Alternative Crossing of the River Derwent Feasibility Study, A166 Stamford Bridge

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Final Report

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Background

1.1 The East Riding of Yorkshire Council is considering its local transport funding strategy in relation to programmes and plans for improvements to transport networks within the East Riding. The Council is developing this funding strategy in order to derive a realistic view of the appropriate approach to any proposals, including the potential for the development of major transport infrastructure scheme bids to the Department for Transport.

1.2 A recent closure of the A166 at Stamford Bridge has highlighted transport issues in the area and led to public questions with regard to the need of an alternative river crossing or bypass for Stamford Bridge. Such an alternative crossing, if pursued, will almost inevitably require the development of a major transport infrastructure scheme costing a number of millions of pounds.

1.3 Consequently, the East Riding of Yorkshire Council has, through its partner Mason Clark, commissioned JMP Consulting to consider its funding strategy for potential schemes on the A166 at Stamford Bridge, and advise on an appropriate approach to developing any future funding bids.

1.4 This advice needs to be made in the context of realistic proposals for an alternative river crossing or bypass for Stamford Bridge. Consequently, a feasibility study on options for such an alternative crossing of the River Derwent by the A166 at Stamford Bridge has been undertaken in advance of consideration of any proposal through the appropriate channels to obtain funding.

Local Transport Funding in England

1.5 Local transport funding in England is an evolving process. Changes to the processes of providing local transport funding have developed apace in 2005 and 2006, with the introduction of a revised system for allocating funds through Local Transport Plans (LTP), the introduction of Regional Funding Allocations (RFA), and the emergence of the Transport Innovation Fund (TIF). The local and regional transport funding framework continues to develop in parallel to these funding processes, as is evidenced by the likely reviews of RFA in the Yorkshire and Humber region in 2008 and 2009.

1.6 The combination of these changes has led to a very challenging landscape for local transport funding, and has significant implications for local authorities in developing their local transport funding strategy, and in the production of detailed bids for programmes of funding.

Local Transport Plans and major schemes

1.7 The Department for Transport, through its Local Transport Plan process, allows local authorities to pursue the funding of major capital infrastructure schemes, the purpose of which is described as "to provide LTP authorities with the necessary capital funding to take forward worthwhile highway and public transport schemes that support the objectives of their Local Transport Plan but which would otherwise be unaffordable from their Integrated Transport or Maintenance block allocations or from other sources"1. In general, this allows LTP authorities to pursue schemes that cost in excess of £5 million, but can also be pursued for some capital infrastructure schemes costing less than £5 million. These exceptional schemes will be eligible under criteria which "will principally be determined by the likely affordability of the scheme" and are laid out in full in guidance on Local

[1] Guidance for Local Authorities seeking Government funding for major transport schemes, DfT, August 2007

Transport Plans.2 This guidance goes on to say that "the Department does not expect to fund more than a handful of such exceptional schemes at a time and certainly no more than one per local transport authority".

1.8 Crucially, Government guidance on the development and funding of LTP major transport schemes identifies that "in order to be considered for funding by the Department any new major scheme must have been identified as a priority by the relevant region within its Regional Funding Allocation (RFA)"3.

Regional Funding Allocations

1.9 In December 2004 'Devolving Decision Making: a consultation on regional funding allocations'4 was published setting out plans for providing the English regions with indicative long term regional funding allocations for the ten year period to 2016, and to help improve integration of decision making on regional transport, housing and economic development. This guidance was finalised in July 2005.

1.10 The regional funding allocations for transport bring together capital funding projected for major schemes under the LTP system, and for major Highways Agency schemes other than those on routes of the greatest strategic national and international importance. Decisions on these routes continue to be taken nationally, as do decisions on rail investment.

1.11 As part of developing advice to government on the transport element of regional funding allocations (RFA) all of the regions in England embarked upon the development of a methodology to identify an objective-led, clearly prioritised set of transport investment and management interventions. All regions appointed independent consultants to help develop their methodology to ensure objectivity, and to ensure that it stood up to scrutiny free from political, institutional or geographical bias.

1.12 In this way, each region developed its own unique methodology to identify regional transport priorities and to prioritise transport schemes for inclusion in the region's advice to government. This allowed the regions to fit the methodology to their own circumstances and incorporate their own regional priorities rather than adopting a one size fits all approach.

Decision making using the RFA in Yorkshire and Humber

1.13 As identified in Section 1.8, government guidance on the development and funding of LTP major transport schemes identifies that "in order to be considered for funding by the Department any new major scheme must have been identified as a priority by the relevant region within its Regional Funding Allocation (RFA)"[5].

1.14 The final advice from regions under the RFA process informs the Department for Transport and Ministers of the regional view on investment priorities. This advice is not binding, and the ultimate decision still lies with Ministers.

1.15 The Yorkshire and Humber region provided its initial advice in January 2006, and in general, though not exclusively the Minister followed the advice from the region[6]. This, coupled with the

[2] Full Guidance on Local Transport Plans, Second Edition, DfT, December 2004
[3] Guidance for Local Authorities seeking Government funding for major transport schemes, DfT, August 2007
[4] Devolving Decision Making: a consultation on regional funding allocations, HM Treasury (and DfT, DTI & ODPM), December 2004
[5] Guidance for Local Authorities seeking Government funding for major transport schemes, DfT, August 2007
[6] Letter from Douglas Alexander, Secretary of State for Transport to Councillor Peter Box, Chair of the Yorkshire and Humber Assembly, and Terry Hodgkinson, Chair of Yorkshire Forward, 6 July 2006

response to other regions around the country, suggests that the views from the regions were welcomed, and did strongly influence the decisions made by the Minister.

1.16 An independent report commissioned by the DfT identified that the regions themselves were very keen to see the process repeated in future years[7] and Government is likely to issue a call during 2008 for a comprehensive review of each region's priorities.

1.17 In expectation that the process would continue, early in 2007, the Yorkshire and Humber Assembly, in support of the Regional Transport Board, identified that it was important for the region to have an up to date view of priorities, and refreshed the methodology in the light of any changes to policy and programme issues affecting regional transport, and agreed to formally review any newly submitted major schemes for consideration by the region. A refreshed methodology was approved in April 2007 and a guide for scheme promoters published.

1.18 Additional changes to major scheme guidance from government that implies a greater role for the Regional Transport Board in "managing" the programme of schemes approved for delivery, coupled with views of Board members themselves has led to a further examination of the RFA process in Yorkshire and Humber. This was the subject of a report to the Regional Transport Board on 30th November 2007.

1.19 The report8 broadly concludes that there is now a longer than expected time before DfT is likely to request a full review of regional advice on funding priorities with a submission early in 2009, rather than in mid-2008 as previously thought. Furthermore, that "there is undoubtedly an increased role for the Board in 'managing' and influencing the programme of schemes from now on and a clear need to make sure that the Region maximises its use of the current Regional Funding Allocation in the short to medium term".

1.20 The Board consequently proposes an interim review of funding priorities early in 2008, focusing on emerging gaps identified in the early to mid years of the RFA programme, for which it will invite proposals for relatively low-cost major schemes that will fill gaps in the mid years of the programme and can be delivered fairly quickly. The Board highlights that these should to be quality schemes that meet the transport priorities, not just 'gap fillers'. This will be followed by preparation for and undertaking of a full review of regional funding priorities from mid-2008 onwards.

1.21 In developing major schemes for future funding bids to government, the views of the region will therefore continue to be important, either within the same or a similar process, or to be accounted for within any new process that comes forward. The ability of proposals to deliver the region's transport priorities, as identified in the Regional Spatial Strategy, and deliver the wider priority outcomes of the region is therefore vital, and will continue to be so. Providing value for money and deliverable schemes will also continue to be essential to obtain government support and approval.

The Yorkshire and Humber RFA Methodology

1.22 Officer level Management and Analysis Group and the Regional Transport Board in preparing the advice to government in January 2006. In 2005/06 the Government Office for Yorkshire and the Humber (GOYH) worked in partnership with the Yorkshire and Humber Assembly, Yorkshire Forward and other regional stakeholders to develop sound, well-informed advice to government on the region's transport priorities. The Government Office commissioned consultants (in this case

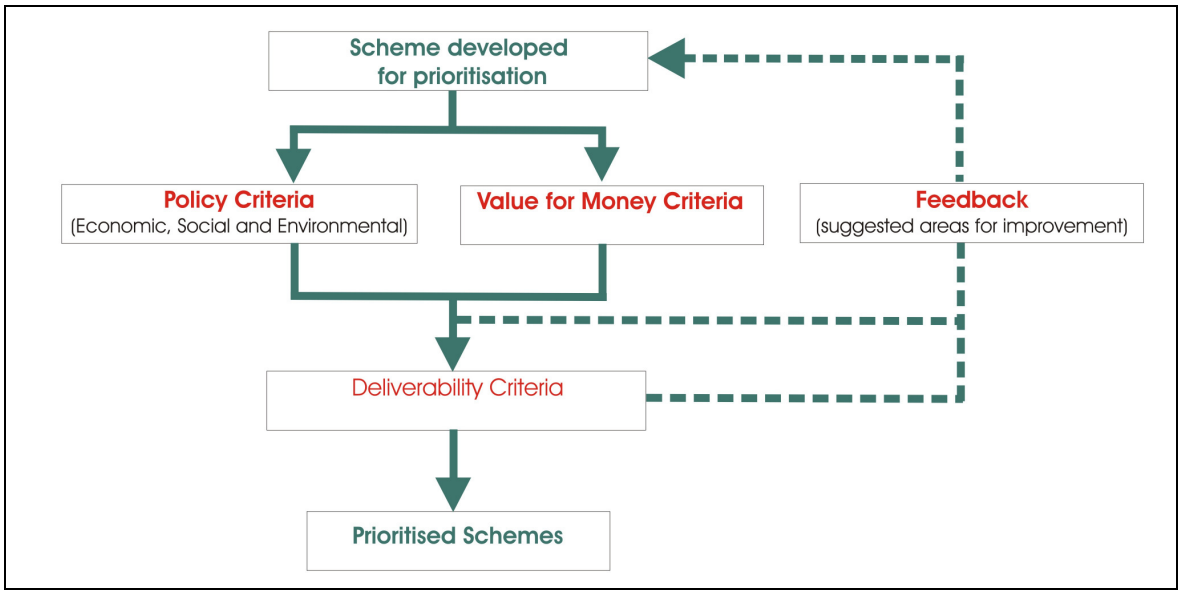
[7] Regions' advice on transport regional funding allocations – the first round, DfT, 20 July 2006
[8] Review of Regional Funding Priorities for Transport, report to Yorkshire and Humber Regional Transport Board, YHA, 30th November 2007

JMP) to undertake work to help formulate this advice by developing the prioritisation methodology by which the region's priorities for transport investment and management were identified.

1.23 This work was supported by a review of the transport evidence base being used to inform the Regional Spatial Strategy (RSS), to establish its soundness, and to identify any gaps. Subsequently, the Government Office commissioned JMP to take this work forward in support of the Regional Funding Allocations process by undertaking the prioritisation of existing and emerging Highways Agency and Local Transport Plan major transport schemes and interventions using the prioritisation methodology that had been developed.

1.24 The adopted methodological approach for Yorkshire and Humber is outlined in the diagram below:

F1.1 Yorkshire & Humber methodology for regional funding allocations



1.25 The methodology has been derived as one that informs the decision making process, rather than one that provides the overriding basis for decision making.

1.26 The methodology is made up of three clear dimensions; policy criteria, value for money and deliverability. The policy dimension of the methodology has been developed with close reference to the emerging Regional Spatial Strategy, the Regional Economic Strategy and other key national and regional policy documents. It has also been developed to ensure compatibility with the Northern Way connectivity work stream. The methodology is therefore focussed on identifying the schemes best placed to deliver good value solutions to deliver the key wider policy outcomes of the region.

1.27 This methodology, as refreshed by the Yorkshire and Humber Assembly in spring 2007 remains the accepted means by which emerging potential major transport infrastructure schemes are assessed within the Yorkshire and Humber region, for consideration for inclusion in the region's RFA transport priority schemes.

Approach to this study, and structure of this report

1.28 Consequently, there are two key elements of this study reported here, namely:

- A transportation and engineering feasibility study for an alternative crossing of the River Derwent by the A166 at Stamford Bridge;
- An assessment of the chosen options from the aforementioned feasibility study against the criteria to obtain regional approval under the RFA process in the Yorkshire and Humber region, a requirement for pursuing with government a funding bid for a major scheme on the A166 at Stamford Bridge.

