

Port of Immingham | A160 Improvements

Scheme Assessment Report

November 2009

Scheme Assessment Report



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EXECUTIVE SUMMARY

Immingham and Grimsby Ports are the largest ports in the UK by tonnage, handling some 10% of the UK's cargo market. The South Humber Bank also contains 27% of the UK's oil and gas refining capacity and remains the largest area of undeveloped land fronting a deep-water estuary in the United Kingdom. Approximately 1000 hectares of land is currently available for future development. The scheme brief is to improve access to the Port of Immingham via the A160.

Approximately 5.15km long the A160 is a nationally strategic route to and from the Port of Immingham and is currently a mix of single and dual carriageway running through areas of both agriculture and heavy industry associated with the petrochemical industry. It currently suffers severe congestion, particularly along the single carriageway sections, due to the very high proportion of HGV traffic (>42%).

Eight scheme options were developed and technically appraised during the Project Control Framework (PCF) Stage 1 - Options Identification. This resulted in four recommended options (1, 2, 4 and 7) and four non-recommended options (3, 5, 6 and 8). A Public Consultation was undertaken between 8th June and 28th August 2009, including a Public Exhibition in July 2009. Consultation responses indicated that Option 7 was the most popular option; however there was a general view from local residents that access to the village of South Killingholme would be compromised by the closure of the Town Street and the removal of Habrough roundabout. This resulted in the development of Option 9, which has all the effectiveness of Option 7 in meeting the scheme objectives. It also resolves these local concerns by provision of a road-bridge over the A160 at Town Street, which safely replaces the central reserve crossing, and re-locating the new roundabout combining Ulceby Junction and Habrough roundabout further East much nearer to the old Habrough roundabout location.

This Scheme Assessment Report summarises the Public Consultation and the technical appraisal of the 4 recommended options and the post-public consultation option (Option 9).

All options considered have high Benefit Cost Ratios (BCRs). The five options assessed have mid-range cost estimates between £103m and £115m and BCRs between 4.4 and 11.7. **Option 9** has the 2nd highest BCR (10.4), the highest Net Present Value and gives the best accident benefit and lower environmental impact than Option 7 (which has the highest BCR of 11.7), is within budget and additionally addresses the access problems of South Killingholme. Therefore it is recommended that option 9 is selected as the Preferred Route.

1. INTRODUCTION

1.1. Purpose of Scheme Assessment Report

- 1.1.1. The A160 Port of Immingham Improvements scheme is currently in Stage 2 of the Project Control Framework (PCF) Lifecycle - Option Selection. As part of this stage, a Public Consultation has been undertaken to enable the public to express their views on the options as recommended in the Technical Appraisal Report (TAR) - Report Ref W11231/VAA/R03 Rev 3, dated April 2009.
- 1.1.2. The Report on Public Consultation (Report Ref W11231/PCF2/5.3, dated October 2009) detailed the consultation process, summarised the responses from members of the public, and recommended that an additional option is developed to resolve the key issues resulting from the consultation. The TAR has been updated to include details of the technical appraisal of the post-consultation option, and the recommended options, including revised cost estimates, economic and environmental assessments. The updated TAR is referred to as the Post Public Consultation Supplementary Technical Appraisal Report (PPCS-TAR) - Report Ref W11231/PCF2/5.2, dated October 2009.
- 1.1.3. This SAR summarises the Report on Public Consultation and the PPCS-TAR, and selects an option to recommend for the Preferred Route Announcement.

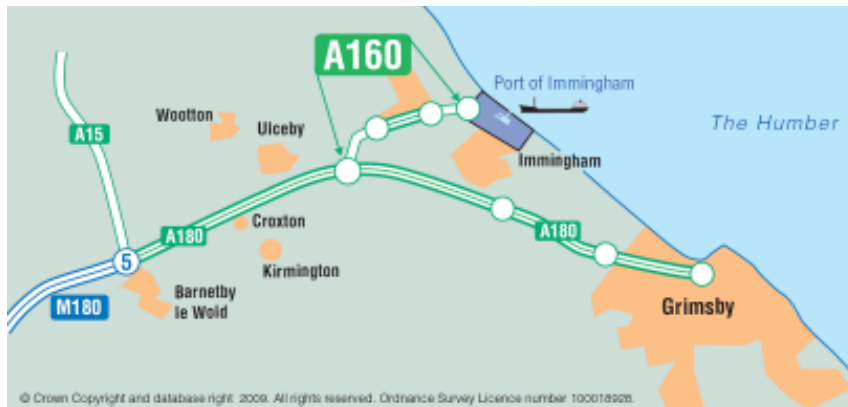
1.2. Scheme History/Background

- 1.2.1. The South Humber Bank (SHB) remains the largest area of undeveloped land fronting a deep-water estuary in the United Kingdom. Approximately 200 hectares of land is currently available for future development. The ports of Immingham and Grimsby located on the SHB are the largest ports in the UK by tonnage having handled 66 million tonnes of freight in 2007, representing some 10% of the UK's cargo market. The SHB is also home to the UK's largest refinery cluster representing 20% of the UK's refining capacity.
- 1.2.2. With the availability of developable land, increasing infrastructure constraints at the major southern ports (Felixstowe, Southampton etc), there is significant growth taking place on the SHB with the ports of Immingham and Grimsby forecast to grow rapidly over the next 10-15 years to meet growing UK demand.
- 1.2.3. The A160 is the principal route to the Port of Immingham from the junction with the A180, which carries onto Grimsby (see [Figure 1.1](#)). The A160 and A180 routes

A160 PORT OF IMMINGHAM IMPROVEMENTS SCHEME ASSESSMENT REPORT

provide the strategic link between these ports and the National Road Network. The A160 and A180 form part of the Trans European Transport Network (TEN-T) and the Trans-Pennine Strategic National Corridor between Grimsby and Immingham in the east and Liverpool in the west.

Figure 1.1: Location of A160



- 1.2.4. Although the local motorway network in the vicinity of the SHB is reasonably lightly trafficked and provides excellent links to the national motorway network, the A160 between the A180 and the Port of Immingham remains the biggest single constraint to the area's development.
- 1.2.5. [Figure 1.2](#) indicates the key locations and features of the A160. The A160 is part single carriageway, between the grade separated junction with the A180 at Brocklesby and the Habrough Roundabout (2km), and again between the Manby Road Roundabout and the port gates (0.7km), and part dual carriageway, between Habrough Roundabout and Manby Road Roundabout (2.5km). There are several direct accesses onto the A160 including a truck stop at the junction with A1077 Ulceby Road.

Figure 1.2: Plan indicating key locations and features of A160 scheme



- 1.2.6. The heavy freight traffic serving the port results in a high proportion of Heavy Goods Vehicle (HGV) traffic on the A160; between 42% and 52%. This proportion is significantly higher than the average (10% HGVs¹) for rural trunk roads which causes severe congestion on the two single carriageway sections; this in turn causes delays on the whole A160/A180 route.
- 1.2.7. With the planned expansion of the port and the land available for development, there is forecast to be considerable traffic growth in the next 10 to 15 years. This existing congestion problem already inhibits growth in the region, and will, without intervention, become worse over time.
- 1.2.8. The A160 Port of Immingham Improvements scheme was identified as being required by the Yorkshire and Humber Assembly (YHA) following assessments which examined the impacts of proposed development on the SHB in North and North East Lincolnshire.
- 1.2.9. The YHA have prioritised the scheme in their Regional Funding Allocation (RFA) that was submitted to Ministers at the end of February 2009 and have allocated £95 million for the scheme. In July 2009 Ministers endorsed this allocation. In November

¹ Derived from transport Statistics Great Britain 2008 (DfT). Total distance travelled for all goods vehicles on rural trunk roads was 5.8 billion vehicle km (in 2007). Total distance travelled for all vehicles was 58.6 billion vehicle km

2008, £30 million of Central Government Funding was also allocated to speed up the delivery of improved transport links to key UK airports and ports.

- 1.2.10. Pell Frischmann Consultants Limited (PFC) has been appointed by the Highways Agency (HA) under the Project Support Framework (PSF) to investigate options for the improvement of the A160 near Immingham in North Lincolnshire, to improve access to the Port of Immingham.
- 1.2.11. Previous commissions to develop solutions for improvements to the A160 proposed to upgrade the A160 to dual 2 lane carriageway standard over its full length, with junction improvements. Initially, two main options for the scheme were developed: an option with grade separated junctions and an option with at-grade junctions. As well as developing these two options, PFC has examined the feasibility of six further options which have arisen following Options and Value Engineering workshops in July and November 2008 respectively.
- 1.2.12. These eight scheme options were developed and appraised during Stage 1 – Options Identification Stage of the PCF Options Phase. The results of this appraisal are contained in the Technical Appraisal Report (TAR - Report Ref W11231/VAA/R03 Rev 3, dated April 2009), which recommended 4 options to be taken forward to Public Consultation.
- 1.2.13. Ministerial approval for the scheme to commence Public Consultation was obtained in May 2009.
- 1.2.14. The project is currently in Stage 2 of the PCF Lifecycle - Option Selection. One of the main objectives of this stage is to carry out a Public Consultation to enable the public to express their views on the options recommended in the TAR.

