New Mersey Crossing Study

Stage 2 Final Report
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**Appendices**

Appendix A - Runcorn Widnes Bridge Trip Distribution
1 Introduction

1.1 Background

Oscar Faber were commissioned by the Department of Transport in 1991 to undertake the Mersey Crossing Study, to examine the need for a new strategic crossing in an area extending from the M6 westwards to the coast. Though the study was completed much earlier, the Final Report was not released till 1993.

The study looked at a number and range of route options and identified five which deserved closer investigation. These were subject to preliminary traffic engineering and environmental appraisals, and the results are described in some detail in the Study Final Report.

The key findings of the study were as follows:

(a) The existing Runcorn Bridge was (in 1993) already close to capacity, carrying in the order of 75,000 vehicles per day AADT, with frequent peak period congestion and queuing.

(b) Forecast growth and new highway schemes programmed or already under construction at the time would increase the demand on the Runcorn-Widnes Bridge to traffic flows of 128,000 to 150,000 AADT by the year 2016, significantly above the capacity of the existing crossing or approach roads.

(c) The Runcorn-Widnes Bridge carries a large amount of long distance traffic, with 50% travelling more than 15 kilometres and 30% travelling between Runcorn and Widnes.

The main conclusions from the study were as follows:

(1) Existing traffic congestion on the bridge will get much worse to the extent that there would inevitably be constraint on traffic demand.

(2) There are severe constraints affecting the construction of a new strategic crossing in particular:

- ecology - due to the sensitive nature of the river and its banks which include a Ramsar site, a Special Protection Area (SPA) and Sites of Special Scientific Interest (SSSI).

- urban environment - due to the location of Widnes and Runcorn on the banks at the shortest crossing point;

- cost and engineering - due to the possible length of a crossing and the difficulty of bridging the Manchester Ship Canal, in particular the need to cross at high level to maintain shipping rights.
Three preferred options were identified for a strategic crossing. All were close to and would give relief to the existing bridge.

The Government concluded that there was insufficient strategic traffic demand across the Mersey to justify a new trunk road (or strategic) crossing. It pointed out however that there is a large local traffic demand, and subsequently accepted that the local authorities in the area may wish to consider the feasibility of a more local crossing, to resolve the increasing congestion. This acceptance reflected the then current Objective 1 status of Merseyside and the Objective 2 designation of areas of North Cheshire.

There is little prospect of the present Government constructing and funding a new trunk road crossing. In the meantime problems continue to increase on the existing bridge affecting particularly the sub-regional and local traffic, for which there is no nearby alternative crossing. Continuing traffic congestion on the bridge and its approaches will restrain future economic development of the counties of Merseyside and North Cheshire and the freestanding towns either side of the Mersey. It could also restrain the potential development of Liverpool Airport and associated strategic development sites in the area. At the recent public inquiry into the expansion of Liverpool Airport, the congestion on Runcorn-Widnes Bridge was cited as a potential constraint on accessibility.

A Mersey Crossing Group was formed by representatives of the Mersey Metropolitan Borough Councils of Liverpool, Knowsley, Wirral, Sefton and St. Helens, Cheshire County Council; the two Cheshire District Councils of Halton and Warrington (subsequently to become Unitary Authorities), and the Chambers of Commerce of Liverpool, Warrington and Halton.

Following ministerial approval in December 1995, the Mersey Crossing Group commissioned Oscar Faber to investigate the feasibility of a new crossing of the Mersey, in the vicinity of the existing Runcorn-Widnes Bridge. The study is particularly aimed at supporting economic development initiatives in the Objective 1 and 2 areas, relieving the constraint on sub-regional and local movements, with only limited improvements to approach roads to the crossing.

Oscar Faber were assisted in the study by the following sub-consultants:

- DTZ Pleda, Economic Development;
- RPS Consultants, Environmental Assessment; and
- Cheshire Engineering Consultancy, Engineering Design.

### 1.2 Objectives of the Study

A brief for the current study was prepared by Oscar Faber, and this was subsequently approved by the Mersey Crossing Group. The objectives of the study were as follows:
To examine the feasibility of a new local crossing aimed at relieving the existing Runcorn Widnes Bridge, in order to remove constraints on accessibility across the river and to facilitate future developments in the widest area on both the north and south banks.

The study area should extend approximately 3 kilometres either side of the existing bridge, to encompass possible southward extensions of the A5300 in the west, and possible crossings linking to the Runcorn Expressway near Astmoor in the east. As the nearest practical options to the existing bridge but facilitating alternative uses of the existing highway network.

The economic development opportunities arising from a new crossing, or alternatively the damage that may occur to the local economy in the absence of a new crossing, is a key issue for this study. Other key issues for the study are as follows:

- Provide an optimal solution, within the identified constraints, for the encouragement and facilitation of economic development on both sides of the Mersey in the widest possible area, including Merseyside, Runcorn and Widnes and North Cheshire;
- Minimise disruption to the rural environment, ecology and river regime, paying particular regard to the Ramsar site, SPA and SSSI;
- Separation of local and sub-regional/strategic traffic movements, particularly on crossing approaches, to ensure the new crossing capacity is used most effectively and to avoid increasing the overall amount of traffic which passes through the urban centres either side of the crossing(s);
- Minimise disruption and further disturbance and pollution to the urban environment of Runcorn and Widnes;
- Minimise construction beyond the new crossing to ensure that a cost effective solution is achieved whilst relieving congestion across the corridor;
- Achieve a deliverable solution which is practical, acceptable, fundable, and environmentally sensitive (neutral);
- Investigate the scope for private financing; and
- Maintain operation of the Manchester Ship Canal.

1.3 Study Approach

The study is being conducted in two stages and this report presents the findings of the second Stage. Stage 1 of the study involved the identification and assessment of a wide range of options within a 3km corridor either side of the existing bridge.
The identified options were subject to a preliminary assessment of their traffic, economic development, environmental and engineering impacts. Three options were identified for analysis in Stage 2 of the study (the original study brief stated that two options were to be taken forward to Stage 2 but this was amended to three following a presentation to the client group on 6 November 1996. A third option was included to ensure that a balanced assessment of the alternative crossing options was undertaken in Stage 2).

Stage 2 of the study involved a thorough assessment of the three options brought forward from Stage 1. A business survey was also undertaken as part of Stage 2 in order to determine the potential economic impact of a new crossing or the 'do-nothing' scenario.

1.4 Report Structure

This report presents the findings of Stage 1 of the Mersey Crossing Study. It details the identification of the scheme options and describes the results and conclusions of the analysis of the options.

Following this introduction there are a further 5 chapters. Chapter 2 details the results of a review of existing data sources and the changes that have occurred since the original study undertaken on behalf of the Department of Transport. The identification and description of the Stage 1 options are presented in Chapter 3. Chapter 4 presents the environmental, economic and traffic assessment of each of the options. Chapter 5 summarises the main findings of the study and the recommended options for Stage 2 of the study are given in Chapter 6.
2  Stage 1

2.1  Introduction

Stage 1 of the current study involved the identification and assessment of a wide range of options within a 3km corridor either side of the existing bridge. The results of Stage 1 of the study were presented to Members of the Mersey Crossing Group in November 1996 and the Stage 1 Report was finalised in June 1997. In order to place Stage 2 of the study in context the main findings of Stage 1 of the study are summarised below.

2.2  Main Findings

In Stage 1 of the study nine options were evaluated in terms of their traffic, economic development, environmental and engineering impacts. The options investigated in Stage 1 are shown in Figure 2.1.

All of the nine options provided traffic relief to the existing bridge and improved accessibility for movements across the River Mersey. However, there are differences in their impact on the surrounding area.

The River Mersey to the west of the existing rail bridge is designated as a Ramsar, SSSI and a SPA. Any crossing to the west would therefore impact on environmentally sensitive area. A route on the line of the existing crossing would pass close to the built up area of Runcorn and would therefore impact on the people living and working in the immediate area of the crossing. The routes to the east of the existing bridge could also impact on the Ramsar site as any disturbance to the river bed could release contaminants downstream and the introduction of piers in the river could alter the river regime in the Ramsar area.

It was important to ensure that the widest range of options and solutions were carried forward to Stage 2 of the study. The Mersey Crossing Group therefore recommended that three options be carried forward to Stage 2 of the study rather than two options as stated in the study brief. It was recognised that the economic development opportunities of a new crossing would form an important part of the Stage 2 assessment and a proposal to conduct postal and face-to-face interviews with businesses in the area was accepted.

In Stage 1 of the study it was recommended that a western, central and eastern option should be carried forward to Stage 2 of the study, as shown in Figure 2.2, and this was accepted by the Mersey Crossing Group.
3 Economic Impact

3.1 Introduction

The assessment of the economic impact of a proposed new crossing of the River Mersey was undertaken by DTZ Piena, as sub-consultants to Oscar Faber, and by the direct appointment of Liverpool Macroeanomic Research Limited, by the client group.

DTZ Piena provided an assessment of the possible employment impacts of the Stage 2 crossing options based on the performance and decisions of existing firms, obtained from questionnaires and direct interviews, and from an assessment of the ability of key employment sites to attract new investment. The results of their work is summarised in the following sections and is fully reported in a separate technical appendix.

Following on from the work undertaken by DTZ Piena, and following discussions with the Roads Minister, the client group commissioned Liverpool Macroeconomic Research Limited to model the economic impact of a new Mersey Crossing using existing simulation models of the Merseyside and Cheshire economies. The model runs tested two of the Stage 2 options and one of the options considered in the original Department of Transport Study. The tests also included the impact of public transport measures. The full report is available as a technical appendix and is also summarised in the following sections.

3.2 Employment Impacts (DTZ Piena)

3.2.1 Introduction

In 1997 a total of 1,600 questionnaires were sent to a sample of businesses in the study area. The purpose of the questionnaire was to explore the use of transport to move goods, materials, supplies, staff and customers. In particular, the survey sought to identify the impact on local businesses of congestion associated with the existing bridge, the perceived advantages of a second crossing and the preferred location of a new bridge. A total of 254 completed questionnaires were returned, representing a sample of 16%. In order to gain a more detailed and specific understanding of the economic impact that current congestion on the Runcom-Widnes Bridge is causing to businesses, and to establish the benefits which might accrue if an additional crossing is constructed, 30 face-to-face interviews were undertaken with local businesses.

3.2.2 Background

It is important to note that all the figures quoted relate to the contribution of any new crossing to economic development. A multiplicity of factors affect the development and performance of existing firms and the attraction of new investment. This point has been emphasised heavily by the 30 firms interviewed face to face and by those involved in property development and lettings. In short,
alleviating current and future congestion on the existing bridge is but one influence on employment change in the area. The estimates are inevitably, therefore, broad brush.

The potential scale of economic impacts has been considered by looking at two influences. Firstly, the performance and decisions of existing firms and secondly, the ability of key employment sites to attract new investment.

3.2.3 Area of Influence

All the research carried out has pointed to a relatively small area over which a new crossing (or lack of it) will exert a strong influence on economic and business development. The area of influence is primarily within 10 miles of the existing crossing and confined to Halton, South Liverpool and South Knowsley (broadly the area defined by the post codes WA5, WA6, L19, L24, L25, L26, L28, L34, L35 and L36).

In 1995, there were some 91,000 employees working in this area (roughly half (53%) in Halton). The Merseyside part of this area had experienced a 23% decline in employment since 1984, although due to a more buoyant employment in Halton the overall decline for the whole area was 8%.

