18% in the AM peak and 23% in the PM peak.

7.1.48 It is assumed that the building of a relief road is dependent on a decision for urban expansion. The model did not provide a full scale assessment of the Hereford Relief Road options but assessed the whole transport network on the affects of a nominal route around the Western or Eastern side of Hereford.

7.1.49 The Public Transport, Cycle and Walking Models were updated in the Hereford Multi-modal Model by adding the Edgar Street Grid highway works, access to the housing estate at Whitecross and new relief roads; no other changes were made including any changes to public transport services.

Network Performance

7.1.50 The comparisons of network performance for the AM and PM future year models with a Western Relief Road (With) compared to models without a relief road (W/O) are shown in Table 7.3

Table 7.3 Summary of Highway Network Performance with a Western Relief Road

Indicators	AM Peak		PM Peak	
	With	W/O	With	W/O
Total Time / hrs	2,640	2,993	2,931	3,228
Transient Queues / hrs	890	1,184	1,010	1,243
Over-Capacity Queues / hrs	12	137	107	297
Link Delays / hrs	86	71	97	70
Total Distance / km	93,586	81,332	97,500	82,803
Total Trips Loaded / pcu	21,790	21,663	22,433	22,287
Average Speed / kph	35	27	33	26

7.1.51 The four housing scenarios with a Western Relief Road return similar statistics and so an average has been calculated for the four growth options in each scenario. The averaged indicators for a western Relief Road show less time spent on the network, less queuing, and less delays due to over-capacity queues and transient queues in both the AM and PM peaks. Total distance travelled on the network increases with the western Relief Road. Time spent travelling on the network is also reduced. The scenario with a Western Relief Road (With) therefore shows a significant improvement on the scenario without a Western Relief Road (W/O). An important factor for economic success is that travel time is more reliable.

Economics

7.1.52 Currently no economic assessment of the scheme option using the current multi-modal model has been undertaken in accordance with current guidance using the TUBA (Transport User Benefit Appraisal) software program. As the work undertaken so far has been only to assess the broadly defined transport and development strategies identified for Hereford a full economic assessment for all the various scenarios was not deemed necessary.

7.1.53 The determination of the preferred development option with Relief Road alignment was undertaken by calculating the generalised cost of travel in each highway network. The total cost of travel was calculated by taking into account the time spent travelling (summed over all modelled vehicles) and the distance travelled (again summed over all vehicles). In effect the travel cost is a combination of time and distance. This means that the option which produces the lowest overall travel time is not necessarily the option that produces the lowest overall cost of travel. The results for the Western Relief Road are shown in table 7.4

Table 7.4 Comparisons of Total Generalised Costs of Travel / Hours of Generalised Time with and Without a Western Relief Road

Period	Cost of Travel With a Western Relief Road (£'s)	Cost of Travel Without Relief Road (£'s)
AM	16,896	17,947
PM	18,016	19,309
Total	34,913	37,256

7.1.54 Generalised costs are a measure of accessibility through providing a calculation for ease of approach between locations. In this instance it is measured in terms of the

distance travelled, and the time taken. The Multi-modal Study shows that with the Western Relief Road in place overall travel cost is reduced. Again the differences between the four development options are not significant. This means that though distances travelled are greater, delay is reduced. The 2001 Hereford Outer Relief Road Business Case identified that one of the main concerns for local businesses is congestion and the corresponding economic fragility of the economy in Hereford. An Outer Relief Road would directly reduce transport costs of all manufacturing and distribution firms serving national and international markets and therefore contribute to a stronger local economy.

Scheme Costs

7.1.55 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.5 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.5: Western Corridor Option W1

	Scheme Costs (£k)	**Comments**
Roadworks – Links	18,094	Link Length 10.9km at £1.66m per km
Roadworks – Junctions	2,900	5 No. at £580K per junction
Structures	2,500	1 No Type A at £250k Each
	0	0 No Type B at £250k Each
	3,750	10 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	1,000	10 No Type E at £100k Each
Preliminaries	7,936	25% of Works Cost
Works Cost Sub Total	**39,680**	**Excluding VAT**
Service Diversions	3,968	10% of Works Cost
Land Acquisition	10,900	Link Length 10.9km at £1k per km
Part1 Claims	1,380	276 houses within 300m at £5k each
Preparation / Supervision	3,968	10% of Works Cost
Sub Total	**59,896**	Excluding VAT
Inflation	18,150	**3%**
Optimism Bias and Risk	35,120	45% of scheme Cost sub total
Total Estimated Out Turn Cost	**113,167**	Excluding VAT
Present Value Cost (2002)	**74,919**	Excluding VAT

7.1.56 Appraisal Summary Tables (AST)

7.1.57 At the heart of the appraisal process is the Appraisal Summary Table (AST). This records the degree to which the five Central Government objectives for transport (environment, safety, economy, accessibility and integration) and the three local specific objectives for transport (social progress, economic prosperity, and environmental quality) would be achieved and provides a comprehensive summary of the impacts of an option. Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.6 gives the final score for the Western Corridor Option W1 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.6: Western Corridor Option W1

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	-
	Landscape	- - -
	Townscape	++
	Heritage of Historic Resources	-
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	- -
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	74,169
	Estimated Outturn Cost	113,167
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

7.2 WESTERN CORRIDOR OPTION W2

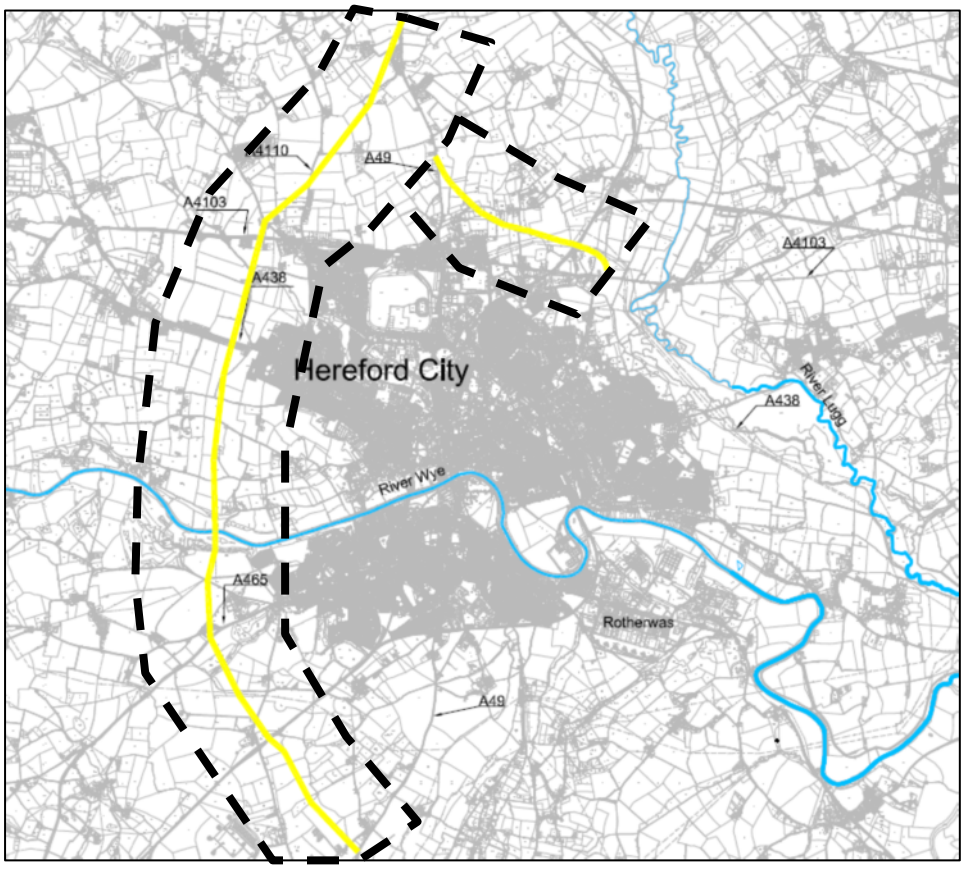
7.2.1 Route Description

7.2.2 This corridor begins at the A49 south of Hereford just east of Knockerhill Farm, see figure 7.2. It proceeds in a generally north western direction where it intersects the Hereford to Newport railway line (HNL), the A465 Belmont Road and B4349 before proceeding northwards across the River Wye just west of St. Michael's Abbey and through Belmont Golf Course land, intersecting Breinton Road and Upper Breinton Road. The corridor then crosses the A438 King's Acre Road and runs adjacent to Huntington Lane before crossing the Yazor Brook, the A4103 Roman Road and Tillington Road. At Tillington Road the corridor then proceeds in a north easterly direction traversing the A4110 Canon Pyon Road and tying in with the A49 Holmer Road to the north of Hereford.

7.2.3 The corridor is essentially the same as W1 but there is also a small section of this corridor which runs south eastwards from the A49 commencing at Highway Cottage, approximately 1200m north of its junction with A4103 Roman Road. This section traverses Coldwells Road, Munstone Road and intersects the Hereford to Shrewsbury Railway Line (SHL). This section of the proposed western corridor is to tie-in at the roundabout junction of A4103 Roman Road and Aylestone Hill.

Figure 7.2: Option W2

7.2.4



7.2.5 The total length of this route corridor is approximately 13.4km.

7.2.6 Engineering Assessment

7.2.7 The following engineering assessment is split into sections for clarity and summarised in Table 7.7. The corridor is essentially the same a W1 but there is also a section named A49 to A4103. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A49 to Railway Line

7.2.8 The corridor commences from the south at an existing ground level of approximately 82m AOD (Above Ordnance Datum) rising at a gentle gradient to 103m AOD near Merryhill Farm where it crosses the Railway. The crossing is just east of an existing highway bridge which crosses the railway via an overbridge in a location where the railway is in a deep cutting. Consideration will be required during Stage 2 when testing vertical alignments to minimise steep inclines, excessive earthworks, reduce structures costs and minimise visual and noise impacts of a new road.

7.2.9 An existing culverted watercourse on the A49 could provide the outfall for the highway drainage system subject to a SUDs (Sustainable Drainage) design. Management of surface water runoff will be required so as not to interfere with the existing hydrology through the creation of any cuttings.

Railway Line to A465

7.2.10 The ground levels fall through farmland as the corridor commences north then through a block of woodland to meet the A465 at the junction with the B4349 at a level of approximately 87m AOD. At this junction, the alignment severs an area of residential housing to the west and playing fields to the east.

7.2.11 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality is carefully managed.

A465 to River Wye

7.2.12 Ground levels continue to fall over arable and grazing land as the corridor travels north to approximately 77m AOD. The corridor crosses Belmont Lodge Golf Club before the river gorge where river bank levels are down to 53m AOD. The river banks include areas of mature and semi mature woodland and walking trails. The vertical alignment is likely to require a high river bridge crossing creating significant visual impact although little impact on river flows.

7.2.13 A likely crest in the vertical alignment will necessitate a discharge into the River Wye via an existing stream and Newtown Brook. Attenuation to prevent any flood risk to the residential Belmont area will be required.

7.2.14 Any structures within the River Wye floodplain will be subject to a full Flood Risk Assessment.

River Wye to A438 Kings Acre Road

7.2.15 The corridor crosses agricultural land as it commences north and ground levels rise again to 70m AOD at Lower Breinton Road and 83m AOD at Upper Breinton Road. Ground levels then fall again down to 65m AOD at the intersection with the A438 which is populated with residential properties on its south side.

A438 Kings Acre Road to A4103 Roman Road

7.2.16 The corridor continues north adjacent to Huntington Lane, through farm land and buildings. It crosses Yazor Brook, requiring culverting before reaching the A4103 at a level of 74m. The Yazor brook is currently subject to flooding and the cause of significant flood damage within the City Centre. However, a flood alleviation scheme is scheduled for completion in 2012 so the mechanics of the watercourse will need to be re-assessed including its use as a possible outfall for surface water.

A4103 Roman Road to A49

7.2.17 The corridor turns northeast and crosses the A4110 which is at a level of 93m AOD. Again vertical alignment considerations are required as levels fall back down to 68m at the junction with the A49. This section is generally agricultural but with small areas of woodland with paths and walking trails.

7.2.18 The lakes between the A4110 and the A49 should be avoided. They appear to be spring fed and flow into two streams which are crossed by the route corridor.

A49 to A4103 at Ayelstone Hill

7.2.19 A separate link is provided from the A49 at Highway Cottage running south east across Coldwells Road, Munstone Road tying in to the A4103 at the Roundabout at Alyestone Hill. Ground Levels fall from the A49 at approximately 100m AOD to the A4103 Roundabout at 50m AOD. The corridor follows predominantly agricultural land but does cause some severance of properties in the Holmer Area. The corridor crosses the railway cutting just before the junction with the A4103.

7.2.20 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage (SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

Table 7.7: W2 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A49 to Railway	82 – 103	1680	Agricultural	Predominantly Raglan Mudstone Fault line at A49	
Railway to A465	103 – 87	1420	Predominantly agricultural with some woodland	Predominantly Raglan Mudstone Head deposits at MerryHill farm	Welsh Water Trunk Main North of Railway. 66KV Overhead north of railway crossing.
A465 to River	87 – 53	1240	Predominantly agricultural with some residential, some woodland a golf course and the river gorge.	Predominantly Glacial deposits Alluvium at river. Fault line 1km to the west.	
River to A438	53 – 85 – 65	2250	Predominantly agricultural with some residential.	Glaciofluvial sand and gravel and Glacial Till. Raglan Mudstone at Hill farm	
A438 to A4103	65 – 74	1270	Predominantly agricultural with some farm settlements.	Glacial deposits, undifferentiated; includes morainic sandy tills, gravels and clays	
A4103 to A49	74 – 93 – 68	3030	Predominantly agricultural with some residential and some woodland	Head deposits	Welsh Water Trunk Main West of A49 and on A4110.
A49 to A4103	100 – 50	2450	Predominantly agricultural with some residential.	Predominantly Raglan Mudstone. Sandstone at Munstone. Alluvium at A4103	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Railway Crossing.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.2.21 Environmental Assessment

7.2.22 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix B. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.2.23 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed route, including schools, monuments and designated sites. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings and existing road noise but are included in the quantitative assessment. Whitecross School is within 600 m.

Local Air Quality

7.2.24 Increase in level of air pollution will occur along the proposed route. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA will reduced the number of receptors exposed to exceedances of the National Objective for NO2

Greenhouse Gases

7.2.25 An increase in CO_2 emissions is expected as extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted largely dependent on route length. Route W2 is the second shortest of the western routes.

Landscape

7.2.26 Main adverse effects are at Huntington, Holmer and around River Wye. Corridor refinements, especially around Huntington, Belmont Abbey and the River Wye, should be explored to minimise impacts.

Townscape

7.2.27 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.2.28 W2 follows the same line as W1 and would pass close to the historic village of Breinton with all its associated Listed Buildings and the Scheduled Ancient Monument of a moated enclosure; and also Holmer, another village medieval in origin that has another Scheduled Ancient Monument of a medieval stone cross in the churchyard of St Peter's. Sites to be directly impacted would include a post-medieval quarry site and the stone tool find location in Grafton.

Biodiversity

7.2.29 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other corridor option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on road alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.2.30 Option W2 requires crossing the River Wye, Yazor Brook and Newton Brook, and potentially other un-named drainage ditches and water courses. This corridor crosses some 580m of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and Yazor Brook catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.2.31 The western corridors are not considered to represent desirable connectivity to amenity and employment areas and are not expected to contribute to a significant increase in active mode transport compared to the existing routes likely to be utilised

by walk/cyclists. The interventions also dissect many rural rights of way likely to be of high recreational value. As such adoption of the western interventions may result in a decrease in recreational usage. However, the scheme could result in an improvement to air quality within the city centre AQMA thus leading to improved levels of health.

Journey Ambience

7.2.32 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the corridor is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.2.33 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.2.34 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the route will be encouraged during construction in order to avoid sterilisation of the mineral deposit. W2 is likely to be the 2nd most sustainable of the western options to construct as it has the second shortest length and therefore should require the 2nd least materials and energy in construction of the western options.

Flood Risk

7.2.35 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.2.36 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.2.37 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.2.38 The route may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.2.39 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.2.40 No Local Geological Sites will be affected by the proposed corridor.

7.2.41 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.2.42 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.2.43 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.2.44 Traffic and Economic Assessment

7.2.45 See section 7.1.3 for an assessment of the traffic model performance which was carried out for the various employment and housing development options. At this

stage a single western option has been modelled which is summarised for the Route W1 section only.