1.3. Scheme Objectives

- 1.3.1. The main scheme objectives are to:
- Provide improved access to the Port of Immingham;
 - Relieve congestion on the A160;
 - Improve safety.
- 1.3.2. For all options it is proposed to improve the A160 to dual 2 lane all-purpose carriageway between the A180/A160 junction (Brocklesby Junction) and the A160/Top Road/Habrough Road junction (Habrough Roundabout). Alternative junction arrangements are investigated in the scheme options.

2. SUMMARY OF EXISTING CONDITIONS

2.1. Traffic

2.1.1. Traffic Survey

2.1.1.1. A traffic survey was undertaken in June 2008. The methodology and findings of the survey are presented in the Traffic Survey Report (Report ref W11231/VAA/RT01, dated October 2008).

2.1.1.2. Annual Average Daily Traffic (AADT) flows along the A160 Humber Road and Manby Road (A1173) are in the range of between 11,000 and 13,200 vehicles. On the A160 east of the junction with Eastfield Road, AADT flows are lower by approximately 20%. For the local road network providing links with the A160 and A180, AADT flows are significantly lower, ranging from approximately 220 to 6,500 vehicles.

2.1.1.3. The % HGV on the A160 ranges from 42.3% to 52.3% of total road traffic, clearly showing that the A160 is heavily trafficked by HGVs.

2.1.1.4. The road network in the study area is subject to a range of speed limits, 70 mph (110km/h) on the A roads - A160, A180 and A1173, and 30 mph (48 km/h) on the minor single carriageway roads in and around the residential area of South Killingholme and Immingham.

2.1.2. Accident Analysis

2.1.2.1. Personal Injury Accident data (PIA) was obtained from CarillionWSP, North Lincolnshire Council (NLC) and North East Lincolnshire Council (NELC) for the A160 and A180 for the study area for the five year period 01 January 2003 and 31 December 2007.

2.1.2.2. [Table 2.1](#) summarises a breakdown of the total number of PIAs on the A160 and A180 and their severity. The full accident data is presented in Appendix H of the Traffic Survey Report (Report Ref W11231/VAA/RT01, dated October 2008).

Table 2.1 Total Number of Accidents and Casualties (2003-2007)

Year	Slight	Serious	Fatal	Total
2003	14	3	0	17
2004	10	1	0	11
2005	6	5	0	11
2006	4	4	0	8
2007	9	1	0	10
Totals	43	14	0	57

2.1.2.3. [Table 2.1](#) indicates that there is not a significant accident problem on the A160 or A180. Despite the low number of accidents, the proportion of killed and seriously injured (KSI's) is calculated at 24.6%, which is unsurprising given the high numbers of HGV's on the A160 and A180 routes.

2.1.3. Journey Times

2.1.3.1. Journey time surveys were undertaken as part of the traffic survey. They were undertaken in eastbound and westbound directions covering two circular routes, the purpose of which was to assist in the development and validation of the SATURN (see Section 11.1 for definition of SATURN) model. Route 1 includes the A160 / A180 / A1173 and Route 2 includes the A160 / Top Road / Chase Hill Road / Rosper Road. The surveys were carried out on Wednesday 9th July 2008. The methodology and results of the journey time surveys is explained in detail in the Traffic Survey Report.

2.1.3.2. The results show journey times to be affected by tidal flows, with the AM Route 1 clockwise experiencing on average 109 seconds reduced journey time compared to the PM.

2.2. Topography, Land Use, Property and Industry

2.2.1. Topography

2.2.1.1. The land within the study area is gently undulating in the south of the study areas, lying at an elevation of between 10 metres above Ordnance Datum (AOD) and 15m AOD. The land gradually flattens out to the banks of the Humber to the north, lying at an elevation of between 4m and 6m AOD. Due to the low lying and undulating nature of the landform in the area there are limited natural ridgelines.

2.2.1.2. There are several agricultural field drains and drains associated with the road drainage within the study area. Man made ponds associated with the oil refinery are also located within the study areas to the north of the A160.

2.2.1.3. At its nearest point the Humber Estuary is located approximately 1.7km to the east of the junction of the A160 and Manby Road.

2.2.2. Land Use

2.2.2.1. The pattern of land use can be divided into three distinct types. The western end of the scheme runs through open farmland. The established field patterns in the area

are of large fields consolidated over time. There are few boundaries and means of enclosure, such as large hedges and there is low tree cover in the study area. The predominant agricultural activity is one of arable farming with a traditional crop mix.

2.2.2.2. The central section of the scheme runs past residential properties forming the village of South Killingholme.

2.2.2.3. The western portion of the scheme is dominated by a large industrial area. This area comprises petrol refineries, power stations and other industrial process. In addition, Immingham Dock is adjacent to the eastern end of the scheme.

2.2.3. Property

2.2.3.1. Private property within the adjoining areas to the road corridor ranges from; individual farm houses and outbuildings, residential housing, industrial buildings, commercial buildings, retail buildings, and storage warehouses. The central section of the scheme runs through the village of South Killingholme. There are approximately 60 properties which have direct or part views over the A160.

2.2.4. Industry

2.2.4.1. To the east of the study area, the A160/Manby Road junction is a heavily industrialised zone. The oil refinery borders the A160 on both sides dominating the character of the area. To the north of the railway line embankment the landscape opens out to flat estuarine land with network of small fields, water bodies and fragmented hedgerows however the area borders industrial areas with its associated coal stockpiles and cranes.

2.3. Climate

2.3.1. The following details have been obtained from the Meteorological Office website for South Killingholme. Averages and extremes taken for the last 30 year period between January 1971 and December 2000 are as follows;

• Average annual rainfall (mm)	607
• Annual average number of rainy days (>=1mm)	113.5
• Maximum fall in 24 hours	N/A
• Annual mean daily maximum temperature	13.1°C
• Annual mean daily minimum temperature	9.5°C
• Annual average number of hours with sunshine	1467.0

- Annual average number of days with ground frost N/A
- Annual average number of days with an air frost 42.1
- Annual average number of days with snow lying at 09h GMT 8.9
- Annual average days with fog at 09h GMT N/A
- Annual average number of gales (34km for 10min) N/A

2.4. Drainage

2.4.1. The drainage in the district is into the Humber estuary via smaller watercourse and field drains. The eastern end of the site (from approximately 400m east of Eastfield Road) lies within an area classified by the Environment Agency as having a 'moderate risk' of flooding i.e. the chance of flooding each year is 1.3% (1 in 75) or less, but greater than 0.5% (1 in 200).

2.5. Geology

2.5.1. British Geological Survey (BGS) maps show that the study area is underlain by solid rocks of the Cretaceous period - Burnham Chalk Formation with the Welton Chalk Formation conformably underlying this unit.

2.5.2. The superficial deposits overlying the bedrock have been shown to typically consist of Glacial Till. At the eastern extent of the study area, from the Rosper Road Area to the Docks, small deposits of Estuarine Alluvium may be encountered overlying the Glacial Till. Isolated deposits of Glacial Sand and Gravel may also be found overlying the Glacial Till in the western section of the site. Made Ground deposits are present throughout the study area; particularly deep deposits may be present at the eastern end of the site, where upfilling for heavy industry has taken place.

2.5.3. The Cretaceous Chalks in East Yorkshire and Lincolnshire are classified as a major aquifer. However, in the vicinity of the study area the chalks are typically overlain by Glacial Till which is a non-aquifer. There are three public water supply boreholes in the vicinity of the site which are protected by Groundwater Source Protection Zones. The boreholes lie approximately 500m east of the eastern end of the scheme, 2.2km north of Top Road roundabout and 750m south of Brocklesby Interchange.

2.5.4. Further information on the descriptions of the anticipated soil materials and contaminated land is included in Section 3.8 of the Post Public Consultation Supplementary Technical Appraisal Report (Report Ref W11231/PCF2/5.2, dated October 2009).

2.6. Mining

2.6.1. No mining or quarrying activities have been identified in the study area.

2.7. Statutory Undertakers' Equipment

2.7.1. There is a significant amount of Statutory Undertakers' (SU) equipment and oil and gas pipelines adjacent to and in the area surrounding the A160. This is largely due to the proximity of the Humber Oil Refinery and Lindsey Oil Refinery. Information on existing Statutory Undertakers' equipment has been reviewed during PCF Stage 2; via C2 inquiries, requesting updated information and plans. A C2 inquiry is a request for records of Statutory Undertakers' equipment, to gain an understanding of services that could potentially be affected by the scheme proposals.

2.7.2. The location of all known SUs' equipment is indicated on Drawing Numbers W11231/03/01 & 02 in Appendix A. A detailed description of the location of all known SU equipment is provided in the Post Public Consultation Supplementary Technical Appraisal Report (Report Ref W11231/PCF2/5.2, dated October 2009). Significant SU equipment which is likely to require diversion or protection is described in Section 10.5 below.

2.8. Environmental Status

2.8.1. A number of statutory protections are in place to conserve specific aspects of the environment in the area surrounding the A160, these are detailed in the Post Public Consultation Supplementary TAR (Report Ref W11231/PCF2/5.2, dated October 2009), Environmental Assessment Report (Report Ref W11231/PCF2/20.4, dated October 2009) and summarised below.