3.2.4 Employment Change Amongst Existing Firms

To date, firms covered by both postal and face to face surveys (some 280 firms) have not experienced employment declines as a result of the congestion (or at least no change they were able to identify). However, the surveys did highlight the potential problems caused by congestion in the future and, similarly, benefit from a new crossing.

Total employment in firms responding to the survey was 20,000 or roughly a fifth of employment in the main impact area. In terms of impact of congestion whether firms "have considered relocating" is taken as the best indicator of potential impact. If firms have considered relocating in the past then it has been assumed that, in the absence of improvement to the crossing they will relocate out of the area in the next 10 to 15 years. What is the potential employment loss?

The key points are:

- overall 13% of firms had considered relocating (23% of firms within 3 miles of the existing bridge but just 4% beyond 10 miles);

- small firms are much more likely to have considered relocating than large firms; and

- these firms employed 1,800 workers or roughly 9% of the total sample (97% of employees in firms considering relocating were within 10 miles of the existing bridge. A total of 34% of all employees in firms responding in the
immediate 3 mile zone had considered relocating).

On a slightly broader note, 13% of firms in the sample (employing 2,350 people) stated that congestion "constrained their activities" (which could be in terms of profitability or increased business costs) whilst 16% stated that congestion had reduced their ability to expand (these firms employ 2,900 people). Clearly, these firms will also be affected by continuing and worsening congestion.

In assessing the likely impact of a new crossing there is a need to (a) predict the impact on firms who did respond to the survey and (b) assess what this means for the wider population of firms in the area. The approach adopted has been as follows:

- All firms who have considered relocating in the past due to congestion are assumed to do so in the absence of a new crossing (over the next 10-15 years). This means that a minimum of 1,800 jobs could be lost to the area.

- There is a balance of some 1,100 employees in firms where their ability to expand has been constrained (2,900 less 1,800). It has been assumed that relieving congestion enables these firms to grow by 20% (creating around 200 jobs).

- In total around 2,000 jobs in the firms in the sample will be significantly influenced by the decision to build a new crossing [some 10% of all employees covered by the survey].

It is important to note that these estimates of the overall level of employment impact on existing firms is not dependent on the option chosen. There is no clear evidence that the actual location of a new crossing would, overall, have a significant net effect on employment impact amongst existing firms. (There is relative indifference to the actual siting of the crossing). However, it is considered that a western option would tend to favour the expansion of firms in the South Liverpool/Knowsley area more than the other options (and would be the most helpful to Liverpool Airport's expansion plan). These effects have not been quantified, nor can be quantified without considerable further work.

The above estimates are based on the reasonably firm basis of information from companies that have responded. These firms represent roughly one in 7 of all jobs in the main impact area. However, it is not possible to extrapolate from the sample (i.e. multiply by seven). There are good reasons to believe that those firms who responded to the survey are much more likely to be affected by current congestion than those that did not respond. It is therefore assumed all firms who did not respond would be unaffected by the new crossing.

An analysis of response rates and employment totals in the main impact area suggest that the possibly the impact figures could be increased by around 50% to cover those firms not covered by the survey. This is a very broad estimate that tries to take account of the fact that large public sector organisations were, generally, excluded from the survey.
The best estimate, therefore, is that building a new crossing would make a significant contribution to the safeguarding or creation of in the region of 3,000 jobs in existing firms in the area. There would be other, more diffuse, impacts beyond this but these have not been quantified. Very broadly the impacts would be split 2/3rd (2,000 jobs) within 3 miles of the bridge (largely Halton) and 1/3rd (1,000 jobs) beyond 3 miles (primarily South Liverpool/Knowsley eg. the Speke/Garston area).

3.2.5 Impacts on Inward Investment

In total DTZ Pleda Consulting estimate that there are some 320 hectares of developable employment land in the direct sphere of influence of a new crossing or 210 hectares if smaller sites (under 7 hectares) are excluded. These are new employment sites either currently marketed or identified in local plans or unitary development plans. A large amount of the employment land is concentrated in two key locations - Manor Park (in Runcorn) and around Liverpool Airport (sites developed by the Speke Garston Partnership).

A total of 23,000 to 34,000 jobs could be located on these sites if they were fully developed. The key points are:

- the alleviation of congestion on the existing bridge is one of several factors influencing the marketability of the sites and ability to attract new investors and occupiers;

- it is unlikely that, even over a 10 to 15 year period, all this employment land will be developed (DTZ Pleda Consulting are aware, for instance, of very significant constraints on a number of the sites in Halton);

- some of the firms and employment on these new sites will be relocations of firms already in the area and so not new additional employment for the area as a whole (DTZ Pleda's work on evaluating the Merseyside Objective 1 Programme suggest that displacement can be up to 50% - this figure has been adopted to reduce gross employment estimates to their likely net effect and so ensure the estimates are cautious); and

- there is evidence of significant development taking place on some sites and locations notwithstanding the current congestion problems (for instance there has been steady development of the various earlier phases at Manor Park that in part help explain the good employment record in Halton).

The overall conclusion is that the creation of a new crossing could aid the development of up to 11,000 to 17,000 net new jobs in the area on new sites. However, for most of these jobs a new crossing will be a contributory factor - probably not the most important factor - in the development of the site and attraction of new firms.
It is extremely difficult to ascribe the likely degree of influence to a new crossing. There is no firm, empirical basis on which to carry out such an assessment. The assessment is further complicated by the fact that firms and those involved in property/relocation decisions focus in the situation now not the likely situation in 10 to 15 years time if no new crossing capacity is provided.

In the absence of a better source the views of existing firms (where 10% of employment is in firms who have considered relocation as a result of current congestion) have been used as a proxy for the possible degree of influence. This may understate the impact of serious (local) congestion on new development and potential new firms moving to the area, as congestion may be more important in the final location decision of firms not already in the area those already physically located there.

However, applying this rule of thumb would suggest in the order of 1,100 to 1,700 new jobs from inward investment over the next 10-15 years could be specifically ascribed to the benefit of a new crossing.

### 3.2.6 Impact of Particular Crossing Option

In DTZ Pieda Consulting’s view the main impact on existing firms particularly and, to a lesser extent new locations, is driven by the existence of any crossing options compared to the do-nothing scenario. By 2016, sub-regional journeys (eg. Liverpool Airport to NE Clwyd) of 40 to 60 minutes under do-minimum would be improved by up to 7 or 8 minutes as a result of the best option. At worst the next best option would in all cases deliver two thirds of this improvement and at best almost the same improvement.

The relative travel time savings between the three options are therefore often minor. However, DTZ Pieda believe that a westerly option would in image (and practical) terms more clearly provide a strategic route linking Merseyside and North Cheshire and so will aid the development of sites in the Spree Garston area more than any of the other options.

DTZ Pieda have assessed potential new employment sites depending on which option would most favour their development. Table 3.1 summarises this analysis. The conclusions are:

- around half the maximum potential jobs affected by a new crossing would benefit most from a western crossing; and
- the relative impact of a western crossing would be greater on these sites/jobs than an eastern or central crossing on ‘theirs’ sites. (This is particularly true for the eastern crossing which would be most beneficial for the Manor Park area but where, in DTZ Pieda’s judgement, congestion problems and access would be less of an impediment to investment than many other locations in the impact area.)
Table 3.1  Assessment of Crossing Options on Employment Sites.

<table>
<thead>
<tr>
<th>Option</th>
<th>Share of Employment Sites Most Directly Affected (%)</th>
<th>Gross Potential Jobs Most Directly Affected</th>
<th>Degree of Influence of Crossing on Development Activity</th>
<th>Extent to which there is a Clear Difference Impact from other Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>52</td>
<td>18,000</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Central</td>
<td>20</td>
<td>7,000</td>
<td>Medium/Low</td>
<td>Low (similar to eastern)</td>
</tr>
<tr>
<td>Eastern</td>
<td>27</td>
<td>9,000</td>
<td>Low</td>
<td>Low (similar to central)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>34,000</td>
<td></td>
</tr>
</tbody>
</table>

The conclusion must be that a western crossing would do most to (a) attract new jobs to the impact area and (b) ensure these were located in the area of greatest need (ie. Merseyside).

3.2.7 Conclusions

Analysis suggests that the actual choice of option could make a difference to the location of employment impacts on new sites, with the western option leading to possibly the order of 500 more jobs in the South Liverpool/Knowsley area than under the other two options. These estimates of relative impact need to be treated with extreme caution and need in any case to be compared to the overall impact on existing firms (in the region of 3,000 jobs under all options). The differences between the overall totals are well within the margins of error and so should not be considered significant.

The overall economic assessment is therefore:

- impact on existing firms - of the order of 3,000 jobs (of which two thirds would be in Halton and the great majority would be jobs safeguarded);
- impact on new inward investment - of the order of 1,700 new, net additional jobs of which over half would be outside Halton; and
- little differential impact between options but some impact on the distribution of employment impacts for new, inward investment with the westerly option possibly delivering 500 more jobs to the South Liverpool/Knowsley area than other options.

3.3 Economic Modelling (Liverpool Macroeconomic Research Limited)

3.3.1 Introduction

During the course of Stage 2 of the study the client group consulted with the new Roads Minister in order to obtain the current government's view of the original
Department of Transport [DoT] study of a New Mersey Crossing. In particular the group were seeking the government's view of the preferred strategic western crossing, from the DoT study, which would cross the Mersey between the end of the A5300 and the M56 at Frodsham. As part of the consultation process the Minister requested additional information with regard to the economic and employment impacts of a new crossing and the potential for public transport improvements.

Liverpool Macroeconomic Research Limited were commissioned, by the client group, to use existing models of the Merseyside and Cheshire economies to determine the impact of the eastern and western crossings, from the current study, and the strategic western crossing from the DoT study.

3.3.2 Methodology

The impact of each of the options on the economies of Merseyside and Cheshire were derived by inputting the transport cost saving generated by each scheme into the economic models. The model simulations then generated percentage point changes in four economic variables: GDP, employment, working population and unemployment, on an annual basis over a period of seventeen years.

The transport cost savings generated by each crossing option were derived from the 2016 forecast traffic model runs for each option. The total travel times and distances for each option, split by Merseyside and Cheshire, were compared to the Do-minimum network in order to derive changes in travel time and distance. The changes in travel time and distance were then converted to a monetary value using the values of time and distance quoted in DoT program COBA10.

In order to derive the potential impact of public transport measures, as requested by the Minister, each of the econometric tests were run on the basis of ‘with’ and ‘without’ public transport measures. In the ‘with’ public transport tests it was assumed that bus lanes would be provided on the bridge crossing thereby reducing the available crossing capacity for private vehicles (it should be noted that the existing model is not multi-modal and it was therefore not possible to determine the potential transfer to public transport as a result of the modelled bus lanes).

3.3.3 Economic Simulation Results

The cumulative impact of the new crossing options over a seventeen year period, by each of the economic variables, is shown below in Table 3.2.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Western Crossing</td>
<td>+£281m</td>
<td>+5,500</td>
<td>+3,150</td>
<td>-2,250</td>
</tr>
<tr>
<td>Local Western Crossing</td>
<td>+£145m</td>
<td>+2,800</td>
<td>+1,550</td>
<td>-1,200</td>
</tr>
<tr>
<td>Local Eastern Crossing</td>
<td>+£193m</td>
<td>+3,150</td>
<td>+1,850</td>
<td>-1,600</td>
</tr>
<tr>
<td>Original Western Crossing - With PT measures</td>
<td>+£281m</td>
<td>+5,450</td>
<td>+3,050</td>
<td>-2,250</td>
</tr>
<tr>
<td>Local Western Crossing - With PT measures</td>
<td>+£105m</td>
<td>+2,050</td>
<td>+1,150</td>
<td>-850</td>
</tr>
<tr>
<td>Local Eastern Crossing - With PT measures</td>
<td>+£155m</td>
<td>+2,850</td>
<td>+1,500</td>
<td>-1,300</td>
</tr>
</tbody>
</table>

The results of the economic simulation indicate that a new crossing of the Mersey would have a significant beneficial impact on the economies of Merseyside and Cheshire. The Original Western Crossing is forecast to perform much better than the local crossing options and would result in an increase in GDP of £281m (1998 prices) and create 5,500 jobs. Of the two local options considered, the Local Eastern option performed best, reaching almost 70% of the increase in GDP forecast for the Original Western Crossing and almost 60% in terms of employment. The Local Western Option is forecast to result in half of the benefits forecast for the Original Western Crossing.