7.2.46 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.8 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.8: Western Corridor Option W2

	Scheme Costs (£k)	**Comments**
Roadworks – Links	22,244	Link Length 13.4km at £1.66m per km
Roadworks – Junctions	3,480	6 No. at £580K per junction
Structures	5,000	2 No Type A at £250k Each
	0	0 No Type B at £250k Each
	4,500	12 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	1,300	13 No Type E at £100k Each
Preliminaries	10,006	25% of Works Cost
Works Cost Sub Total	**50,030**	**Excluding VAT**
Service Diversions	5,003	10% of Works Cost
Land Acquisition	13,400	Link Length 13.4km at £1k per km
Part1 Claims	1,680	336 houses within 300m at £5k each
Preparation / Supervision	5,003	10% of Works Cost
Sub Total	**75,166**	Excluding VAT
Inflation	22,712	3%
Optimism Bias and Risk	44,023	45% of scheme Cost sub total
Estimated Outturn Cost	**141,851**	Excluding VAT
Present Value Cost (2002)	**93,954**	Excluding VAT

7.2.47 Appraisal Summary Tables (AST)

7.2.48 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.9 gives the final score for the Western Corridor Option W2 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.9: Western Corridor Option W2

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	- -
	Landscape	- - -
	Townscape	++
	Heritage of Historic Resources	-
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	- -
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	93,954
	Estimated Outturn Cost	141,851
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

7.3 WESTERN CORRIDOR OPTION W3

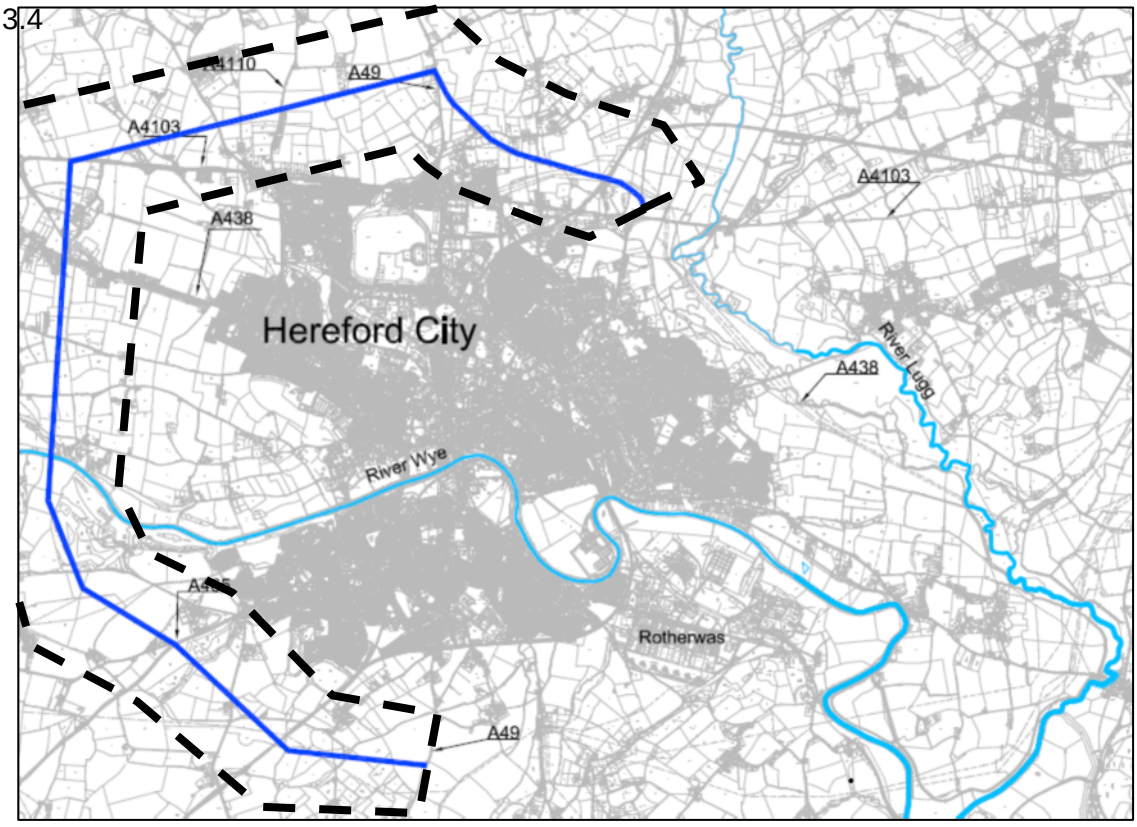
7.3.1 Route Description

7.3.2 This corridor commences from the A49 south of Hereford at the new roundabout for the Rotherwas Access Road (B4399), see figure 7.3. It proceeds in a westerly direction for approximately 1400m, before continuing north-west just prior to crossing the Hereford to Newport railway line, then intersecting Grafton Lane and the A465 Belmont Road within close proximity to its junction with the B4349. It continues in a north-westerly direction towards Belmont Golf Club where it crosses the golf course and proceeds north, intersecting the River Wye.

7.3.3 After crossing the Wye it continues north intersecting Upper Breinton Road, A438 King's Acre Road and A4103 Roman Road. At the intersection with Roman Road the proposed corridor turns and proceeds in a north easterly direction crossing Towtree Road, Tillington Road and Canon Pyon Road. The proposed corridor ties in with the A49 Holmer Road north of Hereford in close proximity to Highway Cottage, approximately 1200m north of its junction with Roman Road.

Figure 7.3: Option W3

7.3.4



7.3.5 The corridor then traverses the Holmer and Shelwick area south eastwards, crossing Coldwells Road, Munstone Road and to a proposed railway crossing at the Hereford to Shrewsbury line, proceeding to tie in with the Aylestone Hill Roundabout on the A4103.

7.3.6 The total length of this corridor is approximately 14.1km.

7.3.7 Engineering Assessment

7.3.8 The following engineering assessment is split into sections for clarity and summarised in Table 7.10. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A49 to Railway Line

7.3.9 The ground levels along the corridor fall gradually from the A49 at a level of 71m AOD to 66m AOD at Grafton Lane. The route crosses the railway at a section roughly at grade at 68m AOD where an overbridge may be required.

7.3.10 The topography lends itself to a drainage outfall in the vicinity of the A49 but attenuation will be important due to potential flood risk downstream in Lower Bullingham.

Railway Line to A465

7.3.11 The ground rises to 103m AOD at Merry Hill Farm then falls to 83m AOD in the vicinity of the B4349/A465 where the alignment passes between the residential properties and playing fields. Just south of the A465 the corridor passes through the narrowest section of mature woodland.

7.3.12 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality is carefully managed.

A465 to River Wye

7.3.13 Ground levels rise again to 103m AOD at Perry Hill before continuing a short distance north to the River Wye gorge with a bank level of around 53m AOD. The alignment crosses the Belmont Golf Course, agricultural land and riverside woodland. The alignment poses significant vertical design challenges with such rapid changes of level necessitating deep cuttings and high, long bridges.

7.3.14 A likely crest in the vertical alignment will necessitate a discharge of surface water into the River Wye via an existing stream and Newtown Brook. Attenuation to prevent any flood risk to the residential Belmont area will be required.

7.3.15 Any structures within the River Wye floodplain will be subject to a full Flood Risk Assessment.

River Wye to A438 Kings Acre Road

7.3.16 North of the river the ground rises again to 83m AOD at the intersection with Green Lane then falls to 69m AOD at the A438 Kings Acre Road. Several areas of Woodland and orchard are located in the vicinity of Breinton and Residential properties line the South side of the A438.

A438 Kings Acre Road to A4103 Roman Road

7.3.17 The corridor cuts through the commercial planting nursery causing major business disruption between the A438 and A4103. The ground levels are relatively flat as the corridor crosses Yazor Brook at around 61m AOD which will require culverting.

7.3.18 The Yazor brook is currently subject to flooding and the cause of significant flood damage within the City Centre. However, a flood alleviation scheme is scheduled for completion in 2012 so the mechanics of the watercourse will need to be re-assessed including its use as a possible outfall for surface water.

A4103 Roman Road to A49

7.3.19 The corridor turns north-east rising in level and crossing the A4110 Canon Pyon Road at a level of 90m AOD then continuing up to the A49 to a level of 100m AOD. This section is generally agricultural but with small areas of woodland with paths and walking trails.

A49 to A4103 at Ayelstone Hill

7.3.20 The corridor continues from the A49 at Highway Cottage running south east across Coldwells Road and Munstone Road tying in to the A4103 at the Roundabout at Alyestone Hill. Ground Levels fall from the A49 at approximately 100m AOD to the A4103 Roundabout at 50m AOD. The route follows predominantly agricultural land but does cause some severance of properties in the Holmer Area. The route crosses the railway cutting just before the junction with the A4103.

7.3.21 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage

(SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

Table 7.10: W3 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A49 to Railway	71 – 83	1500	Agricultural	Predominantly Raglan Mudstone.	66KV Overhead at Railway Crossing.
Railway to A465	83 – 83	1370	Predominantly agricultural with some woodland	Raglan Mudstone	Welsh Water Trunk Main North of Railway. 66KV Overhead at Railway Crossing.
A465 to River	83 – 103 – 53	2340	Predominantly agricultural with some residential, some woodland a golf course and the river gorge.	Predominantly Glacial deposits and Raglan Mudstone. Alluvium at river. Lacustrine alluvium & Alluvium to south of Perry Hill. Fault line to east at river.	
River to A438	53 – 73 – 69	2030	Predominantly agricultural with some residential.	Glaciofluvial sand and gravel and Glacial Till.	
A438 to A4103	69 – 69	900	Commercial Planting Nursery	Glacial deposits, undifferentiated; includes morainic sandy tills, gravels and clays	
A4103 to A49	69 – 90 – 100	3590	Predominantly agricultural with some residential and some woodland	Predominantly Glacial deposits and Raglan Mudstone.	Welsh Water Trunk Main West of A49 and on A4110.
A49 to A4103	100 – 50	2550	Predominantly agricultural with some residential.	Raglan Mudstone.	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Railway Crossing.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.3.22 Environmental Assessment

7.3.23 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix B. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.3.24 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed corridor, including schools, monuments and designated sites. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings and existing road noise but are included in the quantitative assessment

Local Air Quality

7.3.25 Increase in level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA will reduced the number of receptors exposed to exceedances of the National Objective for NO2

Greenhouse Gases

7.3.26 An increase in CO_2 emissions is expected as extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted largely dependent on corridor length. W3 is the second longest of the western corridors.

Landscape

7.3.27 Main adverse effects around River Wye, though effects at lower level than for W1/2. Route refinements, especially around Belmont Abbey and the River Wye, should be explored to minimise impacts.

Townscape

7.3.28 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.3.29 W3 would have an indirect impact on the 16th century Clehonger Court and estate area as the corridor passes just to the north east of this area, as well as the Scheduled Ancient Monument at Breinton of a moated enclosure; directly impacted sites would include remnants of the Shrewsbury to Hereford Railway, positioned to the northeast of Hereford near Holmer. No affect is envisaged upon the SAM site of the medieval bridge in Stretton Sugwas or upon the church at Bullinghope.

Biodiversity

7.3.30 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC), that may have a particular bearing on alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.3.31 Option W3 requires crossing the River Wye, Yazor Brook and Newton Brook, and potentially other un-named drainage ditches and water courses. This corridor crosses some 1km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and Yazor Brook catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.3.32 The western corridors are not considered to represent desirable connectivity to amenity and employment areas and are not expected to contribute to a significant increase in active mode transport compared to the existing routes likely to be utilised

by walk/cyclists. The interventions also dissect many rural rights of way likely to be of high recreational value. As such adoption of the western interventions may result in a decrease in recreational usage. However, the scheme could result in an improvement to air quality within the city centre AQMA thus leading to improved levels of health.

Journey Ambience

7.3.33 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the scheme is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, view from the road is expected to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.3.34 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.3.35 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the corridor will be encouraged during construction in order to avoid sterilisation of the mineral deposit. W3 is likely to be the 2nd least sustainable of the western route options to construct as it has the second longest length and therefore should require the 2nd most materials and energy in construction of the western options.

Flood Risk

7.3.36 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.3.37 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.3.38 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion

and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.3.39 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.3.40 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.3.41 No Local Geological Sites will be affected by the proposed corridor.

7.3.42 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.3.43 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.3.44 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.3.45 Traffic and Economic Assessment

7.3.46 See section 7.1.3 for an assessment of the traffic model performance which was carried out for the various employment and housing development options. At this stage a single western option has been modelled which is summarised for the Route W1 section only.

7.3.47 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.11 are based on unit

figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.11: Western Corridor Option W3

	Scheme Costs (£k)	**Comments**
Roadworks – Links	23,406	Link Length 14.1km at £1.66m per km
Roadworks – Junctions	3,480	6 No. at £580K per junction
Structures	2,500 2,500 4,500 3,500 1,300	2 No Type A at £250k Each 0 No Type B at £250k Each 12 No Type C at £375k Each 1 No Type D at £3,500k Each 13 No Type E at £100k Each
Preliminaries	10,297	25% of Works Cost
Works Cost Sub Total	**51,483**	**Excluding VAT**
Service Diversions	5,148	10% of Works Cost
Land Acquisition	14,100	Link Length 14.1km at £1k per km
Part1 Claims	1,450	290 houses within 300m at £5k each
Preparation / Supervision	5,148	10% of Works Cost
Sub Total	**77,329**	Excluding VAT
Inflation	23,080	3%
Optimism Bias and Risk	45,184	45% of scheme Cost sub total
Estimated Outturn Cost	**145,593**	Excluding VAT
Present Value Cost (2002)	**96,722**	Excluding VAT

7.3.48 Appraisal Summary Tables (AST)

7.3.49 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.12 gives the final score for the Western Corridor Option W3 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

- - -	Large Adverse
- -	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.12: Western Corridor Option W3

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- -
	Local Air Quality	++
	Greenhouse Gases	- -
	Landscape	- -
	Townscape	++
	Heritage of Historic Resources	-
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	- -
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	96,722
	Estimated Outturn	145,593
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

7.4 WESTERN CORRIDOR OPTION W4

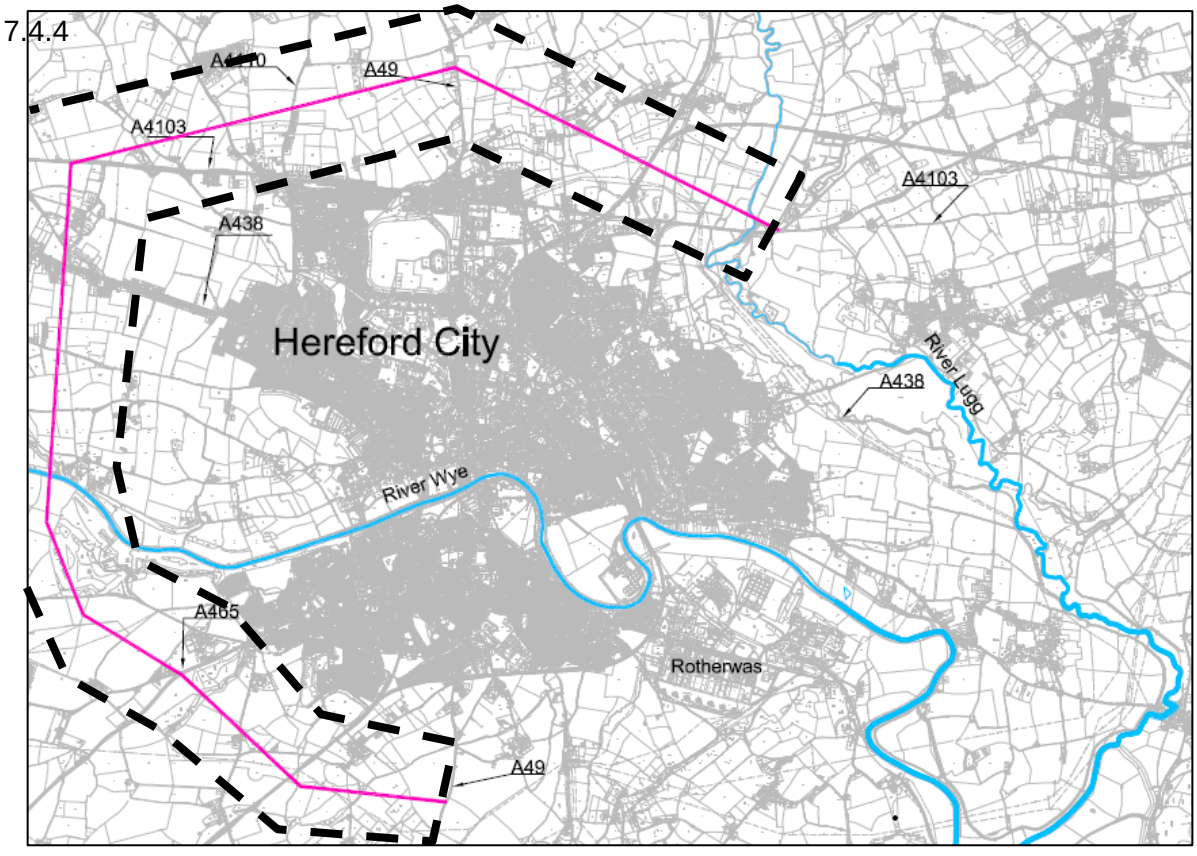
7.4.1 Route Description

7.4.2 This corridor commences at the A49 south of Hereford at the new roundabout for the Rotherwas Access Road (B4399), see figure 7.4. It proceeds in a westerly direction for approximately 1400m, before continuing northwest just prior to crossing the Hereford to Newport railway line, then intersecting Grafton Lane and the A465 Belmont Road within close proximity to its junction with the B4349. It continues in a north westerly direction towards Belmont Golf Club where it crosses the golf course and proceeds north intersecting the River Wye.