2.8.2. An Air Quality Management Area (AQMA) has been declared for dust (PM₁₀) in the Pelham Road/Kings junction area within Immingham (in NELC boundary), which lies approximately 2.4km south of Manby Road Roundabout.

2.8.3. There are no Scheduled Monuments within the study area however there are three which lie immediately to the north in North Killingholme (Manor Farm, North Garth and Baysgarth Farm). There are no World Heritage sites or Registered Historic Battlefields within the study area. One historic building has been identified within the study area and a further six historic buildings (outwith the study area) have been included for assessment due to their proximity. There are no conservation areas,

Registered Parks and Gardens of Special Historic Interest within the study area. There are no designated historic landscapes within the study area.

2.8.4. The Humber Estuary Site of Special Scientific Interest (SSSI) lies within 1.2km of the site. This has been designated for its nationally important habitats, which include coastal saltmarsh, intertidal mudflats and sandflats, saline lagoons and sand dunes. The estuary supports nationally important numbers of many wintering wildfowl and waders, a breeding colony of grey seals, and various other animals and plants. In addition to SSSI status, the Humber Estuary is designated as a Special Protection Area (SPA) and a candidate Special Area of Conservation (SAC) under the Conservation (Natural Habitats & c.) Regulations 1994, as amended 2007 and forms part of the European Natural 2000 network. Further, the Humber Estuary is a Wetland of International Importance under the Ramsar Convention 1971, and is known as a Ramsar site.

2.8.5. There are seven non-statutory nature conservation sites, or SNCIs (Sites of Nature Conservation Importance) within the study corridor.

2.9. Environment

2.9.1. Detailed information on baseline environmental conditions is included in the Environmental Assessment Report produced by Golder Associates (Report Ref W11231/PCF2/20.4, dated October 2009).

3. PLANNING FACTORS

3.1. Option Constraints

3.1.1. No significant constraints have been identified but the following may impact:

- The scheme will require prioritisation from the Yorkshire and Humber Transport Board;
- An Air Quality Management Area has been declared approximately 2.4km south of the site which all options could potentially impact on (indirectly);
- There is known archaeology which could be affected by a number of the scheme options. These sites will require advance works to record significant features that will be lost upon completion of the scheme.

3.2. Local Strategies

3.2.1. Introduction

3.2.1.1. This section reviews the North Lincolnshire Freight Strategy and the South Humber Bank Transport Strategy; to identify any recommendations made in relation to the A160 Improvements scheme, and to ensure that these are taken into consideration during the scheme development.

3.2.2. North Lincolnshire Freight Strategy

3.2.2.1. The North Lincolnshire Freight Strategy was produced by Faber Maunsell for North Lincolnshire Council (NLC) in August 2007. The strategy was developed following a study of all aspects of freight in North Lincolnshire, including traffic counts and numerous surveys and discussions (with operators, businesses, public perception, drivers etc.). Points relating to the A160 are discussed below.

3.2.2.2. The A160 was the busiest route of all specialised count sites, with a flow of 6 HGVs per minute.

3.2.2.3. All routes leading to Humber Sea Terminal from the A160 (Top Road/East Halton Road/Chase Hill Road and Rosper Road) have seen a significant growth in the volume of traffic. The traffic figures used to calculate growth factors were not included in the report; however the report stated that the annual growth rates were approximately 17% on East Halton Road, 25% on Chase Hill Road and 34% on Rosper Road.

3.2.2.4. Since the introduction of the weight restrictions on Chase Hill Road and East Halton Road, the number of HGVs passing North Killingholme has reduced however, there are still a significant number of HGVs contravening this Traffic Regulation Order. A number of suggestions were made to resolve this issue:

- Improve the location of signing to ensure they are visible and clearly direct HGV drivers via the most appropriate routes i.e. direct HGVs away from Chase Hill Road/East Halton Road if they are not accessing North Killingholme Industrial Estate.
- Collaborate with local businesses, including the oil refineries and Humber Sea Terminal to encourage preferred routes.
- Alter the signing so that if travelling east along the A160, 'North Killingholme Industrial Estate Only' is signed at Habrough Roundabout, and Humber Sea Terminal and the oil refineries are signed along Eastfield Road. **It should be noted that this suggestion is not included in the Strategy Recommendations.**

3.2.2.5. Humber Sea Terminal was consulted as part of the study; it was mentioned that no preferred routes are encouraged for drivers accessing the port. However, if asked, they are advised to use Rosper Road to enter and exit the port.

3.2.2.6. The study found that there is insufficient lorry parking provision in North Lincolnshire, with Ulceby Truck Stop being the most utilised (68% utilised in the day and 100% utilised at night).

3.2.2.7. 'A1173/Rosper Road Junction' is identified as an accident hotspot, although no justification is given for this. It is assumed that this refers to Manby Road and Rosper Road junctions. The report states that 14 accidents involving HGVs occurred on the A160 between 2003 and 2007, accounting for 6.8% of all HGV accidents in North Lincolnshire. However, there is no mention of the total number of accidents on the A160 or the number of accidents at 'A1173/Rosper Road Junction'.

Strategy Recommendations

3.2.2.8. The main recommendations for NLC relating to the A160 Improvements scheme include:

- Undertake a full signing audit to ensure continuity of signing from the major highway network to all major industrial sites (including cleaning existing signing).

- Review safety at accident hotspots, including 'A1173/Rosper Road junction'.
 - Support the planning process for the A160 Port of Immingham Improvements scheme.
 - 3 recommendations were made to resolve issues of safety and congestion at junctions; signalisation of Ulceby Road and Rosper Road junctions, and improvement of the eastbound approach to Habrough Roundabout.
- 3.2.2.9. All of the recommendations made above are to be considered during the scheme development.

3.2.3. South Humber Bank Transport Strategy

3.2.3.1. The South Humber Bank (SHB) Transport Strategy (Report Ref - W50358/T58/001) was undertaken by Pell Frischmann in November 2008 for Yorkshire Forward, NLC and North East Lincolnshire Council (NELC). The study proposed to identify transport improvements that would be required to facilitate and service the significant amount of development planned for the South Humber Bank, and included:

- a review of previous transport studies, planning policies and existing traffic flows;
 - consultation with key stakeholders and local businesses to gain an understanding of development plans and transport use;
 - traffic forecasting to determine future traffic flows resulting from significant development on the South Humber Bank;
 - make recommendations to improve infrastructure to enable development to occur.
- 3.2.3.2. As part of the SHB Study, local plans were examined and local key businesses and developers were consulted to gain an understanding of the traffic problems and requirements in the South Humber Bank Area.
- 3.2.3.3. The North Lincolnshire Local Transport Plan mentions that '*We will be undertaking traffic management measures to direct traffic along particular routes or remove them from others around Top Road, Eastfield Road, Rosper Road and Chase Hill Road. This will prevent HGV using inappropriate routes passed residential dwellings to access the A160*'. It is not clear whether or not this means that traffic is to be directed along or away from Rosper Road.
- 3.2.3.4. The Humber Sea Terminal manager mentions that at present the route to the A160 is signed to the right from Haven Road (directing HGV's along Chase Hill Road and then either Eastfield Road or East Halton/Top Road. Since the development of the

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North Lincolnshire Freight Strategy (refer to Section 3.2.2.5), the Humber Sea Terminal has cooperated fully in supporting the police and local residents associations to prevent HGV's using these back roads by handing out flyers and recommending that drivers travel along Rosper Road, but foreign drivers particularly will tend to follow signs rather than other information.

3.2.3.5. It was therefore suggested by the Humber Sea Terminal that all traffic is directed along Rosper Road and that appropriate improvements are undertaken on the road itself and at the junction with the A160. TOTAL also suggested that all port traffic is directed along Rosper Road.

3.2.3.6. The capacity of the main road links in the SHB area was assessed and compared against forecast flows to determine which links need to be improved. Three growth scenarios were modelled to forecast traffic flows, based on varying levels of development. The 3 growth scenarios modelled were:

- Committed development only
- Committed development + Natural development growth
- Full potential development

3.2.3.7. Table 3.2.1 to 3.2.4 are taken directly from tables in the SHB Transport Strategy report and indicate forecast flows against theoretical capacities:

Table 3.2.1 – Base Year Link Capacity Assessment				
Roads	Flow	Theoretical Capacity	% Flow / Capacity	Overcapacity
East Halton Road	235	1260	19	No
Eastfield Road	563	1260	45	No
Rosper Road	334	1260	27	No
Chase Hill Road	242	1260	19	No

Table 3.2.2 – Scenario 1 (Committed Development) Link Capacity Assessment				
Roads	Flow	Theoretical Capacity	% Flow / Capacity	Overcapacity
East Halton Road	394	1260	31	No
Eastfield Road	1053	1260	84	No
Rosper Road	475	1320	36	No
Chase Hill Road	549	1260	44	No

Table 3.2.3 – Scenario 2 (Natural Growth) Link Capacity Assessment				
Roads	Flow	Theoretical Capacity	% Flow / Capacity	Overcapacity
East Halton Road	581	1260	46	No
Eastfield Road	1057	1260	84	No
Rosper Road	518	1320	39	No
Chase Hill Road	553	1260	44	No

Table 3.2.4 – Scenario 3 (Full Potential) Link Capacity Assessment				
Roads	Flow	Theoretical Capacity	% Flow / Capacity	Overcapacity
East Halton Road	454	1260	36	No
Eastfield Road	1286	1260	102	Yes
Rosper Road	1192	1320	90	No
Chase Hill Road	609	1260	48	No

3.2.3.8. The tables above indicate that Rosper Road will not be overcapacity under growth scenarios 1 and 2; however Eastfield Road has a high percentage of flow to capacity. For growth scenario 3, Rosper Road has a 90% flow/capacity and Eastfield Road is overcapacity.