1.29 This report seeks to outline the whole of this process from identifying the feasible options, through to understanding the likelihood of these options receiving the support required at regional level to pursue such a funding bid. The requirements of the adopted RFA methodology for the Yorkshire and Humber region are broadly that any scheme shows a good fit with adopted regional policy, represents good value for money, and is deliverable.

1.30 In assessments of proposals under this methodology it is vital that robust assessments of all three dimensions can be provided in order that the Regional Transport Board can take a well informed view on any schemes presented before the Board for inclusion in advice to Government. At the meeting of the Board on 20 April 2007 emphasis was placed on the need for a robust value for money assessment being presented by scheme promoters in the form of a benefit cost ratio (BCR) in line with the Department for Transport's requirements on such matters. Hence, the analysis required in this study must include technical work to supply a robust BCR for any proposal.

1.31 Consequently, the remainder of the report is structured as follows:

- **Chapter 2** provides an assessment of the engineering feasibility of options for providing an alternative river crossing or bypass for Stamford Bridge. This chapter also provides information on any deliverability issues arising from this engineering feasibility study;
- **Chapter 3** provides a value for money assessment of two selected options based on the feasibility work undertaken;
- **Chapter 4** provides a review of current processes for obtaining the Yorkshire and Humber region's backing as a regional transport priority for inclusion in future RFA guidance to government and an assessment of the fit with adopted regional policy of the options identified; and
- And finally **Chapter 5** provides summary assessments of the two options examined at Stamford Bridge under the RFA methodology, conclusions and recommendations.

1.32 All figures referenced in this document and not indicated as part of the text can be found in a section labelled 'Figures' towards the rear of this document. Similarly, appendices containing relevant information can be found to the rear of this document.

1.33 This feasibility study follows established guidance and methodologies for the assessment of major transport schemes as far as is achievable within the time and budget constraints. These include:

- Design Manual for Roads and Bridges, Department for Transport (DfT)
- Guidance on Transport Assessments (IHT)
- DfT Transport Appraisal Guidance (WebTAG)

2 Engineering Feasibility and Project Delivery

Introduction

2.1 Stamford Bridge is a village and civil parish in the East Riding of Yorkshire, located approximately seven miles to the east of York. The Stamford Bridge parish has a population of 3,394 (National Statistics; 2001 Census). The village is positioned on the River Derwent, which bisects the village.

2.2 The A166 provides access to Stamford Bridge from York and the East Riding coast. Stamford Bridge itself, a narrow stone structure constructed in 1727 and located in the village centre provides a crossing for traffic on the A166. The bridge is a Grade II* listed structure which can only accommodate a one-way flow of traffic. Flow of traffic over the bridge is controlled by a traffic signal 'shuttle' arrangement which minimises the delay to traffic over the bridge. This results in traffic congestion in the centre of Stamford Bridge, which increases journey times and delay.

2.3 **Figure 1** is a Location Plan showing the relevant road network, the proximity of the village to York and Driffield and the River Derwent. Figure 1 can be found in a section labelled 'Figures' to the rear of this document.

Methodology

2.4 As discussed in the previous section, this study has two elements. The first of these is the investigation for and development of feasible options for the provision of a second crossing of the River Derwent, achieving optimal value for money whilst taking into account as many constraining factors as possible.

2.5 This chapter of the report details the feasibility study and development of options for a second crossing. The chapter concludes with the presentation of the preferred choice(s) for a second crossing and discusses the risks to the deliverability of the chosen options.

2.6 Following this methodology statement, this chapter of the report has the following sections:

- Site investigation;
- Data collection;
- Option development; and
- Presentation of the preferred option.

2.7 This engineering feasibility stage is characterised by data gathering, desk-top study and site investigation to identify the constraints and opportunities within the study area. In doing this, the engineering team is compiling important information that allows the development and assessment of options based on known facts.

2.8 Using the information gained, the team developed feasible solutions whose various merits are then discussed and compared, including an assessment of the existing situation.

2.9 Sufficient design has been undertaken to allow the fair comparison of the options identified. This assessment identifies viable options and also removes unfeasible options. The assessment is broadly based upon:

1. Environmental impact;
2. Safety; and
3. Economics, in so far as the cost estimate for the option.

2.10 The preferred options have been chosen from this comparison.

2.11 A cost estimate for each preferred option has been provided based on approximate costs from Spon's Civil Engineering Price Book 2008. These are, by necessity of the design level, approximate and allowances are then made for unforeseeable risks through contingencies.

Site Investigation

Methodology

On-site investigation

2.12 A team from JMP visited Stamford Bridge on the 8th of October to carry out a site investigation and to collect information required to inform the development of options. This includes carrying out journey time surveys and recording signal timings, topographical features, road carriageway geometry, facilities and services, bus routes and timetables and location of utility infrastructures.

Desk top study

2.13 Subsequent to the site visit, a comprehensive desk top study was done to collect further information required for the task (such as significant environmental designations and features, archaeological and cultural heritage and flood risk). A number of official websites for statutory bodies were interrogated for this purpose including English Heritage, Natural England and The Environment Agency. The 'MAGIC' (Multi-Agency Geographic Information for the Countryside) website was also used to map information provided by the Department of Environment, Food and Rural Affairs (DEFRA) such as definitive rural designation boundaries and information about rural land-based schemes.

2.14 This information allowed the team to identify the constraints that need to be considered during the development of feasible engineering options for an alternative river crossing.

2.15 The Planning and Development Control department of East Riding of Yorkshire Council was consulted regarding protected structures in Stamford Bridge. JMP was provided with a record of listed buildings and monuments in Stamford Bridge. The only protected structure of particular relevance to this study is Stamford Bridge itself.

2.16 **Figures 2** and **3** display the constraints identified during the site visit and the desk top study. These are discussed in further detail in the following paragraphs.

Data Collection

2.17 Traffic data collected from site or from existing sources is detailed in **Section 4**. Summaries of the various data are included in this section.

Identified Constraints

A166

2.18 The A166 through Stamford Bridge, whilst being a principal road through the area, has the alignment of a much slower and less important road. This is mainly due to the constraints of the village centre, such as the listed bridge and properties along the main street.

2.19 The A166 is a historical route and as such was not designed to current road standards. However, whilst the radii on the approach to the listed bridge are lower than the design standard for a 30mph principal road, the alignment does not prevent the passage of any vehicular traffic and slows traffic through the centre with benefits to safety.

2.20 The A166 is single carriageway into and out of Stamford Bridge, and approximately 7.3 metres wide on average. There is restricted visibility on the A166 on both approaches into Stamford Bridge. The location of these points is displayed in **Figure 2**.

2.21 The road alignment is relatively flat to the west of Stamford Bridge. The vertical alignment of the road increases as it leaves the village and flattens out again after the main residential area to the east of the village.

2.22 There is a puffin crossing in the village centre, opposite The Square which causes delay (albeit minimal) to A166 traffic in Stamford Bridge. There are footpaths along the A166 through Stamford Bridge, however these are not continuous and at some locations pedestrians are forced to cross the road to continue on the footpath which presents a safety issue. Additionally, there are pedestrian refuge islands to the east of the village in the main residential area.

2.23 The priority junction with Buttercrambe Road is used by heavy good vehicles accessing the plastics factory.

Road Bridge

2.24 The existing bridge crossing of the River Derwent in Stamford Bridge is too narrow to accommodate two-way traffic. As mentioned previously, the bridge is a Grade II* listed structure and therefore any option developed must not have an adverse impact on the structure.

2.25 A separate bridge to the immediate east accommodates a pedestrian footpath alongside the road carriageway, which would also have to be protected or replaced in order to maintain the pedestrian network in the village. Some of the options outlined in this report propose to demolish the footbridge.

2.26 The width of the bridge allows only one way traffic flow and therefore use of the bridge is controlled by traffic signals. There have been changes to the traffic signals by EYRC to improve the delay to traffic using the bridge by the incorporation of MOVA. This change took effect after the surveys detailed in this report were undertaken.

2.27 MOVA is a form of control that uses loop detectors on all approaches to the signals to monitor the traffic flow and adjust the signals to minimise delays, or in congested situations, to maximise capacity. Since it continually monitors approaching traffic at distances of approximately, it can identify approaching platoons of traffic and respond to them. Thus, there should be a recognisable improvement in delay to traffic as a result of the signals and in the length of queues on the approaches to the bridge/signals.

2.28 Earlier this year, the existing bridge was closed for restoration, parapet strengthening and stone repair works that were required as a consequence of the heavy traffic volume. During this closure, traffic was diverted onto the A1079 to Shiptonthorpe, and to the A614 to Driffield. Refer to **Figure 1**.

River Derwent

2.29 Stamford Bridge has suffered from severe flooding in recent years. The village was flooded by the River Derwent in 1999 and 2000. On both occasions, the water level reached five metres above its normal level. Subsequently, flood defences were installed.

2.30 Flood maps for the area were obtained from the Environment Agency's website. The extent of the natural floodplain is displayed in Figures 2 and 3. The original plans are available in **Appendix A**. The purple lines depict flood defences that have been built in the last five years to protect Stamford

Bridge against 1 in 100 year floods. The black hatched lines show areas that benefit from the flood defences shown.

2.31 A sluice is present on the northern bank of the River Derwent to the east of the bridge to control water level and flow rate of the Derwent and to prevent flooding downstream.

Topography

2.32 The topography of the area surrounding Stamford Bridge is relatively flat. There are no significant changes in level or gradient that should affect option development.

Railway Viaduct

2.33 The railway viaduct located to the west of the village originally carried the York to Beverley railway link across the River Derwent. The viaduct is of brick construction, formed of several arches on either side of the river and a single wider wrought-iron span in the centre that crosses the Derwent.

2.34 The viaduct is now protected as a Grade II listed monument and carries a public cycle route. Any option developed must not have an adverse impact on this protected structure.

2.35 There are two earth embankments located on both sides of the river to the east of the viaduct to achieve a significant clearance height above the river. The original height of the rail gauge is not known; however it is substantial and therefore represents a significant barrier in this area of Stamford Bridge.

Utilities

2.36 Figures 2 and 3 show the main lines of passage of the utilities. At this stage, only the major underground and overground services have been shown i.e. those that pose a priority risk to the project complexity, cost and health and safety. Utilities can have significant cost implications for the project and pose health and safety risks. Any incursion onto these is avoided where at all possible.

2.37 Water mains and traffic light cables cross the river within the existing road bridge. The pedestrian footbridge carries infrastructure for all other utilities. Additionally, water and electricity mains run along the A166 to the west and east of the centre and along Buttercrambe Road.

Extent of Development

2.38 The majority of residential development in Stamford Bridge is located to the south of the A166 (refer to **Figure 3**).

Caravan Site

2.39 The Weir Caravan Park is located in Stamford Bridge, on the northern bank of the River Derwent and accessible via Buttercrambe Road.

McKechnie Plastics Factory

2.40 The plastics factory located off the A166 in Stamford Bridge is a generator of both HGV and private vehicular traffic. It is also located in close proximity to the bridge. HGV vehicles access the site via Buttercrambe Road (refer to **Figure 2**).

Public Transport

2.41 Two public transport providers operate a bus service through Stamford Bridge. The number 10 service operated by First serves the route between Stamford Bridge, York and Poppleton, with a 20 minute frequency during the day, and 60 minute frequency in the evenings and on Sundays. The number 10 serves the residential area to the south of the A166 (accessible by Burton Fields Road) before beginning its westbound route back to York.

2.42 The number 747 operated by East Yorkshire Motor Services serves the route between York, Stamford Bridge, Full Sutton, Fangfoss, Bolton and Pocklington. This service is available 3-4 times a day but there is no service in the evenings or on Sunday.

2.43 Buses travelling westbound through Stamford Bridge cause delay to mainstream traffic, because the bus stop is located within the carriageway outside the public conveniences. Thus mainstream traffic is held behind the bus as passengers board and alight the bus.

2.44 Buses travelling eastbound through Stamford Bridge can stop in a lay-by off the main carriageway at the village square. Therefore the eastbound buses have minimal impact on traffic flow.

Parking

2.45 There are several designated parking areas in Stamford Bridge. These are located off Viking Road, in The Square and adjacent to the Memorial. All of these parking areas allow one hour free parking in designated bays. The Viking Road car park is the largest, with 47 spaces available. An off-street parking area (without designated bays) is located on Main Street outside a cluster of local shops.