The ‘with’ public transport tests results in slightly lower benefits than those forecast in the ‘without’ public transport tests. However, it should be noted that the methodology used does not include an assessment of the economic impact of additional patronage on public transport services.

In terms of the individual economies of Merseyside and Cheshire the simulations indicate that a new crossing option would have a greater impact on the Cheshire economy than that of Merseyside. This is due to the fact that the Cheshire economy is more receptive to cost savings than Merseyside, that is to say Cheshire is more competitive than Merseyside and productivity improvements show up more markedly.
4 Engineering Assessment

4.1 Introduction

The engineering assessment of each of the Stage 2 options has been undertaken by Cheshire Engineering Consultancy (CEC), as sub-consultants to Oscar Faber. The alignment of each option is shown on the following plans:

- Western Option, CR/10865/05/01 D/A and CR/10865/05/02D/B;
- Central Option, CR/10865/05/03/A; and
- Eastern Option, CR/10865/05/04/A.

The following sections describe the alignment of each route and their connections with the existing highway network and a cost estimate is provided for each option.

4.2 Western Option (Option A/B)

4.2.1 Introduction

As part of the Stage 2 engineering assessment two alternative alignments have been reviewed for the western option. The two routes are Option A and Option B from Stage 1 of the study, with Option B being the preferred alignment from Stage 1 of the study, on cost benefit terms. The engineering appraisal detailed below therefore concentrates on Option B and presents the assessment of Option A, where different.

4.2.2 Description of Route

At its northern end, the existing A5300/A562 junction would be modified to form a three-level interchange with the new road carried on a high level bridge over the A562 and the existing roundabout, and with slip roads catering for all traffic movements. This bridge would comprise a continuous viaduct 370 metres long or a shorter viaduct over the roundabout with approaches in reinforced earth. The approaches would include a bridge span over Ditton Brook. The width of the viaduct would be 23.1 metres.

The new road in cross-section would be a dual two-lane all-purpose road with 7.3 m wide carriageways and 1.0 m hardstrips. The predicted traffic flows from the A5300 to the roundabout would require a single-lane slip road and hard shoulder for northbound traffic and a two-lane slip road with hard strip for southbound traffic. Single-lane slip roads with hard shoulders would connect with the new road south of the existing roundabout.

From its northern connection with the A5300 the new route would swing slightly to the east in order to pass through the centre of the existing grade-separated roundabout. This would allow for construction of slip roads from the new road and
a viaduct over this roundabout and across the A562 at high level.

The main constraint on the alignment from here to its southern terminal junction with the A557 Expressway would be the main residential area of Hale Bank village. To avoid this, the route would follow a straight alignment across agricultural land passing over the railway and crossing Hale Bank Road obliquely, directly affecting some residential properties, before curving gently to head in a south-easterly direction over Hale Gate Road just north east of Hope Farm, again directly affecting some residential property.

The route would then gain height to cross the Mersey Estuary and Manchester Ship Canal. The southern end of the route would be constrained by the need to minimise the impact on industrial/commercial development and the existing grade-separated interchange of the A557 Expressway with Picow Farm Road whilst maintaining geometric highway design standards. After passing through a parcel of undeveloped industrial land on the southern river bank, north of the Weston Point chemical works, the route would follow a right-hand curve bridging over railway sidings and Picow Farm Road, before merging with the A557 Weston Point Expressway. Two industrial premises between Picow Farm Road and the Expressway would be directly affected as would a clubhouse, recreation grounds and sports pitches.

The new route would form a free-flow interchange with the A557 Weston Point Expressway some 600 m south of the existing Picow Farm Road interchange and would become the through route. Northbound Expressway traffic would be diverted onto a new 7.3 m wide carriageway with 1.0 m hard strips passing beneath the new route before rejoining the Expressway. The existing northbound slip to Picow Farm Road would also be diverted, sharing the first part of this carriageway and then on a single-lane slip road with hard shoulder to Picow Farm Road. Southbound Expressway traffic would form a normal merge with the new route.

Links are provided from the new route northwards onto the Expressway. Although predicted levels of traffic usage are low, the links would be very useful whenever there are lane closures on the existing bridge. The inclusion of these slip roads would, however, cause considerable difficulties for a suspension or cable-stayed bridge solution as described in the following section.

4.2.3 Bridge Options

As the Mersey Estuary in this area has considerable environmental value, it is desirable that the chosen bridge option minimises the number of piers in the estuary thus keeping to the minimum, disturbance to the bed which will have detrimental consequences to the environment and ecology of the river. A suspension or cable-stayed form of bridge, though costly, would therefore be preferred on environmental grounds alone. However, the proximity of Liverpool Airport means that tower heights are restricted to provide the required clearance to the flight-path of approaching aircraft.
The tower heights for a cable-stayed bridge and for a single main span suspension bridge would infringe this clearance. However, a two span suspension bridge with a tower height some 85 m above river level is feasible. This solution would consist of two 675 m main spans with 200 m side spans.

The requirement for the new crossing to allow for all traffic movements could easily be accommodated on conventional multi-span viaducts.

For a suspension or cable-stayed bridge, the provision would be more difficult: the problem being to avoid conflict between the alignment of the bridge supporting cables and the clearance envelope of the diverging traffic lanes.

In the case of a suspension bridge it is considered that this could only be achieved if the divergence was limited to within the end spans. The end spans would not then be suspended, but would comprise conventional beam spans. Therefore the suspension cable - without hangers - would continue along the length of the end spans to provide the anchorage for the main suspended spans. The end spans are not over the river.

The plan of Option B assumes that for a two-span suspension bridge the southerly pier is located in the river just outside the Ship Canal. A solution with just the central pier in the estuary may be feasible but the alignment of the slip roads would require further detailed investigation at a later stage as they would be of a sub-standard nature horizontally and vertically. Should the slip roads not be required, only the central pier need be within the river.

For all types of bridge construction, the provision of slip roads could impair the aesthetic qualities of the crossing.

Land requirements and easements for construction would require Works Agreements for the crossing of the Ship Canal and the railway and Official Consents for work in or over the River Mersey.

Easements to enable construction of the bridge would be required over significant areas of land at each end of the bridge.

A considerably cheaper conventional multi-span viaduct is also feasible having a river clearance of 15.3 m rising to 21.96 m over the Manchester Ship Canal, but this would have the severe environmental disadvantage of having numerous piers in the river. Its cost is estimated to be half of that of a cable-supported structure.

The comparative cost between viaduct and cable-supported bridges is based on published information on large-scale bridgeworks over open water. The findings point to a cost factor of between 1.5 and 2.0 times. The factor applies to the cost of the actual engineering works and does not reflect other considerations ie cost of environmental impact etc. To fully assess these aspects will require detailed input from specialists in these fields.
Although Stage 1 identified Option B as the preferred option for further study in Stage 2 on cost-benefit grounds, the Option A variation does have certain advantages.

It would not directly affect residential property on Hale Bank Road or Hale Gate Road. It would also move the route further from the main residential area of Hale Bank. A further advantage is that the route would avoid Pickering's Pasture, a local nature reserve, used for conservation and public amenity.

The route would be similar to Option B in the north until it crosses the railway. It would then follow gentle reverse curves first sweeping west to cross Hale Bank Road south-east of Linner Farm before swinging east to pass over Hale Gate Road south-west of Pickering's Farm. At both roads it would avoid directly affecting residential property. The route would then pass south-west of the sewage works before crossing the estuary and rejoining Option B alignment.

A disadvantage of this option is that its more curved alignment results in there being a shorter length of straight available for a suspension bridge solution. This would result in at least two, and probably three, piers being located in the river.

The breakdown of the cost estimate for each of the alignments for the western option are provided below in Table 4.1.

<table>
<thead>
<tr>
<th>Option</th>
<th>Highways (£m)</th>
<th>Structures (£m)</th>
<th>Property (£m)</th>
<th>Total (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>39.3</td>
<td>93.8</td>
<td>2.0</td>
<td>135.1</td>
</tr>
<tr>
<td>B</td>
<td>33.8</td>
<td>111.5</td>
<td>3.0</td>
<td>148.3</td>
</tr>
</tbody>
</table>

4.2.4 Connections with Existing Network

It would be possible to construct the majority of the northern interchange with no interruption of existing traffic flows. Only when constructing tie-ins of slip roads to the main line and roundabout would there be moderate disruption to existing flows when temporary reduction of two lanes to one would be necessary, mainly at off-peak periods. Initially the slip roads for the A5300 north of the roundabout would be constructed with bridges over Ditton Brook. Traffic on the A5300 would then be temporarily diverted onto these slip roads maintaining two lanes in each direction. The vertical alignment of the main line would then be raised and a viaduct or separate bridge constructed over Ditton Brook and the roundabout. Additional land will be required adjacent to the A5300 to accommodate the higher embankment and slip roads of the raised alignment. Several weekend closures of the A5300 and A562 slip roads would be necessary for placing bridge beams over the roundabout and A562. It is likely that the inner lane of the roundabout would need to be closed to provide working space/access for bridge construction, this should not prevent the roundabout operating relatively normally for most of the day with some delays at peak periods.
The majority of the southern interchange could be constructed with little or no disruption to existing traffic. Only when constructing tie-ins to the Expressway and Picow Farm Road would traffic experience moderate disruption whilst two lanes are temporarily reduced to one, mainly in off-peak periods. The diversion of the northbound slip road to Picow Farm Road would first be constructed including the first part of the diversion for the northbound Expressway traffic. Slip road traffic would then be diverted allowing completion of the Expressway northbound diversion across the old slip road. The overbridge for the new route would also be constructed. Northbound Expressway traffic would then be diverted onto the new carriageway. After completion of the new route over the new bridge and Picow Farm Road, the final operation would be to construct the tie-ins to the Expressway carriageways.

4.3 Central Option

4.3.1 Bridge Option

This is the shortest option and would consist mainly of a new bridge constructed between the existing road bridge and the railway bridge. The existing bridge would carry four lanes as at present but all lanes would be southbound. The new bridge would provide four lanes for northbound traffic. The clear gap between the existing bridges is approximately 34 metres and the overall width of the proposed bridge is 19.5 metres. Therefore the type of new bridge must be capable of construction within the gap.

With allowance for working space and for safety clearances, it is unlikely that there would be sufficient space for a through girder bridge or for a suspension or stayed bridge. It is considered that the only solution lies with a deck type bridge - ie main beams supporting a top slab deck.

Because of the restricted space it appears that construction/erection of the main beams (steel or prestressed concrete) would have to be by incremental launching or balanced cantilever construction.

For a bridge of this type, piers would be required in the river. It is considered that three main spans of 100 metres are appropriate. These would match the spans of the railway bridge and thus the new piers could line up with the railway piers. Problems concerning the effect of the new piers upon the piers of both the railway and the existing road bridge would require detailed study, similarly the effect on the river regime of an increase in pier obstruction. In addition to the main spans there would be six Widnes approach spans and four Runcorn approach spans - each span 55 metres.