Recommendations of SHB Study Transport Strategy

3.2.3.9. The report states that the link assessments indicate that ‘one of the three north-south corridors from the A160 needs to be improved to accommodate future traffic levels’. The 3 north-south corridors referred to are:

- Top Rd/East Halton Rd
- Eastfield Rd
- Rosper Rd

3.2.3.10. The report states that Top Rd/East Halton Rd is the least appropriate to improve as it runs through North Killingholme. Although the tables above indicate that Eastfield Rd will experience more congestion than Rosper Rd, the strategy recommends that Rosper Road is improved to dual carriageway because:

- There is more land available adjacent to Rosper Road to facilitate widening without the need to demolish buildings and restricting existing accesses.
- A significant amount of (currently) vacant development land on the SHB is located either immediately adjacent to Rosper Rd or to the North West (on the south of the Humber bank). Dualling Rosper Road would improve access to this area.

3.2.3.11. The dualling of Rosper Road is given 4th priority in the SHBS Transport Strategy report, behind A160 Improvements (1st), Network Rail improvements in SHB area (2nd) and A18 Stallingborough Link Road (3rd).

Conclusions

3.2.3.12. The SHB Study Transport Strategy clearly recommends that Rosper Road is dualled to improve access to the SHB.

3.2.3.13. The problem of congestion along Rosper Road and Eastfield Road forecast in the transport strategy is based on a growth scenario which includes full potential development in the SHB.

3.2.3.14. Forecast traffic figures for the A160 Improvement scheme are based on a more conservative growth scenario, which includes committed development and TEMPRO growth only.

3.2.4. Comparison

3.2.4.1. The North Lincolnshire Freight Strategy does not consider the increased traffic resulting from future development in its recommendations, however, all of its recommendations relating to the A160 will be considered as part of the scheme development. It is worth noting that a suggestion is made (not in recommendations of strategy; refer to Section 3.2.2.4) for Eastfield Road to be used for vehicles accessing the Humber Sea Terminal.

3.2.4.2. This contradicts the SHB Transport Strategy, which recommends that Rosper Road is improved to improve access to new development on the SHB. The SHB Transport Strategy includes consideration of future traffic flows resulting from development, however, it is noted that the growth assumptions used in recommending the dualling of Rosper Road are less conservative than those used in this scheme.

3.2.4.3. It is important that Yorkshire Forward, NLC and NELC are consulted regularly during the scheme development to ensure that all parties agree on the strategy for routing vehicles, and to ensure that this is reflected in the planning of other developments in the SHB.

4. SUMMARY OF DO NOTHING CONSEQUENCES

- 4.1. The A160 Improvements are seen as the biggest catalyst for development of the Port of Immingham and the South Humber Bank. As stated earlier, development in and around the Port is of strategic national importance bearing in mind the lack of further development potential at the major southern ports.
- 4.2. Failure to carry out this improvement has the potential to cause development stagnation in the area.
- 4.3. Significant congestion already occurs on the single carriageway stretches of the route which carry in excess of 40% HGVs. Already planned development on the South Humber Bank will make this significantly worse which will further reduce the incentive for development.
- 4.4. The South Humber Bank Transport Strategy Report (Report Ref W50358/T58/001), completed in November 2008 sets out the overall transport strategy for the South Humber Bank. Policy 2 states that: *'it is clear from the assessments conducted in this report, that there is a critical need for the A160 improvements which the Highways Agency (HA) are progressing, to be implemented as soon as possible to assist in facilitating growth in the Region. Indeed this is a fundamental element of the transport strategy for the area and is critical if the area is to develop as hoped. This is evident from the technical assessments in Section 11 of this report (refer to SHB Study Report)'*

5. DESCRIPTION OF PRE-PUBLIC CONSULTATION OPTIONS

5.1. Introduction

- 5.1.1. The Technical Appraisal Report (TAR) - Report Ref W11231/VAA/R03 Rev 3 Dated April 2009 produced in the Options Identification stage recommended four options to be taken forward to Public Consultation; Options 1, 2, 4 and 7. These are described below.
- 5.1.2. The non-recommended options (Options 3, 5, 6 and 8) were presented as part of the Public Consultation exercise to demonstrate the process of options identification and appraisal that has been undertaken. Descriptions of the non-recommended options can be found in the TAR.
- 5.1.3. All of the recommended options include the proposal to dual the A160 between Brocklesby Junction and Habrough Roundabout. Each option proposes alternative layouts at the main junctions with the A160. The 4 recommended options have a number of elements which are common and, to explain this, they have been split into segments as shown on the drawings included in Appendix B. [Table 5.1](#) below seeks to demonstrate this commonality.

Table 5.1: Segments in Common between Route Options

Option	Segment							
	1A	1C	2A	2B	2D	3A	4A	4C
1 - W11231/01/100	✓		✓			✓	✓	
2 - W11231/01/200	✓			✓		✓	✓	
4 - W11231/01/400	✓				✓	✓	✓	
7 - W11231/01/700		✓			✓	✓		✓

5.2. Option 1

Figure 5.1 – Option 1



5.2.1. Option 1 is an at-grade solution with a simple left-in/left-out junction at Ulceby Road junction ([Figure 5.1](#) above and Drawing number W11231/01/100 Rev 3 in Appendix B) and comprises the following segments:

Segment 1A

5.2.2. Segment 1A consists of Brocklesby grade separated junction and the mainline A160 up to Chainage 400.

5.2.3. Brocklesby Junction is to be improved to a dumb-bell layout with newly aligned slip roads. The existing junction bridge is to be re-used and a new bridge is to be constructed to the east of it for the new westbound carriageway. The existing slip-roads and embankment on the loop of the junction are to be demolished and returned to agricultural land.

5.2.4. The existing A160 running from Brocklesby Junction is single carriageway, it is proposed to improve this to dual 2 lane carriageway standard by construction of a new westbound carriageway on agricultural land alongside the existing carriageway.

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Segment 2A

- 5.2.5. Segment 2A consists of the mainline A160 from CH400 to CH2100 (just past Habrough Roundabout)
- 5.2.6. The existing A160 is currently a single carriageway up to Habrough Roundabout. It is proposed to improve this to dual 2 lane carriageway standard by construction of a new westbound carriageway on agricultural land alongside the existing carriageway.
- 5.2.7. The junction with Ulceby Road (A1077) is to be an at-grade left in/left out junction (including resurfacing of approx 100m of Ulceby Road).
- 5.2.8. Habrough Roundabout is to be enlarged to accommodate the new dual carriageway to the west (including resurfacing of approx 50m of Top Road and Habrough Road). The existing 5.5m wide access road from Top Road will have its connection to the A160 severed and will be extended to give access for the farm shop and adjacent property onto Top Road.

Segment 3A

- 5.2.9. Segment 3A consists of the mainline A160 from CH2100 to CH4000 (approaching A1173, Manby Road).
- 5.2.10. The existing A160 is currently dual carriageway for the entire length of this segment. It is not proposed to amend or improve the mainline A160 in this segment. No changes are proposed to the signalised junction at Eastfield Rd. There are currently gaps in the central reserve at various junctions with the A160 along this segment. It is proposed to close the central reserve gap at Town St Junction (CH 2650) and at the refinery entrances (CH 3900).
- 5.2.11. It is also proposed to provide a new footbridge over the A160 at approximately CH2720 providing pedestrian access between the 2 halves of Town St.

Segment 4A

- 5.2.12. Segment 4A consists of the mainline A160 from CH4000 to CH5160 at the dock gate entrance to the Port of Immingham.
- 5.2.13. The existing A160 is dual carriageway from CH4000 to the existing roundabout at Manby Road. It then continues as single carriageway underneath the railway line to the dock gate entrance to the Port of Immingham. It is proposed to improve the

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existing single carriageway to dual 2 lane carriageway, requiring the construction of a new railway bridge over the new westbound carriageway.

- 5.2.14. It is proposed to improve the existing Manby Road Roundabout to a signal controlled roundabout, and to improve the Rosper Road Junction to a linked signal controlled junction.