Archaeological

2.46 There is a registered battlefield to the south of Stamford Bridge, where the last Viking battle occurred in England in 1066. The battlefield is located south of the A166 and the general residential area. Its exact location is displayed in Figure 3. However, the battlefield is unlikely to be a significant constraint because it lies a significant distance from Stamford Bridge centre.

Environmental

2.47 There are areas surrounding Stamford Bridge that have environmental significance, identified on the MAGIC website. The River Derwent Special Area of Conservation runs through the length of Stamford Bridge to Buttercrambe (refer to **Figure 3**).

Statutory Rural Designations

2.48 The River Derwent is a Site of Special Scientific Interest (SSSI) along its length up and down stream from Stamford Bridge. There are also a couple of smaller SSSIs to the north of Stamford Bridge, adjacent to the River Derwent upstream. These will have to be avoided in any proposals. The location of these statutory rural designations can be viewed in **Figures 2** and **3**.

Habitat Inventories

2.49 The desk study identified forest and woodland habitats to the north of Stamford Bridge that are listed on the National Inventory of Woodland and Trees for England. Habitats are located in proximity to the Weir Caravan Park, adjacent to the River Derwent upstream of the Caravan Park and in areas surrounding Upper Helmsley (which includes replanted ancient woodland). Refer to **Figure 3** for the exact locations of these habitats. There should be no adverse impact on these habitats as a result of the alternative river crossing.

Local Plan

2.50 The East Riding of Yorkshire's Local Plan highlights the village of Stamford Bridge as a conservation area. Additionally, a section of the River Derwent is designated as a 'National Nature Conservation Site' in the Local Plan. Policies EN19 and EN9 relate to these designations respectively.

2.51 Refer to Appendix B for the Local Plan's Inset Map for Stamford Bridge.

Land ownership

2.52 The York Land Registry was contacted for information regarding land ownership in the Stamford Bridge area. A significant area of land both within and to the north of Stamford Bridge is privately owned. This could restrict the deliverability of any proposals. Stamford Bridge is privately owned. This could restrict the deliverability of any proposals.

Local businesses

2.53 There are a variety of businesses in Stamford Bridge, many of which are located on the main road through the centre of the village. Stamford Bridge is both a popular destination for day-trips and as a through route for traffic to the coast.

Data Collection

2.54 In order to undertake option development, it was necessary to understand the operation of the A166 through Stamford Bridge in traffic terms. To this end, the following data was collected:

- Origin-destination surveys – external survey company;
- Automatic Traffic Count (ATC) Data on the A166;
- Accident data from EYRC;
- Journey Time Surveys - undertaken by JMP;

2.55 **Figure 4** shows the data collection points used for the above surveys.

2.56 The traffic demand on the A166 does not exceed the maximum set for a 7.3 metre single carriageway all purpose road (as identified by the Design Manual For Roads and Bridges Chapter 5 Section 1 Part 3 TD79/99 Traffic Capacity of Urban Roads Table 2). This is true for both present demand (traffic flows obtained from ATC data) and also under a future traffic growth predicted to be 15.7% in the ERYC area by 2017. Therefore, any new link roads should be designed to the same standard.

2.57 Accident data was provided for the area by East Riding of Yorkshire Council. The data provides information on the location, severity, vehicle manoeuvres, casualty and age. The data is displayed graphically in **Figure 5**. There are no particular accident patterns evident.

2.58 The traffic data collection element of the work is explained in more detail in **Chapter 3**.

Summary of the Existing Conditions

2.59 Traffic flow through Stamford Bridge is currently constrained by the Grade II listed bridge over the River Derwent. The width of the bridge allows only one way traffic flow and therefore use of the bridge is controlled by traffic signals. There have been changes to the traffic signals by EYRC to improve the delay to traffic using the bridge by the incorporation of MOVA. This will have improved both the delay incurred by traffic at the signals and the resultant queues but further survey work over a longer period will confirm this.

2.60 However, MOVA was incorporated into the signals after the surveys for this project were undertaken, hence the data from the surveys used to prepare this report represent the previous existing situation before any benefits of MOVA are taken into account.

2.61 From the data collection undertaken for this project, the journey time surveys show that traffic waiting for the traffic signals at the bridge are only delayed for one cycle of the traffic signals and pass over the bridge at the first available green aspect. Journey times in the AM and PM Peaks were found to be between three and seven minutes.

Option Development

2.62 Following from the initial site investigation and desk top study, the next stage of the project is to start identifying feasible options for the second river crossing. These have to consider all the constraints and opportunities identified in the previous sections.

2.63 This section details the options that have been identified, presents a sketch of each and discusses the various merits and disadvantages of each option.

2.64 All drawings referred to in this section can be found in the **Figures** section towards the rear of this document.

Requirements of Design

Common Elements

2.65 When identifying feasible options, there are elements of the design of these that are common to all options. These are detailed below.

Road Standard

2.66 The existing A166 through Stamford Bridge is a 30mph single carriageway. However this is a principal road and although not a trunk road, should be designed using the Design Manual for Roads and Bridges (DMRB). The design of any new link which is close to the centre of Stamford Bridge and short in length should be designed to the DMRB TD 9/93 Highway Link Design with a 30mph design speed to maintain consistency with the local road network.

2.67 A longer alignment, further from the centre and passing around Stamford Bridge may be designed to a higher design speed to maintain consistency in speed limits on the A166 to the west and east of Stamford Bridge.

2.68 Design standards that apply are identified on each of the option drawings.

2.69 The design criteria to be applied can be decided by the highways authority who may decide that the DMRB is too restrictive and does not allow consistency with the existing A166 alignment through Stamford Bridge. Whilst it is desirable to have a standard alignment, the larger radii this requires may encourage higher speeds than currently experienced in the centre of Stamford Bridge. Thus, it may be possible to adjust the alignments shown in the options drawings to allow smaller radii.

Traffic Flows

2.70 The Automatic Traffic Count data provided by City of York Council and East Riding of Yorkshire Council (refer to chapter 3 of this report) identifies that current traffic flows on the A166 through Stamford are between 4300-5300 vehicles two-way 24 hour Annual Average Daily Traffic (AADT) or a peak hour flow of less than 700 vehicles per hour (weekday) and a maximum of around 275 vehicles per hour on a weekend.

2.71 DMRB TD79/99 identifies the two-way AADT capacity of different road standards. Table 2 of TD79/99 indicates the road standard that is required for the predicted traffic. Therefore, assuming that any new road link would be required to accommodate the existing two-way traffic only, the existing road standard (7.3 metre single carriageway) is adequate. Any new link road will be provided to this standard.

2.72 Clearly there will be traffic that will need to use the centre of Stamford Bridge and there may be suppressed demand for a bypass (i.e. traffic that is not using the A166 through Stamford Bridge because of the delays at present which may use a bypass once opened).

Option 1 – New Link to the West of the Existing Bridge

2.73 There are two alternatives for Option 1 and these are shown in drawings **D083009/P/001A** and **001B**. The figures show a new link road to the west of the existing bridge. The figures detail both the design standards used in the design of the road and also summarise the pros and cons of each alternative, reflecting the constraints identified in the previous sections.

2.74 The new link to the west of the bridge would commence from the junction of the A166 and Viking Road and rejoin the A166 to the west of Stamford Bridge. Visibility on the approach to the Stamford Bridge residential area from the west is constrained by the vertical alignment of the road. This has been considered in the siting of new junctions in this and all other options.

2.75 Both options are built over the flood plains and defences and therefore may affect the flooding regime of the river and the effectiveness of the defences. The undeveloped area to the west of the existing bridge is also a protected habitat area.

Option 1a – Gyratory

2.76 A new link road would be constructed between Viking Road and the A166 as shown in drawing **D083009/P/001A**. The link would be 580 metres in length and would carry traffic in a westerly direction only. The link would form a gyratory with the existing A166, so that the existing A166 alignment carried only eastbound traffic over the existing listed bridge structure. This would negate the need for traffic signals (which would be removed) over the listed bridge structure and reduce delay.

2.77 This link would have a design speed of 30mph and would be a single link around 4 metres wide with verges to allow passing in the event of a breakdown or accident. There would be footpaths provided on either side of the link.

2.78 The treatment of the junctions at either end of the new link where it rejoins the A166 eastbound is very important particularly at the eastern end where the area available for a junction is limited and the topography is not ideal.

2.79 The new link and junctions at either end of the link would need to accommodate the movements of both public transport and HGV traffic from the factory. This may mean that the junctions are traffic controlled and require a large area of land or existing carriageway.

2.80 This option would require the construction of a new bridge structure over the River Derwent. The new bridge is located approximately 200m downstream of the existing bridge and carries westbound traffic only.

2.81 The bridge is curved on plan with a high degree of skew over the river and would require embankments on the approaches to the crossing. The bridge would have a 80 metre main span and a 15 metre side span (flood relief channel) either side, giving an overall length of 110 metres. The bridge would have a total width of nine metres, consisting four metres wide carriageway and two, two metre wide verges with two 0.5m wide parapet string courses.

2.82 The summary table of pros and cons for Option 1a can be found on drawing **D083009/P/001A**.

Option 1b – New Two Way Link

2.83 A new two-way link road would be constructed along the same alignment as Option 1a and is shown in drawing **D083009/P/001B**. The alignment would carry traffic travelling in both directions therefore unimpeded by the existing traffic signals.

2.84 The existing A166 would then be de-prioritised to a local road. Junctions at either end of the new link would give priority to the link road traffic and only local traffic, including that associated with the factory, would use the existing A166.

2.85 The traffic levels over the listed bridge would be significantly reduced. Following the establishment of a new link, the bridge could be completely closed to vehicular traffic and the A166 from the west past the factory effectively converted to a cul-de-sac to motorised vehicles. This would concentrate all local traffic on one junction at the western end of the new link as shown. This would also allow the removal of the existing pedestrian footbridge.

2.86 It is likely that the junction would have to be signalised to allow local traffic to join the new link road, however the delay incurred at these signals would be significantly less than that at the traffic signals operating at the bridge presently. In this case, no junction would be required at the eastern end of the new link.

2.87 Again, the link would have a design speed of 30mph and would be a 7.3 metre wide single carriageway with footpaths and verges on either side.

2.88 The treatment of the junctions at either end of the new link where it rejoins the A166 eastbound is very important particularly at the eastern end where the area available for a junction is limited and the topography is not ideal.

2.89 This option would require the construction of a new bridge structure over the River Derwent. The new bridge is located approximately 200m downstream of the existing bridge and carries two-way traffic.

2.90 The bridge is curved on plan with a high degree of skew over the river and would require embankments on the approaches to the crossing. The bridge would have an 80 metre main span and a 15 metre side span (flood relief channel) either side, giving an overall length of 110 metres. The bridge would have a total width of 12.3 metres, consisting 7.3 metres wide carriageway and two, two metre wide verges with two 0.5m wide parapet string courses.

2.91 The summary table of pros and cons for Option 1b can be found on drawing **D083009/P/001B**.

Option 2 – New Bridge Construction

2.92 This option is shown on drawing **D083009/P/002**. The drawing shows a link to the west of the existing bridge. The drawing details both the design standards used in the design of the road and also summarise the pros and cons of this option, reflecting on the constraints identified in the previous sections.

2.93 It should be noted that drawing **D083009/P/002** shows a new bridge to the immediate west of the existing bridge. There are a number of options that might take an alignment that lies somewhere between Option 1 and Option 2, however for ease of assessment, the two extremes are shown. Any options, for example, that lie between Option 1 and Option 2 would require the demolition of residential dwellings and have therefore not been examined further at this time.

2.94 This option requires a new bridge to be built to the west of the existing bridge. This would allow two way movement across the river over two structures; the newer structure would carry westbound traffic and the older, listed structure, eastbound traffic.

2.95 Given space constraints in the immediate vicinity of the existing bridge, following construction, the new bridge would carry westbound traffic and the existing bridge the eastbound traffic, rather than constructing a full-carriageway width bridge. Pedestrian footpaths would be provided across the new bridge and the existing bridge. The existing pedestrian footbridge could therefore be removed.

2.96 It is suggested that the bridge be constructed to the west of the existing bridge. Any structure to the east would be constrained by the flood defence walls, the veterinary surgery and the pub car park to the south over which the bridge is retained. Thus the structure would be complex and expensive to build. Construction to the west can utilise existing highway alignments and structures.