Land requirements and easements for construction would require Works Agreements, for the crossing of the Ship Canal, and access under the railway, and Official Consents for work in or over the River Mersey. Health and safety considerations of working adjacent to A533 and to the railway would be paramount.
It is considered that there would be major logistical problems in gaining access into the river in order to construct the new piers - practicable from the Widnes side only. The areas at the ends of the bridge are restricted and space would be at a premium. It is likely that on the Runcorn side, all the housing between the existing road and railway bridge would have to be demolished in order to gain space for construction purposes.

The breakdown of the cost estimate for the central option are provided below in Table 4.2.

**Table 4.2 - Central Option Cost Estimates**

<table>
<thead>
<tr>
<th>Option</th>
<th>Highways (£m)</th>
<th>Structures (£m)</th>
<th>Property (£m)</th>
<th>Total (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>2.3</td>
<td>39.7</td>
<td>2.0</td>
<td>44.0</td>
</tr>
</tbody>
</table>

### 4.3.2 Connections with Existing Network

At the north end beyond the new bridge the northbound carriageway would merge into the existing carriageway just upstream of the existing diverging lanes to the A557 Widnes Eastern Bypass. Construction would involve temporary closure of the existing nearside northbound lane. When northbound traffic has been diverted on to the new bridge, temporary closure of the offside lanes would be necessary to form the new central reservation.

At the south end of the new bridge the northbound carriageway would divert from the existing carriageway on to the approach to the new bridge where there is an existing diverging section of carriageway which was constructed in anticipation of a future second bridge. Construction would involve temporary lane closure similar to those required at the north end.

The present layout at the interchange between the bridge crossing and the Expressway would have to be improved so that existing two-lane carriageways, which are marked down to a single lane prior to merging with another carriageway, would have two-lane marking throughout their length.

The traffic movement, where this revised marking would be difficult, is the southbound traffic from the bridge looping into the westbound Expressway traffic and having to pass through the restricted width of the end span of the railway viaduct. To avoid this problem it is would be sensible to divert the comparatively low flow on the westbound carriageway of the Expressway on to a separate viaduct passing over the interchange and the railway. This traffic would re-join the Expressway on a merging slip road downstream of the interchange.

To ease the two-lane traffic movement from the A533 Expressway to the bridge crossing, the approach to the loop would be re-aligned. Before work could start on the westbound viaduct, it would be necessary to build this section of carriageway first and divert westbound traffic on to a temporary length of...
carriageway linking the offside lanes of the two carriageways at the end of the loop.

Construction of new lengths of carriageway would involve periods of one-lane working on existing carriageways where new merges or diverges are formed.

4.4 Eastern Option

4.4.1 Description of Route

The main features are a long river crossing of about 1.25 km and comparatively sharp curves at each end.

At the north end a horizontal curve of radius about 670 metres is required to avoid the reclaimed amenity area of Spike Island and run into the A557 road where it passes through the railway bridge. Near the south end of the crossing a curve of radius about 760 metres is required to line up with the existing approach to the Expressway Interchange.

The vertical alignment would be determined by the need to provide the required clearances over the River Mersey and Ship Canal and the end constraints i.e. the level of the A557 at the north end and the roundabout above the A533 Expressway at the south end. At the south end there should be no difficulty in providing curves in excess of minimum values. However, at the north end sharper curves would be required to rise from near ground level at the road tie-in to the required height over the river.

In view of these restrictions on horizontal and vertical alignment a speed limit (60 mph maximum) would seem desirable. A557 Widnes Eastern Bypass at the northern end of the crossing is subject to a 40 mph speed limit. Sharper curves than those proposed for this Option exist on the Expressways in Runcorn. The road width would be dual 2-lane all-purpose road standard.

4.4.2 Bridge Options

The crossing of the River Mersey, the Ship Canal and the approach to the A533 Expressway is proposed to be a continuous viaduct of 18 spans of 100 metres each. 15 piers would be founded within the river bed, which would result in considerable disturbance of the bed silt. However, it is understood that this may not be so critical as further downstream, at the western option.

The bridge spans would be in steel or in prestressed concrete, constructed using launching or balanced cantilever systems. Easement, to enable construction of the bridge, would be required over significant areas of land at each end of the bridge.

Land requirements and easements for construction would require Works Agreements, for the crossing of the Ship Canal, and Official Consents for work in or over the River Mersey.
It is considered that the eastern option would be the most straightforward bridge crossing to construct, compared to the other options.

The breakdown of the cost estimate for the central option are provided below in Table 4.3.

<table>
<thead>
<tr>
<th>Option</th>
<th>Highways (£m)</th>
<th>Structures (£m)</th>
<th>Property (£m)</th>
<th>Total (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern</td>
<td>10.0</td>
<td>59.5</td>
<td>3.0</td>
<td>72.5</td>
</tr>
</tbody>
</table>

### 4.4.3 Connections with Existing Network

The site of the junction between the new crossing and the A557 Widnes Eastern Bypass is constrained by adjacent industrial plants and a railway. These constraints and the orientation of the roads make it very difficult to construct a grade-separated link between A557(North) and A557(South) passing over or under the new crossing. Therefore, an at-grade junction of the same form as the existing junction with A562 Ashley Way on the north side of the railway would be sensible. Traffic signals would be used to control the conflict between northbound traffic from the new crossing and southbound traffic on the A557 travelling to the existing bridge. These signals could be linked to those at Ashley Way to avoid any traffic stopping twice. Southbound traffic to the new crossing would bypass the signals to maintain free flow as at the existing Ashley Way junction. Construction would involve restrictions of carriageway widths to single lane and periods of contra-flow working whilst the new road is constructed through the junction and existing carriageways are tied into it.

The junction between the new crossing and the A533 Expressway would be at the location of the existing interchange between the Expressway and Astmoor Road - Astmoor Road being at the lower level. This would be the location for a new high level interchange with the crossing over the river.

Before the interchange could be closed for reconstruction, a diversion for Astmoor Road would have to be built. Astmoor Road would continue as a through route to Mason Road and proceed on a new curving, rising alignment to Heath Road which has links from it to the Expressway. This new length of road would pass over the busway and Wyvern Place and then run into Heath Road where it bends into Bridge Street. There would be a rise of about 15 metres along this 0.4 km length of new road with a maximum gradient of 5%. The diversion of Astmoor Road affects a primary school building, recent residential development at Pinellas Park and an electricity sub-station.

The section of Astmoor Road leading to the Expressway would be stopped off but would be kept open, under the viaduct carrying the new road, as far as Jensen Court to maintain access.
After temporary closure of the interchange, two bridges would be built over the Expressway for an elevated roundabout serving the new crossing. Embankments and retaining walls, where space is restricted, would be constructed above the existing slip roads to support new slip roads at a higher level between the roundabout and the Expressway. Restrictions to one-lane working would be required on the Expressway carriageways whilst the new slip roads are merged into the main carriageways.
5 Environmental Assessment

5.1 Introduction

The Stage 2 Environmental Assessment of the Design Manual for Roads and Bridges, Volume II [DMRB Vol II], involves identifying factors and effects that should be taken into account when considering which of the options has the least environmental impact. The environmental advantages, disadvantages and constraints of each option must therefore be identified and considered. This section of the report concentrates on environmental and planning related topics.

Route corridors were considered rather than detailed schemes, and the findings are therefore based principally on desk top research/work. Also, in view of the level of detail being worked to, the likely effects of the options during their construction are not considered, but will need to be addressed at a later stage.

5.2 Approach

Each of the Stage 2 options, and a do-nothing, were assessed against the following topics:

1. Air Quality.
3. Cultural Heritage.
5. Landscape and Visual Amenity.
6. Land Use and Built Environment.
7. Planning Policy.

The scale of any adverse or beneficial effects were measured as follows:

- No Change.
- Slight impact.
- Moderate impact.
- Substantial impact.

Generally 'no change' or 'slight adverse impact', depending upon type and level, are unlikely to warrant any major mitigation measures or consideration of
alternative alignments. Where adverse impacts are 'moderate' or 'substantial',
depending upon the type and level, it is probable that mitigation measures or
alternatives will be required.

The assessment of each of the options is summarised in the following sections and
a full environmental appraisal is available as a technical appendix.

5.3 Air Quality

Air quality can be affected in two different ways by roads and traffic. First, there
could be localised changes, either improvements or reductions, on the existing
network. Secondly, there may be changes in the overall quantity of emissions from
traffic. In general, concentrations of slow or near stationary traffic represent the
conditions most likely to bring about a reduction in air quality. The greater the
concentration and length of tail back, the greater the problem. Vehicles operate
most efficiently and produce least pollution when they are driven in free flowing
traffic at moderate speeds. It is therefore assumed that slow moving or stationary
vehicles result in greater emission levels and a reduction in air quality, than vehicles
moving at a speed greater than 30 mph. Accordingly, junctions and junction
approaches have been specifically considered.

Problems also tend to be more serious in urban situations, particularly where there
are large concentrations of industrial land uses which are close to residential
properties. Topography, the level of vegetation and wind conditions also play a
role.

The number of residential properties and other occupied buildings within 200m of
each of the route corridors has been considered. This represents the area within
which people might possibly be subjected to changes in air quality. This is also
used as the basis for identifying areas which would be at some risk from reductions
in air quality.

None of the options are likely to cause a significant adverse effect to air quality.
The risk of air quality being adversely affected will be greatest where
concentrations of traffic develop. Generally, these tend to be at roundabouts
and therefore the western and eastern options would all give rise to a moderate
adverse impact. The elevated nature of the mid-sections of each option would
assist in dispersal of emissions. Mitigation would principally involve planting to assist
dispersal of emissions.

Given current conditions close to the corridors of the central and eastern options,
these options are likely to provide greater potential for congestion than the
western option and therefore, increase the potential for air quality to be adversely
affected. By virtue of the proximity to groups of houses and other factors, the
western option, is likely to have least overall impact.

The western option followed by the eastern and central options, in that order, is
likely to have the least overall impact on air quality.
Whilst there is some scope for mitigation, in the form of planting, this is limited in respect of the central and eastern options by virtue of the alignment of the approach roads and generally developed nature of the Estuary's hinterland. There is scope for mitigation at the northern end of the western option which would be restricted to the south by existing development.

5.4 Noise and Vibration

The sources of noise from moving traffic can be split into two components. The first is generated by the engine, exhaust system and transmission. This is the dominant noise source when traffic is not freely flowing, particularly from heavy vehicles which contribute a significant proportion of low frequency noise. Noise levels will vary primarily according to engine speed rather than vehicle speed. The second noise source component is generated from the interaction of tyres with the road surface and is the dominant noise source under free flow traffic conditions at moderate to high road speeds and contributes a proportion of high frequency noise. Noise levels vary according to vehicle speed, road surface and whether the surface is wet or dry.

Noise levels from traffic when measured from any one point vary since various factors influence the audible range of sounds. Such factors include topography, wind direction, density of vegetation and weather conditions.

Noise nuisance is defined as 'A feeling of displeasure evoked by noise' (World Health Organisation). Humans are more sensitive to sudden changes in traffic noise, rather than steady streams of traffic. Disturbance may also be greater at night when sleep patterns can be disturbed.