7.4.3 After crossing the Wye it continues north intersecting Upper Breinton Road, A438 King's Acre Road and A4103 Roman Road. At the intersection with A4103 Roman Road the proposed corridor turns and proceeds in a north easterly direction crossing Towtree Road, Tillington Road and A4110 Canon Pyon Road. The proposed corridor ties in with the A49 Holmer Road north of Hereford in close proximity to Highway Cottage, approximately 1200m north of its junction with A4103 Roman Road. From this point the corridor runs in a south easterly direction on the north side of W3, crossing Munstone Road, the railway line, the Lugg Meadows and River Lugg and terminates at the A4103 Aylestone Hill / A465 junction within close proximity to Lugg Bridge Farm.

Figure 7.4: Option W4

7.4.4



7.4.5 The total length of this corridor is approximately 14.9km.

7.4.6 Engineering Assessment

7.4.7 The following engineering assessment is split into sections for clarity and summarised in Table 7.13. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A49 to Railway Line

7.4.8 The ground level along the corridor falls gradually from the A49 at a level of 71m AOD to 66m AOD at Grafton Lane. The corridor crosses the railway at a section roughly at grade at 68m AOD where an overbridge may be required.

7.4.9 The topography lends itself to an outfall in the vicinity of the A49 but attenuation will be important due to the significant flood risk downstream in Lower Bullingham.

Railway Line to A465

7.4.10 The ground rises to 103m AOD at Merry Hill Farm then falls to 83m AOD in the vicinity of the B4349/A465 where the corridor alignment passes between the residential properties and playing fields. Just south of the A465 the corridor passes through the narrowest section of mature woodland.

7.4.11 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality is carefully managed.

A465 to River Wye

7.4.12 Ground levels rise again to 103m AOD at Perry Hill before continuing a short distance north to the River Wye gorge with a bank level of around 53m AOD. The alignment crosses the Belmont Golf Course, agricultural land and riverside woodland. The alignment poses significant vertical design challenges with such rapid changes of level necessitating deep cuttings and high, long bridges.

7.4.13 A likely crest in the vertical alignment will necessitate a discharge of surface water into the River Wye via an existing stream and Newtown Brook. Storage to prevent any flood risk to the residential Belmont area will be required.

7.4.14 Any structures within the River Wye floodplain will be subject to a full Flood Risk Assessment.

River Wye to A438 Kings Acre Road

7.4.15 North of the river the ground rises again to 83m AOD at the intersection with Green Lane then falls to 69m AOD at the A438 Kings Acre Road. Several areas of Woodland and orchard are located in the vicinity of Breinton and Residential properties line the South side of the A438.

A438 Kings Acre Road to A4103 Roman Road

7.4.16 The corridor cuts through the commercial planting nursery causing major business disruption between the A438 and A4103. The ground levels are relatively flat as the corridor crosses Yazor Brook at around 61m AOD which will require culverting.

7.4.17 The Yazor brook is currently subject to flooding and the cause of significant flood damage within the City Centre. However, a flood alleviation scheme is scheduled for completion in 2012 so the mechanics of the watercourse will need to be re-assessed including its use as a possible outfall for surface water.

A4103 Roman Road to A49

7.4.18 The corridor turns northeast rising in level and crossing the A4110 Canon Pyon Road at a level of 90m AOD then continuing up to the A49 to a level of 100m AOD. This section is generally agricultural but with small areas of woodland with paths and walking trails.

A49 to A4103 at Ayelstone Hill

7.4.19 The corridor runs east from the A49 at Highway Cottage falling to around 79m AOD at Coldswell Road. The corridor follows predominantly agricultural land with small streams along field boundaries. The corridor crosses the railway cutting just before crossing Sutton St Nicholas Road. An additional crossing of the River Lugg would be required to tie into the existing junction of the A4103/A465.

Table 7.13: W4 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A49 to Railway	71 – 83	1500	Agricultural	Predominantly Raglan Mudstone.	66KV Overhead at Railway Crossing.
Railway to A465	83 – 83	1370	Predominantly agricultural with some woodland	Raglan Mudstone	Welsh Water Trunk Main North of Railway. 66KV Overhead at Railway Crossing.
A465 to River	83 – 103 – 53	2340	Predominantly agricultural with some residential, some woodland a golf course and the river gorge.	Predominantly Glacial deposits and Raglan Mudstone. Alluvium at river. Lacustrine alluvium & Alluvium to south of Perry Hill. Fault line to east at river.	
River to A438	53 – 73 – 69	2030	Predominantly agricultural with some residential.	Glaciofluvial sand and gravel and Glacial Till.	
A438 to A4103	69 – 69	900	Commercial Planting Nursery	Glacial deposits, undifferentiated; includes morainic sandy tills, gravels and clays	
A4103 to A49	69 – 90 – 100	3590	Predominantly agricultural with some residential and some woodland	Predominantly Glacial deposits and Raglan Mudstone.	Welsh Water Trunk Main West of A49 and on A4110.
A49 to A4103	100 – 56	3300	Predominantly agricultural with some residential. Crossing River Lugg floodplain.	Predominantly Raglan Mudstone. Crossing fault line at Munstone. Alluvium by River Lugg	Welsh Water trunk main East of A49. High pressure gas main east of railway. Close to but not crossing 66KV Overhead at Railway Crossing.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.4.20 Environmental Assessment

7.4.21 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix B. This summary is split into firstly the DfT National Environmental Objective areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.4.22 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed corridor, including schools, monuments and designated sites. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings and existing road noise but are included in the quantitative assessment

Local Air Quality

7.4.23 Increase in level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA will reduce the number of receptors exposed to exceedances of the National Objective for NO2

Greenhouse Gases

7.4.24 An increase in CO_2 emissions is expected as the extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted largely dependent on route length. W4 is the longest of the western routes.

Landscape

7.4.25 Main adverse effects around River Wye, though effects are at a lower level than for W1/2. Alignment refinements, especially around Belmont Abbey and the River Wye, should be explored to minimise impacts.

Townscape

7.4.26 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.4.27 W4 follows a very similar alignment to W3 for the most part and would have additional impacts on undated landscape features such as areas of ridge and furrow near Holmer. Directly impacted sites would include remnants of the Shrewsbury to Hereford Railway, positioned to the northeast of Hereford near Holmer. No affect is envisaged upon the SAM site of the medieval bridge in Stretton Sugwas or St Peter's church at Bullingham.

Biodiversity

7.4.28 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. This option currently also includes a new crossing over the River Lugg north-east of Hereford, which forms part of the River Lugg SAC and is also designated as a SSSI in its own right. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.4.29 Option W4 requires crossing the River Wye, Yazor Brook, Newton Brook, River Lugg and Little Lugg and potentially other un-named drainage ditches and water courses. This corridor crosses some 2km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and Yazor Brook catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.4.30 The western corridors are not considered to represent desirable connectivity to amenity and employment areas and are not expected to contribute to a significant increase in active mode transport compared to the existing routes likely to be utilised by walk/cyclists. The interventions also dissect many rural rights of way likely to be of high recreational value. As such adoption of the western interventions may result in a decrease in recreational usage. However, the scheme could result in an improvement to air quality within the city centre AQMA thus leading to improved levels of health.

Journey Ambience

7.4.31 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the corridor is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.4.32 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.4.33 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the route will be encouraged during construction in order to avoid sterilisation of the mineral deposit.

Flood Risk

7.4.34 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.4.35 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.4.36 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.4.37 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.4.38 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.4.39 No Local Geological Sites will be affected by the proposed corridor.

7.4.40 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.4.41 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.4.42 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.4.43 Traffic and Economic Assessment

7.4.44 See section 7.1.3 for an assessment of the traffic model performance which was carried out for the various employment and housing development options. At this stage a single western option has been modelled which is summarised for the Route W1 section only.

7.4.45 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.14 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.14: Western Corridor Option W4

	Scheme Costs (£k)	**Comments**
Roadworks – Links	24,734	Link Length 14.9km at £1.66m per km
Roadworks – Junctions	3,480	6 No. at £580K per junction
Structures	2,500	1 No Type A at £250k Each
	2,500	1 No Type B at £250k Each
	4,500	12 No Type C at £375k Each
	7,000	2 No Type D at £3,500k Each
	2,300	23 No Type E at £100k Each
Preliminaries	11,754	25% of Works Cost
Works Cost Sub Total	**58,768**	**Excluding VAT**
Service Diversions	5,877	10% of Works Cost
Land Acquisition	14,900	Link Length 14.9km at £1k per km
Part1 Claims	1,440	288 houses within 300m at £5k each
Preparation / Supervision	5,877	10% of Works Cost
Sub Total	**86,861**	Excluding VAT
Inflation	25,738	3%
Optimism Bias and Risk	50,669	45% of scheme Cost sub total
Estimated Outturn Cost	**163,268**	Excluding VAT
Present Value Cost (2002)	**108,644**	Excluding VAT

7.4.46 Appraisal Summary Tables (AST)

7.4.47 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.15 gives the final score for the Western Corridor Option W4 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.15: Western Corridor Option W4

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- -
	Local Air Quality	++
	Greenhouse Gases	- -
	Landscape	- -
	Townscape	++
	Heritage of Historic Resources	-
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	- -
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	108,644
	Estimated Outturn Cost	163,268
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

7.5 EASTERN CORRIDOR OPTION E1

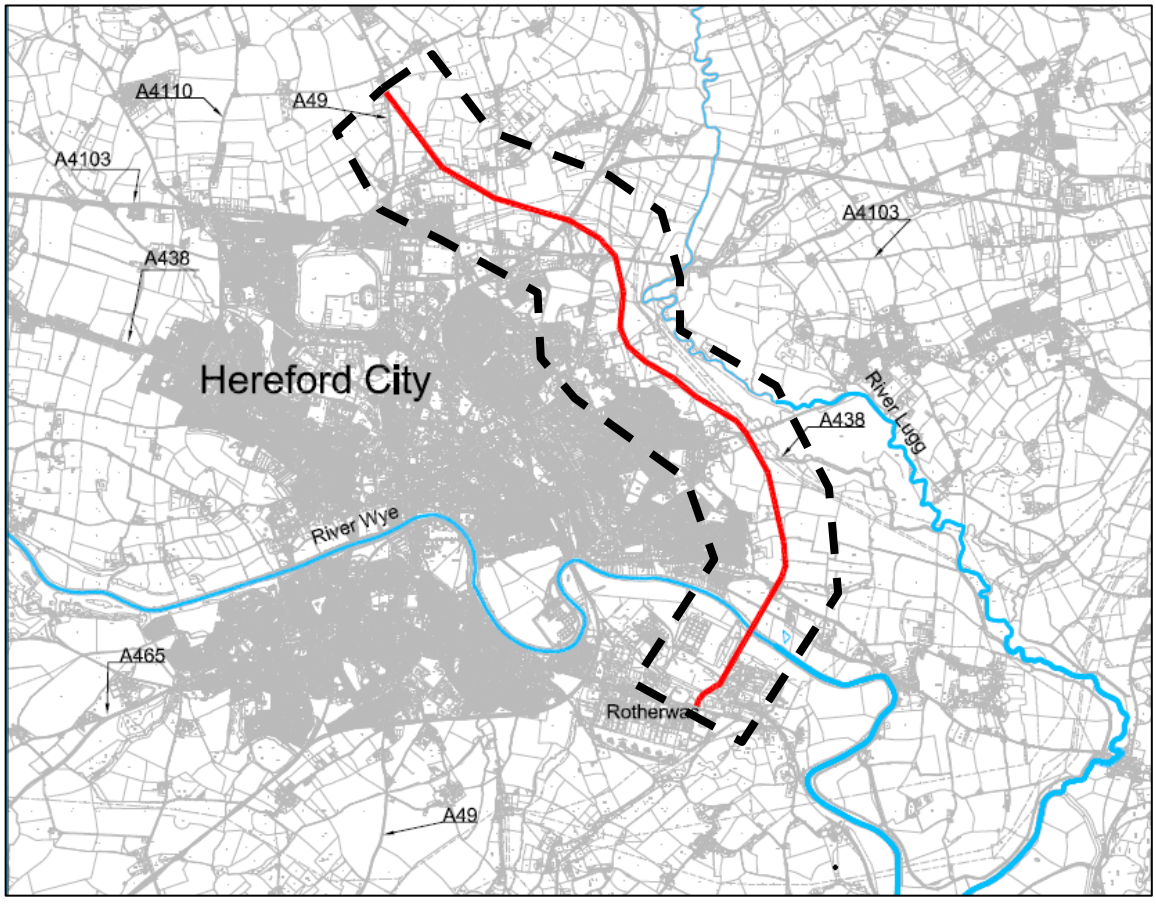
7.5.1 Route Description

7.5.2 This corridor commences at the newly constructed (2007) Rotherwas Access Road roundabout junction with the B4399 Straight Mile in Rotherwas Industrial Estate, see figure 7.5. The corridor proceeds in a north-east direction along Chapel Road where it goes offline. The corridor crosses the River Wye and the B4224 Hampton Park Road and continues northwards intersecting the A438 Ledbury Road and generally running adjacent to the Lugg Meadows, straddling the toe of a large embankment on the outskirts of Hereford's urbanised Aylestone Hill.

7.5.3 The corridor then crosses the A465 Aylestone Hill on the near east side of the roundabout junction with the A4103. It continues in a general north-west direction crossing the Hereford to Shrewsbury railway line and intersecting Munstone Road and Coldwells Road before tying in with the A49 Holmer Road close to Highway Cottage, approximately 1200m north of its junction with A4103 Roman Road.

7.5.4 The total length of this corridor is approximately 7.5km.

Figure 7.5: Option E1



7.5.5 Engineering Assessment

7.5.6 The following engineering assessment is split into sections for clarity and summarised in Table 7.1.4 Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

Rotherwas to River Wye

7.5.7 The roundabout on the Rotherwas Industrial Estate is at approximately 50m AOD, just above the maximum flood level. As the corridor travels north the alignment will need to be on embankment incorporating flood relief culverts, or on structure, rising to cross the river and maintain headroom to flood waters.

7.5.8 As the land is subject to significant flood risk minimising impact upon the flood plain and river conveyance will need to be proven including significant mitigation works. Consultation and approval of any Flood Risk Assessment will be required from the Environment Agency.

River Wye to A438 Ledbury Road

7.5.9 From the river the corridor crosses Hampton Park Road at 50m AOD through orchards and agricultural land to the A438 Ledbury Road, also at 50m AOD.

7.5.10 Higher ground lies to the west in a residential area of the city and the flood plain to the east. Most of the corridor lies outside the functional floodplain although mitigation works are likely as a result of the impact of any embankments. Streams from the higher ground to the west need to be accommodated with culverts.

A438 Ledbury Road to A4103 at Aylestone Hill

7.5.11 The corridor passes through Baynton Wood Nature reserve and agricultural land at a relatively consistent level of between 50m and 51m AOD.

7.5.12 Higher ground lies to the West in a residential area of the city and the flood plain to the east. Most of the corridor lies within land subject to shallow flooding and so significant mitigation works are required as a result of the impact of any embankments on flood storage. Streams from the higher ground to the west need to be accommodated with culverts.

A4103 at Aylestone Hill to A49

7.5.13 The corridor crosses the railway cutting just after the junction with the A4103. Ground Levels rise from the A4103 roundabout at approximately 51m AOD to the A49 at 100m AOD. The corridor follows predominantly agricultural land but does

cause some severance of properties in the Holmer Area. The corridor continues to the A49 running northwest across Munstone Road and Coldwells Road.

7.5.14 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage (SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

Table 7.16: E1 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
Rotherwas to River	50 – 50	1000	Agricultural with some residential.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	
River to A438	50 – 50	1840	Orchards and Agricultural.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	Close to 66KV Overhead at A438
A438 to A4103	50 – 51	2100	Agricultural, woodland and nature reserve.	Raglan Mudstone with glaciofluvial sand and gravel towards A4103.	
A4103 to A49	51 - 100	2030	Predominantly agricultural with some residential.	Alluvium along River Lugg. Raglan Mudstone at Munstone.	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Railway Crossing.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.5.15 Environmental Assessment

7.5.16 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix B. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.5.17 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed route. The quiet suburban and rural nature of the route means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings but are included in the quantitative assessment. Royal National College for the Blind, Ayelstone School, Herefordshire College of Technology, Broadlands School, Bishop of Hereford's Blue Coat School and St Pauls Primary School are within 600 m.

Local Air Quality

7.5.18 Increase in the level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA and reduce the number of receptors exposed to exceedances of the National Objective for NO2. E1 has concerns over nitrogen deposition at the Lugg Meadows SSSI and has a particularly sensitive receptor, Broadlands Primary School is 200 m from the proposed corridor but no impact is expected at the school.

Greenhouse Gases

7.5.19 An increase in CO2 emissions is expected as the extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO2 emitted is largely dependent on route length.