2.97 The bridge would have a 35 metre main span and a ten metre side span (flood relief channel) either side, giving an overall length of 55 metres. The bridge would have a total width of 7.6 metres, consisting four metres wide carriageway and one, two metre wide hard verge to the western side of the bridge, one 0.6 metre wide hard strip to the eastern side of the bridge and two 0.5m wide parapet string courses.

2.98 There are a number of options for the design of the bridge, ranging from a modern construction to a masonry construction. It is assumed that for the purposes of cost estimates, it will be necessary to construct a masonry bridge rather than a 'modern' alternative due to the proximity of a listed structure. This would also require the incorporation of a central pier into the structure, which will increase costs.

2.99 The bridge is located in the flood plain and therefore flood alleviation measures would be required to gain Environment Agency approval. However the new bridge in this option would be located close to the existing bridge and cross sectional areas should be maintained. The east abutment would have to be set back to match the existing bridge.

2.100 This option requires the construction of a new bridge very close to the existing listed bridge. This would require the acquisition of third-party land and planning approval for the new bridge. Obtaining approval for this option will be a costly exercise and the design of the proposals thoroughly debated. The new construction would also be complex and hard to access, and there would need to be changes to the junctions at either end of the existing bridge.

2.101 The summary table of pros and cons for Option 2 can be found on drawing **D083009/P/002**.

Option 3 – Buttercrambe Road Link Road

2.102 This option is shown on drawing **D083009/P/003**. The drawing shows a new link road between the Buttercrambe Road and the east of Stamford Bridge, rejoining the junction with Burton Fields Road. The drawing details both the design standards used in the design of the road and also summarises the pros and cons of this option, reflecting on the constraints identified in the previous sections.

2.103 The new link road develops from the existing HGV access to the factory before passing to the north of the caravan park, over the flood plain to join Bridlington Road at a roundabout. The existing alignment of the A166 approaching the factory from the west would be utilised and the existing bridge bypassed.

2.104 The link road would be a two- way 7.3 metre wide 30mph link road to maintain consistency with the speed limit through Stamford Bridge and is some 460 metres in length. The HGV access to the

factory would have to be rationalized so that all traffic from Buttercrambe Road and the factory accesses can use a new junction with the link road.

2.105 The existing bridge would be closed to vehicular traffic; therefore access to the central area would only be possible from the proposed roundabout to the east of Stamford Bridge. This would reduce the traffic levels through the majority of Stamford Bridge centre and allow the existing pedestrian bridge to be removed.

2.106 This option would require the construction of a new bridge structure over the River Derwent. The new river crossing is located approximately 400m upstream of the existing bridge and carries two-way traffic over the River Derwent.

2.107 The bridge would have a 35 metre main span and a ten metre side span (flood relief channel) either side, giving an overall length of 55 metres. The bridge has a total width of 12.3 metres, consisting 7.3 metres wide carriageway and two, two metre wide verges with two 0.5m wide parapet string courses.

2.108 This option would have to span both existing flood defences and the river and traverse flood plain. However, the topography is relatively flat and this should reduce construction complexity.

2.109 The summary table of pros and cons for Option 3 can be found on drawing **D083009/P/003**.

Option 4 – Northern Bypass

2.110 This option is shown on drawing **D083009/P/004**. The drawing shows a bypass of Stamford Bridge to the north of the village between the A166 to the west of the railway embankment to the east of Stamford Bridge. The drawing details both the design standards used in the design of the road and also summarises the pros and cons of this option, reflecting on the constraints identified in the previous sections.

2.111 The new road develops from the immediate west of the railway viaduct. The road then bypasses Stamford Bridge north of the residential area, crosses Buttercrambe Road and rejoins the A166 at Burton Fields Road.

2.112 The bypass would be a two- way 7.3 metre wide 60mph single carriageway to maintain consistency between the existing road and existing speed limits and the bypass. The route, as shown on **D083009/P/004** is approximately 2.3 kilometres in length. The flow of traffic on the bypass would be continuous and to maintain consistency with the speed limit to the east and west of Stamford Bridge the speed limit of the road would be 60 mph. All proposed junctions with the new bypass would be priority junctions, most likely in the form of ghost island right turn layouts.

2.113 Clearly, the traffic levels through the village centre would be reduced, and it would be possible to both close the existing bridge to vehicular traffic, and remove the existing pedestrian bridge, or to retain the traffic signals and allow traffic to continue to use the bridge.

2.114 This option would require the construction of a new bridge structure over the River Derwent. The new river crossing is located approximately 700m upstream of the existing bridge and carries two-way traffic over the River Derwent.

2.115 The bridge is straight on plan but has a skew span across the river. The bridge would have a 45 metre main span and a ten metre side span (flood relief channel) either side, giving an overall length of 65 metres. The bridge would have a total width of 12.3 metres, consisting 7.3 metres wide carriageway and two, two metre wide verges with two 0.5m wide parapet string courses.

2.116 This option would have to span both existing flood defences and the river and traverse flood plain. However, the topography is relatively flat and this should reduce construction complexity.

2.117 The summary table of pros and cons for Option 4 can be found on drawing **D083009/P/004**.

Option Using the Existing Viaduct

2.118 This option has been proposed on a number of occasions in the past. The option is not feasible and has therefore been discounted from the option development. This is for the following reasons:

- The viaduct is not continuous; it terminates shortly after its southern extremity. Lengthening this would require the demolition of numerous residential dwellings;
- The difference in height between the A166 and the viaduct could not be overcome without significant embankments on the approaches, increasing the footprint of the option;
- There is a well established SUSTRANS cycle route running atop the viaduct;
- An option to the south of the river may affect the battlefield.
- Land availability; this option would require significant uptake of third party land.

2.119 Due to these reasons this option has not been considered feasible, not least on the issue of cost, and has been taken no further in the assessment process.

Southern Bypass Option

2.120 This option is also not feasible. This is for the following reasons:

- The location of the Battlefield site to the south of Stamford Bridge;
- Land availability; this option would require significant uptake of third party land;
- The high cost of the option; and
- The environmental footprint of such a scheme.

Comparison of Options

2.121 The drawing for each option 1 to 4 shows a summary table identifying the pros and cons of each option. These should be noted as they form the basis for comparison of the options.

2.122 Sufficient design and investigation has been undertaken in the previous section to allow the fair comparison of the options identified. This investigation has identified viable options that can be compared quantitatively or qualitatively to select a preferred option. This simple comparison has been undertaken comparing the following variables:

1. Environmental (Air quality, landscape, heritage, biodiversity, water);
2. Safety (Accidents, these may be increased with a new link road); and
3. Cost (economic efficiency based on cost and benefits such as the reduction of congestion is the subject of further appraisal later in this report).

2.123 Integration has not been looked at in detail in this section. This is done under the further appraisal in this report.

2.124 **Table 2.1** overleaf shows the comparison of the options. The method of comparison is simply an assessment of whether the option has a positive (+2), slightly positive (+1), neutral (0), slightly negative (-1) or negative (-2) effect on the variable.

T2.1 Option Comparison Table

Option/ Variable	Environment	Safety	Cost	Score
Option 1a	-2	0	-1	-3
Option 1b	-2	0	-1	-3
Option 2	-1	0	-1	-2
Option 3	-2	+1	-1	-2
Option 4	-2	+1	-2	-3

Preferred Solutions

Identification of the Preferred Solutions

2.125 Based on the findings of the comparison in the previous sections, the preferred options are identified as:

1. Option 2 – New Bridge Construction
2. Option 3 – Buttercrambe Road Link Road

2.126 Options 2 and 3 are shown in drawings **D083009/D/002** and **D083009/D/003** and can be found in the **Figures** section to the rear of this document. The drawings show the options in more detail.

Option 2

2.127 Option 2 is likely to be the least cost option of the options presented in Section 5. It is shortest in length, allows two-way traffic through the village centre and is likely to have less serious consequences for the river and the flood regime. This option would allow the removal of the existing pedestrian bridge. Option 2 is, however, very close to the existing listed bridge, would require the acquisition of third-party land and does not address the issue of traffic running through the village centre.

2.128 This option proposes a new bridge structure close to the existing listed bridge. Therefore, obtaining approval for this option would be a costly exercise and the design of the proposals thoroughly debated.

Option 3

2.129 Option 3 is not the costliest option of the five presented, but would involve significant cost due to the river crossing and the length of the new link road. It allows traffic to bypass the majority of the village centre, unimpeded by traffic signals, along a 30mph single carriageway link. The existing bridge could be closed to traffic and only utilised by non-motorised users. To retain the signals at the bridge would complicate the existing junction to the north of the bridge, as vehicles queuing to cross the bridge would block the new link road.

Cost Estimates

2.130 In order for further appraisal of the costs and benefits of both options, it is necessary to estimate the cost of both options. This is done using the Spon's Civil Engineering Price Book 2008 Approximate Costs (Chapter 11). The approximate costs are used to provide a cost estimate for feasibility design at an early stage in a project.

2.131 The cost estimates have been broken down into cost of road elements, structural elements and inclusions for unknowns such as utilities diversion and an optimism bias of 40%, the usual applied to road schemes at this stage in the design process. A contingency of 20% has been added to account for design and construction risk, and design and supervision fees account for 15% which is an industry accepted norm.

2.132 The cost estimates include utilities diversion. However this cannot be accurately predicted at this time. This cost would be investigated further with the utilities companies whose plant was affected.

2.133 It should be noted that the cost estimates do not account for the following:

- Land purchase; and
- Remediation for ground conditions.

2.134 The cost estimates are intended to be robust as there are a significant number of unknowns, such as those given above, which could affect the final outturn cost of the scheme. The contingency applied is significant for this reason.

Option 2

2.135 **Table 2.2** below shows the breakdown of the cost estimate for Option 2.

2.136 For the purposes of the cost estimate it has been assumed complete re-grading of the two priority junctions, one either end of the new bridge, to allow for the new road alignment. It may be necessary to construct retaining structures and/or embankments to achieve this, particularly on the eastern approach. The cost of these retaining walls will be higher than normal as they would need to be aesthetically pleasing.

2.137 The bridge would have a 35 metre main span and a 10 metre side span (flood relief channel) either side, giving an overall length of 55 metres. The bridge would have a total width of 7.6 metres, consisting four metres wide carriageway and one, two metre wide verge and one 0.6 metre hard strip with two 0.5m wide parapet string courses.

2.138 Based on information received from ERYC the costs of bridges can be estimated in relation to the size of the bridge. The bridge required in this option is a medium sized structure. The bridge area is estimated as 418m2.

2.139 The bridge is located close to the existing structure and therefore the cost of constructing the bridge will be higher than for a standard bridge construction. Based on figures supplied by the Highways Agency we have estimated the bridge cost based on a construction cost of £3,500 per sq.m.

T2.2 Cost Element for Option 2

Cost Element	Cost (£M)
New link road	0.96
Priority junctions (2 No.)	0.60
Roundabout	0.60
New bridge structure	2.03
Utilities Diversion	0.10
Removal of existing footbridge	0.30
Flood Remediation works	0.50
Total costs	5.09
Contingency (20%)	1.02
Fees (15%)	0.76
Sub-total	6.87
Optimism Bias (40%)	2.75
Total	**£9.62M**

Option 3

2.140 **Table 2.3** below shows the breakdown of the cost estimate for Option 3.

2.141 For the purpose of the cost estimate, it has been assumed that the new road is a 7.3 metre single carriageway with a 2.0 metre verge to either side as a minimum. A footpath has not been accounted for. Non-motorised users would be encouraged to use the less-trafficked routes of the village centre.

2.142 The bridge would have a 35 metre main span and a 10 metre side span (flood relief channel) either side, giving an overall length of 55 metres. The bridge would have a total width of 12.3 metres, consisting 7.3 metres wide carriageway and two, two metre wide verges with two 0.5m wide parapet string courses

2.143 Based on information received from ERYC the costs of bridges can be estimated in relation to the size of the bridge. The bridge required in this option is a medium sized structure and is likely to be at the higher price range due to the curved geometry. The bridge area is estimated as 677m2.

2.144 Based on figures supplied by the Highways Agency we have estimated the bridge cost based on a construction cost of £3,000 per sq.m.

T2.3 Cost Element for Option 3

Cost Element	Cost (£M)
New link road	0.96
Priority junctions (2 No.)	0.60
Roundabout	0.60
New bridge structure	2.03
Utilities Diversion	0.10
Removal of existing footbridge	0.30
Flood Remediation works	0.50
Total costs	5.09
Contingency (20%)	1.02
Fees (15%)	0.76
Sub-total	6.87
Optimism Bias (40%)	2.75
Total	**£9.62M**

Deliverability

2.145 A final factor affecting the choice of a preferred scheme is the deliverability of the scheme. In order to assess this, a risk register is drawn up for each option, which identifies risks to project that may affect its deliverability.