To identify areas close to each route option which could suffer noise nuisance, the number of units within 300m of existing road subject to traffic changes of over 25%, have been estimated using 100m bands (the first band is split into 50m bands). The western and eastern options will result in +25% traffic flow changes since they are new routes. Although, the central option complements the existing bridge, and utilizes the existing bridge's approach roads, albeit in a modified state, the total flow will also represent a +25% traffic flow change.

Traffic vibration generally needs to be considered in terms of effects on buildings and disturbance to people. Vibration related problems are unlikely to extend beyond the 50m band. Accordingly the potential within this band for vibration related problems are also considered.

The western option and parts of the eastern option will have the greatest noise impact due to likely existing ambient noise levels, current land use, topography (generally flat), proximity of houses, lack of screening vegetation and prevailing wind conditions (westerly). The central options and the northern part of the eastern option are likely to have least effect due to likely existing noise levels, current land use, existing roads, and the generally densely developed nature of urban structure.
The western option could also result in noise impact on an SPA, SSSI and Ramsar site. The likely level of impact requires more detailed study, though it is likely to be greater in the short rather than longer term when the new crossing and its impacts have become established, though these could still be damaging to current amenity levels.

Whilst limited, there is some scope for mitigation on all options. Elevated sections are also a problem because of the difficulty to 'noise screen'. Off line works can be considered where appropriate, particularly where close to housing.

Overall the central option, followed by the eastern and western options, in that order, is likely to have the least noise impact.

5.5 Cultural Heritage

Cultural heritage designations include:

- Listed buildings;
- Conservation areas;
- Schedule Ancient Monuments;
- Heritage Sites; and
- Other designations of note.

The western option would pass close to two scheduled Ancient Monuments and a Conservation Area.

The central option would affect two Grade II listed structures, namely the existing railway bridge and road bridge.

The eastern option would affect no relevant designations or structures.

The only form of mitigation that can be put forward to reduce the impact of any of the options on a listed building, ancient monument or conservation area are various forms of screening, or in the case of the central option, a sympathetic design, since impact is generally visual rather than physical.

Of all the Options, the eastern option has the least impact, followed by the western and central options. However, if the central option utilises a design which either complements or does not affect the setting of the two adjacent listed structures, then impact may be limited.
5.6 Landscape and Visual Amenity

The assessment of the impact of the options on landscape and visual amenity essentially concerns the effect of the route and its infrastructure and traffic on the quality, character and individual components of the landscape of the area.

The quality of the landscape of the study area can be regarded as average with small, generally older areas of distinct character. A small area east of Hale is regarded as being of County Value. The western option would adversely affect this designation and its qualities.

Residential properties in the western part of the study area, particularly around Beacon Hill & Westfield, plus sections of the Trans-Pennine Trail and other footpaths would have views of the route and bridge infrastructure with the western option. The central option would adversely affect the older residential areas on the north and south banks. It would cross the Trans-Pennine Trail, as would the eastern option, but impact on the trail from these two options would be much less than the western option. The eastern option would be visible from areas to the east, though any impact would be localised.

Some long to medium distance views are available of the study area from vantage points to the south and south-west. Indeed, there are some fine views of the Mersey Estuary and the western part of the study area from the A533 (Runcorn Expressway) between Weston and Westfield and further south from Heisby Hill. The western option would be visible from these points, and would result in a substantial adverse impact in views of the estuary. The central and eastern options would be either not visible or not visually obvious from these locations. The eastern option would result in localised moderate adverse impacts.

In terms of landscape and visual amenity, the western option would have most adverse impact, where as the eastern and central options would have least. Of these, the central option would be least visually prominent and most acceptable in terms of impact, whilst the eastern option represents the proposal with potentially the most to contribute to a new landscape identity for the Mersey Estuary.

5.7 Ecology and Nature Conservation

The assessment of the potential effects on the ecology and nature conservation interest of the area identifies the rare or valuable habitats designated for their ecological or nature conservation interest within the route corridor, and the potential impacts of the route options.

The existence of the Mersey Estuary SSSI, which is also an SPA and Ramsar Site, is a significant constraint seriously affecting the potential of any option which crosses these designations or which has an impact on them. Although the implications of these designations is considered in greater detail later in the findings and conclusions, it is possible to confirm at this stage that the western option, could have a substantial adverse impact.
The central and eastern options would be significantly less constrained due to the fact that they do not directly cross the designations. However, any bridge infrastructure which has the potential to disturb contaminated sediment upstream of the SSSI etc. could give rise to an adverse impact.

More detailed study will be required to accurately predict the effects of any of the options on the SSSI etc., but in line with relevant planning policy guidance, considered later, the western option would be extremely difficult to justify if the designated sites were to be breached by piers or other structures, or the overall extent and integrity of the designations were reduced in any way.

The central and eastern options offer the greatest potential to leave the designations undisturbed by virtue of being upstream of them. Positioning of piers, adjacent to existing railway bridge piers could assist in reducing their impact. The central option is therefore probably the least environmentally damaging, but a more detailed study should be undertaken as to the effect that piers would have on the regime of the river.

5.8 Land Use and Built Environment

This refers to the type and quality of the area’s land use and built environment. Also examined is land and property take, agricultural land quality, community implications and other relevant matters. Land take areas considered are estimated on the basis that twice the road width needs to be acquired for operation of the new route.

In terms of land take, the western option, would be the least economic. The eastern option involves least land take, followed by the central option.

The eastern option involves the demolition of a small number of buildings, but no houses. The central option would have the greatest impact in terms of the numbers of houses requiring demolition since the route passes over/through a small enclave of high density Victorian terraced houses located on the south bank between the road and railway bridge. This area, known as Dukesfield (part of) has recently been improved through a Single Regeneration Budget funded scheme.

As intimated above, other buildings and land uses would be affected. These tend to be industrial in terms of use, though some open space and agricultural land would also be lost.

Although the central option requires the demolition of a number of houses, its overall impact on existing land use and the built environment would be less than the other options due to the presence of the existing crossing. Of these the eastern option would probably, on balance, be the next most acceptable option.
5.9 Planning Policy Designations

The western option would affect substantial areas of green belt on the north bank. The route would pass over the SSSI and Ramsar site and an Area of Special County Value. The option would also have a substantial adverse impact on the Estuary Nature Conservation designations due to the bridge structure potentially disturbing the ecological balance.

The eastern option crosses public open space adjacent to a Local Nature Reserve on the north bank and passes over public open space again on the south bank. The central and eastern options would have relatively little impact on the nature conservation designations where they cross the River.

South of the River, the western and eastern options pass through industrial/employment areas as does the central option on the north bank. Residential areas would be affected by the central option to the south, but due to the existing crossing already passing through this area, the impact is only considered to be moderate.

Overall, the central option would have least affect on Planning designations, as it passes through previously developed areas rather than Green Belt, Greenspace or the Ramsar Site. The western option would have the greatest adverse effect.

5.10 Weighting Impacts

Each option has been assessed in the context of various topic areas. It is not possible to suggest that each topic area should be given equal weight, because of the importance of certain designations having Ecological and nature conservation value. The study area includes an internationally important and unique wildfowl habitat with appropriate designations. Although the central and eastern options do not cross the designations, because of their location up stream, it is considered that they have the potential to adversely affect their integrity.

It is important therefore to consider the requirements of relevant guidance and planning controls which relate to those designations, as they will provide the framework for a decision on whether any of the options can be regarded as acceptable.

Both in the existing (Halton Local Plan) and emerging (Cheshire 2011 Structure Plan) development plan framework, a second Mersey Crossing is proposed as a specific aim. The Halton Local Plan, a statutory adopted plan, refers to this as a longer term aim. The Examination in Public (EIP) into the Cheshire 2011 Structure Plan (October 1997) does not propose to specifically examine the issue of a second Mersey Crossing. The matter is likely to be formally included in a future review of the Halton Local Plan once the Council becomes a Unitary Authority in 1998.
5.11 Bridge Design

Bridge design is an important further factor which will influence the degree of environmental impact, particularly on the nature conservation designations referred to above. Bridge designs which do not affect (penetrate or abut) the nature conservation designations are likely to have the least overall impact. Those that do could have a greater, potentially unacceptable, impact and may be difficult to justify.

The proximity of Liverpool Airport is a significant factor to be taken into account, with regard to all of the options, but principally with regard to the western option. Any bridge structure, by virtue of its height or design, which affects the safety zone for aircraft taking off or landing at the airport, may not be regarded as acceptable.

5.12 Guidance Relating to SSSI, SPAs and Ramsar Sites

Annex B of Planning Policy Guidance Note 9 (PPG9), classifies the Mersey Estuary as a Special Protection Area (No.130).

Annex C of the guidance (PPG9) sets out the procedure for considering a development proposal that would affect an SPA or SAC.

The approach that must be used to test whether a proposal which directly affects an SPA etc. is acceptable, is as follows:

1. Is the proposal directly connected with or necessary to site management for nature conservation? Would the proposal adversely affect the integrity of the site?

2. If the proposed development is unconnected with site management and would adversely affect the SPA, the proposal must be assessed in view of the site's conservation objectives, so as to ascertain whether it will adversely affect the integrity of a site (i.e., the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified).

3. If it would, could these effects be removed through the use of conditions?

4. If not, are there any alternative solutions, which are reasonable alternative solutions, which are practical approaches and which would have a lesser impact?

5. If there are no alternatives and the site does not host a priority natural habitat type or species (defined in Habitats Directive), in order for the proposal to proceed, it must be justified 'for reasons of overriding public interest, including those of a social or economic nature'. Furthermore, the reasons need to be
sufficiently important to override the ecological importance of the designation.

(6) If the site accommodates either a priority habitat or species, and there is no alternative solution, the only consideration which can justify the approval of the proposal, are those which relate to human health, public safety, or beneficial consequences of primary importance to the environment (the European Commission can identify other imperative reasons etc. in consideration with the Government).

In a number of recent cases development decisions affecting designated SPA/Ramsar sites have resulted in the intervention of the European Courts. As a result the British Government is justifiably aware of its responsibilities to protect these designations.

The cases are seen as confirmation of the rigorous examination required of all development proposals that have the potential to damage SSSIs, SPAs and Ramsar sites. As a result, ecological considerations are a material determining factor when determining which option is the most suitable overall, even where there are significant economic and transportation arguments in favour of one specific option.

5.13 Assessment of the Options in Light of PPG9 Advice

The recommended options assessed in accordance with the approach set out above result in the following:

(1) Given the nature of the proposal, it cannot be deemed necessary for the purpose of site management for nature conservation.

(2) The Mersey Estuary has been designated as an internationally important site for wildfowl (SPA). Throughout the winter period the SPA supports large numbers of wildfowl and waders. It is also a valuable staging post for migrating birds in spring and autumn. A bridge crossing in the locations represented by the western option, would adversely affect the integrity of the SPA because of the effect on the coherence of its ecological structure and function across its whole area, even though the crossing would only affect part. It would also be unable to sustain current levels of populations of the various species for which it was designated.

(3) It is unlikely any adverse effects caused by the western option and possibly the eastern option, could be removed or controlled through the use of conditions.

(4) The western option would adversely affect the SPA. The central option and, to a lesser degree, the eastern option, would have relatively little adverse effect on the SPA. The eastern and central options must therefore be regarded as suitable and viable alternatives.
Even if the central and eastern options could not be regarded as viable alternatives, the SPA accommodates priority species and therefore criterion 5 relating to justifying the proposal for reasons of overriding public interest, including those of a social or economic nature, does not fail to be considered. The test relating to this category of SPA, i.e., one housing a priority species, must be considered.

The relevant test, i.e., justified in relation to human health, public safety, or beneficial consequences of primary importance to the environment, cannot be satisfied since the primary justifications for the new crossing are transportation and economic orientation. Even if the test could be satisfied, there are two preferable alternatives which would achieve more or less the same effects in transport and economic terms.