7.5.20 E1 is the shortest corridor length and therefore has the least emissions.

Landscape

7.5.21 The main adverse effects are at Lugg Meadows and around River Wye, and also at Rotherwas. Corridor refinements, especially around Lugg Meadows and the River

Wye, and also for Rotherwas Chapel, should be explored to minimise impacts. This is the shortest of the eastern route options.

Townscape

7.5.22 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.5.23 Direct impact from E1 would occur on the site of the Rotherwas Estate, which is a Scheduled Ancient Monument and also directly affect the area of Lugg Meadows and areas of ridge and furrow near Hampton Bishop. Indirectly the ring ditch and enclosures at Tupsley. Hampton Bishop another SAM, could be affected along with the areas of Holmer and Shelwick by an increase in noise levels or by sight.

Biodiversity

7.5.24 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. This option would also run adjacent to the Lugg Meadows SSSI and SWS for over 1km. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC), that may have a particular bearing on route alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.5.25 Option E1 requires crossing the River Wye and tributary of the River Lugg, Lugg Meadows SSSI and potentially other un-named drainage ditches and water courses. This corridor crosses some 3.8km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and River Lugg catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in or bordering the flood plain and other permanent structures such as bridges and

culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.5.26 The route skirts the eastern periphery of Hereford and has been identified to result in severance of various public rights of way. However, it is considered that the design of the corridor could utilise these severances of mostly semi-rural and urban rights of way and in conjunction with a new eastern river crossing, significantly contribute to a modal shift by creating active mode journey desirability for journeys between residential districts in the east and north of Hereford and employment areas south of the River Wye at Rotherwas. The new corridor may also contribute to an increase in connectivity to existing rights of way and improved access to the countryside. In addition the intervention could result in an improvement to existing air quality levels within the city centre AQMA.

Journey Ambience

7.5.27 The corridor is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.5.28 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.5.29 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the corridor will be encouraged during construction in order to avoid sterilisation of the mineral deposit. E1 is likely to be the most sustainable option to construct as it has the shortest length and therefore should require the least materials and energy in construction.

Flood Risk

7.5.30 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.5.31 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.5.32 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.5.33 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.5.34 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.5.35 No Local Geological Sites will be affected by the proposed route though the geomorphologic features of the Lugg valley which form part of the SSSI will be affected by this corridor.

7.5.36 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.5.37 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.5.38 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.5.39 Traffic and Economic Assessment

7.5.40 For more detail and background to the methodology see the Stage 1 Traffic and Economic Report, and Multi Modal Study 2009 in Appendix C. This summary is split into firstly the traffic scenario modelling and then the economic assessment.

Model Performance

7.5.41 The latest multi-modal highway models have assessed different housing and employment allocation location scenarios (DS1 – 4) with provision of a Relief Road to the East. The comparison has been based on network conditions using such measures as average speed, delays and queues in the network for a future year of 2026.

7.5.42 The models included the implications of urban expansion for highway usage, public transport usage, and cycling and walking usage. TEMPRO was used to establish growth factors, and a DIADEM model choice component allowed for a prediction in modal shift.

7.5.43 A summary of modal split following expansion within and around Hereford is shown in table 7.17

Table 7.17 Modal Split on network with an Eastern Relief Road

Mode	Period	Demand Scenario Average		Period	Demand Scenario Average	
		Number	%'age		Number	%'age
Car	AM Peak	27,255	71%	PM Peak	28,292	69%
PT		2,989	8%		2,184	5%
Cycle		1,178	3%		1,148	3%
Walk		6,823	18%		9,380	23%
Total		38,245			41,003	

7.5.44 Table 7.17 identifies that network usage is taken up primarily by car, then walking, public transport and finally cycling. The car has a network usage share of 71% in the AM peak and 69% in the PM peak. After this walking is the most popular with a share of 18% in the AM peak and 23% in the PM peak.

7.5.45 It is assumed that the building of a relief road is dependent on a decision for urban expansion. The model did not provide a full scale assessment of the Hereford Relief Road options but assessed the whole transport network on the affects of a nominal route around the Western or Eastern side of Hereford.

7.5.46 The Public Transport, Cycle and Walking Models were updated in the Hereford Multi-modal Model by adding the Edgar Street Grid highway works, access to the housing estate at Whitecross and new relief roads; no other changes were made including any changes to public transport services.

Network Performance

7.5.47 The comparisons of network performance for the AM and PM future year models with an Eastern Relief Road (With) compared to scenarios without a relief road (Without) are shown in Table 7.18. The results for each Scenario have been averaged to show a comparison of network performance with a relief road in each peak traffic period and network performance following housing construction without an eastern relief road.

Table 7.18 Summary of Highway Network Performance with an Eastern Relief Road

Indicators	AM Peak		PM Peak	
	With	W/O	With	W/O
Total Time / hrs	2,599	2,993	2,882	3,228
Transient Queues / hrs	845	1,184	988	1,243
Over-Capacity Queues / hrs	12	137	89	297
Link Delays / hrs	111	71	118	70
Total Distance / km	92,151	81,332	95,656	82,803
Total Trips Loaded / pcu	21,815	21,663	22,468	22,287
Average Speed / kph	35	27	33	26

7.5.48 The four housing and employment scenarios with an eastern Relief Road return similar statistics and so an average has been calculated in table 7.18 for the four growth options in each scenario. The four scenarios are averaged with an Eastern Relief Road (With) showing a significant improvement on the averaged scenarios without a Western Relief Road (W/O). In the Multi Modal Study 2009 an Eastern Relief Road is identified to marginally best suit demand scenario DS3 (north / south housing focus).

7.5.49 As expected total distance travelled on the network increases with the eastern Relief Road with total time (hours) on the network reduced, there are also less transient

queues, and less over-capacity queues, with average speed (kph) on the network increased. The scenario with an eastern Relief Road (With) therefore shows a significant improvement on the scenario without an eastern Relief Road (W/O). An important factor for economic success is that travel time is more reliable.

Economics

7.5.50 Currently no economic assessment of the scheme option using the current multi-modal model has been undertaken in accordance with current guidance using the TUBA (Transport User Benefit Appraisal) software program. As the work undertaken so far has been only to assess the broadly defined transport and development strategies identified for Hereford a full economic assessment for all the various scenarios was not deemed necessary.

7.5.51 The determination of the preferred development option with Relief Road alignment was undertaken by calculating the generalised cost of travel in each highway network. The total cost of travel was calculated by taking into account the time spent travelling (summed over all modelled vehicles) and the distance travelled (again summed over all vehicles).). In effect the travel cost is a combination of time and distance. This means that the option which produces the lowest overall travel time is not necessarily the option that produces the lowest overall cost of travel. The results for the Eastern Relief Road are shown in table 7.19

Table 7.19 Generalised Total Cost of Travel / Hours of Generalised Time Eastern Relief Road

Period	Cost of Travel With an Eastern Relief Road (£'s)	Cost of Travel Without Relief Road (£'s)
AM	16,527	17,947
PM	17,580	19,309
Total	34,108	37,256

7.5.52 Generalised costs are a measure of accessibility through providing a calculation for ease of approach between locations. In this instance it is measured in terms of the distance travelled, and the time taken. In the Multi-modal Study DS 3 (North / South focus) provides the lowest overall travel cost with an Eastern Relief Road in place. However the differences between the four development options are again not significant, being just over 1% between the highest and lowest. In table 7.19 the four scenarios are averaged with an Eastern Relief Road (With) showing a significant improvement on the averaged scenarios without an Eastern Relief Road (Without). This means that though distances travelled are greater, delay is reduced.

7.5.53 The 2001 Hereford Outer Relief Road Business Case identified that one of the main concerns for local businesses is congestion and the corresponding economic fragility of the economy in Hereford. An Outer Relief Road would directly reduce transport costs of all manufacturing and distribution firms serving national and international markets and therefore contribute to a stronger local economy.

Scheme Costs

7.5.54 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.20 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.20: Eastern Corridor Option E1

	Scheme Costs (£k)	**Comments**
Roadworks – Links	12,450	Link Length 7.5km at £1.66m per km
Roadworks – Junctions	2,320	4 No. at £580K per junction
Structures	2,500	1 No Type A at £250k Each
	0	0 No Type B at £250k Each
	1,500	4 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	4,000	40 No Type E at £100k Each
Preliminaries	6,568	25% of Works Cost
Works Cost Sub Total	**32,838**	**Excluding VAT**
Service Diversions	3,284	10% of Works Cost
Land Acquisition	7,500	Link Length 7.5km at £1k per km
Part1 Claims	2,315	463 houses within 300m at £5k each
Preparation / Supervision	3,284	10% of Works Cost
Sub Total	**49,220**	Excluding VAT
Inflation	16,190	3%
Optimism Bias and Risk	29,435	45% of scheme Cost sub total
Estimated Outturn Cost	**94,846**	Excluding VAT
Present Value Cost (2002)	**61,535**	Excluding VAT

7.5.55 Appraisal Summary Tables (AST)

7.5.56 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.21 gives the final score for the Western Corridor Option E1 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.21: Eastern Corridor Option E1

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	-
	Landscape	- - -
	Townscape	++
	Heritage of Historic Resources	- -
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	++
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	61,535
	Estimated Outturn Cost	94,846
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

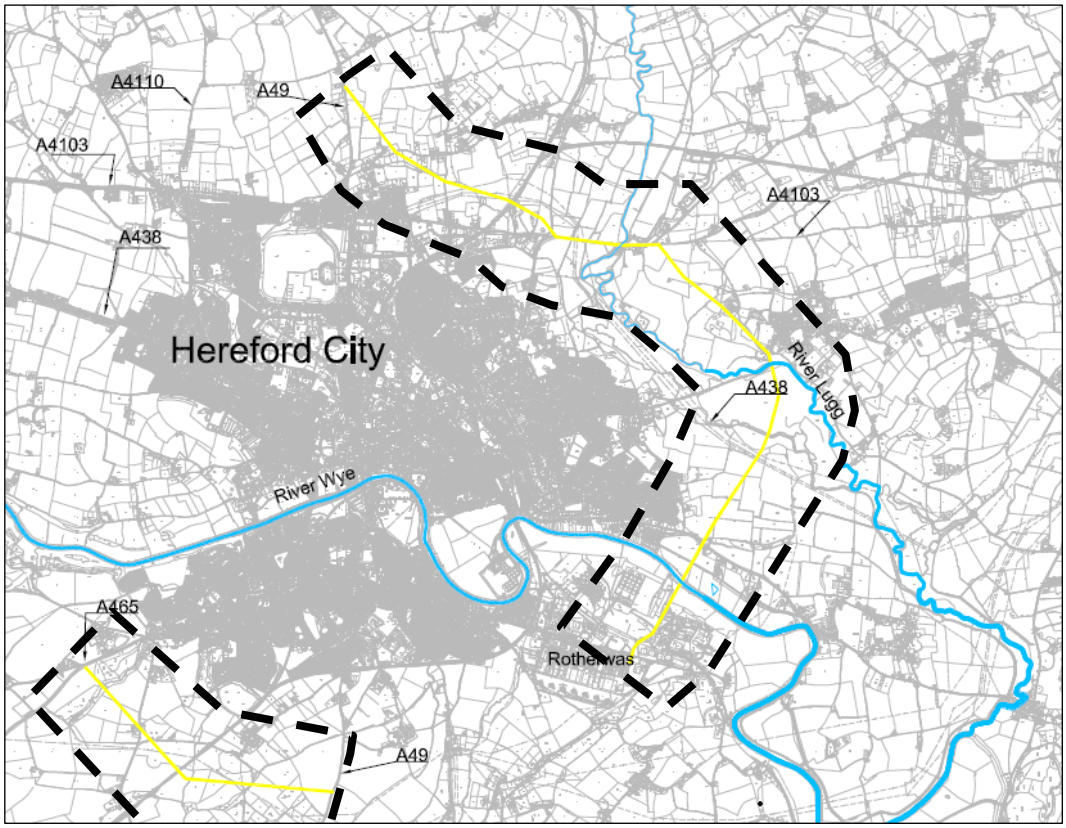
7.6 EASTERN CORRIDOR OPTION E2

7.6.1 Route Description

7.6.2 This corridor begins at the A465 Belmont Road and B4349 junction on the south-west outskirts of Hereford and proceeds in a south easterly direction to Merry Hill, crossing the Hereford to Newport railway line and continuing eastwards, traversing Grafton Lane and connecting to the A49 Ross Road, tying in with the roundabout on the B4399 Rotherwas Access Road, (see figure 7.6). The E2 corridor proposes to adopt this new access road and recommence at the industrial estate and along Chapel Road. Beyond this road the corridor continues offline in a north-easterly direction crossing the River Wye, the B4224 Hampton Park Road and the Lugg Meadows. The corridor intersects the A438 Ledbury Road within the vicinity of Lugwardine Bridge before continuing north-westwards and connecting with the A4103 at the A465 junction.

7.6.3 The route proposes to adopt approximately 1000m of the A4103 up to the Aylestone Hill roundabout. It then proceeds to move offline in a north-west direction crossing the Hereford to Shrewsbury railway line and intersecting Munstone Road and Coldwells Road before terminating along the A49 north of Hereford at Highway Cottage, approximately 1200m north of its junction with A4103 Roman Road.

Figure 7.6: Option E2



7.6.4 The total length of this route corridor is approximately 11.2km (excluding the existing road sections).

7.6.5 Engineering Assessment

7.6.6 The following engineering assessment is split into sections for clarity and summarised in Table 7.22. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A465 to Railway Line

7.6.7 The ground rises from 83m at the A465 in the vicinity of the junction with the B4349 to 103m AOD at Merry Hill Farm before falling to 83m at the railway crossing. Just south of the A465 the corridor passes through the narrowest section of mature woodland.

7.6.8 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality are carefully managed.

Railway Line to A49

7.6.9 The ground levels along the corridor fall from the railway line level of 83m AOD to 66m AOD at Grafton Lane. The corridor then rises gradually across agricultural land to the A49 at 71m.

7.6.10 The topography lends itself to an outfall in the vicinity of the A49 but attenuation will be important due to the significant flood risk downstream in Lower Bullingham.

Rotherwas to River Wye

7.6.11 The roundabout on the Rotherwas Industrial Estate is at approximately 50m AOD, just above the maximum flood level. As the corridor travels north the alignment will need to be on embankment incorporating flood relief culverts, or on structure, rising to cross the river and maintain headroom to flood waters.

7.6.12 As the land is subject to significant flood risk minimising impact upon the flood plain and river conveyance will need to be proven including significant mitigation works. Consultation and approval of any Flood Risk Assessment will be required from the Environment Agency.

River Wye to A438 Ledbury Road

7.6.13 From the river the corridor crosses Hampton Park Road at 50m AOD through orchards and agricultural land to the A438 Ledbury Road at 51m AOD in the vicinity of Lugwardine Bridge where it crosses the river.

7.6.14 Significant structure (regular pier structures or viaduct) will be required to minimise impact on the River Wye floodplain and measures required to maintain the existing and any new flood defences. Extensive river modelling to inform a Flood Risk Assessment will be required to the satisfaction of the Environment Agency. The designation and sensitivity of the Meadows needs to be considered in any proposals for earthworks or structures.

A438 Ledbury Road to A4103

7.6.15 The corridor traverses the east edge of the Lugg Meadows before meeting the A4103 at its junction with the A465 at a level of around 55m AOD. The corridor follows the existing A4103 to the roundabout at Aylestone Hill.

7.6.16 The existing A4103 provides a platform for re-crossing the River Lugg reducing the impact of the corridor. However, some improvement works are likely to be necessary to upgrade this existing length.

A4103 at Aylestone Hill to A49

7.6.17 The corridor crosses the railway cutting just after the junction with the A4103. Ground Levels rise from the A4103 roundabout at approximately 51m AOD to the A49 at 100m AOD. The corridor crosses predominantly agricultural land but does cause some severance of properties in the Holmer Area. The corridor continues to the A49 running northwest across Munstone Road and Coldwells Road.

7.6.18 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage (SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

Table 7.22: E2 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A465 to Railway	83 – 103 – 83	1360	Predominantly agricultural with some woodland	Predominantly Raglan Mudstone. Sandstone at Merry Hill farm.	Welsh Water Trunk Main North of Railway. 66KV Overhead at Railway Crossing.
Railway to A49	83 – 71	1500	Agricultural	Raglan Mudstone	66KV Overhead at Railway Crossing.
Rotherwas to River	50 – 50	1000	Agricultural with some residential.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	
River to A438	50 – 51	1840	Orchards, Agricultural and floodplain.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	High Pressure Gas Main. 3 No. 66KV Overhead cables.
A438 to A4103	51 – 55	2100	Agricultural and floodplain	Predominantly Raglan Mudstone. 2nd Terrace deposits of River Lugg and Proto-Wye; sand & gravel close to A4103.	High Pressure Gas Main3 No. 66KV Overhead cables over existing A4103.
A4103 to A49	55 - 100	2030	Predominantly agricultural with some residential.	Alluvium along River Lugg. Raglan Mudstone at Munstone.	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Railway Crossing.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.6.19 Environmental Assessment

7.6.20 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.6.21 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse

effects at residential properties and other noise sensitive receptors near the proposed route. The quiet suburban and rural nature of the route means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings but are included in the quantitative assessment.