2.146 The risk registers for Options 2 and 3 are shown on the following pages. At this stage the risk registers are relatively simple but illustrate the risks adequately.

T2.4 Risk Register for Option 2

Risk	Consequence	Effect on Project
Proximity to listed structure	May be required to relocate bridge to a specific distance from existing to new alignment Obtaining planning approval will be more difficult Detrimental impact on the visual amenity of the listed structure, depending on the proposed design and materials of the additional bridge. Care and quality in the design to ensure design meets requirements for approval	Delay in programme Compulsory purchase of property Significant increased cost for obtaining planning approval, for undertaking design and consultation and also impact of higher quality design specification on construction cost
Non-standard road alignment	As above Non standard design	Delay in approval of highway alignments Compulsory purchase of property
Access for construction	Health and safety Complex construction Construction next to river in confined space Diversion of traffic during construction	Health and safety implications Cost
Third party land	Delay through compulsory purchase procedures Delay through negotiations	Cost higher for third party land Delay to project
Unknown requirements for reducing impact on flood plain and flood regime	Increase in cost of the scheme Delay	Increase in cost due to additional design and build. Delay due to liaison with Environment Agency and agreement on measures required
Utilities	Additional cost for diversion	Additional cost for diversion
Public consultation and Planning Procedures	Public opposition Delay in planning procedures	Delay to the project Increased costs
Road Orders and Side Road Orders	Development of and consultation on such orders will take time	Delay to project Increased costs
Survey and Site Information	Lack of information to inform design	May identify problems that affect the design and increase scheme outturn cost
Archaeology	Given the history of the area, construction work may expose archaeological artefacts that need to be investigated and/or protected before work recommences	Delay to project Increased costs

T2.5 Risk Register for Option 3

Risk	Consequence	Effect on Project
Third party land	Delay through compulsory purchase procedures Delay through negotiations	Cost higher for third party land Delay to project
Unknown requirements for reducing impact on flood plain and flood regime	Increase in cost of the scheme Delay	Increase in cost due to additional design and build. Delay due to liaison with Environment Agency and agreement on measures required
Utilities in the existing bridge and footbridge	Additional cost for diversion	Additional cost for diversion
Public consultation and Planning Procedures	Public opposition Delay in planning procedures	Delay to the programme Increased costs
Road Orders and Side Road Orders	Development of and consultation on such orders will take time	Delay to project Increased costs
Survey and Site Information	Lack of information to inform design	May identify problems that affect the design and increase scheme outturn cost
Archaeology	Given the history of the area, construction work may expose archaeological artefacts that need to be investigated and/or protected before work recommences	Delay to project Increased costs

3 Economic Analysis

3.1 This section presents an economic analysis of the two preferred solutions described in Chapter 2, and presents value for money assessments in the form of benefit-cost ratios and net present values.

Data Collection

3.2 In order to undertake option development, it was necessary to understand the operation of the A166 through Stamford Bridge in traffic terms. To this end, the following data was collected:

- Origin-destination surveys – external survey company;
- Automatic Traffic Count Data
- Manual journey time surveys

Third Party Data

Origin-Destination Surveys

3.3 JES Surveys was commissioned by JMP to carry out origin-destination surveys in Stamford Bridge on the 8th of October 2007. The surveys were therefore carried out in a neutral month in accordance with good practice.

3.4 Origin / Destination (OD) matrices were produced for movement of vehicular traffic between two points, one on the A166 west of Stamford Bridge (A) and the other on the A166 east of Stamford Bridge (B). Refer to **Figure 4**.

3.5 Five vehicle types were recorded during the survey (Car, LGV, OGV1, OGV2 and PSV). Pedestrians, motorcycles and pedal cycles were excluded from the count.

3.6 The data analysis shows the number of vehicles travelling through or into Stamford Bridge from the two points on the A166. Four types of trips were possible, which are:

- A to B (i.e. eastbound through traffic)
- B to A (i.e. westbound through traffic)
- A back to A (return journey)
- B back to B (return journey)

3.7 Traffic counts, minimum, maximum and average journey times by vehicle type for 15 minute periods were produced by the survey.

Automatic Traffic Count Data

3.8 Automatic Traffic Count (ATC) data from 2006 was supplied by City of York Council for an ATC site on the A166 to the west of Dunnington (refer to Figure 4).

3.9 East Riding of Yorkshire Council (ERYC) provided data for an ATC on the A166 to the east of Stamford Bridge (refer to Figure 4). ERYC also provided turning count data for the A1079 junction with the A614.

3.10 Both sets of traffic count data were not disaggregated into vehicle categories.

Accidents

3.11 Accident data was provided for the area by East Riding of Yorkshire Council. The data provides information on the location, severity, vehicle manoeuvres, casualty and age. The data is displayed graphically in **Figure 5**. There are no particular accident patterns evident.

Surveys undertaken by JMP

Journey Time Surveys

3.12 Journey time surveys were undertaken by JMP during the on-site investigation on the 8th of October.

3.13 Journey times for eastbound and westbound traffic were recorded between two points on the A166, one to the west of Stamford Bridge and the other to the east (refer to Figure 4 for their exact location).

3.14 Surveys were carried out during the morning and evening peaks and the morning and afternoon inter-peak periods (i.e. 11:00 to 11:30 and 14:30 to 15:00). The A64 was closed in the morning of the on-site investigation, which delayed the start of the morning peak survey. Therefore the morning peak survey was carried out between 8:45 and 9:15.

3.15 The extent of the queuing associated with the traffic signals at the bridge was also recorded.

3.16 The results of these surveys show that delay never exceeds the duration of the traffic signal timings on Stamford Bridge. In other words, vehicles waiting for the traffic signals at the bridge are only delayed for one cycle of the traffic signals and pass over the bridge at the first available green aspect.

Methodology

Development of the Spreadsheet Model

3.17 A spreadsheet model based on the survey data described above was used to perform the economic analysis, rather than a more traditional approach based on a full traffic assignment model and cost-benefit analysis using COBA. Although less technically robust, it was considered that the spreadsheet method would give a good initial indication of the economic performance of each option.

3.18 The Do-Minimum option assumes the existing road network, from west of Buttercrambe Road on the A166 to the west of Stamford Bridge to Bridlington Road at the east of Stamford Bridge, with the existing signalised single-lane bridge in the centre of Stamford Bridge.

3.19 Two Do-Something options were considered:

- **Option 2**– Second Central Bridge - assumes the introduction of a second bridge adjacent to the existing bridge and removal of traffic signals.
- **Option 3**– Link from Buttercrambe Road – assumes the construction of a new link road from Buttercrambe Road to Bridlington Road passing north of the village centre. This option requires a new priority junction at Buttercrambe Road, a new river crossing and a 4-arm roundabout at the new junction with Bridlington Road.

3.20 Two possible routes were considered:

- Eastbound through traffic
- Westbound through traffic

3.21 For the Option 2 scenario, all traffic was assumed to assign to the existing route through the village centre.

3.22 For the Option 3 scenario, all through traffic in each direction was assumed to re-assign to the new bypass route rather than passing through the centre of Stamford Bridge on the existing A166.

3.23 Analysis of turning count data at Shiptonthorpe roundabout indicates only a small volume of traffic turning between the A1079 to/from York and the A614 to/from Driffield. Examination of the figures suggests that even with a conservative approach, the reassignment of traffic avoiding congestion in Stamford Bridge would not have a significant effect on the model.

3.24 No other induced traffic effects were considered.

3.25 Based on the manual origin-destination surveys and ATC data described in Chapter 2 annual traffic matrices were developed for five periods – AM peak (0700-1000), PM peak (1600-1900), inter-peak (1000-1600), evening (1900-0600) and weekend, each disaggregated by vehicle type (Car, LGV, OGV1, OGV2 and PSV). Daily, monthly and annual uplifts derived from ATC data are shown in **Table 3.1**.

T3.1 Traffic Flow Expansion Factors

Period	Factor
October Monday to Weekdays	4.7
October Weekdays to Month	4.4
October Month to Annual	11.99
0730-0900 to 0600-1000	1.19
1630-1830 to 1600-1900	1.19
AM/PM Peak to Inter-peak	0.85
AM/PM peak to Evening	0.30
Saturday 1200-1400 to Weekend	11.73

3.26 For the do-minimum scenario journey times were derived from the manual surveys and origin-destination surveys described above. For the do-something scenarios, journey times were estimated from analysis of existing signal timings, junction delays and revised journey distances.

3.27 The base year for modelling was taken to be 2006. Two future years were also modelled, 2016 and 2026 with traffic growth factors derived from TEMPRO and National Road Traffic Forecasts (NRTF) 1997. **Table 3.2** shows the resulting traffic uplifts applied in the future year scenarios.

T3.2 Traffic Growth Factors

Period	Factor
2006-2016	1.160
2006-2026	1.286

3.28 Given the increase in traffic in the two future years, it was assumed that journey times would increase by 5% to 2016 and 10% to 2026 in the do-minimum scenarios and 2.5% to 2016 and 5% to 2026 in the do-something scenarios.

Quantification of Benefits

3.29 In order to evaluate the value for money of the alternative route options, four sources of benefits were considered in this analysis:

- Journey time savings
- Accident savings
- Vehicle operating costs
- Environmental savings

3.30 Journey time benefits were calculated by application of standard DfT values of time per vehicle (Webtag 3.5.6 Table 9), uplifted to the modelled year, to the estimates of total time saved by vehicle type/time of day taken from the spreadsheet model.

3.31 Accident benefits were calculated by application of standard accident rates, casualty rates and costs per casualty taken from the Design Manual for Roads and Bridges (DMRB, Volume 13, Section 1, Tables 3/1, 3/2, 4/1) adjusted to the modelled year. It was assumed that the accident rate for both the existing A166 through Stamford Bridge and for the bypass route under Option 3 are each that for a single carriageway 2-way road with 30/40mph speed limit.

3.32 Vehicle operating costs for each vehicle type were calculated using standard DfT formulae for fuel and non-fuel operating costs (Webtag 3.5.6), based on average vehicle speeds derived from the spreadsheet model. Average fuel efficiency rates and resource costs of fuel were updated to the appropriate modelled year.

3.33 Environmental savings were quantified based on the total volume of fuel saved in the do-something scenario. Standard DfT emission rates and petrol/diesel vehicle mix were used to calculate the resulting change in carbon emissions (Webtag 3.3.5 Table 1), adjusted to the modelled year. Carbon savings were then monetised using the standard DfT cost of carbon (Webtag 3.3.5, Table 2), uplifted to the appropriate modelled year.

Quantification of Costs

3.34 Construction costs for the do-something scenarios were taken from Chapter 2 and are summarised in **Table 3.3**, including an optimism bias uplift of 40%.

T3.3 Construction Costs (£m) – 2007 Prices

	Option 2	Option 3
Total Costs	3.71	5.09
Contingency (20%)	0.74	1.02
Fees (15%)	0.56	0.76
Sub total	5.00	6.87
Optimism Bias	2.00	2.75
TOTAL	**7.00**	**9.62**

3.35 Standard road maintenance costs of £10,400 per annum per kilometre were taken from DMRB (Volume 13, Section 1, Part 2, Table 9/1) to reflect the additional maintenance costs associated with each option. It was assumed that the re-assignment of traffic away from the current route through Stamford Bridge under Option 3 would not lead to any reduction in maintenance costs on the existing A166.

3.36 Additional bridge maintenance costs for each option were estimated at £1,000 per annum.

3.37 Costs due to disruption during construction were not considered.

Economic Appraisal

Assumptions

3.38 Each of the costs and benefits described above were brought together in a 60 year appraisal, following DfT Guidance. All prices in the appraisal were adjusted for inflation back to 2002, the Department's standard price base year for appraisal purposes.

3.39 The discount rate was assumed to be 3.5% for the first 30 years, 3% thereafter, and the base year for discounting was assumed to be 2002.

3.40 The opening year of the scheme was assumed to be 2009 with all construction costs occurring in the previous year.

3.41 Values of costs and benefits for years between the three modelled years were calculated by interpolation. No further growth in traffic or benefits was assumed following the final modelled year of 2026.

3.42 A gross benefit-cost ratio for the scheme was calculated from the sum of benefits (journey time savings, accident savings, vehicle operating cost savings, environmental savings) divided by the sum of costs (construction and maintenance costs). Any indirect tax impacts or other impacts on Government finances were not considered within the appraisal.