5.14 Do Nothing

'Do Nothing' considers the scenario where there is no new crossing constructed.

The existing crossing would not only be subject to increases in traffic as predicted by National Road Traffic Forecasts and the traffic model, but also when allocated employment and residential areas are developed.

Air quality around the existing bridge would be adversely affected in future years under the 'Do-nothing' option. This is as a consequence of increased traffic flow which will assume current peak time traffic characteristics, i.e., slow moving nose to tail flows, across a greater proportion of the day.

Congestion would therefore increase and peak traffic flows over the bridge would occur for longer periods. Air quality would be further reduced, noise and vibration would be increased and the general quality of the surrounding environment would decline.

By providing an additional crossing increased congestion and associated environmental problems would be relieved. A second crossing would also facilitate the closing of the existing Runcorn Bridge for maintenance, should that be necessary. Closing the existing bridge for maintenance, without a second crossing, would likely cause considerable problems.

Acknowledging the fact that a second crossing would create its own environmental impacts, the impacts of, say, the central and eastern option would not be as great as those of the 'Do-nothing' approach. Therefore the 'Do-nothing' scenario should be excluded from consideration of the alternatives.

5.15 Overall Findings

The overall findings confirm that none of the options could be implemented without varying degrees of adverse environmental impact.
None of the options would be likely to create wholly unacceptable air quality, noise or vibration related conditions. Least acceptable conditions are likely where traffic flows are slow, noise to tail or at junctions.

In landscape and visual quality terms, the area to the west is of a higher quality than the remainder of the study area, and consequently the western option would have the greatest adverse impact. The central option would be unlikely to bring about a significant change in the visual quality of the area, nor would the eastern option.

The central option would affect the setting of two well known listed structures, though the effects could be minimised through the design of the new crossing. The western option options would adversely affect various designations of note, whereas the eastern option would affect none.

In land take terms and effects on the built environment, and with regard to planning policy, the central option is probably the most acceptable, followed by the eastern and western options, in that order. Although the central option would give rise to the least adverse effect overall, it could involve the demolition of a number of houses.

Ecological and nature conservation matters are the most telling when considering which option is the least environmentally damaging. Given that the western option crosses an SSSI, SPA and Ramsar site, and in the light of relevant guidance, it is highly unlikely that this option could be readily justified. This is especially pertinent in the light of the existence of two potentially suitable alternatives.

Of the two alternatives, the central option, by virtue of the fact that it could be designed so that the crossing causes limited disruption of the river's regime by locating piers adjacent to the existing railway bridge, suggests that this is more suitable and potentially less damaging than the 15 pier bridge further upstream considered by the eastern option. Further more detailed work is required to confirm that the eastern option and piers in this section of the Mersey Estuary would not adversely impact on the SSSI, SPA and Ramsar site located down stream.

In environmental terms, the central option is the most suitable option.
6 Traffic Assessment

6.1 Introduction

The traffic model developed for the original Dot study used 1991 as a base year. Since that date a number of changes have taken place to the highway network with a number of schemes now being open to traffic, and they are:

- Widnes Eastern Bypass;
- A5300; and
- St Helens Link.

The traffic patterns in the study area are therefore different to those that existed at the time of the original study. The existing traffic model was therefore updated to reflect base traffic conditions in 1996, the date at which the study was commissioned.

In Stage 1 of the study a review of existing data was conducted in order to identify traffic counts for the main crossing points of the River Mersey. Cheshire County Council were able to supply data for the Runcorn-Widnes Bridge and other links within Cheshire. Merseytravel were able to provide traffic count data for the Mersey Tunnels.

Traffic flows across the M6 Thelwall Viaduct were restricted, during 1996, due to roadworks and traffic management arrangements associated with the construction of a new motorway viaduct. Unfortunately as a consequence of the roadworks traffic count data had not been collected across the Viaduct during 1996. (It should be noted that the DOT study of the Mersey Crossing indicated that the improvements to Thelwall Viaduct would not significantly reduce the level of congestion across the Runcorn Bridge and this has been confirmed in this study).

Comparison of 1996 and 1991 traffic flows across Runcorn Bridge indicated that traffic flows had increased by almost 13% from 67,000 vehicles AADT in 1991 to 75,000 vehicles AADT in 1996. In comparison national car traffic increased by 6% between 1991 and 1995. This indicates that there has been a significant increase in traffic flow across the Runcorn Bridge which is in excess of national growth. Analysis of historical count data indicates that up to 1991 traffic growth across the bridge was in line with observed national growth.

The higher than average increase in traffic flows could be caused by the new highway schemes in the area drawing additional traffic onto the bridge and by general traffic growth.

The 1991 traffic model and its technical content were approved during the Dot study of a new Mersey Crossing and a Local Model Validation Report was
produced. The 1991 model was developed and validated according to the guidance given in the then Department of Transport's Traffic Appraisal Manual (TAM) (now Volume 12a of the Design Manual for Roads and Bridges) and meets all the relevant technical criteria. The 1991 model therefore provides a useful tool for assessing the changes to travel patterns in the study area and the implications of providing a new crossing of the River Mersey.

In order to determine the cause of the significant growth in bridge traffic the 1991 traffic model was updated to include the new highway schemes in the area. The car/light goods vehicle trip matrices were factored to 1996 using growth rates for the North West Region extracted from the National Trip End Model. The heavy goods vehicle matrices were factored from 1991 to 1996 using national growth rates. The matrices were then assigned to the model and a comparison was made between the observed flows on the Runcorn Bridge and the figure produced by the model. The model was found to replicate the observed traffic flows on the Runcorn Widnes Bridge within an acceptable confidence interval as detailed in the Stage 1 Report. The model run therefore confirmed that the higher than average increase in traffic flow across the existing Runcorn Bridge is as a result of the new highway schemes in the study area and general traffic growth.

6.2 Analysis of Existing Bridge Traffic

6.2.1 Introduction

During a meeting between the client group and the Minister for Transport the Minister requested details of the existing movements across the Mersey, in terms of their origins and destinations, and the trip purposes associated with these movements. In order to provide this information the data collected as part of the original Department of Transport (DoT) study was reviewed and the results are presented in the following sections.

6.2.2 Runcorn Widnes Bridge 1991 Roadside Interview Data

As part of the original DoT study roadside interview data was collected on the northbound slip roads of the Runcorn Widnes Bridge on the 15th of October 1991 between seven am and seven pm. Drivers were asked their origin, destination and trip purpose and the type of vehicle was noted. The database can therefore be used to determine the pattern of movements across the Runcorn Widnes Bridge and the types of journey being made.

The interview data was collected on a sample basis and expansion factors were added to the database to convert the data into a 12 hour average weekday. One of five trip purposes was added to the interview data as follows:

**Home Based Work (HBW)** - a journey being taken either from the main place of residence to the usual place of employment and visa versa. This trip purpose does not include journeys being made as part of an employers business and mainly consists of journeys to and from work and the home.
Home Based Other (HBO) - a journey with the origin at the home and the destination address being anything other than the usual place of work, and visa versa. For example HBO trips include journeys from the home to a supermarket, home to dentist, home to children’s school, etc.

Car Employers Business (CEB) - a journey being undertaken in a car as part of one’s employment, excluding the journey to and from work. Such trips include those being made by travelling salespeople, journeys to and from meetings or to and from suppliers.

Non-Home Based (NHB) - a journey having neither the origin or destination at the home address, which is being undertaken outside of work time. Such trips would include journeys from the dentist to the supermarket or from the theatre to a restaurant, for example.

Goods Vehicles (GV) - all light and heavy goods vehicles have been grouped together and are included in this trip category. It is assumed that all trips in this category are being undertaken in ‘work time’.

A comparison of 1996 count data and 1991 traffic flows across the Runcorn Widnes Bridge indicate that the Annual Average Daily Traffic (AADT) flow has increased by 13% from 67,000 vehicles in 1991 to 75,000 vehicles AADT in 1996. In comparison national car traffic increased by 6% between 1991 and 1996 and car traffic in Merseyside increased by 8.8% over the same period. There has been a significant increase in traffic flow across the Runcorn Widnes Bridge since the 1991 roadside interview data was collected. However, for the purpose of this note all figures relating to movements across the bridge are expressed at their 1991 levels.

6.2.3 Runcorn Widnes Bridge - Trip Purposes

The 1991 interview data for the Runcorn Widnes Bridge has been analysed in order to determine the trip purpose of movements across the bridge, the results are presented below in Table 6.1.

Table 6.1 Runcorn Widnes Bridge 1991 Trip Purposes (12 Hour Average Weekday Northbound)

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>Trips</th>
<th>Proportion (Cars Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Based Work</td>
<td>11208</td>
<td>52%</td>
</tr>
<tr>
<td>Home Based Other</td>
<td>5077</td>
<td>23%</td>
</tr>
<tr>
<td>Non-Home Based</td>
<td>1884</td>
<td>9%</td>
</tr>
<tr>
<td>Car Employers Business</td>
<td>3519</td>
<td>16%</td>
</tr>
<tr>
<td>Goods Vehicles</td>
<td>6271</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>27959</td>
<td></td>
</tr>
</tbody>
</table>

In total 27959 vehicles were observed travelling northbound over the Runcorn Widnes Bridge during the 1991 survey period with a proportional split between cars and goods vehicles of 78% and 22% respectively.
A total of 21688 cars crossed the bridge during the survey period of which 52% (11208) were travelling to or from work and their home address. The next largest trip category for cars was Home Based Other trips at 23% (5077). In total 75% (16385) of the cars crossing the bridge had either their origin or destination at their home address. A total of 16% (3519) of the cars crossing the bridge were travelling on employers business whilst 9% (1884) were a non-home based trip.

6.2.4 Runcorn Widnes Bridge - Trip Distribution

Analysis of the observed 1991 distribution of movements across the Runcorn Widnes Bridge indicated that a total of 21,688 cars crossed the bridge, during the roadside interview period, of which 61% (13253) originated from the Runcorn sector and 44% (9595) had Widnes as their destination sector. In terms of individual movements 32% (6904) of all the cars observed crossing the bridge were travelling between the Runcorn and Widnes sectors.

A more detailed breakdown of the trip distribution is provided in Appendix A.

6.3 Traffic Forecasts

In producing the traffic forecasts for each of the options an opening year of 2001 was assumed and traffic flows were therefore produced for the design year 2016, ie fifteen years after opening. The 2016 assignments were derived using traffic growth factors from the Merseyside Integrated Transport Study (MERITS). The MERITS study produced central growth factors for the period 1991-2011, which were extrapolated to cover the period 1996-2016. These were then applied to the 1996 base year matrices to produce low growth forecasts for 2016. The central growth forecasts from MERITS were derived from a distribution of activity to the present day. It is likely that the provision of additional highway capacity across the River Mersey will lead to an increase in economic activity either side of the river. It was therefore necessary to include high growth forecasts as a sensitivity test. High growth figures were produced by factoring the 2016 low growth matrices by the relative growth between the national low and high traffic forecasts.

The assessment methodology used is that of a fixed matrix approach, that is to say the total trip making remains the same in both the do-minimum and do-something tests. No allowance has been made for trips being induced as a result of the removal of congestion for movements across the River Mersey.

A capacity restrained assignment technique was used was to produce the forecast traffic flows. This allows speeds on the traffic network to fall as flow levels increase. It does not, however, impose a limiting capacity on any link in the road network. The assumption is that all the traffic demand is satisfied during the 12 hour modelling period and that no trips are suppressed, however great the cost of making the trip becomes. This approach is equivalent to assuming that peak hour congestion will result in peak hour spreading rather than trip suppression.