Local Air Quality

7.6.22 Increase in level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA and will reduce the number of receptors exposed to exceedances of the National Objective for NO2.

Greenhouse Gases

7.6.23 An increase in CO2 emissions is expected as extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO2 emitted is largely dependent on corridor length. E2 is the second shortest of the eastern options.

Landscape

7.6.24 Main adverse effects are at Lugg Meadows and around River Wye, and also at Rotherwas. The corridor crosses the River Lugg twice, but at existing crossing points, and passes through meadows, but at a location where they are less important to the setting of Hereford. Corridor refinements, especially around Lugg Meadows and the River Wye, and also for Rotherwas Chapel, should be explored to minimise impacts.

Townscape

7.6.25 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.6.26 Direct impact from E2 would occur on the site of the Rotherwas Estate, and on the ring ditches and enclosures at Tupsley, which are Scheduled Ancient Monuments. No impact is envisaged to significantly affect the SAM's of the moated site at Hemhill, Lugwardine or the church at Bullinghope.

Biodiversity

7.6.27 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts on the environment, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. This option would also require a new crossing of the River Lugg SSSI which also forms part of the River Wye SAC. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on route alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.6.28 Option E2 requires crossing the River Wye, Little Lugg, River Lugg and its tributary twice, Lugg Meadows SSSI, Newton Brook and potentially other un-named drainage ditches and water courses. This corridor crosses some 3.6km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and River Lugg catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.6.29 Interventions E2, E3 and E4 follow a mostly identical footprint. The corridors extend further east from the outskirts of eastern Hereford than route E1 and for the most part do not create a potentially desirable route for active modes owing to an increase in distance. However, the routes all involve the creation of a vital river crossing which could create a highly desirable walk/cycling linkage between densely populated residential areas of eastern and north eastern Hereford and the Rotherwas Industrial Estate employment area. In addition, the corridors could enhance active mode transport between Lugwardine, east of Hereford, and the amenities and employment areas of the city.

7.6.30 The corridors have been identified to result in severance of various public rights of way. However, it is considered that design could ameliorate adverse impacts and may contribute to an increase in connectivity to existing rights of way and improved access to the countryside. In addition new green routes in conjunction with the carriageway design could increase the uptake of sustainable transport adoption and the scheme will result in an improvement to existing air quality levels within the city centre AQMA, thus resulting in an improvement in levels of health.

Journey Ambience

7.6.31 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the corridors is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.6.32 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the route could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create 'time-efficient', safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.6.33 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed corridor. The use of safeguarded mineral deposits, where technically and economically viable, beneath the corridor will be encouraged during construction in order to avoid sterilisation of the mineral deposit. Route E2 is likely to be the 2nd most sustainable of the eastern options to construct as it has the second shortest length and therefore should require 2nd least materials and energy in construction.

Flood Risk

7.6.34 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.6.35 The voids created by mineral workings for aggregates near the route could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.6.36 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.6.37 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.6.38 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.6.39 No Local Geological Sites will be affected by the proposed route though the geomorphologic features of the Lugg valley which form part of the SSSI will be affected by this corridor.

7.6.40 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.6.41 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.6.42 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.6.43 Traffic and Economic Assessment

7.6.44 See section 7.5.3 for an assessment of the traffic model performance which was carried out for the various employment and housing development options. At this stage a single eastern option has been modelled which is summarised for the Route E1 section only.

7.6.45 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.23 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.23: Eastern Corridor Option E2

	Scheme Costs (£k)	**Comments**
Roadworks – Links	18,592	Link Length 11.2km at £1.66m per km
Roadworks – Junctions	4,060	7 No. at £580K per junction
Structures	5,000	2 No Type A at £250k Each
	0	0 No Type B at £250k Each
	2,625	7 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	4,800	48 No Type E at £100k Each
Preliminaries	9,644	25% of Works Cost
Works Cost Sub Total	**48,221**	**Excluding VAT**
Service Diversions	4,822	10% of Works Cost
Land Acquisition	11,200	Link Length 11.2km at £1k per km
Part1 Claims	1,210	242 houses within 300m at £5k each
Preparation / Supervision	4,822	10% of Works Cost
Sub Total	**70,276**	Excluding VAT
Inflation	20,883	3%
Optimism Bias and Risk	41,021	45% of scheme Cost sub total
Estimated Outturn Cost	**132,180**	Excluding VAT
Present Value Cost (2002)	**87,899**	Excluding VAT

7.6.46 Appraisal Summary Tables (AST)

7.6.47 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.24 gives the final score for the Western Corridor Option E2 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.24: Eastern Corridor Option E2

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	-
	Landscape	- -
	Townscape	++
	Heritage of Historic Resources	- - -
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	++
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	87,899
	Estimated Outturn Cost	132,180
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

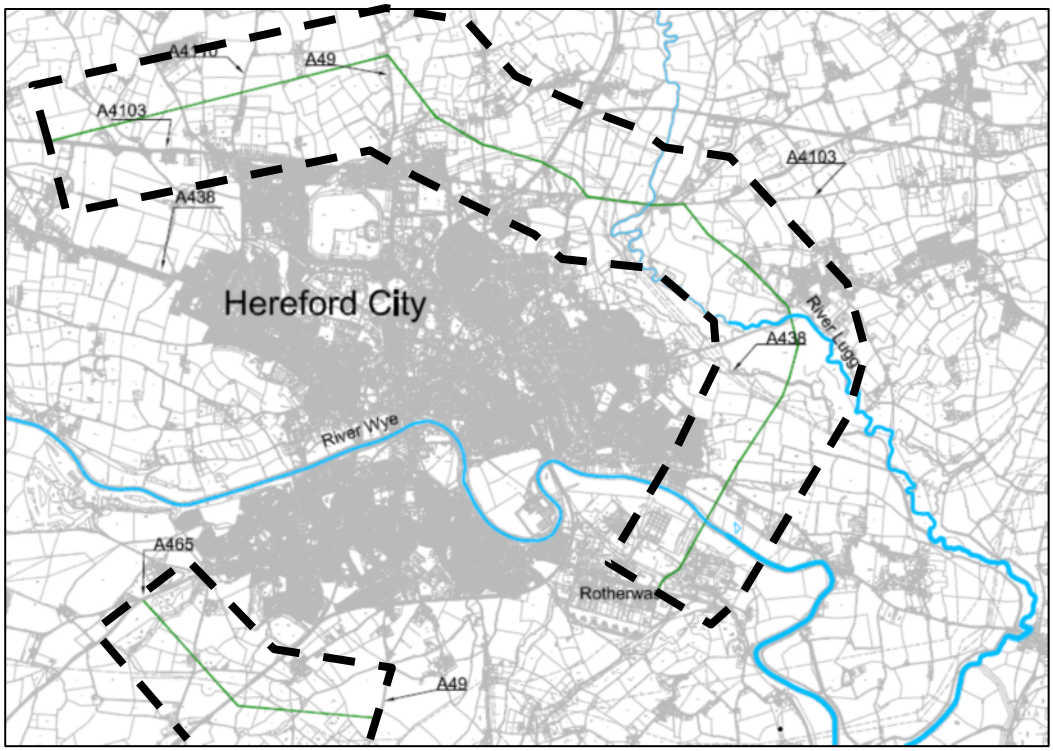
7.7 EASTERN CORRIDOR OPTION E3

7.7.1 Route Description

7.7.2 This corridor begins at the A465 Belmont Road and B4349 junction on the south-west outskirts of Hereford and proceeds in a south easterly direction to Merry Hill, crossing the Hereford to Newport railway line and continuing eastwards, traversing Grafton Lane and connecting to the A49 Ross Road, tying in with the roundabout on the B4399 Rotherwas Access Road, (see figure 7.7). The E2 corridor proposes to adopt this new access road and recommence at the industrial estate and along Chapel Road. Beyond this road the corridor continues offline in a north-easterly direction crossing the River Wye, the B4224 Hampton Park Road and the Lugg Meadows. The corridor intersects the A438 Ledbury Road within the vicinity of Lugwardine Bridge before continuing north-westwards and connecting with the A4103 Aylestone Hill and A465 junction.

7.7.3 The route proposes to adopt approximately 1000m of the A4103 up to the near east side of the A465 roundabout junction with A4103 Roman Road. It then proceeds to move offline in a north-west direction crossing the Hereford to Shrewsbury railway line and intersecting Munstone Road and Coldwells Road before terminating along the A49 north of Hereford at Highway Cottage, approximately 1200m north of its junction with Roman Road.

Figure 7.7: Option E3



7.7.4 This corridor continues to run in a south-west direction intersecting the A4110 Canon Pyon Road, the Tillington Road and Towtree Lane and crosses Yazor Brook before terminating at the A4103 Roman Road, 550m east of the A4103 and A480 junction roundabout.

7.7.5 The total length of this corridor is approximately 14.7km (excluding the existing road sections).

7.7.6 Engineering Assessment

7.7.7 The following engineering assessment is split into sections for clarity and summarised in Table 7.25. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A465 to Railway Line

7.7.8 The ground rises from 83m at the A465 in the vicinity of the junction with the B4349 to 103m AOD at Merry Hill Farm before falling to 83m at the railway crossing. Just south of the A465 the corridor passes through the narrowest section of mature woodland.

7.7.9 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality is carefully managed.

Railway Line to A49

7.7.10 The ground levels along the corridor fall from the railway line level of 83m AOD to 66m AOD at Grafton Lane. The corridor then rises gradually across agricultural land to the A49 at 71m.

7.7.11 The topography lends itself to an outfall in the vicinity of the A49 but attenuation will be important due to the significant flood risk downstream in Lower Bullingham.

Rotherwas to River Wye

7.7.12 The roundabout on the Rotherwas Industrial Estate is at approximately 50m AOD, just above the maximum flood level. As the corridor travels north the alignment will need to be on embankment incorporating flood relief culverts, or on structure, rising to cross the river and maintain headroom to flood waters.

7.7.13 As the land is subject to significant flood risk minimising impact upon the flood plain and river conveyance will need to be proven including significant mitigation works. Consultation and approval of any Flood Risk Assessment will be required from the Environment Agency.

River Wye to A438 Ledbury Road

7.7.14 From the river the corridor crosses Hampton Park Road at 50m AOD through orchards and agricultural land to the A438 Ledbury Road at 51m AOD in the vicinity of Lugwardine Bridge where it crosses the river.

7.7.15 Significant structure (either regular structures or viaduct) will be required to minimise impact on the River Wye floodplain and measures required to maintain the existing and any new flood defences. Extensive river modelling to inform a Flood Risk Assessment will be required to the satisfaction of the Environment Agency. The designation and sensitivity of the Meadows needs to be considered in any proposals for earthworks or structures.

A438 Ledbury Road to A4103

7.7.16 The corridor traverses the east edge of the Lugg Meadows before meeting the A4103 at its junction with the A465 at a level of around 55m AOD. The corridor follows the existing A4103 to the roundabout at Aylestone Hill.

7.7.17 The existing A4103 provides a platform for re-crossing the River Lugg reducing the impact of the corridor. However, some improvement works are likely to be necessary to upgrade this existing length.

A4103 at Aylestone Hill to A49

7.7.18 The corridor crosses the railway cutting just after the junction with the A4103. Ground Levels rise from the A4103 roundabout at approximately 51m AOD to the A49 at 100m AOD. The corridor follows predominantly agricultural land but does cause some severance of properties in the Holmer Area. The corridor continues to the A49 running northwest across Munstone Road and Coldwells Road.

7.7.19 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage (SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

A49 to A4103 Roman Road

7.7.20 The corridor turns south-west falling in level and crossing the A4110 Canon Pyon Road at a level of 90m AOD then continuing to fall to the A4103 to a level of 69m AOD. This section is generally agricultural but with small areas of woodland with paths and walking trails.

Table 7.25: E3 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A465 to Railway	83 – 103 – 83	1360	Predominantly agricultural with some woodland	Predominantly Raglan Mudstone. Sandstone at Merry Hill farm.	Welsh Water Trunk Main North of Railway. 66KV Overhead at Railway Crossing.
Railway to A49	83 – 71	1500	Agricultural	Raglan Mudstone	66KV Overhead at Railway Crossing.
Rotherwas to River	50 – 50	1000	Agricultural with some residential.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	
River to A438	50 – 51	1840	Orchards, Agricultural and floodplain.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	High Pressure Gas Main. 3 No. 66KV Overhead cables.
A438 to A4103	51 – 55	2100	Agricultural and floodplain	Predominantly Raglan Mudstone. 2nd Terrace deposits of River Lugg and Proto-Wye; sand & gravel close to A4103.	High Pressure Gas Main3 No. 66KV Overhead cables over existing A4103.
A4103 to A49	55 - 100	2030	Predominantly agricultural with some residential.	Alluvium along River Lugg. Raglan Mudstone at Munstone.	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Railway Crossing.
A49 to A4103	100 – 90 – 69	3590	Predominantly agricultural with some residential and some woodland	Predominantly Glacial deposits and Raglan Mudstone.	Welsh Water Trunk Main West of A49 and on A4110.

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.7.21 Environmental Assessment

7.7.22 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.7.23 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed corridor. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings but are included in the quantitative assessment.

Local Air Quality

7.7.24 Increase in level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new route. The re-routing of traffic away from the city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA and will reduce the number of receptors exposed to exceedances of the National Objective for NO2.

Greenhouse Gases

7.7.25 An increase in CO_2 emissions is expected as the extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted is largely dependent on corridor length. Route E3 is the longest of the eastern options.

Landscape

7.7.26 Main adverse effects are at Lugg Meadows and around River Wye, and also at Rotherwas. The corridor crosses River Lugg twice, but at existing crossing points, and passes through meadows, but at a location where they are less important to the setting of Hereford. Route refinements, especially around Lugg Meadows and the River Wye, and also for Rotherwas Chapel, should be explored to minimise impacts.

7.7.27 This is the longest of the eastern options.

Townscape

7.7.28 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.7.29 The route crosses areas of archaeological and historical significance. Unknown deposits of archaeological significance may also survive within the proposed footprint.

7.7.30 Sites that would be directly affected include the following Scheduled Ancient Monuments: 16th century Rotherwas House, Tuplsley Prehistoric ring ditches and enclosures and 14th Century stone Lugg Bridge which is crossed by the corridor.

Biodiversity

7.7.31 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. This option would also require a new crossing of the River Lugg SSSI which also forms part of the River Wye SAC. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on corridor alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.7.32 Option E3 requires crossing the River Wye, Little Lugg, River Lugg and its tributary twice, Yazor Brook, Newton Brook Lugg Meadows SSSI and potentially other un-named drainage ditches and water courses. This corridor crosses some 4km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye, River Lugg and Yazor Brook catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is

significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.7.33 Interventions E2, E3 and E4 follow a mostly identical footprint. The routes extend further east from the outskirts of eastern Hereford than E1 and for the most part do not create a potentially desirable route for active modes owing to an increase in distance. However, the corridors all involve the creation of a vital river crossing which could create a highly desirable walk/cycling linkage between densely populated residential areas of eastern and north eastern Hereford and the Rotherwas Industrial Estate employment area. In addition, the corridors could enhance active mode transport between Lugwardine, east of Hereford, and the amenities and employment areas of the city. The corridors have been identified to result in severance of various public rights of way. However, it is considered that design could ameliorate adverse impacts and may contribute to an increase in connectivity to existing rights of way and improved access to the countryside. In addition new green routes in conjunction with the carriageway design could increase the uptake of sustainable transport adoption and the scheme will result in an improvement to existing air quality levels within the city centre AQMA, thus resulting in an improvement in levels of health.

Journey Ambience

7.7.34 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the route is anticipated to yield High driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.7.35 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the corridor could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create ‘time-efficient’, safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.7.36 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed route. The use of safeguarded mineral deposits, where technically and economically viable, beneath the corridor will be encouraged during construction in order to avoid sterilisation of the mineral deposit. E3 is likely to be the least sustainable of the eastern route options to construct as it has the second longest length and therefore should require the most materials and energy in construction of the eastern options.

Flood Risk

7.7.37 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.7.38 The voids created by mineral workings for aggregates near the route could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.7.39 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.7.40 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.7.41 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.7.42 No Local Geological Sites will be affected by the proposed route though the geomorphologic features of the Lugg valley which form part of the SSSI will be affected by this corridor.

7.7.43 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.7.44 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.7.45 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.7.46 Traffic and Economic Assessment

7.7.47 See section 7.5.3 for an assessment of the traffic model performance which was carried out for the various employment and housing development options. At this stage a single eastern option has been modelled which is summarised for the Route E1 section only.