Economic Appraisal

3.43 **Table 3.4** presents a 60-year financial appraisal for each of the two options, with prices adjusted for inflation to 2002 values (the DfT standard price base year). An average construction cost inflation rate of 4% per annum from 2002-2007, was used for this purpose.

3.44 Both options have positive benefit-cost ratios, with option 2 having a BCR of 1.39 and Option 3 a BCR of 1.35. **Option 3** has the greater net present value of £2.2million, compared to £1.8million for **Option 2**.

T3.4 60-Year Economic Evaluation (£'000, 2002 prices)

	Option 2 Second Central Bridge	Option 3 Link from Buttercrambe Road
Present value to 2067		
Construction Costs	4,510	6,196
Maintenance Costs	46	128
Total Costs	4,556	6,324
Journey Time savings	5,722	7,605
Accident savings	0	46
Vehicle Operating Cost savings	568	847
Environmental savings	36	51
Total Economic Benefits	6,326	8,548
Net Present Value	1,770	2,224
BCR	1.39	1.35

Sensitivity Analysis

3.45 This section presents the results of sensitivity analyses for both the options presented above. The sensitivity tests performed are to:

- Increase Construction Costs by 25%
- Increase/reduce traffic flows by 25%
- Increase journey time savings by 15/30 seconds, reduce journey time by 15 seconds.

3.46 **Table 3.5** shows the results of an increase in construction costs of 25%. Both options still have positive BCRs, reducing from 1.39 to 1.11 for Option 2 and from 1.35 to 1.09 for **Option 3**.

T3.5 Sensitivity Tests – 25% Increase in Construction Costs, 60-year economic evaluation (£'000, 2002 prices)

	Option 2 Second Central Bridge	Option 3 Link from Buttercrambe Road
Present value to 2067		
Construction Costs	5,637	7,746
Maintenance Costs	46	128
Total Costs	5,683	7,874
Total Economic Benefits	6,326	8,548
Net Present Value	642	674
BCR	1.11	1.09

3.47 **Table 3.6** shows the results of an increase and decrease in traffic flows of 25%. Option 2 demonstrates a range in BCR from 1.04 to 1.74, whilst Option 3 has BCRs between 1.69 and 1.01.

T3.6 Sensitivity Tests – Increase/Decrease in Traffic Flows, 60-year economic evaluation (£'000, 2002 prices)

	Option 2 Second Central Bridge		Option 3 Link from Buttercrambe Road	
	25% Increase	25% Decrease	25% Increase	25% Decrease
Present value to 2067				
Total Costs	4,556	4,556	6,324	6,324
Total Economic Benefits	7,907	4,744	10,685	6,411
Net Present Value	3,351	188	4,361	87
BCR	1.74	1.04	1.69	1.01

3.48 **Table 3.7** shows the results of an increase and decrease in do-something journey times by up to 30 seconds, i.e. the journey time savings differ from those previously estimated. Option 2 demonstrates a range in BCR from 0.45 to 1.86, whilst Option 3 has BCRs between 0.68 and 1.69.

T3.7 Sensitivity Tests – Increase/Decrease in Do-something Journey Times, 60-year economic evaluation (£'000, 2002 prices)

	Option 2 Second Central Bridge			Option 3 Link from Buttercrambe Road		
	15 sec Increase	30 sec Increase	15 sec Decrease	15 sec Increase	30 sec Increase	15 sec Decrease
Present value to 2067						
Total Costs	4,556	4,556	4,556	6,324	6,324	6,324
Total Economic Benefits	4,198	2,072	8,453	6,421	4,294	10,671
Net Present Value	(358)	(2,484)	3,897	97	(2,030)	4,346
BCR	0.92	0.45	1.86	1.02	0.68	1.69

Summary

With central case BCRs of 1.39 for Option 2 and 1.35 for Option 3, both alternatives would be considered Low Value for Money.

Sensitivity testing of the resulting journey time savings for each Option shows that only a small reduction in the assumed savings (15 seconds for Option 2 and 30 seconds for Option 3) has the effect of reducing the BCR to below 1.0, representing Poor Value for Money. A BCR of less than 1 indicates that monetised costs outweigh monetised benefits and on value for money grounds the option should not be pursued unless there are other substantial non-monetised benefits.

4 Policy Assessment

High Level Objectives

4.1 The aim in developing the policy criteria for RFA was to focus on the importance of transport as a means to an end rather than transport for transport's sake. Regional stakeholders wanted to look at the wider regional objectives in preference to simply appraising the specific transport merits of a scheme, which is covered in other aspects of the appraisal required by government of major transport schemes. The assessment of a proposed intervention in policy terms therefore focuses on the key aspects of delivering the RSS, and thus on regional and sub-regional objectives.

4.2 It is clear that the RFA transport scheme prioritisation methodology should not simply duplicate a transport scheme appraisal. All schemes will, in any case, go through this process as part of the LTP major scheme bid appraisal process, should they receive regional approval for inclusion in the list of transport priorities forwarded to government.

4.3 Thus the high level approach creates strong links between the chosen policy criteria and the objectives from the regional strategies, which helps with the transparency and robustness of the methodology. The inclusion in the criteria and the associated scoring method of spatial specificity backs up the spatial elements of regional policy in RSS.

4.4 The following regional and national policy documents were reviewed as part of the policy criteria development in 2005:

- Emerging and existing Regional Spatial Strategy
- Regional Economic Strategy
- Regional Housing Strategy
- Regional Sustainable Development Framework
- Northern Way Growth Strategy
- Advancing Together:
- DfT Public Service Agreements
- National and local government's Shared Transport Priorities

4.5 Advancing Together is the vision and strategic framework for Yorkshire and Humber produced in 2005 by the Yorkshire and Humber Regional Assembly, and represents an agreement between the regional partners about the key issues, needs and opportunities in Yorkshire and the Humber at the time of the initial methodology development. The overarching objectives from this document were used as a starting point for the policy criteria. Aims and objectives from the other strategy documents were divided up between these overarching objectives and the key themes picked out. These formed the themes from which policy criteria were developed.

Incorporating Sub-Regional Policies

4.6 Concern was expressed by stakeholders during the methodology development process that the draft policy objectives were 'too regionally focused' and that the methodology will not serve decision making on more locally based schemes, such as those typically brought forward as LTP major transport schemes, which essentially support agreed local objectives.

4.7 This was addressed in the methodology by firstly incorporating sub-regional and spatially specific policy within the scoring guidelines, and ensuring that locally significant schemes would have an equal opportunity to demonstrate that they either met sub-regional objectives and / or perform well in terms of value for money or deliverability.

Number of Criteria

4.8 Following advice from expert advisers from the Institute of Transport Studies at the University of Leeds, the number of policy criteria was settled at 15. This enables the methodology to focus on the key issues that affect the delivery of regional policy. This contrasts with some regions of England that used over 50 policy criteria, making the method difficult to navigate whilst 'desensitising' the policy influences.

Criteria scoring

4.9 Given the relatively 'high level' of the objectives under consideration a key aspect to the approach is to how to 'score' a scheme or intervention against these objectives. The region agreed an approach for each criterion, based on compatibility with policy designations and priorities, the likely scale of benefit and the degree to which the intervention supports the criteria either directly or indirectly. Where possible GIS-based maps of policy designations and spatial priorities are used to assist this process.

Scoring Range

4.10 A seven point scoring system is used to score each criterion, from -3 to +3. The lowest score is applied to a criterion if the scheme has a strong inconsistency with policy and the highest score is applied to criteria if the scheme impacts are strongly consistent with policy. Schemes that have little discernable impact on the criteria receive the middle score. The scoring will vary in the way it was applied according to the relevant policy context.

4.11 The results of scoring policy criteria are presented not as sums, but with information relating to positive and negative impacts being presented separately, therefore aiding decision making, rather than hiding information.

4.12 The methodology is a relative tool for comparison of schemes. The scoring of schemes is undertaken in a consistent way, and results are presented in a simple and transparent form. This should result in a fair and balanced methodology, allowing regional decision makers to judge the merits of the interventions in question.

4.13 In order to ensure consistent evidence is presented a manual has been produced by the Regional Assembly which identifies the information required from scheme promoters to enable a policy assessment to be undertaken, and the Assembly uses a written guide to ensure consistency of scoring.

Policy Assessment of Stamford Bridge Options

4.14 For the two scheme options identified through the feasibility study in chapter 2, policy assessments have been undertaken in line with the adopted RFA methodology for Yorkshire and Humber, as refreshed in 2007.

4.15 A score sheet (displayed in **Appendix C**) outlines the evidence base for each of the policy criteria and scoring notes which highlight how each score had been determined for each option.

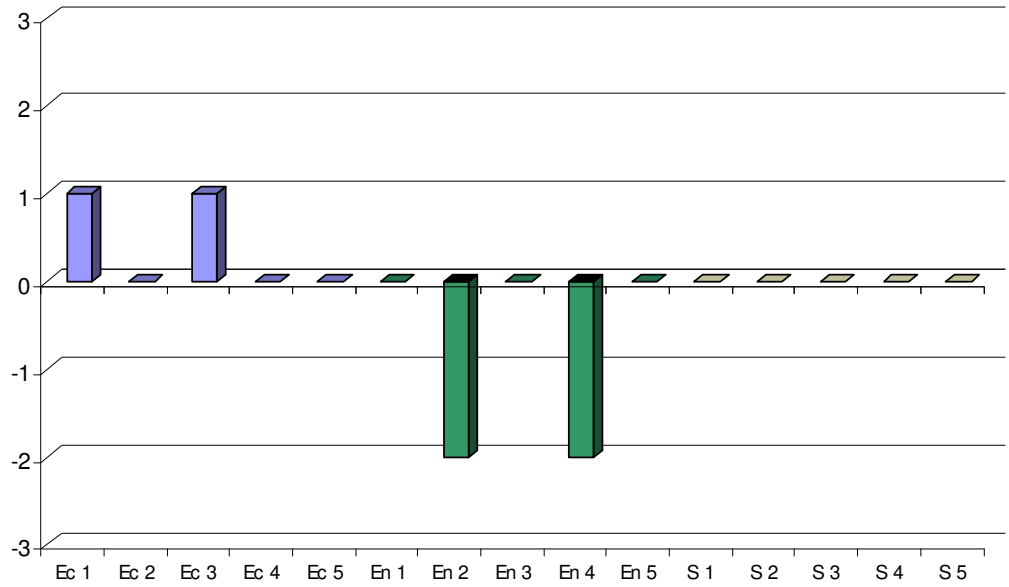
Maps identifying how the options assessed contribute spatially to the delivery of regional priorities are an integral part of this evidence base and scoring process. These are displayed in **Appendix D**.

Option 2 – New Bridge Construction

4.16 **Figure 4.1** shows the scoring graph for Option 2. It is evident that this Option may produce some minor economic benefits, by delivering a minor improvement in accessibility to York city centre and the east coast and Scarborough.

4.17 However, this Option may have some significant detrimental environmental impacts, specifically on the River Derwent Special Area of Conservation and in terms of increasing greenhouse gas emissions that contribute to climate change. The impact on social policy and access to key services is neutral. Table 4.1 shows these scores presented against criteria in tabular form.