Using these low and high matrices, traffic was assigned to each of the following test networks:
- Do-Minimum network, i.e. no increased road capacity across the River Mersey.
- Western Option (Routes A and B from Stage 1 of the study were tested);
- Central Option (Route F from Stage 1 of the study); and
- Eastern Option (Route G from Stage 1 of the study).

Figures 6.1 to 6.5 show the results of these assignments in each option.

The following section describes the results of the assignments to each option and compares the traffic flows with the Do-minimum. It highlights the main increases and reductions in flows and gives an indication of the scale of improvements required to the wider study network.

6.4 Do-minimum

Figure 6.1 shows the forecast Do-minimum 2016 AADT flows. The forecast traffic flows across the Runcorn Bridge would be in the range 102000-120000 AADT. At such levels of traffic flow there would be high levels of congestion for journeys across the bridge. Indeed the queues and delays currently experienced across the bridge during peak hours are likely to exist for much of the working day at the forecast levels of flow in the Do-minimum. This will ultimately result in disruption to trip patterns with trips being either suppressed, retimed or diverted.

A comparison between the base year and forecast Do-minimum cross river traffic flows indicates that the flows across the Runcorn Bridge would increase by a lower proportion than the overall matrix growth. All things being equal the increase in flow across each of the river crossings should be the same. The fact that the increase in flow across the Runcorn Bridge would be lower than the other crossing points demonstrates that the levels of congestion across the bridge would force trips to seek alternative routes. In other words the growth in traffic flow on Runcorn Bridge would be suppressed due to the capacity constraints. The result of traffic seeking alternative routes would be that the other river crossings would experience a slightly larger increase in traffic flow than the overall matrix growth.

Traffic flows across the M6 Theiwall Viaduct would be in the range 153000-165000 AADT. Once again, at such levels flow breakdown will occur and the levels of delay are likely to be similar to those that were experienced prior to the provision of additional capacity across the viaduct.

Traffic flows on the A557 Runcorn Expressway would be in the range 54000-60000 AADT and at such levels traffic flow breakdown and delays may be experienced during parts of the day. In addition the traffic flows on the A561, between the A5300 and the Runcorn Bridge, would be in the range 57000-66000 AADT which could result in delays and congestion on the approaches to the Runcorn Bridge, from the northern side of the Mersey.
The traffic flows on the M56 to the west of Junction 12 would be in the range 110000-127000 AADT which, once again, may result in flow breakdown on this section of the motorway.

The capacity limitations across the Runcorn Bridge, in the Do-minimum, would result in traffic seeking alternative crossings of the River Mersey. Traffic that remains on the Runcorn crossing would be likely to experience delays and congestion both on the bridge and its approaches.

6.5 Western Option (Route A)

The 2016 forecast traffic flows for this option are shown in Figure 6.2. The route would carry vehicle flows in the range of 49000-63000 vehicles AADT. The traffic on the new crossing would mainly be as a result of a transfer of traffic from the existing bridge, whose flow would be reduced by up to 34%, compared to the Do-minimum, to between 67000 and 80000 AADT.

The provision of additional capacity across the Mersey would result in traffic that was diverting away from the existing Runcorn Bridge in the Do-minimum returning to this corridor. This suppressed traffic would then revert to its preferred route across the river. As a consequence traffic flows on the Mersey Tunnels would drop by up to 7% with traffic on the Thelwall Viaduct falling by 3%. However, the effect of traffic returning to the corridor from other crossing points would be to increase the traffic flows on the A557 Runcorn expressway by an average of 21% to between 66000-72000 vehicles AADT. At such traffic levels on the Expressway, the peak period may be subject to flow breakdown and congestion. As a result, the expressway may require widening from a dual two lane carriageway to dual three lanes. Junction 12 of the M56 may also require improvements to accommodate traffic flows onto the expressway. To the west of Junction 12 flows on the M56 would increase by 4% to 115000-132000 AADT by 2016.

On the A5300 traffic flows would increase, on average, by 5% to between 57000 and 60000 AADT. Such growth is within the present capacity of the road. East of the A5300, traffic flows on the Widnes Eastern By-Pass would increase by 4%, when compared with the Do-Minimum, to reach flow levels of between 34000-38000.

The forecast traffic flows across the new and existing bridge crossing have been analysed in order to ascertain what level of local and sub-regional/long distance traffic each of the bridge crossings is carrying (the segregation of local and sub-regional traffic being one of the key requirements of the brief). The analysis indicates that with a western crossing in place the existing crossing would carry mainly local traffic whilst the new crossing would cater for only a small element of local traffic. The main element of traffic flow on the new crossing would be sub-regional and longer distance. A western option would therefore result in the natural segregation of strategic and longer distance traffic.
6.6 Western Option (Route B)

The alignment followed by Route B is similar to Route A but forms a slightly more direct route to the A5300. The 2016 forecast traffic flows are shown in Figure 6.3. This option would attract flows in the range 48000-55000 vehicles AADT, mainly drawn from the existing Runcorn-Widnes bridge. The flow levels on the existing bridge would be reduced by up to 33% when compared with the Do-minimum, to between the range 68000-81000 AADT.

As in option A, traffic would no longer be diverted to other crossings due to the constraints on capacity between Runcorn and Widnes. Therefore the other river crossings would experience reduction in traffic as movements return to the corridor. The Mersey Tunnels flows would reduce by up to 6% and the Thelwall Viaduct by 3%, compared to the Do-minimum.

Once again traffic flows on the A557 would be increased by 12% to 62000-66000 vehicles AADT by the year 2016. Once more, the expressway may require widening from dual two lanes to dual three. Junction 12 of the M56 may also require improvements to accommodate the additional traffic attracted to this junction. West of Junction 12 traffic flows would increase by 4%, to between 115000 and 132000 vehicles AADT by 2016.

Traffic flows on the A5300 would increase by up to 5% to between 57000-60000 AADT, a similar increase to Option A, such that no road improvements are necessary. Following on, east of the A5300 traffic flows would be similar to those experienced in the previous option, where flows increase by 3%.

6.7 Central Option (Route F)

Figure 6.4 shows the forecast 2016 traffic flows for this option. The improved crossing would attract between 112000 and 130000 vehicles AADT by the year 2016. This represents an increase in vehicle flow of 10% compared to the Do-minimum. As in previous options, the provision of additional capacity in this corridor results in traffic no longer diverting to other river crossings. As a result the flows through the Mersey Tunnels and on the M6 Thelwall Viaduct would be respectively 5% and 2% lower than in the Do-minimum.

Traffic flows on the A557 Runcorn Expressway would be similar to those in the Do-minimum and, should high growth materialise, may require widening in order to accommodate the forecast traffic flows. Traffic flows on the A533 Central expressway would increase by an average of 16% to 23000-28000 vehicles AADT by 2016. These flows are within acceptable limits for a dual two lane carriageway. However, the A557 may require widening to dual three lanes from Junction 12 of the M56 to the junction with the A533. As in previous options, Junction 12 of the M56 may also require improvements.

On the A561 north of the bridge, traffic flows would increase by 9% to 62000-72000 vehicles AADT by the year 2016. The A561 may require widening to a dual three lane carriageway from the A533 roundabout to the A5300 in order to prevent a
breakdown in traffic flows.

The analysis of the traffic forecast to cross the central option indicate that it would be catering for local and longer distance traffic in approximately equal proportions. This option would therefore require complex traffic management arrangements in order to segregate local and longer distance traffic movements.

6.8 Eastern Option (Route G)

The forecast 2016 traffic flows for this option are shown in Figure 6.5. The new crossing would carry forecast traffic flows of between 56000 and 65000 vehicles AADT, by the year 2016. These flows would mainly be as a result of a transfer from the existing bridge. Flows on the existing bridge would therefore reduce by 38%, compared to the Do-minimum, to between 63000-74000 AADT.

Due to the fact that the new crossing would be located to the east of the existing bridge traffic from the south, eg M56 Junction 12, would route via the A533 Central Expressway, rather than travelling round the western side of Runcorn on the A557. The flows on the A557 would therefore reduce by an average of 26%, compared to the Do-minimum, to 39000-45000 vehicles AADT. In comparison to the Do-minimum traffic levels, the flows on the A533 Central Expressway would more than double to between 47000 and 52000 vehicles AADT by the year 2016. Both flow levels could be accommodated within the existing highway capacity.

Junction 12 of the M56 may require improvements, and the A557 may require widening from Junction 12 of the M56 to the A533 junction. In addition the A533 Northern Expressway may also require widening to dual three lanes, between the new crossing and the junction with the A558.

This option would result in a reduction in flow on the A5300 of 7% to 45000-52000 vehicles AADT, as sub-regional traffic transfers to the Widnes Eastern Bypass. This experiences an average increase in flows of 67%, to the low-high range of 55000-60000. The additional traffic on the bypass would put further pressure on Junction 7 of the M62 which is currently overloaded and subject to congestion and delays during the peak periods.

Analysis of the traffic forecast to cross the new eastern crossing and the existing bridge indicates that they would cater for similar traffic movements with just under half of the traffic on each crossing consisting of local traffic. Such an option would therefore not segregate local and longer distance movements and traffic management proposals would be required in order to achieve this.

6.9 Cost Benefit Analysis

The Department of Transport cost benefit program COBA10 has been used to derive the transport benefits of each of the Stage 2 options. The transport costs and benefits have been calculated over a thirty year period from the assumed opening year of 2001. The costs and benefits were then discounted at 6% to 1994.
The results of the economic assessment are shown below in Table 6.1.

<table>
<thead>
<tr>
<th>Option</th>
<th>Present Value of Benefits (PVB)</th>
<th>Present Value of Costs (PVC)</th>
<th>Net Present Value (NPV)</th>
<th>PVB/PVC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>£148m</td>
<td>£127m</td>
<td>£22m</td>
<td>1.17</td>
</tr>
<tr>
<td>Central</td>
<td>£81m</td>
<td>£39m</td>
<td>£42m</td>
<td>2.08</td>
</tr>
<tr>
<td>Eastern</td>
<td>£124m</td>
<td>£62m</td>
<td>£62m</td>
<td>2.00</td>
</tr>
</tbody>
</table>

All three alignment would result in significant transport economic benefits with the Western Crossing producing the largest Present Value of Benefits (PVB). However, due to it's high construction cost this option would result in the lowest Net Present Value and would have the lowest ratio of benefits to costs.

The Central Crossing would have the lowest PVB, but due to the relatively low construction costs of this option it would result in the second highest NPV at £42m. The scheme would result in the highest ratio of costs to benefits of the three options which indicates that for every pound spent on the new crossing it would result in a greater return in term of transport benefits than the other two options.

The Eastern Crossing would have the second highest PVB, at £124m , and the highest NPV of £62m. However, the costs used for this option have been based on a viaduct crossing with fifteen piers located in the estuary. If this proved to be unacceptable on environmental grounds a suspension bridge would be required which would significantly increase the costs and hence reduce the NPV of this option. This option would result in a slightly lower ratio of costs to benefits than the Central Option.
Transport White Paper

7.1 Introduction

In 1998 the Government published the Transport White Paper (TWP), "A New Deal for Transport: Better for Everyone", which details the government’s policies to create a better more integrated transport system. The emphasis is now on a more integrated transport policy, which is defined as follows:

- Integration within and between different types of transport;
- Integration with the environment;
- Integration with land use planning;
- Integration with policies for education, health and wealth creation.