7.7.48 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.26 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.26: Eastern Corridor Option E3

	Scheme Costs (£k)	Comments
Roadworks – Links	24,568	Link Length 14.8km at £1.66m per km
Roadworks – Junctions	4,640	8 No. at £580K per junction
Structures	5,000	2 No Type A at £250k Each
	0	0 No Type B at £250k Each
	3,750	10 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	5,100	51 No Type E at £100k Each
Preliminaries	11,640	25% of Works Cost
Works Cost Sub Total	**58,198**	**Excluding VAT**
Service Diversions	5,820	10% of Works Cost
Land Acquisition	14,800	Link Length 14.8km at £1k per km
Part1 Claims	1,395	279 houses within 300m at £5k each
Preparation / Supervision	5,820	10% of Works Cost
Sub Total	**86,032**	Excluding VAT
Inflation	25,458	3%
Optimism Bias and Risk	50,171	45% of scheme Cost sub total
Estimated Outturn Cost	**161,661**	Excluding VAT
Present Value Cost (2002)	**107,607**	Excluding VAT

7.7.49 Appraisal Summary Tables (AST)

7.7.50 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.27 gives the final score for the Western Corridor Option E3 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

- - -	Large Adverse
- -	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 7.27: Eastern Corridor Option E3

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	- -
	Landscape	- -
	Townscape	++
	Heritage of Historic Resources	- - -
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	++
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	107,607
	Estimated Outturn Cost	161,661
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

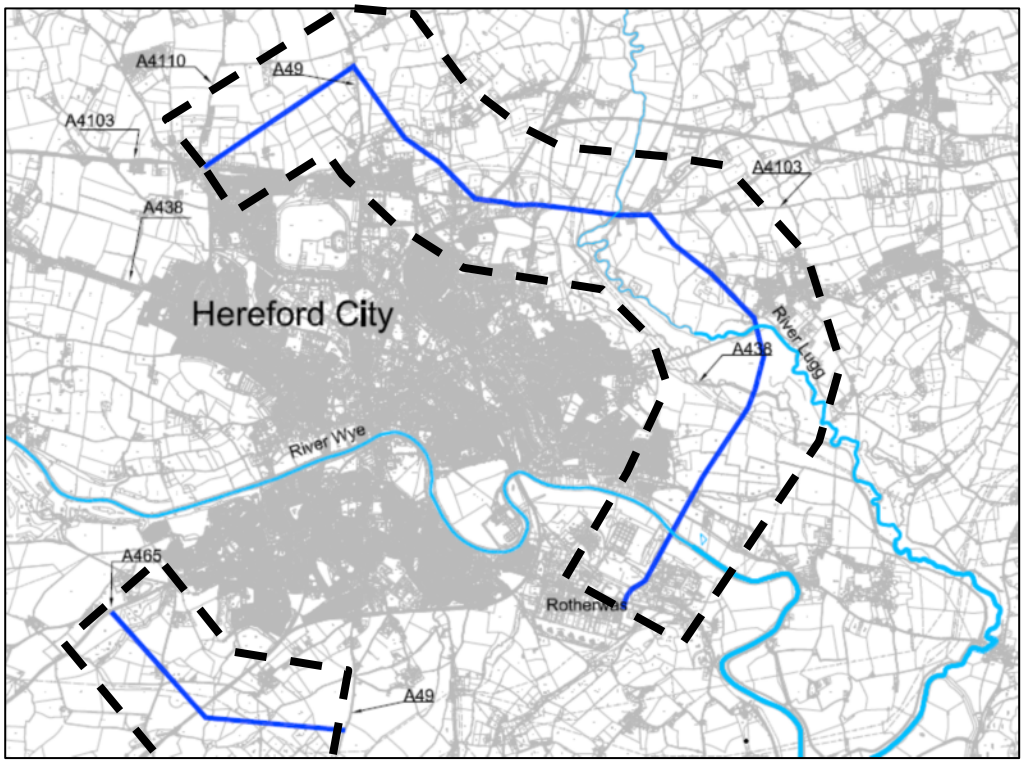
7.8 EASTERN CORRIDOR OPTION E4

7.8.1 Route Description

7.8.2 This corridor begins at the A465 Belmont Road and B4349 junction on the south-west outskirts of Hereford and proceeds in a south easterly direction to Merry Hill, crossing the Hereford to Newport railway line and continuing eastwards, traversing Grafton Lane and connecting to the A49 Ross Road, tying in with the roundabout on the Rotherwas Access Road, (see figure 7.8). The E4 corridor proposes to adopt this new access road and recommence at the industrial estate and along Chapel Road. Beyond this road the corridor continues offline in a north-easterly direction crossing the River Wye, the B4224 Hampton Park Road and the Lugg Meadows. The corridor intersects the A438 Ledbury Road within the vicinity of Lugwardine Bridge before continuing north-westwards and connecting with the A4103 Aylestone Hill and A465 junction.

7.8.3 The corridor proposes to adopt approximately 1600m of the A4103 which includes a section of the existing carriageway crossing over the Hereford to Shrewsbury railway line. It then proceeds to move offline in a north-west direction intersecting Munstone Road and Coldwells Road before intersecting the A49 north of Hereford at Highway Cottage, approximately 1200m north of its junction with A4103 Roman Road.

Figure 7.8: Option E4



7.8.4 This corridor continues to run in an acute south-west direction, south of E3, and proposes to link with the existing 4-arm signalised junction of the A4110 Canon Pyon Road and A4103 Roman Road.

7.8.5 The total length of this corridor is approximately 13.1km (excluding the existing road sections).

7.8.6 Engineering Assessment

7.8.7 The following engineering assessment is split into sections for clarity and summarised in Table 7.28. Further detail on the Engineering Assessment can be seen in the Stage 1 Engineering Assessment Report in Appendix A.

A465 to Railway Line

7.8.8 The ground rises from 83m at the A465 in the vicinity of the junction with the B4349 to 103m AOD at Merry Hill Farm before falling to 83m at the railway crossing. Just south of the A465 the corridor passes through the narrowest section of mature woodland.

7.8.9 Ponds and streams run through a Site of Important Nature Conservation (SINC) into Newtown Brook and on into fishing ponds (Belmont Pool). Any drainage system will need to ensure runoff volumes and quality is carefully managed.

Railway Line to A49

7.8.10 The ground levels along the route fall from the railway line level of 83m AOD to 66m AOD at Grafton Lane. The corridor then rises gradually across agricultural land to the A49 at 71m.

7.8.11 The topography lends itself to an outfall in the vicinity of the A49 but attenuation will be important due to the significant flood risk downstream in Lower Bullingham.

Rotherwas to River Wye

7.8.12 The roundabout on the Rotherwas Industrial Estate is at approximately 50m AOD, just above the maximum flood level. As the corridor travels north the alignment will need to be on embankment incorporating flood relief culverts, or on structure, rising to cross the river and maintain headroom to flood waters.

7.8.13 As the land is subject to significant flood risk minimising impact upon the flood plain and river conveyance will need to be proven including significant mitigation works. Consultation and approval of any Flood Risk Assessment will be required from the Environment Agency.

River Wye to A438 Ledbury Road

7.8.14 From the river the corridor crosses Hampton Park Road at 50m AOD through orchards and agricultural land to the A438 Ledbury Road at 51m AOD in the vicinity of Lugwardine Bridge where it crosses the river.

7.8.15 Significant structure (either regular structures or viaduct) will be required to minimise impact on the River Wye floodplain and measures required to maintain the existing and any new flood defences. Extensive river modelling to inform a Flood Risk Assessment will be required to the satisfaction of the Environment Agency. The designation and sensitivity of the Meadows needs to be considered in any proposals for earthworks or structures.

A438 Ledbury Road to A4103

7.8.16 The corridor traverses the east edge of the Lugg Meadows before meeting the A4103 at its junction with the A465 at a level of around 55m AOD. The corridor follows the existing A4103 to the roundabout at Aylestone Hill.

7.8.17 The existing A4103 provides a platform for re-crossing the River Lugg reducing the impact of the corridor. However, some improvement works are likely to be necessary to upgrade this existing length.

A4103 at Aylestone Hill to A49

7.8.18 The corridor utilises a section of the A4103 to cross the railway cutting rising from 51m to 60m AOD. However this section of road and bridge are substandard and will require significant upgrading. Just after the railway bridge the corridor leaves the A4103 in a Northwest direction crossing Munstone Road and Coldwells Road and joining the A49 at 100m AOD. The corridor follows predominantly agricultural land but does cause some severance of properties in the Holmer Area.

7.8.19 The scattered residential properties create a constraint and consideration must be given to ground water and the avoidance of settlement. A Sustainable Drainage (SUDs) design will be essential to prevent excessive runoff, particularly considering the gradient of this section.

A49 to A4103 Roman Road

7.8.20 The corridor turns south-west falling in level to join the A4103 at the junction with A4110 Canon Pyon Road at a level of 80m AOD. The corridor would have significant impact upon residential properties at the junction with the A4103.

Table 7.28: E3 Engineering Assessment Summary

Location	Ground Levels (m AOD)	Link Length (m)	Land Use	Geology *	Significant Utilities** and Misc Features
A465 to Railway	83 – 103 – 83	1360	Predominantly agricultural with some woodland	Predominantly Raglan Mudstone. Sandstone at Merry Hill farm.	Welsh Water Trunk Main North of Railway. 66KV Overhead at Railway Crossing.
Railway to A49	83 – 71	1500	Agricultural	Raglan Mudstone	66KV Overhead at Railway Crossing.
Rotherwas to River	50 – 50	1000	Agricultural with some residential.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	
River to A438	50 – 51	1840	Orchards, Agricultural and floodplain.	Predominantly First Terrace Deposits of River Wye, sand & gravel. Alluvium at river.	High Pressure Gas Main. 3 No. 66KV Overhead cables.
A438 to A4103	51 – 55	2100	Agricultural and floodplain	Predominantly Raglan Mudstone. 2nd Terrace deposits of River Lugg and Proto-Wye; sand & gravel close to A4103.	High Pressure Gas Main 3 No. 66KV Overhead cables over existing A4103.
A4103 to A49	51 – 60 – 100	3540	Improvement to existing road, Predominantly agricultural with some residential.	Alluvium along River Lugg. Raglan Mudstone at Munstone.	Welsh Water trunk main East of A49. High pressure gas main east of railway. 3 No. 66KV Overhead at Munstone Road
A49 to A4103	100 – 80	1900	Predominantly agricultural with some residential and some woodland	Predominantly Raglan Mudstone. Alluvium and Glacial deposits close to A4103.	

* Raglan Mudstone Forms the Bedrock for the whole route

** Significant = High Pressure, Extra High Voltage or Trunk Systems only. Local services ignored.

7.8.21 Environmental Assessment

7.8.22 For more detail and background to the methodology see the Stage 1 Environmental Assessment Report, worksheets and mapping in Appendix. This summary is split into firstly the DfT National Environmental Objectives areas and then the Herefordshire Council Environmental Objectives as follows:

Noise

7.8.23 Re-routing of traffic, in particular HGVs, from the city centre will give benefits to dwellings and other noise sensitive receptors near the A49. There will be adverse effects at residential properties and other noise sensitive receptors near the proposed route. The quiet suburban and rural nature of the corridor means that there will be large adverse noise impacts. Most receptors within the Hereford city area will be protected from noise from the proposed corridor by buildings but are included in the quantitative assessment.

Local Air Quality

7.8.24 An increase in the level of air pollution will occur along the proposed corridor. Nevertheless, the air pollution levels are expected to remain below National Objective levels along the course of the new corridor. The re-routing of traffic away from city centre is a measure in the Air Quality Action Plan and will reduce the levels of pollution within the AQMA and reduce the number of receptors exposed to exceedances of the National Objective for NO2.

Greenhouse Gases

7.8.25 An increase in CO_2 emissions is expected as the extra road available causes an increase in distance travelled by vehicles. The alleviation of congestion and idling in the city centre may give a neutral net balance. The amount of CO_2 emitted is largely dependent on corridor length. E4 is the 2nd longest of the eastern options.

Landscape

7.8.26 The main adverse effects are at Lugg Meadows and around River Wye, and also at Rotherwas. The corridor crosses River Lugg twice, but at existing crossing points, and passes through meadows, but at a location where they are less important to the setting of Hereford. Corridor refinements, especially around Lugg Meadows and the River Wye, and also for Rotherwas Chapel, should be explored to minimise impacts.

7.8.27 This corridor has the greatest length of on-line widening, which should in principle reduce landscape effects.

Townscape

7.8.28 Relief of existing congestion within the town centre would produce a range of townscape benefits and also facilitate other improvements.

Heritage and Historic Resource

7.8.29 The corridor crosses areas of archaeological and historical significance. Unknown deposits of archaeological significance may also survive within the proposed footprint.

7.8.30 Sites that would be directly affected include the following Scheduled Ancient Monuments: 16th century Rotherwas House, Tuplsley Prehistoric ring ditches and enclosures and 14th Century stone Lugg Bridge which is crossed by the corridor.

Biodiversity

7.8.31 The most significant nature conservation constraint identified so far is the River Wye SAC and SSSI, which it will be necessary for this option (and any other option east or west of Hereford) to cross. A wide-span crossing should be used to minimise impacts, and a package of mitigation measures will be required to ensure no adverse impacts on the qualifying features of this European designated site. This option would also require a new crossing of the River Lugg SSSI which also forms part of the River Wye SAC. Other potential constraints identified so far include Belmont Meadows Local Nature Reserve (not currently directly affected), a number of Special Wildlife sites, areas of ancient woodland and the local hedgerow network. Protected species issues (in addition to those associated with the River Wye SAC) that may have a particular bearing on route alignment at Stage 2 and beyond include bats, dormice and great crested newts. Mitigation measures will need to be identified at Stage 2 and the detail of these developed through subsequent work on the project. The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

Water Environment

7.8.32 Option E4 requires crossing the River Wye, Little Lugg, River Lugg and its tributary twice, Lugg Meadows SSSI, Newton Brook and potentially other un-named drainage ditches and water courses. This corridor crosses some 3.6km of flood plain which would impact upon the extent of flood storage capacity within this section of the River Wye and River Lugg catchments. This option has therefore the potential to increase flood risk by the displacement of flood plain capacity through the construction of the road in the flood plain and other permanent structures such as bridges and culverts in the water courses. Potential impact to the River Wye is significantly adverse without mitigation measures being taken into account at this stage.

Physical Fitness

7.8.33 Interventions E2, E3 and E4 follow a mostly identical footprint. The routes extend further east from the outskirts of eastern Hereford than E1 and for the most part do not create a potentially desirable route for active modes owing to an increase in distance. However, the corridors all involve the creation of a vital river crossing which could create a highly desirable walk/cycling linkage between densely populated residential areas of eastern and north eastern Hereford and the Rotherwas Industrial Estate employment area. In addition, the corridors could enhance active mode transport between Lugwardine, east of Hereford, and the amenities and employment areas of the city. The corridors have been identified to result in severance of various public rights of way. However, it is considered that design could ameliorate adverse impacts and may contribute to an increase in connectivity to existing rights of way and improved access to the countryside. In addition new green routes in conjunction with the carriageway design could increase the uptake of sustainable transport adoption and the scheme will result in an improvement to existing air quality levels within the city centre AQMA, thus resulting in an improvement in levels of health.

Journey Ambience

7.8.34 In accordance with the assessment guidance tables provided in DMRB Chapter 9 the corridor is anticipated to yield high driver stress owing to the proposed carriageway type and traffic volumes. However, a new route will alleviate considerable traffic volumes from the city centre and improve the ambience of city centre routes, resulting in a net reduction in overall driver stress for the scheme in contrast to the do minimum option. In addition, views from the new carriageway are anticipated to be of high aesthetic quality.

Contribution to Hereford Green Infrastructure

7.8.35 Reinforcement and creation of locally important and distinctive habitats, particularly those that support locally significant species, could be established alongside the route of the proposed relief road. Associated with the corridor could be the creation of new rights of way and connection of open spaces. The relief road could benefit both recreational and commuter users especially between employment areas and residential areas and could create ‘time-efficient’, safe and aesthetic movement corridors especially if associated footpaths or cycleways are built alongside the road.

Sustainable Design and Construction Methods

7.8.36 The construction methods are not considered in detail at this early design stage. The use of new aggregates will generally be minimised with exception of safeguarded mineral deposits under the proposed corridor. The use of safeguarded mineral

deposits, where technically and economically viable, beneath the route will be encouraged during construction in order to avoid sterilisation of the mineral deposit. E4 is likely to be the 2nd least sustainable of the eastern options to construct as it has the second longest length and therefore should require the 2nd most materials and energy in construction of the eastern routes.

Flood Risk

7.8.37 Prior to mitigation the provision of the relief road will increase flood risk, though with sufficient mitigation the risk can be reduced.

7.8.38 The voids created by mineral workings for aggregates near the corridor could assist with flood management and reduce flood risk.

Renewable Energy and Carbon Emissions

7.8.39 The provision of the relief road is expected to increase carbon emissions through the extra road kilometres available. This may be offset by the reduction in congestion and idling in the city centre. The provision of renewable energy could be achieved through the use of electricity generating renewable energy technology on lamp columns along side the road, to be used to feed energy into the national grid or private wire networks.