F4.1 Scoring Graph for Option 2 - New Bridge Construction



T4.1 Criteria and Scores for Option 2

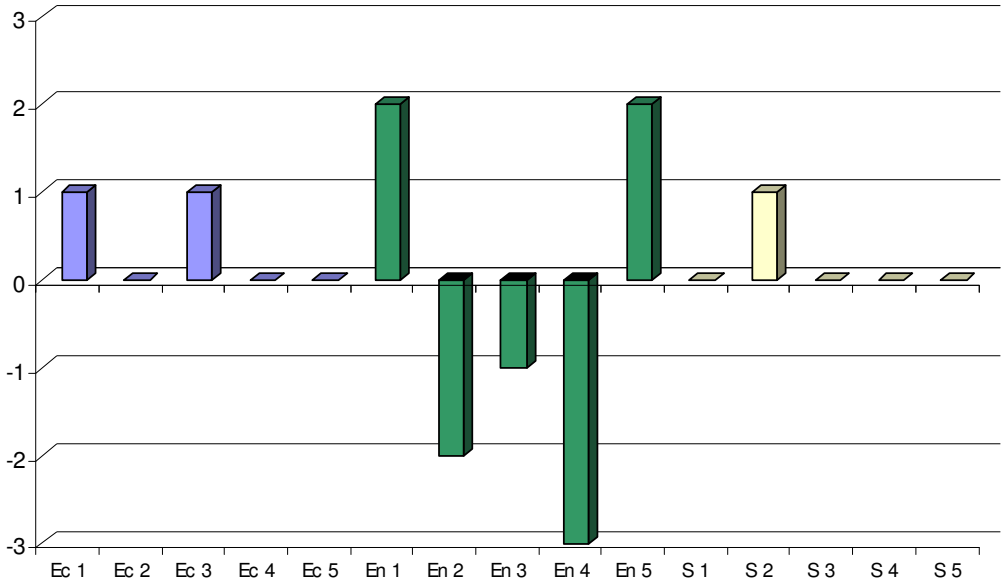
Criteria	Score
EC 1: Key Spatial Priority Aims	1
EC 2: Knowledge base	0
EC 3: Growth potential/ competitiveness/ productivity	1
EC 4: National and International trade	0
EC 5: Regeneration of former industrial areas and brownfield site	0
EN 1: Local air quality	0
EN 2: Climate change	-2
EN 3: Natural environment	0
EN 4: Environmental significance	-2
EN 5: historical, cultural and archaeological value	0
S 1: Urban and rural renaissance	0
S 2: Health	0
S 3: Access to basic goods services and amenities	0
S 4: Economic inclusion	0
S 5: Crime and security	0

Option 3 – Buttercrambe Road Link Road

4.18 The scoring graph for Option 3 is shown in **Figure 4.2**. It is evident that Option 3 would have both negative and some positive environmental impacts. This Link Road would significantly reduce traffic in the village centre, thus improving air quality, enhancing the visual amenity of the village and protecting the local heritage features (such as listed buildings). Conversely, as a road scheme Option 2 will increase greenhouse gas emissions. Furthermore, Option 2 will been visually intrusive to the landscape to the north of the village and is likely to damage the River Derwent Special Area of Conservation.

4.19 This Option would contribute to the same economic priorities as Option 2 and would produce some social benefit, by making a minor contribution to improving health in the village as it is considered that removing the majority of the traffic from the village may encourage an increase of walking and cycling, in addition to the air quality and road safety benefits. **Table 4.2** shows these scores presented against criteria in tabular form.

F4.2 Scoring Graph for Option 2 – Buttercrambe Road Link Road



T4.2 Criteria and Scores for Option 3

Criteria	Score
EC 1: Key Spatial Priority Aims	1
EC 2: Knowledge base	0
EC 3: Growth potential/ competitiveness/ productivity	1
EC 4: National and International trade	0
EC 5: Regeneration of former industrial areas and brownfield site	0
EN 1: Local air quality	2
EN 2: Climate change	-2
EN 3: Natural environment	-1
EN 4: Environmental significance	-3
EN 5: historical, cultural and archaeological value	2
S 1: Urban and rural renaissance	0
S 2: Health	1
S 3: Access to basic goods services and amenities	0
S 4: Economic inclusion	0
S 5: Crime and security	0

5 Summary, Conclusions and Recommendations

Context and Objectives

5.1 The East Riding of Yorkshire Council is seeking advice on the likely success of developing a funding case in the context of realistic proposals for an alternative river crossing or bypass for Stamford Bridge. A feasibility study on options for such an alternative crossing of the River Derwent by the A166 at Stamford Bridge has been undertaken in advance of consideration of any proposal through the Yorkshire and Humber Regional Funding Allocations process.

5.2 The A166 provides access to Stamford Bridge from York and the East Riding coast. Stamford Bridge, a narrow stone structure constructed in 1727 and located in the village centre provides a crossing for traffic on the A166. The bridge is a Grade II* listed monument which can only accommodate a one-way flow of traffic. Flow of traffic over the bridge is controlled and optimised by a traffic signal 'shuttle' arrangement. However, this one-way flow of traffic results in congestion in the centre of Stamford Bridge, increasing journey times and delay especially in peak periods.

5.3 The objective of any scheme options developed is to reduce the delay and congestion associated with the existing one-way flow of traffic crossing the Derwent in Stamford Bridge, and improve local environmental conditions in the village.

5.4 If the scheme is not implemented, the delay and congestion currently associated with the restricted traffic flow could be exacerbated due to traffic growth. Additionally, the environmental quality in the village could deteriorate.

Description of Options

5.5 Two options have been selected from a longer list of possible options for delivering the transport and environmental objectives, and have been subject to more detailed feasibility and design, prior to the assessment of these options using the adopted RFA methodology for the Yorkshire and Humber region.

5.6 Option 2 involves:

- The construction of an additional bridge to the west of the existing one-way bridge in the village of Stamford Bridge, to facilitate two-way traffic flow over the River Derwent.

5.7 Option 3 involves:

- The construction of a new two-way link road between Buttercrambe Road and the east of Stamford Bridge, rejoining the A166 at its junction with Burton Fields Road (the link road will be approximately 460 metres in length);
- The construction of a bridge structure across the River Derwent to the north-east of the village;
- The construction of a four arm roundabout at the A166, Burton Fields Road junction;
- The construction of two priority junctions with the new link road; and
- Revising the existing HGV access to the factory on Buttercrambe Road.

Assessment of the options under RFA

5.8 The application of the Yorkshire and Humber region's adopted RFA methodology using the process highlighted in Figure 1.1 to the two options chosen starts with a parallel assessment of both policy fit and value for money.

5.9 This has been undertaken using the evidence identified through the engineering feasibility work in chapter 2, the benefit cost calculations in chapter 3, and the broader policy assessment in chapter 4. The engineering feasibility work, by defining the options to be considered, has been fundamental in providing evidence for and informing all three dimensions of the methodology, including deliverability.

5.10 Option 2, the new bridge adjacent to the existing structure, does not show a good policy fit, as demonstrated by Figure 4.1. This option represents low value for money as defined by the Department for Transport Guidance in the central case, as shown in Table 3.4.

5.11 Option 3, the new link road to Buttercrambe Road, does not show a good policy fit either, as demonstrated by Figure 4.2. This option also represents low value for money in the central case, as shown in Table 3.4.

5.12 In terms of value for money, both options are subject to significant variations in the benefit cost ratio in the sensitivity tests undertaken. None of the sensitivity tests undertaken show a benefit cost ratio for a scheme option of above 2, the value at which the Department for Transport's guidelines indicate a scheme represents high value for money. Even in the exemplifications that account for a significant increase in future traffic flows (25% increase) or additional journey time savings for each vehicle (an additional 15 seconds) from the central case, the benefit cost ratio still lies below 2. In the sensitivity tests where there is a reduction in the assumed savings, the benefit cost ratios of the options fall to at or below 1 for reductions of only 15 seconds per journey. Benefit cost ratios below 1 represent poor value for money, as this indicates that monetised costs outweigh monetised benefits across the life of the appraisal.

Conclusions and recommendations

5.13 Neither of the options examined perform well within the RFA methodology.

5.14 The poor policy fit, combined with only low value for money means with some certainty that the Regional Transport Board would be unlikely to support such a proposal for inclusion in its transport priorities in advice to government under RFA on the evidence presented. The sensitivity tests suggest that the value for money assessment is responsive to variations in the input parameters, as there is significant variation in benefit cost ratios when the input parameters are changed. However none of the sensitivity tests undertaken produced a value for money assessment above the figure where a scheme option would represent high value for money within the government's definition. This, combined with the poor policy fit is likely to mean support for inclusion in regional priorities is unlikely.

5.15 Even if the Regional Transport Board were disposed to look favourably on one of the scheme options, there remain a number of significant delivery risks that may affect any option's early delivery.

5.16 It is possible to identify, but not to quantify, factors that could affect the deliverability of the scheme at this stage in the project process, however the risks can be identified. Presently, neither the outline scheme design nor public consultation has taken place. Moreover, a detailed work programme is yet to be developed.

5.17 There are a number of delivery risks that are inherent to all projects and these have been outlined, such as the need to secure third party land and the diversion of utilities. More importantly though, it is clear that it will be necessary to provide some compensation for the effects of new structures on local flood regimes, protection and the operation of the flood plain and the measures to mitigate against these effects cannot be identified at present. Furthermore, building a structure in close proximity to the existing listed structure will be difficult and there may be problems obtaining planning approval for this. There are also health and safety and design problems posed by design and construction of structures close to rivers and on flood plains, as well as gaining access to construct close to the existing structure.

5.18 The River Derwent Special Area of Conservation runs through the length of Stamford Bridge. Additionally, the length of the River Derwent through Stamford Bridge is a Site of Special Scientific Interest (SSSI). Due to the potential adverse impact on these significant environmental designations, there may be public and stakeholder objection to the scheme.

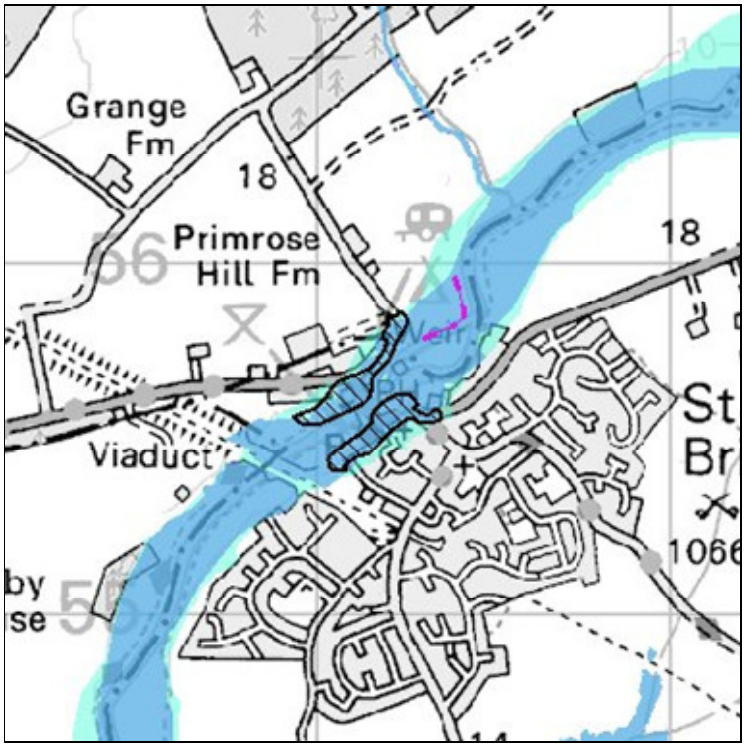
5.19 It is therefore recommended that the development of options for an alternative crossing of the River Derwent at Stamford Bridge are not pursued further for consideration through the local transport major schemes programme. Any such scheme is unlikely to receive regional approval as part of Yorkshire and Humber's transport priorities for inclusion in advice to government, and is therefore unlikely to receive Department for Transport funding at the present time through this process.