At a national level there is now a strong emphasis on the need to consider all alternatives before constructing new roads, such as managing the demand for travel, promoting the use of other modes, and making better use of existing roads. The priorities have therefore changed considerably, following the publication of the TWP, and new road building is now considered to be appropriate only after all the other options have been investigated. In addition the government is now seeking to ensure that these transport policies and proposals are integrated with land use planning at the national, regional and local levels.

In order to deliver a integrated transport system the government are modernising the planning system in England and reforming the Regional Planning Guidance (RPG). A key proposal is that RPG should include a Regional Transport Strategy (RTS) which will form a long term regional framework. It is envisaged that the RTS will reflect the national policies contained in the TWP and will cover a fifteen to twenty year period. Local Authorities will have an opportunity to influence the development of the RTS as the strategy for a region is developed.

At the more local level Local Authorities will be required to implement the integrated transport policies through the development of Local Transport Plans (LTP), which will set out the authorities objectives over a five year period. As well as reflecting national policies the LTP will need to reflect the objectives of the RTS in order to ensure that there is a common and co-ordinated approach between neighbouring authorities.

7.2 New Approach to Appraisal

As detailed in the TWP a New Approach To Appraisal (NATA) has been developed to provide a clear and open framework to appraise and inform the prioritisation of road investment. The framework was initially developed to appraise the road schemes in the trunk road programme but the intention is that it’s use should be extended to cover the appraisal of all road schemes. A NATA assessment is
broadly based and takes account of the five criteria detailed in the TWP as follows:

- Environmental impact – includes noise, local air quality, landscape, biodiversity, heritage and water;
- Safety;
- Economy – includes journey times and vehicle operating costs, journey time reliability, scheme costs, and regeneration;
- Accessibility – includes access to public transport, community severance, pedestrians and others; and
- Integration.

It is inevitable that any further assessment of a New Crossing of the River Mersey will have to be accompanied by a completed NATA assessment.

A key input to the NATA appraisal is an assessment of the environmental impact of any new transport proposal. As has been stated in Chapter 5 the Mersey Estuary has been designated a Ramsar Site of international importance and any of the Stage 2 options could have an adverse impact on the Ramsar site. As a consequence in a NATA appraisal any proposal that impacted on the Ramsar site would be classified as having a 'very large adverse effect' (as defined in the Guidance on the New Approach to Appraisal). The NATA guidance note states that such options:

'are likely to be unacceptable on nature conservation grounds alone (even with compensation proposals').

This is further reinforced in the TWP which states that:

'we expect there to be few cases where it is judged that imperative reasons of overriding public interest will allow development to proceed which will have an adverse impact on the integrity of internationally designated sites'.

The TWP then goes on to state:

'for all environmentally sensitive areas or sites there will be a strong presumption against new or expanded transport infrastructure which would significantly affect such sites or important species, habitats or landscapes.'
7.3 Summary

The publication of the TWP and its supporting documents have resulted in a radical change to transport policy and the planning system within England. The emphasis is no longer on 'predict and provide', with new road building, but on the management of existing resources and the investigation of alternative modes within the framework of a fully integrated transport strategy.
8 Summary and Conclusions

8.1 Summary

The results of the Stage 2 assessment of a proposed New Crossing of the River Mersey are summarised in the following sections.

8.1.1 Economic Impact

The economic assessment based upon a survey of existing businesses in the study area indicated the following:

- Impact on existing firms - of the order of 3000 jobs (of which two thirds would be in Halton and the great majority would be jobs safeguarded).

- Impact on new inward investment - of the order of 1,700 new, net additional jobs of which over half would be outside Halton.

- Little differential impact between the options but some impact on the distribution of employment impacts for new, inward investment with the westerly option possibly delivering 500 more jobs in the South Liverpool/Knowsley Area than other options.

The economic modelling undertaken by Liverpool University indicated the following:

- A new crossing of the River Mersey would have a significant beneficial impact on the economies of Merseyside and Cheshire.

- A new crossing would have a greater impact on the Cheshire economy than that of Merseyside.

- The original Dot strategic western crossing would have a greater impact on the economy of the area than the local crossings, resulting in 5,500 additional jobs with an increase in GDP of £281m (1998 prices) over a seventeen year period.

- The local Eastern crossing is forecast to perform better than the local Western crossing resulting in 3,150 additional jobs and an increase in GDP of £139m (1998 prices).

- The local Western crossing is forecast result in 2,800 additional jobs and an increase in GDP of £145m.

8.1.2 Western Crossing (Option A/B)

- Height restriction for Liverpool Airport prevents the provision of tall support


- Towers and a single span crossing of the river.
- Option B - two span suspension bridge with central pier in estuary.
- Slip roads to Expressway necessitates southern pier to be located in the river (Option B).
- Option A would require up to three piers to be located in the river.
- Costs, Option A - £135m, Option B - £148m.
- Adverse impact on visual quality of the area.
- Crosses SSSI, SPA and Ramsar site - unlikely that option could be justified given that, alternatives exist.
- Substantial impact on Planning Policy Designations.
- Would require detailed assessment of impact on River Mersey.
- Segregates sub-regional and strategic traffic.
- Relieves existing crossing.
- Traffic flows increase on A557 Runcom Expressway.

8.1.3 Central Crossing (Option F)

- Gap between existing road and rail bridges limits construction methods.
- Three piers are likely to be required adjacent to rail bridge piers.
- Aerodynamic study will be required to assess effects of, and on, new bridge deck.
- Would require the demolition of some housing.
- Traffic disruption would occur during construction.
- Construction costs £44m.
- Unlikely to result in a significant change to the visual quality of the area.
- Would affect two listed structures.
- Minimal impact on Planning Policy Designations.
• Requires the demolition of housing.

• Impact of extended piers on SSSI, SPA and Ramsar site would require further investigation.

• On its own does not segregate Sub-regional and Strategic Traffic.

• Traffic flows increase on Runcorn Expressway and A561 through Widnes.

8.1.4 Eastern Crossing (Option G)

• Northern junction constrained by adjacent industrial plants and a railway.

• Fifteen piers would be located in the river bed which could result in contamination of the Ramsar site.

• Southern junction would require diversion of Astmoor Road effecting housing and a school.

• Costs £73m.

• Unlikely to result in a significant change to the visual quality of the area.

• Impact of piers on the SSSI, SPA and Ramsar site would require further investigation.

• Moderate to substantial impact on Planing Policy Designations.

• No impact on cultural heritage.

• Relieves existing crossing.

• Does not segregate sub-regional and strategic traffic.

• Would result in increased traffic flows on the A533 Central Expressway.

8.2 Conclusions

• All options have environmental difficulties.

• Any option that impacts on the SSSI, SPA and Ramsar site will be difficult to justify.

• For employment purposes the biggest impact is the provision of a new crossing rather than the actual location, although there would be some differences between the options.
- A new crossing would have a significant beneficial impact on the economy of the study area.

- Impact of Western Option on the Ramsar site make it a high risk option.

- Eastern Option may also have an impact on the Ramsar site due to the large number of piers required. An alternative design of a suspension bridge would significantly increase construction costs and may still require some piers in the river. This option also has some risk due to possible environmental impacts.

- The Central Option is the cheapest of the routes considered in Stage 2 and also produces the highest return in terms of traffic benefits. The resulting reduction in travel times also produce employment benefits. The Central Option therefore offers the most cost effective and deliverable solution and meets the stated objectives of the study. It will, however, require further investigation of the potential impact on the Ramsar site. This option is chosen as the recommended route for a new crossing of the River Mersey.
Appendix A - Runcorn Widnes Bridge Trip Distribution
Trip Origins and Destinations

In order to analyse the pattern of movements across the Runcorn Widnes Bridge the zoning system used in the original study was compressed from 187 zones to 25 sectors, as shown in Figure 1. In the original zoning system Runcorn and Widnes were made up of eight and seven zones respectively and these have been amalgamated into single sectors for each area. The sectors follow county and district boundaries with the amalgamation of several counties into a single group in regions remote from the immediate crossing area. Each of the trip purposes detailed above has been analysed in terms of the origin destination movements, at a sector level, and the results are detailed in the following sections.

The sector matrices and sector definition are provided in Appendix X.

Home Based Work (HBW) - A total of 11208 HBW car trips were observed travelling north across the Runcorn Widnes Bridge and of these 57% (6370) originated from the Runcorn sector. The next largest origin sector was Vale Royal which accounted for 11% (1258) of all HBW movements across the bridge. The main destination for HBW trips was Widnes accounting for 41% (4645) of all movements. This was followed by the Liverpool sector which collectively accounted for 23% (2602) of all HBW destinations across the bridge.

The largest individual movement was between Runcorn and Widnes with 3121 trips which equates to 28% of all HBW trips crossing the Mersey and 49% of all the HBW movements from Runcorn.

Home Based Other (HBO) - A total of 5077 HBO car trips were observed crossing the Runcorn Widnes Bridge during the survey period. A total of 71% (3585) of the HBO trips observed crossing the bridge originated from Runcorn and of these trips 56% (2008) were heading for destinations in Widnes. The next largest HBO movement was between Runcorn and Liverpool Airport and Liverpool Central sectors which accounted for 10% (366) and 11% (393) respectively of the movements from Runcorn.

The main destination for HBO trips was the Widnes sector which attracted 47% (2407) of the total HBO trips crossing the bridge, of these trips 83% (2008) had originated from Runcorn. The second largest HBO movement to Widnes was from the Vale Royal sector with a total of 6% (154) of the movements to Widnes.

Non-Home Based (NHB) - A total of 1884 NHB car trips were observed crossing the Runcorn Widnes Bridge during the survey period. A total of 69% (1292) of the NHB trips observed crossing the bridge originated from Runcorn and of these trips 69% (892) were heading for destinations in Widnes. The second largest movement was between Runcorn the Liverpool Airport sector with 10% (126) of all the movements from Runcorn.

The largest destination for NHB trips was the Widnes sector which attracted 57% (1068) of all the NHB trips crossing the bridge and of these 84% (892) originated from Runcorn.

Car Employers Business (CEB) - A total of 3519 CEB car trips were observed crossing the Runcorn Widnes Bridge during the survey period. A total of 57% (2006) of the CEB trips observed crossing the bridge originated from Runcorn and of these trips 44% (883) were heading for destinations in Widnes. The second largest movement was between Runcorn and the Liverpool Central sector with 19% (390) of all the movements from Runcorn.
The largest destination for CEB trips was the Widnes sector which attracted 42% (1470) of all the NHB trips crossing the bridge and of these 60% (883) originated from Runcorn. The second largest origin sector for movements to Widnes was Vale Royal which accounted for 11% (161) of the CEB movements to Widnes.

**Goods Vehicles** - A total of 6271 goods vehicles were observed crossing the Runcorn Widnes Bridge during the survey period. A total of 46% (2876) of the goods vehicles observed crossing the bridge originated from Runcorn and of these trips 53% (1510) were heading for destinations in Widnes. The second largest movement was between Runcorn and the Liverpool Central sector with 11% (302) of all the movements from Runcorn. The second largest origin for goods vehicles crossing the bridge was the Vale Royal sector which accounted for 9% (555) of movements and of these 48% (267) were heading for the Widnes sector.

The largest destination for goods vehicles was the Widnes sector which attracted 46% (2871) of all the goods vehicles crossing the bridge and of these 53% (1510) originated from Runcorn. The second largest destination sector for goods vehicle movements was the Liverpool Airport and Knowsley South sector which attracted 12% (776) of the trips crossing the bridge and of these 38% (293) originated from Runcorn.