Waste and Pollution Protection

7.8.40 The road may impact surface water and groundwater quality. Consideration of appropriate pollution prevention measures for surface water runoff will be applied to mitigate pollution risk. The location of discharge points for surface water and the possible impacts on receiving watercourses will also be investigated and mitigation applied. Noise emissions will be reduced by the use of a low noise road surface.

Biodiversity and Geodiversity

7.8.41 The opportunity exists to enhance biodiversity through creation of habitat corridors alongside the proposed relief road.

7.8.42 No Local Geological Sites will be affected by the proposed route though the geomorphologic features of the Lugg valley which form part of the SSSI will be affected by this corridor.

7.8.43 Road cutting and mineral extraction sites could provide exposures providing educational, cultural, biodiversity, geodiversity and recreational benefits.

Natural, Built, Historic and Cultural Assets

7.8.44 The provision of this option would alleviate congestion in the city centre area which would benefit a variety of historical and cultural assets. The road construction could

facilitate the access to and, through excavations related to the corridor, provide opportunities for interpreting and better understanding the archaeological, historical and cultural features in the landscape and how they define a sense of place and a sense of history.

Urban Air Quality

7.8.45 All the proposed corridors are expected to improve urban air quality through diverting traffic away from the urban area and reducing congestion. Pollution concentrations are expected to drop within the AQMA as a result of the relief road.

7.8.46 Traffic and Economic Assessment

7.8.47 No alignment design or assessment of structure sizes has been undertaken at this stage. As such the scheme cost estimates included in Table 7.29 are based on unit figures in the 2007 Cost Estimate Report and as described in more detail in Appendix D. At Stage 2, the route alignments and structures will be assessed in more detail and the basis for the cost estimates will be updated.

Table 7.29: Eastern Corridor Option E4

	Scheme Costs (£k)	**Comments**
Roadworks – Links	21,746	Link Length 13.1km at £1.66m per km
Roadworks – Junctions	4,640	8 No. at £580K per junction
Structures	5,000	2 No Type A at £250k Each
	0	0 No Type B at £250k Each
	2,625	7 No Type C at £375k Each
	3,500	1 No Type D at £3,500k Each
	4,900	49 No Type E at £100k Each
Preliminaries	10,603	25% of Works Cost
Works Cost Sub Total	**53,014**	**Excluding VAT**
Service Diversions	5,301	10% of Works Cost
Land Acquisition	13,100	Link Length 13.1km at £1k per km
Part1 Claims	3,005	601 houses within 300m at £5k each
Preparation / Supervision	5,301	10% of Works Cost
Sub Total	**79,722**	Excluding VAT
Inflation	25,419	3%
Optimism Bias and Risk	47,313	45% of scheme Cost sub total
Estimated Outturn Cost	**152,454**	Excluding VAT
Present Value Cost (2002)	**99,714**	Excluding VAT

7.8.48 Appraisal Summary Tables (AST)

7.8.49 Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B. Table 7.30 gives the final score for the Western Corridor Option E4 for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

- - -	Large Adverse
- -	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

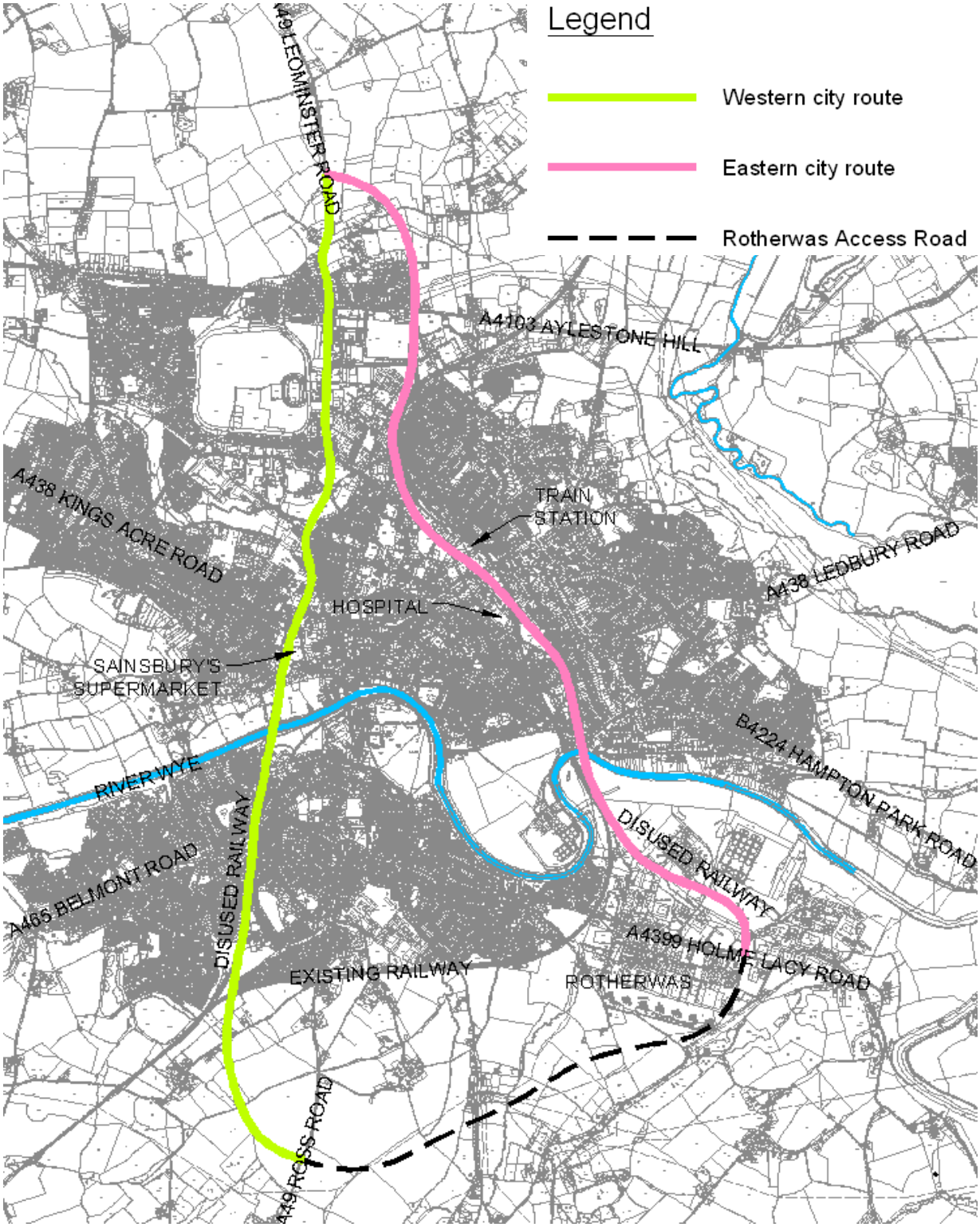
Table 7.30: Eastern Corridor Option E4

Objective	Sub-Objective	Assessment
ENVIRONMENT	Noise	- - -
	Local Air Quality	++
	Greenhouse Gases	- -
	Landscape	- -
	Townscape	++
	Heritage of Historic Resources	- - -
	Biodiversity	- - -
	Water Environment (ground water)	- -
	Physical Fitness	++
	Journey Ambience	++
SAFETY	Accidents	NA
	Security	NA
ECONOMY	Public Accounts Present Value Cost (2002)	99,714
	Estimated Outturn Cost	152,454
	Business Users and Providers	NA
	Consumer Users	NA
	Reliability	NA
	Wider Economic Impacts	+++
ACCESSIBILITY	Option values	NA
	Severance	NA
	Access to the Transport System	NA
INTEGRATION	Transport Interchange	NA
	Land-Use Policy	NA
	Other Government Policies	NA
SOCIAL PROGRESS	Meet Housing Needs	+++
	Access to Public Spaces and Health Facilities	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+
	Accessible, Integrated, Safe Transport Network	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++
	Sustainable Design and Construction Methods	NA
	Flood Risk	- -
	Renewable Energy and Carbon Emissions	-
	Waste and Pollution Protection	- -
	Biodiversity and Geodiversity	- -
	Natural, Built, Historic and Cultural Assets	+
	Urban Air Quality	+

7.9 CITY ROUTES

7.9.1 The city routes are considered briefly and shown on Figure 7.9 below. The full assessment of these along with the other relief road options is necessary as evidence that all reasonable alternatives have been considered in the selection of a final preferred alignment at the end of the stage 2 process.

Figure 7.9: City Routes



Western City Route

7.9.2 The historic assessment of a route utilising the Great Western Way identified it worthy of further consideration and the 1992 Inspectors Report included the merits below:

- Heritage Environment – The route could amount to enhancing parts of the city, the city would benefit from additional lighting and mitigation. The green wedge into the city could be extended to a green corridor from Holmer to Red Hill. The essential character of a road is compatible with an urban environment and capable of being an improving feature.
- Traffic – The long term relief of the City Centre traffic problems is vital to the citizens and tourists to Hereford. It is essential that a long term solution to the city centre traffic problem is decided before a solution to help the through traffic is decided.

7.9.3 The City Route West was also considered in 1985 and presented to have two very important advantages:

- It would reduce the town centre traffic,
- And construction and land costs would be less than an outer route.However, the 1985 Study found that the City Route West had a severe impact on both the proposed and existing development in Hereford. It was determined that a dual carriageway would be required with a number of grade separated junctions through the city and would cause a significant increase in noise levels to many people who live close to the route.

7.9.4 The old railway bridge on the line of the central route is a listed structure and is likely to be unsuitable for adaptation to highway requirements. If this was the case, the bridge would be demolished to allow a 30m wide structure designed to current highway loadings.

7.9.5 In the main the original railway corridor exists including original embankments and the original railway river bridge. However, it is assumed that a dual carriageway standard highway would be required. As such, significant earthworks and retaining structures will be necessary to provide the width required for the highway at levels appropriate to minimise noise, visual impact and requirements for third party land. Also a Sainsbury's supermarket severs the route and would require relocation to accommodate a design alignment.

Eastern City Route

7.9.6 Travelling north, the route extends from the new roundabout on the B4399 at the end of the Rotherwas Access Road in the Rotherwas Industrial Estate and turns to follow the former railway line. The Route then runs adjacent to the railway, north to the river where it crosses through a vacant plot between residential properties where Eign Brook outfalls into the River. It should be noted that this is the route for a proposed Footway/cycleway (Greenway) known locally as the Connect2, or the Hereford Greenway scheme.

7.9.7 The route follows the course of Eign Brook, which has known use by otters, requiring the removal of much of the existing green open space and associated floodplain. The route would cross the Ledbury Road before passing through an area of former green open space and allotments. However, recent development of a retirement village creates a major barrier to the route progressing. Assuming this could be traversed through an alignment closer to the railway; the route crosses the Railway and then travels between the railway and the Hospital to Commercial Road at the train station. The route would utilise the proposals for the Edgar Street Grid Link Road but continue north utilising railway siding and disused railway corridors up to the A4103.

7.9.8 The advantages and disadvantages associated with the Eastern City Route are much the same as for the Western City Route. Relief to traffic within the city centre would be achieved but the negative Impacts upon residential properties would be significant due to increase noise. The recent constraints associated with the retirement village on the Ledbury Road may be insurmountable in terms of land availability.

7.9.9 Although within the City Limits, the impacts upon the local environment would be significant due to the impact upon the Eign Brook and associated green open space, floodplains and ecology.

8 Conclusions and Recommendations

8.1 CONCLUSIONS FROM STAGE 1 ASSESSMENT

8.1.1 The Stage 1 assessment has followed the format required by the Highways Agency Design Manual for Roads and Bridges guidance for scheme assessments but has included the information required by the New Approach to Transport Appraisal (NATA) as described on the Department for Transport (DfT) online Transport Assessment Guidance (WebTAG).

8.1.2 The study objectives have been set to accord with DfT objectives from WebTAG and specific local objectives have been set based upon Herefordshire Councils emerging Local Development Framework (LDF).

8.1.3 Wide and broadly defined corridors were set at the beginning of the Stage 1 assessment to reflect the work undertaken to date on the Hereford Multi Modal Study. As recommended by the study, both East and West corridors have been considered.

8.1.4 To ensure that the Stage 1, 2 and 3 scheme assessment process identifies the optimum corridor and then alignment, a wide study area has been considered from the outset without bias from historic study options. As such, for each strategy, East or West, an inner option and an outer option has been considered. The inner options are as close as is reasonable to the existing developed city limits. The outer options are further away from the existing city but limited by what is considered to be economically sensible. A corridor too far outside of the city would not provide a short enough route to attract traffic use from bypassing traffic or local trips.

8.1.5 The corridors E1, E2, E3 and E4 on the east of the city and W1, W2, W3 and W4 to the west have been proposed. Many sections are common to several corridors. For example E3 is just an extended version of E2. As such in the detailed assessments within the Appendices and in the summaries within the main body of this report there is a certain amount of repetition with each corridor being assessed separately.

8.1.6 The environmental impact of all proposed relief road options is generally adverse for Noise, Greenhouse Gases, Landscape, Biodiversity, Water Environment and Physical Fitness and beneficial for Townscape, Journey Ambience and Local Air Quality.

8.1.7 More specifically, from the data collected for Stage 1, it is clear that landscape and ecological impacts are likely to be very significant for both the western and eastern options. However, on balance the Western Options are considered to be more

favourable. Table 8.1 shows the preference against the environmental sub-objectives.

Table 8.1 Preferred Options Based on Environmental Objectives.

SUB OBJECTIVE	PREFERRED OPTIONS	LEAST FAVOURED OPTIONS
Noise	W1, E2	E1, E4
Local Air Quality	E1, E2	W5, E4
Greenhouse Gases	E1, W1	W4, W5, E3
Landscape	W4, E4	W2, E1
Townscape	Do-Something	Do-Nothing
Heritage of Historic Resources	W1, W3, W4	E4, E3, E2
Biodiversity	W1, W2, W3	E1, W4, E2, E3, E4
Water Environment	W1, W2	E3,E4
Physical Fitness	E1	W3, W4
Journey Ambience	Do-Something	Do-Nothing

Western Route

8.1.8 All west corridors require a number of highway bridges; however the main structures would be a single road over a rail bridge and a single crossing over the River Wye. The inner west corridors cross the Wye to the east of the Belmont Lodge buildings but crossing part of the golf course. At this location the topography to the north of the river is favourable as the river gorge is at its lowest and bank vegetation least, reducing structure height, cost and environmental impact. Further west, where the outer corridors are proposed, the gorge is deeper and the high ground of Perry Hill creates significant topographical challenges. There are significant cuts on Perry Hill and an impact on the west side of the Belmont Lodge golf course. A high viaduct across the river valley would increase costs and the impact on the landscape. However, any corridor on this section of the river, to the west of the city will have significant landscape disbenefits to the area.

8.1.9 The western corridors cross the A465 west of Belmont and an at grade junction, probably a roundabout, will be required. The inner corridor utilises the narrowest section of small woodland and uses the gap in the residential properties, currently

used as playing fields to cross the A465. The removal of the playing field and the severance caused by bisecting the residential area will require further consideration and likely mitigation. The outer corridor avoids severance but cuts through the wider woodland area. However, moving the corridor further west would simply mitigate these environmental impacts.

8.1.10 Options W1 and W2, represent the inner corridors, and follow more of a 'bypass style' route, tying into the A49 in the north and south further from the city. These do not provide an attractive link to the employment area of the Rotherwas Industrial Estate via the newly built B4399 Rotherwas Access Road or the potential for a link from the A49 to the north to the A4103 at Aylestone Hill.

8.1.11 North of the River Wye both inner and outer corridors have a negative impact on the Historic setting of Breinton although less so with the inner corridor. Prior to the Kings Acre Road, both inner and outer corridors cross predominantly agricultural land and both require residential land adjacent to Kings Acre Road. Both inner and outer corridors create severance in this area, but to a greater degree with the inner corridor which also severs potential residential development between the A438 Kings Acre Road and A4103 Roman Road.

8.1.12 Several options exist for the link from the A4103 Roman Road to the A49 north of the City. Few major topographical or environmental constraints exist, however, the use of the high quality section of the A4103 to minimise the length of new road required would have both environmental and economic advantages.

8.1.13 The link from the A49 North of the City to the A4103 at Aylestone Hill presents some engineering challenges. Frequent road bridge crossings, large level differences but particularly the railway crossing in close vicinity to 66KV overhead cables will restrict the alignment options or cause high construction costs. Severance to existing and proposed residential and employment areas in Holmer is also a consideration.

Eastern Route

8.1.14 The eastern corridors all have impacts upon the ecology of the Wye and Lugg river floodplains. The inner eastern corridor utilises the land between the existing city limits and the SSSI and SAC of the Lugg meadows. However, on designing alignments through this corridor, some impact of earthworks and drainage features is inevitable and so significant mitigation will be necessary. The corridor will pass between the Lugg SSSI and SAC designations causing severance of habitats requiring significant mitigation and consideration in any later detailed designs. However, benefits exist with the inner eastern corridor with the opportunity to provide greater amenity access to these areas by the provision of sustainable links with road.