5.3. Option 2

Figure 5.2: Option 2



- 5.3.1. Option 2 is an at-grade solution with a roundabout at Ulceby Road Junction ([Figure 5.2](#) above and Drawing number W11231/01/200 Rev 3 in Appendix B) and comprises the following segments:

Segment 1A – as Option 1

Segment 2B

- 5.3.2. Segment 2B consists of the mainline A160 from CH400 to CH2100 (just past Habrough Roundabout)

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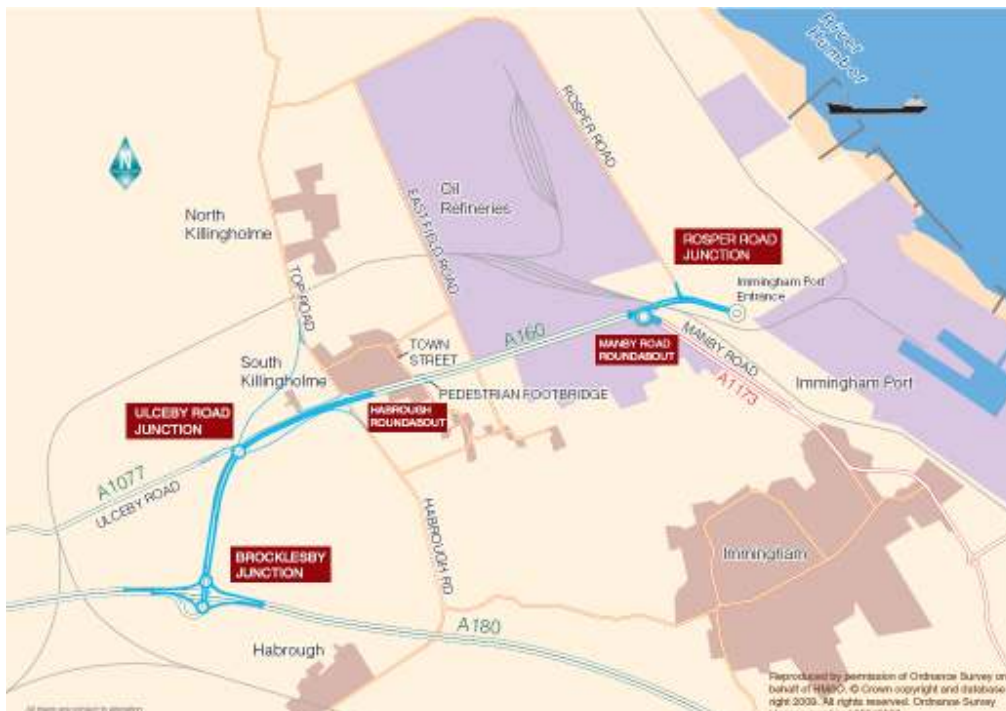
- 5.3.3. The existing A160 is currently a single carriageway up to Habrough Roundabout. It is proposed to improve this to dual 2 lane carriageway standard by construction of a new westbound carriageway on agricultural land alongside the existing carriageway.
- 5.3.4. The junction with Ulceby Road (A1077) is to be a new roundabout (including resurfacing of approx 100m of Ulceby Road).
- 5.3.5. Habrough Roundabout is to be enlarged to accommodate the new dual carriageway to the west (including resurfacing of approx 50m of Top Road and Habrough Road). The existing 5.5m wide access road from Top Road will have its connection to the A160 severed and will be extended to give access for the farm shop and adjacent property onto Top Road.

Segment 3A – as Option 1

Segment 4A – as Option 1

5.4. Option 4

Figure 5.3: Option 4



- 5.4.1. Option 4 is an at-grade solution with a roundabout at Ulceby Road Junction, including new links to Top Rd and Habrough Rd ([Figure 5.3](#) above and Drawing

number W11231/01/400 Rev 4 in Appendix B) and comprises the following segments:

Segment 1A – as Option 1

Segment 2D

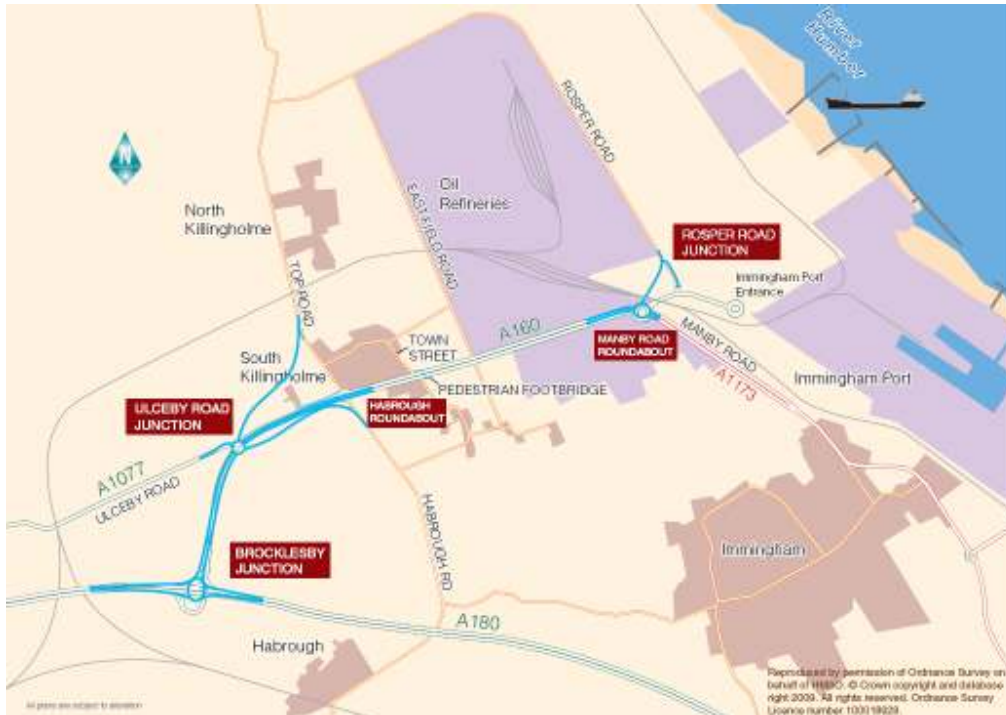
- 5.4.2. Segment 2D consists of the mainline A160 from CH400 to CH2100 (just past Habrough Roundabout)
- 5.4.3. The existing A160 is currently a single carriageway up to Habrough Roundabout. It is proposed to improve this to dual 2 lane carriageway standard by construction of a new westbound carriageway on agricultural land alongside the existing carriageway.
- 5.4.4. The junction with Ulceby Road (A1077) is to be a new roundabout, with new links to Top Road and Habrough Road (including resurfacing of approx 100m of Ulceby Road).
- 5.4.5. Habrough Roundabout is to be removed. The existing 5.5m wide access road from Top Road will have its connection to the A160 severed and will be extended to give access for the farm shop and adjacent property onto Top Road.

Segment 3A – as Option 1

Segment 4A – as Option 1

5.5. Option 7

Figure 5.4: Option 7



- 5.5.1. Option 7 is an at-grade solution, which was conceived during the Value Engineering exercise on the other options. Option 7 is similar to Option 4 with differences at Brocklesby Junction and Manby Road/Rosper Road Junctions, as described below. The arrangement at Ulceby Road Junction is the same as for Option 4. This arrangement was proposed to reduce the number of junctions on the A160, by removing Harbrough Roundabout and providing new link roads from Top Road and Harbrough Road to a new roundabout at Ulceby Junction.
- 5.5.2. The first difference in Option 9 is the proposal of a 2 bridge roundabout layout grade separated junction at Brocklesby Junction, which is considered to be easier to use than a dumbbell layout junction. Also, it is proposed to provide a dedicated left turn lane for vehicles leaving the Eastbound A180 to join the A160, to reduce congestion at the junction during peak times.
- 5.5.3. At the Value Engineering workshop in November 2008, it was noted that a significant number of vehicles travel between Manby Road Roundabout and Rosper Road, which causes congestion at Rosper Road Junction. The congestion problem is worsened due to the A160 being single carriageway at this location. The second

difference in Option 9 included a new link road directly from Manby Road Roundabout to Rosper Road, and the removal of Rosper Road Junction. It was intended that this would provide a single point for traffic travelling to/from Rosper Road to be separated from the port traffic. This also has the advantage of reducing the number of junctions on the A160.

- 5.5.4. Option 7 ([Figure 5.4](#) above and Drawing number W11231/01/700 Rev 3 in Appendix B) comprises the following segments:

Segment 1C

- 5.5.5. Segment 1C consists of Brocklesby grade separated junction and the mainline A160 up to Chainage 400.

- 5.5.6. Brocklesby Junction is to be improved to a 2-bridge roundabout layout with newly aligned slip roads. The existing junction bridge is to be re-used and a new bridge is to be constructed to the west of it for the circulatory carriageway. The A180 eastbound off-slip road is to be improved to 2 lanes with 1 dedicated free-flow link directly onto the A160. The A180 westbound on-slip road is also to be upgraded to 2 lanes. The existing slip-roads and embankment on the loop of the junction are to be demolished and returned to agricultural land.

- 5.5.7. The existing A160 running from Brocklesby Junction is single carriageway, it is proposed to improve this to dual 2 lane carriageway standard by construction of a new westbound carriageway on agricultural land alongside the existing carriageway.