Figures

Appendix A

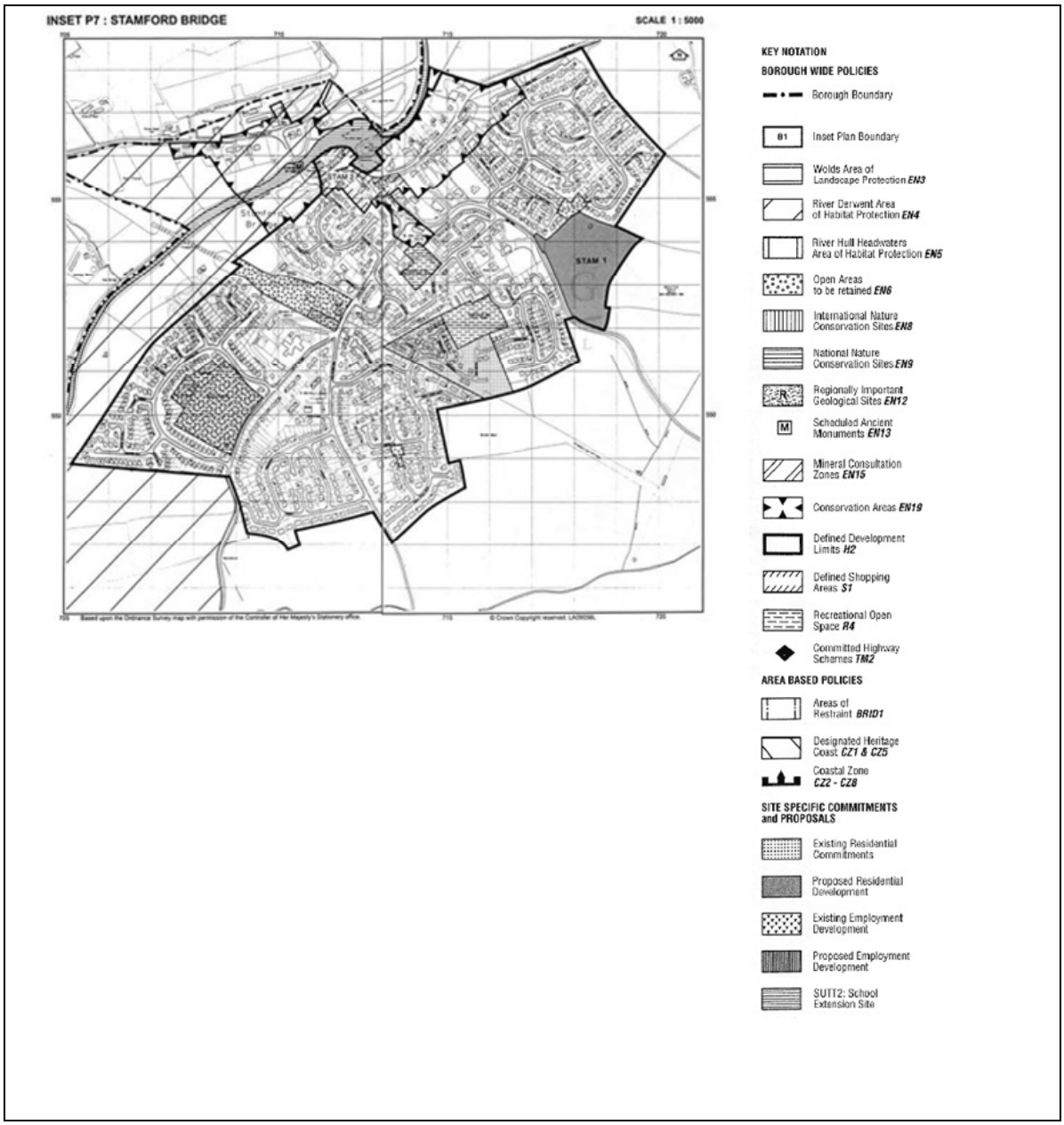
Environmental Agency Flood Plans


A64
Claxton
Sand Hutton
Scrayingham
River Derwent
Buttercrambe
Skirpenbeck
Upper Helmsley
Stockton on the Forest
Warthill
Gate Helmsley
A166
Holtby
Low Catton
High Catton
Stamford Bridge
1066
Full Sutton
16
Dunnington
A1079
Wilberfoss
Bolto


Grange Fm
18
Primrose Hill Fm
Viaduct
St
Br
1066

Appendix B

Local Plan Inset Map for Stamford Bridge


INSET P7 : STAMFORD BRIDGE
SCALE 1 : 5000
STAM 1
KEY NOTATION
BOROUGH WIDE POLICIES
Borough Boundary
B1
Inset Plan Boundary
Wolds Area of Landscape Protection EN3
River Derwent Area of Habitat Protection EN4
River Hull Headwaters Area of Habitat Protection EN5
Open Areas to be retained EN6
International Nature Conservation Sites EN8
National Nature Conservation Sites EN9
Regionally Important Geological Sites EN12
M
Scheduled Ancient Monuments EN13
Mineral Consultation Zones EN15
Conservation Areas EN19
Defined Development Limits H2
Defined Shopping Areas S1
Recreational Open Space R4
Committed Highway Schemes TM2
AREA BASED POLICIES
Areas of Restraint BRID1
Designated Heritage Coast CZ1 & CZ5
Coastal Zone CZ2 - CZ8
SITE SPECIFIC COMMITMENTS and PROPOSALS
Existing Residential Commitments
Proposed Residential Development
Existing Employment Development
Proposed Employment Development
SUTT2: School Extension Site

Appendix C

Policy Scoring Sheet

Policy Scoring Sheet

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
EC1	Will the initiative deliver the key spatial priority aims of the RSS Policy YH3?	Neither option supports any of the key RSS Policy YH3 aims or First tier RTS priorities. Both options deliver a minor improvement in accessibility to York city centre (2nd tier) and the east coast and Scarborough (3rd Tier).	Both options may make a minor contribution to the delivery of a second tier and a third tier spatial priority.	1	1
EC2	Will the initiative develop and exploit the region's knowledge base?	Both options may deliver some improvement in road access from the surrounding rural area to York University, York Science Park and York Biocentre.	It is considered that the marginal improvement in road access (i.e. a small reduction in journey times) to York University, York Science Park and York Biocentre, will not contribute sufficiently to the development of the region's knowledge base to score credit within the methodology.	0	0
EC3	Will the initiative exploit the growth potential of the business sectors and improve the competitiveness and productivity of the region's businesses?	Both options deliver small journey time savings from the surrounding rural area to York City Centre and York Science City and to the coastal area of Scarborough and Bridlington.	It is considered that the marginal improvement in road access (i.e. reduction in journey times) to York and coastal villages may make a small contribution to inward investment in employment.	1	1
EC4	Will the initiative support the development of national and international trade?	Both options deliver a reduction in journey times for freight traffic between York and Bridlington.	Given the limited regional significance of Bridlington in terms of its port activities, it is considered that both options will have a neutral impact on supporting the development of national and international trade.	0	0

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
EC5	Will the initiative support the regeneration of former industrial areas and brown field sites?	There is no direct impact on regeneration areas	Neither option has potential to support the regeneration of former industrial areas or brown field sites.	0	0
EN1	Will the initiative protect and improve local air quality?	Stamford Bridge is not located near any AQMA. Option 2: 2nd Central bridge - removes traffic queuing in Stamford Bridge centre due to signals at existing one-way bridge, approximately 1.2million (two-way) trips per annum. Option 3: Link from Buttercrambe Road - removes through traffic from Stamford Bridge centre and reduces queuing at traffic signals, approximately 1.1million through trips (two-way) per annum.	It is considered that because Option3 will remove a substantial amount of through traffic in the village centre (change in traffic flow will be >10%), where pedestrian exposure is high (as the village is an important local centre) the option would have a significant improvement on local air quality in Stamford Bridge. Despite the fact that Option 2 would reduce congestion in the village, by providing a constant two-way flow of traffic, it is considered that the impact on local air quality would be negligible due to the high traffic flows remaining in the village coupled with a high pedestrian exposure.	0	2
EN2	Will the initiative address the need to limit and adapt to	Option 2:2nd Central bridge - reduced queuing will increases vehicle efficiency, saving 10,000litres of fuel	Both options could theoretically have a beneficial effect on greenhouse gas emissions through	-2	-2
	climate change?	per annum. Option 3: Link from Buttercrambe Road - small reduction in journey length for through traffic, totalling over 200,000 vehicle km	relieving congestion. However, the guidance is framed to account for the fact that new road capacity ultimately encourages the use of the private		

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
		per annum and 24,000 litres of fuel saved per annum.	car. Neither option influences behavioural change to more sustainable modes of transport; therefore, they are considered to have a negative impact on greenhouse gas emissions and climate change under this criterion.		
EN3	Will the initiative protect and enhance the natural environment?	There are areas to the north of Stamford Bridge that are designated within the National Inventory of Woodland and Trees (England). The routes for both options avoid these areas. It is therefore considered that both would have a neutral impact on these woodlands. The site is not located near any World Heritage site, AONB, National Park, Heritage Coast or regionally important geological site.	Option 2 has the same road alignment as the existing condition and will therefore have a neutral impact. The construction of the link road for Option 3 would be visually intrusive to the landscape to the north of the village, and therefore should have a slightly negative score.	0	-1
EN4	Will the initiative protect and enhance areas of environmental significance?	The River Derwent is a Special Area of Conservation and Site of Special Scientific Interest. It is considered that both options for the scheme will have a detrimental impact on the River Derwent, due to the removal of habitat and sediment runoff and consequent pollution during construction. The options will therefore have a negative impact on protecting and enhancing areas of environmental significance.	Both options would have a detrimental impact on the River Derwent Special Area of Conservation, which is an International designation of environmental significance. The scores have been presented with the assumption that strict mitigation measures will be in place to ensure the impact on the River Derwent is minimal. Option 2 would have a detrimental effect on an area of the Derwent that is already disturbed by man-	-2	-3

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
			made structures, whereas the construction of an additional bridge for Option 3 would involve damaging another section of the Derwent's Special Area of Conservation, and should therefore receive a poorer score than Option 2.		
EN5	Will the initiative protect and enhance places and buildings of historic, cultural and archaeological value?	There is a Registered Battlefield located to the south of Stamford Bridge; however neither option for the scheme will have any material impact on this. There are a number of Listed Buildings and Structures in Stamford Bridge, including Stamford Bridge itself, (which is protected as Grade II*). Grade II* structures are considered to have some national significance. Both options will reduce the amount of traffic on this listed structure; however Option 2 (the additional central bridge to be constructed adjacent to the existing bridge) could potentially detract from the visual amenity of the listed structure (depending on the proposed design and materials of the additional bridge). Furthermore, Stamford Bridge is a designated 'Conservation Area' in the East Riding Local Plan. Since Option 3 would reduce the amount of traffic in Stamford Bridge (as through traffic would use	In terms of protecting and enhancing Stamford Bridge as a place with historic, cultural and archaeological value, Option 3 would generate the greatest benefit. Option 3 would enhance locally significantly heritage features, by reducing the amount of traffic on the protected structure and through traffic in the village, thus enhancing the villagescape and contributing to the protection of the village's listed buildings. The construction of an additional bridge adjacent to the existing one for Option 2 could detract from the visual amenity of the listed structure. However, this depends on the design of the bridge and the materials used. At best Option 2 would score a 0. However, if the design of the additional bridge had a detrimental impact on the existing bridge, the option would score -2, because the existing structure is a nationally	At best 0; at worst -2	2

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
		the new link road to bypass the village) it would have a positive impact in protecting and enhancing the character of the village. Conversely, Option 2 may degrade the character of the village, due to the construction of an additional bridge adjacent to the existing, listed structure.	significant asset.		
S1	Will the initiative deliver urban and rural renaissance?	Neither of the options for the scheme will contribute to the delivery of urban and rural renaissance, because Stamford Bridge is not located near any of the designated renaissance areas in Yorkshire.	Neither option would contribute to any renaissance area, therefore the impact is neutral.	0	0
S2	Will the initiative improve health and reduce health inequalities?	Option 2 will not encourage a significant modal shift to more sustainable or healthier modes of travel (such as walking and cycling). Option 3 may have result in a small increase in sustainable travel, due to the removal of traffic from the village centre.	Option 3 will have a moderately positive benefit in reducing driver stress and anxiety, by allowing through traffic to avoid congestion and delay in the village. It may also reduce accidents and reduce severance in the village centre, which may increase walking and cycling in the village. Option 2 may have a slight benefit in reducing driver stress and anxiety. However without producing an increase in walking and cycling activity, the overall benefit on health must be considered as negligible.	0	1
S3	Will the initiative improve access to and use of basic goods, services and	Neither option will have an impact on any of the 'priority areas', i.e. areas that are within the 10% most deprived according	Neither option for the scheme will improve accessibility to services and amenities in priority or non-priority	0	0

Policy Criteria		Evidence base	Scoring Notes	Score Option 2	Score Option 3
	amenities?	to Indices of Multiple Deprivation (IMD) because Stamford Bridge does not contain any relatively deprived or excluded areas. Neither option will improve accessibility by sustainable modes. By removing through-traffic from the village, Option 3 could potentially improve the reliability of bus services in Stamford Bridge, thus improving bus access. However, it is considered that the impact will be negligible due to the limited number of services and amenities in the village that would have improved access as a result of improved bus reliability.	areas.		
S4	Will the initiative secure economic inclusion particularly for those in priority areas?	As previously mentioned, Stamford Bridge does not contain any relatively deprived or excluded areas. Neither option is therefore able to secure economic inclusion for those in priority areas. Furthermore, the options will not materially improve public transport access to York, which is the closest key employment centre. It will therefore have a neutral impact on securing economic inclusion.	Neither option for the scheme will improve accessibility to employment centres or priority areas of multiple deprivations.	0	0
S5	Will the initiative reduce crime, disorder and fear of crime?	Due to the nature of the options, they will not reduce crime, disorder and fear of crime.	Neither option for the scheme increases security; therefore the impact is neutral.	0	0

Appendix D

Policy Designation & Spatial Priority Maps