The corridor is also the shortest as it links the A49 to the south with the A49 to the north, utilising the existing B4399 Rotherwas Access Road for much of its length.

8.1.15 Whilst the unmitigated ecological effects may be greater for the eastern corridors, the landscape effects are much lower than those to the west. The inner corridor especially does not extend into the undeveloped countryside very far, hugging the existing development boundary and making use of the favourable topography.

8.1.16 The outer eastern corridor crosses the River Wye once and then the River Lugg twice. One of the Lugg crossings is via an existing structure, although this is likely to require upgrading and strengthening and is of some historic importance itself.

8.1.17 The impact upon the river floodplains is most evident with the outer eastern corridor, however both eastern corridors will impact upon floodplain storage and river conveyance without significant mitigation works. Significant bridge and culvert structures, if not a long stilted structure will be required to cross the Wye and Lugg floodplains increasing the cost of these options.

City Routes

8.1.18 It is not recommended that the City Routes should be given any further consideration as a feasible option to provided relief to existing and future city congestion. The routes will have a major disruptive effect on residential properties and will not support Herefordshire Councils wider development proposals.

8.1.19 The Western Route would be the better of the two alignments but would cause the removal of one of Herefordshire Key existing sustainable transport links through the city. The enhancement of these routes for sustainable transport use such as cycling and walking should be encouraged within the package of sustainable measures taken forward.

8.1.20 Appraisal Summary Tables (AST)

8.1.21 At the heart of the appraisal process is the Appraisal Summary Table (AST). This records the degree to which the five Central Government objectives for transport (environment, safety, economy, accessibility and integration) and the three local specific objectives for transport (social progress, economic prosperity, and environmental quality) would be achieved and provides a comprehensive summary of the impacts of an option. Full Environmental Appraisal Summary Tables including qualitative and quantitative impacts are included in the Stage 1 Environmental Assessment Report in Appendix B.

8.1.22 Table 8.2 gives the final score for the Western and Eastern Corridor Options for each of the National and Local objectives for this scheme. Some objectives cannot be assessed at Stage 1 as identified on the table. The Table will be updated through the later stages of scheme assessment as more detail is developed for the scheme options. The following notation is used in the assessment column:

---	Large Adverse
--	Moderate Adverse
-	Slight Adverse
0	Neutral
+	Slight Beneficial
++	Moderate Beneficial
+++	Large Beneficial
NA	Not Assessed at Stage 1

Table 8.2: Western & Eastern Corridor Options

		Assessment Summary of Western Corridors				Assessment Summary of Eastern Corridors			
Objective	**Sub-Objective**	**W1**	**W2**	**W3**	**W4**	**E1**	**E2**	**E3**	**E4**
ENVIRONMENT	Noise	- - -	- - -	- -	- -	- - -	- - -	- - -	- - -
	Local Air Quality	++	++	++	++	++	++	++	++
	Greenhouse Gases	-	- -	- -	- -	-	-	- -	- -
	Landscape	- - -	- - -	- -	- -	- - -	- -	- -	- -
	Townscape	++	++	++	++	++	++	++	++
	Heritage of Historic Resources	-	-	-	-	- -	- - -	- - -	- - -
	Biodiversity	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
	Water Environment (ground water)	- -	- -	- -	- -	- -	- -	- -	- -
	Physical Fitness	- -	- -	- -	- -	++	++	++	++
	Journey Ambience	++	++	++	++	++	++	++	++
SAFETY	Accidents	NA	NA	NA	NA	NA	NA	NA	NA
	Security	NA	NA	NA	NA	NA	NA	NA	NA
ECONOMY	Public Accounts 2002 (Present Value Cost £K)	74,169	93,954	96,722	108,644	61,535	87,899	107,607	99,714
	Estimated Outturn Cost	113,167	141,851	145,593	163,268	94,846	132,180	161,661	152,454
	Business Users and Providers	NA	NA	NA	NA	NA	NA	NA	NA
	Consumer Users	NA	NA	NA	NA	NA	NA	NA	NA
	Reliability	NA	NA	NA	NA	NA	NA	NA	NA
	Wider Economic Impacts	+++	+++	+++	+++	+++	+++	+++	+++
ACCESSIBILITY	Option values	NA	NA	NA	NA	NA	NA	NA	NA
	Severance	NA	NA	NA	NA	NA	NA	NA	NA
	Access to the Transport System	NA	NA	NA	NA	NA	NA	NA	NA
INTEGRATION	Transport Interchange	NA	NA	NA	NA	NA	NA	NA	NA
	Land-Use Policy	NA	NA	NA	NA	NA	NA	NA	NA
	Other Government Policies	NA	NA	NA	NA	NA	NA	NA	NA
SOCIAL PROGRESS	Meet Housing Needs	+++	+++	+++	+++	+++	+++	+++	+++
	Access to Public Spaces and Health Facilities	NA	NA	NA	NA	NA	NA	NA	NA
	Access to Services and Facilities Via Walking, Cycling and Public Transport	+	+	+	+	+	+	+	+
	Accessible, Integrated, Safe Transport Network	NA	NA	NA	NA	NA	NA	NA	NA
ECONOMIC PROSPERITY	Package of transport measures to include relief road and second river crossing	+++	+++	+++	+++	+++	+++	+++	+++
ENVIRONMENTAL QUALITY	Contribution to Green Infrastructure	++	++	++	++	++	++	++	++
	Sustainable Design and Construction Methods	NA	NA	NA	NA	NA	NA	NA	NA
	Flood Risk	- -	- -	- -	- -	- -	- -	- -	- -
	Renewable Energy and Carbon Emissions	-	-	-	-	-	-	-	-
	Waste and Pollution Protection	- -	- -	- -	- -	- -	- -	- -	- -
	Biodiversity and Geodiversity	- -	- -	- -	- -	- -	- -	- -	- -
	Natural, Built, Historic and Cultural Assets	+	+	+	+	+	+	+	+
	Urban Air Quality	+	+	+	+	+	+	+	+

8.2 RECOMMENDATIONS FOR STAGE 2 ASSESSMENT

8.2.1 Route Corridors

8.2.2 The corridors assessed at stage 1 were of varying length, each with the additional option of extra links to further serve specific zones around the city. It is proposed that at Stage 2, all eastern and western corridors, for the purposes of assessment shall include the link from the A465 to the A49 to the Southwest of the City and the link from the A4103 Roman Road to the A49 then to the A4103 at Aylestone Hill. The specific alignment of these links will require investigation to ensure the optimum solution. However, the main choice will be between inner and outer versions of the eastern corridor between Rotherwas and the A4103 at Aylestone Hill; and inner and outer versions of the western corridor between the A465 and the A4103 Roman Road as shown on Figure 8.1.

Figure 8.1: Stage 2 Corridors for Assessment

Western Corridor Recommendations

- The choice of crossing location over for a Western corridor will be a critical decision and it is recommended that both inner and outer corridors included in the Stage 1 assessment are refined and both considered in greater detail at Stage 2.
- The outer corridor should be moved further west where it lies south of the A465 to avoid the woodland area and the inner corridor should continue to cut through the narrowest section of this woodland.
- All western corridors considered at stage 2 will tie into the B4399 Rotherwas Access Road to provide best access to the employment zone of Rotherwas as W3 and W4 of this Stage 1 assessment.
- Additional corridors should be explored at Stage 2, further west to minimise the severance on the Kings Acre Road and of the proposed development land between A438 and A4103.
- The corridors should utilise the high quality elements of the A4103 to reduce the length of new road required. Consultation with the Highways Agency over the quality (number of direct accesses) at this location will be required.
- The link from the A49 North of the City to the A4103 at Aylestone Hill needs to be considered in detail at Stage 2. The use of the Stage 1 corridor at the railway line should be avoided due to the conflict with the overhead cables. The optimum location for junctions on the A4103 and A49 should be sought and the alignment between detailed to minimise severance of existing and proposed development land.

Eastern Corridor Recommendations

- Investigate both inner and outer eastern corridors in more detail at stage 2.
- Align the eastern corridor to avoid the Heritage Sites of Rotherwas Chapel. This will divide the corridors at Chapel Lane into two different river crossing points either side of the Rotherwas Chapel.
- The inner corridor alignment should be designed in some detail to fully establish the impact of earthworks upon the Lugg floodplain and the encroachment onto the SSSI/SAC and nature reserves.
- The outer corridor should be aligned to avoid the Heritage Site and move slightly further west.

8.2.3 Environmental Assessment

8.2.4 The environmental assessment should be taken forward to Stage 2 which will consist of scoping of focused corridor options, rather than indicative corridor options at Stage 1, and simple or detailed assessment for the topics as required.

8.2.5 Phasing

8.2.6 The phasing of the development of individual links and sustainable transport measures in the delivery of the eventual full scheme should be explored in the Stage 2 reporting as opportunities may exist to deliver different solutions depending upon the chosen housing and employment options.

8.2.7 Sustainable Transport Measures

8.2.8 The Stage 1 assessment has concentrated on the assessment of the eight corridor options east and west of the city. However, there has been little inclusion of other sustainable transport initiatives in the detailed assessments. It is important that the Stage 2 assessment includes the full 'package' of transport initiatives, not just the relief road. Herefordshire Council have identified a range of sustainable transport options within the Place Shaping Paper consultation towards the Local Development Framework.

- Behavioural change through investment in promoting alternatives to car use.
- Investment in improvements to pedestrian facilities.
- Expansion of the cycle network, roadspace re-allocation and cycle hire schemes.
- Smart ticketing on buses.
- Expansion of Hereford Park and Ride.
- Bus Priority at key junctions.
- Promote rail service improvements.
- Reduce highway capacity in central Hereford.
- Consider Road User Charging in the historic centre.
- Increase car parking charges, on street charging and work place parking levy.
- Improve road safety through residential 20 zones and car free zones at schools.

8.2.9 At stage two fully detailed schemes are unlikely to be developed so broad assumptions will need to be made. This should include the following:

- **Behavioural Change** – A modal shift from car to walking, cycling and public transport with percentages to reflect all measures within the strategy.
- **Reduced Car Capacity** – Reduce the capacity on key links and junctions to reflect bus priority and roadspace re-allocation.
- **Park and Ride** – Reflect park and ride in the origin/destination matrices to alter the car loading on the network.

8.2.10 Consultation

8.2.11 The Stage 1 Assessment has not included any external consultation beyond the Herefordshire Council Forward Planning team. Early in the Stage 2 Assessment process refined corridors will be established upon which the assessments are to be based.

8.2.12 To fully assess the engineering and environmental impacts of the scheme a technical consultation will be necessary as listed in Table 8.2. The consultation should not be a generic consultation to each of these parties but an opportunity to ask focused and specific technical questions.

Table 8.2: Stage 2 Consultation Strategy

Local Planning Authority	For an early screening opinion and any specific planning requirements associated with the corridors.
Herefordshire Environmental Department	To discuss mitigation measures associated with corridors close to environmentally sensitive sites.
Herefordshire Forward Planning	To discuss the impact upon land with potential for development.
Herefordshire Transport Planning	To agree the package of sustainable transport measures.
Herefordshire Property and Legal Services	To discuss existing land-use.
Highways Agency	Liaison with the network teams and forward planning to establish the required design standards, query the use of existing highways and discuss future design and construction checks towards adoption.
Network Rail	Agree the design requirements and procedures for new and upgrading existing road over rail structures.

English Heritage	To discuss mitigation measures associated with corridors close to heritage features.
Environment Agency	Discuss matters in relation to watercourses, particularly design requirements for the River Wye and Lugg crossings.
Natural England	To discuss mitigation measures associated with corridors close to wildlife sites.

Appendix A: Engineering Assessment Report

Appendix B: Environmental Assessment Report

Appendix C: Traffic and Economic Assessment Report

Appendix D: Basis of Scheme Cost Estimates

Construction Costs

Amey were commissioned to develop an outline costing for two potential routes for the Hereford Outer Distributor Road in 2007. The costing exercise was to utilise the information held on the B4399 Rotherwas Access Road under construction at that time and now complete. This Appendix has been prepared to give an outline of the assumptions made in developing the cost estimate for the Stage 1 assessment.

The cost estimates were developed with the guidelines given in HM treasury Green Book, which is the current financial appraisal and evaluation method for publicly financed schemes. These guidelines direct the user through the estimation process, utilising available current construction rates. For this report we have used rates from the Rotherwas Access Road Tender Submissions, rates from other schemes completed recently within Herefordshire and delivered elsewhere in the Amey Group and the industry at large and rates from SPON's 2007 (Civil Engineering and Highway Works Price Book).

Additional Costs

Inflation

The scheme estimate currently has an allowance for inflation of 2.7% per year. An estimated construction time based on the works may be in the region of two years. It could be assumed that land costs and statutory undertakers costs could be incurred during the first year of construction. The preparation & supervision costs could be spread over several years. The spread of expenditure assumed can be seen on table D1 below.

Table D1 Cashflow forecast for scheme cost estimate

	% Expenditure by Year					
	2012	2013	2014	2015	2016	2017
Prelims				50	50	
Roadworks - Links				50	50	
Roadworks – Junctions				50	50	
Structures				50	50	
Service Diversions				100		
Land Acquisition				100		
Part 1 Claims						100
Preparation / Supervision	10	20	20	20	20	10

Optimism Bias

The approach to adjusting for optimism bias has been based on the Highways Agency's Chief Highway Engineer Memorandum 121/03 "H.M Treasury's New Green Book on Appraisal and Evaluation in Central Government".

The Hereford Relief Road is deemed to be a standard/ non-complex scheme at conception stage; therefore optimism bias is applied at 45% as no risk assessment had been carried out.

The optimism bias adjustment has been applied to the total cost comprising construction, statutory undertakers, land, preparation and supervision and non-recoverable VAT.

Cost Estimation

Preliminaries

Preliminaries have been estimated at 25% of the total construction cost.

Road Works - Links

The estimate for the road construction assumes a single two lane carriageway of a similar standard to the Rotherwas Access Road. The cost estimate includes for the following highway features in the quantities necessary for the Rotherwas Access Road:

- Earthworks
- Drainage using SUDs principals
- Pavement and road foundation construction

- Kerbs
- Traffic signs & road markings
- Street lighting (Assume no street lighting on links, see junctions for estimate)
- Safety fencing
- Environmental mitigation (Including ecology and archaeology)
- Landscaping

A rate has been generated for a KM of carriageway based on the Rotherwas Access Road tender submissions of £1.66m/km in 2007 prices.

Road Works - Junctions

The estimate for the construction of junctions assumes roundabout junctions of a similar standard to those used on the Rotherwas Access Road. The cost estimate includes for the following highway features in the quantities necessary for the Rotherwas Access Road:

- Earthworks
- Drainage using SUDs principals
- Pavement and road foundation construction
- Kerbs
- Traffic signs & road markings
- Street lighting
- Safety fencing
- Environmental mitigation (Assume none as included in Links above)
- Landscaping

A cost estimate of £580K has been generated for a roundabout junction based on the Rotherwas Access Road tender submission then applied to the number of junctions necessary for each option.

Structures and Features

Potential structures have been identified for each of the Route Options in 2007 prices. The structures fall into the following categories:

Table D2 – Structures Assumptions

Structure Code	Structure Description	Cost Estimate (£k)	Basis For Estimate
A	New road over existing live railway line (dual track railway line, 7.3m carriageway)	2,500	Recent scheme cost estimates
B	New road beneath existing live railway line (dual track railway line, 7.3m carriageway)	2,500	Recent scheme cost estimates
C	New road over single carriageway road	375	Rotherwas Access Road Tender
D	New road river crossing (single carriageway viaduct with two piers)	3500	Recent scheme cost estimates
E	Culverts for minor watercourses	100	Rotherwas Access Road Tender

All other minor structures, for example drainage features are included in the Roadworks cost estimates based on the Rotherwas Access Road

It should be noted that additional structure may be required across the floodplain, either in the form of an elevated carriageway on viaduct or regular flood relief culverts. The cost of viaduct is likely to be prohibitively expensive to we have assumed flood relief culverts (as structure E above) at a spacing of 100m through any areas of floodplain.

Service Diversions

There has been no assessment of the impact of the route options on statutory undertakers. The Rotherwas Access Road has required considerable diversions to both local services and also strategic apparatus. The percentage cost for Statutory Undertakers has therefore been estimated as 10% of construction costs based on the Rotherwas Access Road.

Land

With no detailed design information and therefore no scheme footprint it is not possible at this stage to make an assessment of land costs. The detailed alignment design will be developed to avoid any impact on high value property, however this cannot be assessed at this stage.

For the purposes of the cost estimate a cost per km of road has been assumed based on the costs incurred on the Rotherwas Access Road (Cost Per KM = £1.022k).

Part 1 Claims

Due to the construction of a new road there will be the potential for compensation from local residents to accommodate noise disturbance during construction and traffic noise after completion. Under CPO compensation guidelines houses within a 300m proximity of the new construction should be considered and is estimated at £5K per house.

Preparation and Supervision

Preparation and supervision costs are based on 10% of the overall cost, this is an indicative rate that is industry standard and comparable with the Rotherwas Access Road.