Segment 2D - as Option 4

Segment 3A- as Option 1

Segment 4C

- 5.5.8. Segment 4C consists of the mainline A160 from CH4000 to CH5160 at the dock gate entrance to the Port of Immingham.

- 5.5.9. The existing A160 is dual carriageway from CH4000 to the existing roundabout at Manby Road. It then continues as single carriageway underneath the railway line to the dock gate entrance to the Port of Immingham. It is proposed to provide a new link between Manby Road Roundabout and Rosper Road, requiring the construction of a new bridge under the railway.

- 5.5.10. Manby Road Roundabout is to be signalised to give priority to vehicles leaving the port. The junction between the A160 and Rosper Road is to be closed to traffic with a crash gate to enable high vehicles to access the port as necessary.

6. SUMMARY OF PUBLIC CONSULTATION

6.1. Introduction

6.1.1. This section summarises the Report on Public Consultation (Report Ref W11231/PCF2/5.3, dated October 2009), which describes the Public Consultation in detail.

6.2. Consultation Arrangements

6.2.1. A Public Consultation was undertaken for 12 weeks between 4th June and 28th August 2009.

6.2.2. As part of the Public Consultation, a Public Exhibition was held at South Killingholme Community Centre on 3rd and 4th July 2009; 4 weeks into the Consultation Process. The exhibition was arranged to provide an opportunity for members of the public to discuss the scheme with members of the project team.

6.2.3. A preview exhibition was held for dignitaries at 6pm on 2nd July 2009. This included a presentation on the A160 scheme. Members of the local press were also invited prior to the exhibition opening to the public on 3rd July 2009.

6.3. Consultation Material

6.3.1. A Public Consultation Leaflet (PCL) was produced to explain the scheme proposals to the public and to provide contact details for the return of questionnaires and requests for further information. A copy of the leaflet is included in Appendix C. The leaflet included details of: the scheme background, the options that have been developed, the results of the environmental and economic assessments, details of the consultation process and the current scheme programme. Details of the public exhibition and scheme webpage were also included.

6.3.2. The Public Consultation Leaflet included a questionnaire to provide a convenient way for members of the public to provide written comments on the scheme options. The questionnaire was designed to collect views on the 4 recommended scheme options. The majority of questions required simple responses (check boxes and ranking scores) to obtain views on a number of specific aspects of the scheme options. Space was also provided to enable the respondent to provide additional comments, including comments on the non-recommended options.

6.3.3. A scheme webpage was uploaded to the Highways Agency's website at the following address: <http://www.highways.gov.uk/A160-A180improvements>. The website was intended to provide an alternative source of information on the scheme, and included background information on the scheme, details of the Public Exhibition and an online questionnaire.

6.3.4. The exhibition display panels were based on the information contained in the Public Consultation Leaflet. In addition to the display panels, screens were provided to display 3d flythrough animations for each of the 8 scheme options.

6.4. Exhibition Publicity

6.4.1. In order to ensure that the Consultation information reached as many people who may have an interest in the scheme as possible, 3 methods of publicity were used:

- Leaflet mailing
- Deposit Points
- Media advertisements

6.4.2. Leaflets were mailed directly to the residents who are likely to be directly affected by the proposals (residents of South Killingholme) and those who may be indirectly affected by the proposals (residents of North Killingholme, Immingham, Ulceby, Habrough, Brocklesby and Wooton).

6.4.3. Leaflets were also mailed directly to 'Key Stakeholders'. These include:

- Local MPs and MEPs *
- Local Councillors and Parish Councillors *
- Local Councils (N Lincolnshire Council, N E Lincolnshire Council and Lincolnshire County Council) *
- Government Office for Yorkshire and the Humber *
- Yorkshire Forward *
- Emergency Services *
- Government Departments and Agencies, including the Environment Agency, Natural England and English Heritage;
- Major local businesses, including ABP, Conoco Phillips and Total;
- Utility companies, including National Grid Gas and British Telecom;
- Other interest groups, including The National Trust, RAC etc.

* indicates key stakeholders that were invited to the dignitaries preview exhibition.

6.4.4. Deposit Points were established in local Post Offices and Public buildings to inform other local and non-local residents about the consultation. Deposit Points were also established in the ports, refineries and Ulceby Truck Stop to target other stakeholders and road users.

6.4.5. The local media was also used to reach people who have not received a leaflet, or been made aware of the consultation and exhibition by other means. This included advertisements in the local newspapers and local radio stations.

6.5. Attendance at Public Exhibition

6.5.1. Over the two days of the public exhibition, 316 members of the public attended. Of these approximately 55% were residents of South Killingholme, representing approximately 15-16% of the population of the village, indicating a very high level of interest from local residents.

6.6. Summary of Consultation Responses

6.6.1. Introduction

6.6.1.1. Consultation responses, including questionnaires and written responses (from Key Stakeholders and members of the public) are summarised below and described in detail in the Report on Public Consultation (Report Ref W11231/PCF2/5.3).

6.6.1.2. 371 written questionnaires and 89 electronic questionnaires were completed and returned. Of these, 107 questionnaire responses were received by residents of South Killingholme, representing 23% of the total number of completed questionnaires.

6.6.1.3. Written consultation responses were also received from 19 Key Stakeholders and 10 members of the public.

6.6.2. Preferred Option

6.6.2.1. Analysis of the consultation responses indicates that in overall terms Option 7 received the highest level of support. A number of additional issues have arisen as a result of the consultation; these will be considered in the selection of a Preferred Route. In order to summarise the consultation responses, individual sections of the scheme have been considered separately below.

6.6.2.2. Comments relating to Ulceby Road Junction, Habrough Road Junction and Town Street Junction are closely related and have therefore, been considered together.

6.6.3. Brocklesby Junction

- 6.6.3.1. The responses to Questions 2 and 3 in the consultation questionnaire indicated that there was an overall preference for Option 7; the only option to include a 2 bridge roundabout layout at Brocklesby Junction. Of the written questionnaire responses relating to Brocklesby Junction, 24 supported the 2 bridge roundabout layout, whilst 9 were against the dumb-bell arrangement.
- 6.6.3.2. Two of the written consultation responses from Key Stakeholders specifically stated support for a 2 bridge roundabout layout at Brocklesby Junction. In addition, seven of the Key Stakeholders' responses indicated strong support for Option 7.
- 6.6.3.3. Overall, the public consultation results indicate strong support for a 2 bridge roundabout layout at Brocklesby Junction.

6.6.4. Ulceby Road, Habrough Road and Town Street Junctions

Ulceby Road Junction

- 6.6.4.1. Option 1 was considered to be the poorest option in terms of road users' safety, local residents' safety and local access; this is likely to be due to the left-in left-out junction arrangement proposed at Ulceby Road. This conclusion is supported by discussions held with member of the public at the public exhibition and the written questionnaire responses in which 15 people stated that they currently experience problems accessing the A160 westbound from Ulceby Road and that Option 1 would not improve this. Also, 13 people commented that they were in favour of a roundabout at Ulceby Road Junction.
- 6.6.4.2. Three of the consultation responses from Key Stakeholders stated support for the proposed roundabout at Ulceby Road Junction, in addition to their general strong support for option 7.

Habrough Road Junction

- 6.6.4.3. Options 4 and 7 were considered to be poor in terms of 'local residents' safety' and 'local access'; this is likely to be due to the removal of Habrough Roundabout in both options. This conclusion is supported by discussions held with members of the public at the public exhibition and the written questionnaire responses, where the view was expressed that the removal of Habrough Roundabout would result in higher vehicle speeds along the A160, adversely affecting local residents' safety, and reduced access to South Killingholme. Analysis of the responses from local

residents indicated that the local view was that Options 4 and 7 were the poorest in terms of 'local access'.

6.6.4.4. Options 4 and 7 include link roads from Ulceby Junction to Top Road and Habrough Road and the removal of Habrough Roundabout, therefore, the comments about these links are closely related to the comments regarding Habrough Roundabout. In the written questionnaire comments, 50 people commented that Habrough Roundabout should be retained. Also, four of the responses from Key Stakeholders stated that Habrough Roundabout should be retained. Reasons given for this included:

- removal of the roundabout would reduce access to South Killingholme; and
- removal of the roundabout would result in vehicles rat-running through South Killingholme to the north of the A160, and along unsuitable roads to the south, including Baptist Chapel Lane.

6.6.4.5. 17 people commented that they were against the links from Ulceby Roundabout to Top Rd and Habrough Rd, reasons given for this included:

- increased journey times for vehicles travelling between the A160 and Top Road or Habrough Road; and
- providing these links would encourage more vehicles to travel along Top Road to access the port.

6.6.4.6. Some comments were received in support of the proposal to remove Habrough Roundabout. These were generally from residents of Top Road, who mentioned that noise was an issue on Top Road. 9 people commented that they would support any proposal that moved traffic away from the residential properties on Top Road.

Town Street Junction

6.6.4.7. Overall, there was a slight majority of people who were against the proposal to close the central reserve gap at Town Street Junction. 39% of people stated they were 'for' the closure and 40% stated they were 'against' the closure. Analysis of the responses from local residents indicated a far stronger view about the central reserve gap closure, with 87% of local residents 'against' the closure. In addition, 39 people and 4 Key Stakeholders provided written comments opposing the Town Street gap closure.

6.6.4.8. It was clear from discussions held with local residents that Town Street was considered to be the main entrance to South Killingholme, and that closing the central reserve gap would result in significant detrimental effects. 31 written questionnaire comments stated that closing the central reserve gap would have a major impact on access to the village. Specific concerns relating to this included:

- reduced access/additional journey times for local residents;
- access for emergency vehicles;
- access for public transport; and
- adverse effect on local businesses.

6.6.4.9. The footbridge was proposed in order to provide a safe means of crossing the A160. A number of comments were received regarding the footbridge. These were closely related to the issue of closing the central reserve gap at Town St. 167 people stated that they supported the footbridge and two Key Stakeholders specifically included support for the footbridge in their responses. A number commented that a footbridge would improve safety for both road users and pedestrians crossing the A160. 36 people commented that they were opposed to the footbridge. Overall, this indicated support for the provision of a pedestrian crossing at Town Street.

6.6.4.10. However, of the questionnaire comments relating to the footbridge received from local residents, approximately half expressed support for the footbridge and half opposed the footbridge. All of the local residents who commented that they opposed the footbridge proposal also opposed the Town Street central reserve gap closure. This indicated that many residents did not support the proposals at Town Street, and that a pedestrian footbridge would not be a suitable replacement for the existing arrangement. 11 people stated that the footbridge proposal would not resolve the issues caused by closing the central reserve gap at Town Street. This comment was also made by South Killingholme Parish Council.

Alternatives to consider

6.6.4.11. Access to South Killingholme was highlighted as a specific concern by the majority of local residents, resulting in numerous comments which are summarised above. In order to resolve these issues, some alternative junction layouts at Ulceby Road, Habrough Road and Town Street Junctions should be considered.

6.6.4.12. When considering alternative arrangements to address the issue of local access, it should be noted that the HA has confirmed that it intends to close central reserve gaps on the A160 for safety reasons.

6.6.5. Eastfield Road Junction

6.6.5.1. There was general support for retaining the current layout of the signalised junction at Eastfield Road (56% 'for'). This was also reflected in the responses from local residents. In the written responses, four people commented that improvements were needed to the signals at Eastfield Road Junction; this was also mentioned by 3 of the Key Stakeholders.

6.6.5.2. The public consultation results indicated strong support for retaining the current layout at Eastfield Road Junction. Any improvements required to Eastfield Road Junction will be investigated at a later stage in the design process.

6.6.6. Central Reserve Gap Closure at Refinery Entrance

6.6.6.1. There was general support for closing the central reserve gap at the refinery entrance (41% 'for'). The response from local residents however, indicated that the majority (41%) were opposed to the proposal to close this gap. In the written responses, five people commented that they were opposed to the central reserve gap closure at the refinery entrance; this was also stated by two of the Key Stakeholders (Conoco Phillips and Total).

6.6.6.2. The public consultation results indicate general support for closing the central reserve gap at the refinery entrance. Also, it should be noted that the HA has confirmed that it intends to close central reserve gaps on the A160 for safety reasons. Discussions will continue with Conoco Phillips and Total throughout the scheme development to either mitigate the effects of closing the central reserve gap or to compensate for additional expense as a result of the closure.

6.6.7. Manby Road and Rosper Road Junctions

6.6.7.1. The strong support for Option 7 indicated that the preferred arrangement at Manby Road and Rosper Road Junction is as shown in Option 7. One of the Key Stakeholders (Conoco Phillips) expressed concern at this proposal. The joint response from the local Parish Councils indicated strong support for this layout.

6.6.7.2. The public consultation results indicated general support for the Manby Road/Rosper Road arrangement as shown in Option 7.

6.7. Conclusions of Public Consultation

- 6.7.1. The public consultation exercise gave the public the opportunity to gain information about the scheme and to comment on the proposals. A significant number of local and non-local responses were received, and all views have been analysed.
- 6.7.2. The consultation responses indicated an overall preference for Option 7; however the issue of access to South Killingholme has dominated the consultation responses. Significant findings include:
- 87% of South Killingholme residents are against the closure of the central reserve gap at Town Street;
 - Over 75% of local residents feel that all of the options are 'Poor' for local access;
 - 167 comments and 2 responses from Key Stakeholders included support for the footbridge, as it would improve safety for road users and pedestrians.
 - 50 comments and 4 responses from Key Stakeholders state that Habrough Roundabout should be retained in order to improve access to South Killingholme and remove the need for vehicles to rat-run through the village.
- 6.7.3. In order to address the issue of access to South Killingholme, the HA has determined that an additional option needs to be developed which is based on Option 7, with amendments to the junction arrangements at Ulceby Road, Habrough Road and Town Street.
- 6.7.4. It will be necessary to carry out a full technical appraisal of the new option, including environmental and economic assessments. The HA does not intend to undertake a consultation on the new option at this stage, as the alterations would be minor and only affect side roads. Also, as the minor amendments would address comments received during the formal consultation exercise, it is not considered necessary to consult on the new option.

6.8. Post Public Consultation Option

6.8.1. Option 9 has been developed to address the issue of access to South Killingholme. Based on Option 7, it moves Ulceby Road Junction towards the existing Habrough Roundabout location and replaces the South Killingholme footbridge with a road bridge linking the two halves of South Killingholme.

Development of Option 9

6.8.2. The consultation responses indicated an overall preference for Option 7; however a number of other issues were raised. A large number of comments related to the issue of access to South Killingholme.

6.8.3. A significant number of consultation responses mentioned that Habrough Roundabout should be retained. The local view was that removing Habrough Roundabout would reduce the level of access to South Killingholme and increase journey times for local residents. It was also felt that removing Habrough Roundabout would encourage people to rat-run through the village to both the North and South of the A160 to avoid having to travel via Ulceby junction. Only a small number of local residents supported the removal of Habrough Roundabout as this would prevent HGVs from travelling along Top Road where they live, thus reducing noise for all residents of Top Road.

6.8.4. Option 7 was developed with the intention of reducing the number of junctions on the A160, by the removal of Habrough Roundabout and the provision of links from Top Road and Habrough Road to Ulceby Roundabout. However, it was made clear at the Public Consultation that the location of Ulceby Roundabout was not fixed. Following the Public Consultation it has been proposed to relocate Ulceby Roundabout further east towards South Killingholme in Option 9. This change has been proposed to resolve the issues of access to the village and rat-running, whilst reducing the number of junctions on the mainline A160 (an aim of Options 4 and 7) and still taking HGVs away from the residents of Top Road. Locating the roundabout at this location has proven to provide an improved economic benefit, as detailed in the Post Public Consultation Supplementary TAR (PPCS-TAR) - Report Ref W11231/PCF2/5.2.

6.8.5. A significant number of consultation responses indicated that the majority of local residents are against the central reserve gap closure at Town Street Junction. The

main reasons for this objection are that Town Street Junction is considered to be both the main access to South Killingholme as well as linking the north and south halves of the village, which were severed when the A160 was originally built. Closure of the central reserve gaps would severely impact on this. There was also considerable support for providing pedestrians with a safe means of crossing the A160. HA Netserv and Network Operations confirmed that on safety grounds it would be wrong not to close all central reserve gaps on the A160 in view of the projected large increase in traffic.

- 6.8.6. To address this issue, two alternative options for a safe crossing were considered: a signalised junction at Town Street and a vehicular overbridge. The comparison of these alternatives is detailed in the PPCS-TAR. A signalised junction would introduce additional delay to the A160, and also require the implementation of a 50mph speed limit. This would result in reduced economic benefits, reduced safety and a higher impact on air and noise quality in comparison to the vehicular overbridge.
- 6.8.7. In Option 9 the preferred alternative is to provide a vehicular overbridge to link the two halves of Town Street, in place of a pedestrian footbridge as proposed in all other options. This would allow the central reserve gap to be closed as required by Netserv. It is felt by the design team that adoption of these changes in Option 9 will resolve the issues raised by the South Killingholme residents and guard against significant objections in the future.
- 6.8.8. Apart from the two post-public consultation changes detailed above Option 9 is the same as Option 7. Option 9 consists of Segments 1C, 2E, 3B and 4C ([Figure 6.1](#) below and Drawing number W11231/01/900 Rev A in Appendix B).

Figure 6.1: Option 9



Segment 1C – as Option 7 (Section 5.5)

Segment 2E

- 6.8.9. Segment 2E consists of the mainline A160 from CH400 to CH2300 (approximately 200m east of Habrough Roundabout).
- 6.8.10. The existing A160 is currently a single carriageway up to Habrough Roundabout. It is proposed to improve this to dual 2 lane carriageway standard by construction of a new southbound carriageway on agricultural land alongside the existing carriageway up to CH1450. The proposed alignment then moves off-line by continuing the horizontal curve to a new 100m diameter roundabout situated approximately 250m southwest of the existing Habrough Roundabout. The A160 links back up with the existing dual carriageway to the east of the existing location of Habrough Roundabout.
- 6.8.11. It is proposed to provide link roads (1m hard strip + 7.3m carriageway + 1m hard strip = 9.3m paved width) from the new roundabout to Top Road (approx 630m), Habrough Road (approx 690m) and Ulceby Road (approx 900m).
- 6.8.12. Habrough Roundabout and Ulceby Road Junction are to be removed.

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6.8.13. The existing 5.5m wide access road from Top Road will have its connection to the A160 severed and will be extended to give access for adjacent property onto Top Road.

Segment 3B

6.8.14. Segment 3B consists of the mainline A160 from CH2300 to CH4000 (approaching A1173, Manby Road).

6.8.15. The existing A160 is currently dual carriageway for the entire length of this segment. It is not proposed to amend or improve the mainline A160 in this segment. No changes are proposed to the signalised junction at Eastfield Rd. There are currently gaps in the central reserve at various junctions with the A160 along this segment. It is proposed to close up the gaps at the Town Street Junction (CH 2650) and at the refinery entrances (CH 3900).

6.8.16. It is proposed to provide a new road bridge over the A160 at approximately CH2770 linking Town Street to the north and south of the A160, providing direct pedestrian and vehicular access between the 2 halves of South Killingholme.

Segment 4C – as Option 7 (Section 5.5)

7. DESIGN INFORMATION

7.1. Road Layout and Standards

7.1.1. Standards Used

7.1.1.1. The following design standards from the Design Manual for Roads and Bridges (DMRB) and North Lincolnshire Council have been used and referenced;

- DMRB 6.1.1 TD9/93 – Highway Link Design
- DMRB 6.1.2 TD27/05 – Cross Sections and Headrooms
- DMRB 6.2.1 TD22/06 – Layout of Grade Separated Junction
- DMRB 6.2.3 TD16/07 – Geometric Design of Roundabouts
- DMRB 6.2.3 TD50/04 - The Geometric Layout of Signal-Controlled Junctions and Signalised Roundabouts
- DMRB 6.2.5 TD40/94 – Layout of Compact Grade Separated Junctions
- DMRB 6.2.6 TD42/95 – Geometric Design of Major/Minority Priority Junctions
- DMRB 8.1.1 TA12/07 – Traffic Signals on High Speed Roads
- North Lincolnshire Council Residential Roads Design Guide

7.1.2. Design Speed

7.1.2.1. The mainline A160 between Brocklesby Junction and CH 4000 (west of Manby Road Junction) is to be dual carriageway and has been designed with a design speed of 120 kph.

7.1.2.2. The A160 between CH 4000 and the Port of Immingham is currently a single carriageway road with National Speed Limit restriction (i.e. 60 mph, corresponding to a design speed of 100 kph). The design speed for this section of carriageway has been determined separately for each option. Details of the design of this section of carriageway are explained in detail in sections 7.1.7 to 7.1.11.

7.1.2.3. Slip roads for Brocklesby grade separated junction have been designed with a design speed of 70 kph (TD22/06);

7.1.2.4. Design speeds for local single carriageway roads have been assessed separately; these are explained in detail in sections 7.1.7 to 7.1.11.

7.1.3. Cross Sections

7.1.3.1. **Dual carriageway** sections are to be Dual 2 lane All-Purpose (D2AP) standard, as detailed in Figure 4-3a in TD27/05. This cross section consists of two carriageways; each with two 3.65m wide lanes, plus 1m wide hard strips and 2.5m wide verges (and central reserve).

7.1.3.2. **Single carriageway** sections are to be single carriageway (S2) standard, as detailed in Figure 4-3a in TD27/05. This cross section has the same dimensions as one of the D2AP carriageways.

7.1.4. Junction designs

7.1.4.1. The layouts of the grade separated junctions are based on the core growth scenario traffic forecast figures. In order to select appropriate merge and diverge layouts, based on forecast traffic flows, it is necessary to apply an adjustment factor which is based on the percentage of HGVs (Tables 3/2 and 3/3 in TD 22/06). The standard does not include adjustment factors for %HGVs in excess of 20%, so in this case it is assumed that the adjustment factor can be extrapolated from Table 3/2 and 3/3 to take account of high percentage flows of HGVs. Discussion has taken place with Gordon Heath of the HA, who has agreed that this is a reasonable assumption at this stage.

7.1.4.2. Roundabout and at-grade junction designs shown on the options layout drawings are indicative only.

7.1.5. Departures

7.1.5.1. Potential departures are briefly identified in the option descriptions below. An item has been included in the risk register to represent the risk of additional cost or time due to departures not being granted. Each departure will be considered in detail during the preliminary design stage.

7.1.6. Heavy Load Routes and High Load Routes

7.1.6.1. The A160 was checked against the HA's National Trunk Road Network – Heavy and High Loads; a number of routes were identified. All options have been designed to ensure that these routes can be retained. A drawing indicating the extent of abnormal load routes is included in Appendix E.

7.1.7. Description of design layout of options

7.1.7.1. Details of the design layout of each preferred option are provided in sections 7.1.8 to 7.1.12. Each option has been sub-divided into segments (as described earlier in Sections 5.2 to 5.5 and 6.8, and shown on layout drawings in Appendix A), to prevent repetition where design features are common to more than one option.

7.1.8. Option 1

Segment 1A

7.1.8.1. A ‘dumb bell’ layout is proposed for Brocklesby Junction; designed in accordance with TD22/06, using peak hourly flows from the core growth scenario traffic forecast figures. Details of the proposed design are provided in [Table 7.1](#).

Table 7.1: Design details for Segment 1A (Brocklesby Junction)

Item	Recommended standard	Reference	Proposed standard	Departure required	Comments
Eastbound diverge slip road cross section	DG2E (2 lanes with hardstrip)	TD22/06 Table 3/1a	DG2E (2 lanes with hardstrip)	No	Based on connector road flow of 1216 vph.
Eastbound diverge layout	Type A (taper diverge)	TD22/06 Fig. 2/5 AP	Type A (taper diverge)	No	
Eastbound merge slip road cross section	MG1C (single lane with hardshoulder)	TD22/06 Table 3/1a	MG1C (single lane with hardshoulder)	No	Based on connector road flow of 89 vph.
Eastbound merge layout	Type A (taper merge)	TD22/06 Fig. 2/3 AP	Type A (taper merge)	No	
Westbound merge slip road cross section	MG1C (single lane with hardshoulder)	TD22/06 Table 3/1a	MG1C (single lane with hardshoulder)	No	Based on connector road flow of 891 vph.
Westbound merge layout	Type A (taper merge)	TD22/06 Fig. 2/3 AP	Type A (taper merge)	No	
Westbound diverge slip road cross section	DG1C (single lane with hardshoulder)	TD22/06 Table 3/1a	DG1C (single lane with hardshoulder)	No	Based on connector road flow of 304 vph.
Westbound diverge layout	Type A (taper diverge)	TD22/06 Fig. 2/5 AP	Type A (taper diverge)	No	

7.1.8.2. Forecast traffic flows indicate that the number of vehicles joining and leaving the A160 from/to the west is relatively high in comparison with the total number of vehicles using the A180. However, [Table 7.1](#) shows that no departures are required

for any of the slip roads, with only the eastbound diverge needing more than one lane.

Segment 2A

7.1.8.3. Segment 2A includes the provision of dual carriageway between Brocklesby Junction and Top Road Junction. It is proposed to utilise as much of the existing asset as possible to minimise construction cost, land take requirements and environmental impact. The junction with Ulceby Road is to be a left in-left out junction, designed in accordance with TD42/95.

7.1.8.4. The A160 has a horizontal radius of 720m between CH 740 and CH 1400, which is a **relaxation** of one step below the desirable minimum radius. Also, due to the proposed concrete barrier in the central reserve, the A160 eastbound stopping sight distance (SSD) is about 215m, a **relaxation** of 1 design speed step. Although this combination is permitted on its own, the substandard SSD is not allowed on the immediate approach to Ulceby Junction (according to paragraph 1.26 of TD9/93) and so a **departure** is needed. The departure could only be eliminated by increasing the width of the 7.475m central reserve by 5.4m to 12.875m but this would be undesirable for environmental, cost and aesthetic reasons.

Segment 3

7.1.8.5. It is not proposed to amend the carriageway alignment in segment 3. There are currently no carriageway alignment departures or relaxations on this section of the A160.

Segment 4A

7.1.8.6. It is proposed to upgrade the existing Manby Road Roundabout to a signal controlled roundabout. At this stage, the alignment of the existing roundabout is to be retained.

7.1.8.7. It is proposed to improve the existing junction with Rosper Road to a signal controlled junction. As it is proposed to realign the junction, the design has been undertaken in accordance with TD50/04.

7.1.8.8. The mainline A160 between Manby Road Junction and the Port of Immingham is currently S2 carriageway, subject to the national speed limit (60mph). It is proposed to upgrade this length of carriageway to D2AP, however the national speed limit

(70mph) is not considered to be appropriate for this section of carriageway for the following reasons:

- Traffic signals are not recommended for use in situations where the 85th percentile approach speed exceeds 65mph, according to TA12/07. Traffic signals have been chosen at Manby Road and Rosper Road to improve capacity at these junctions.
 - It is not safe (or necessary) for vehicles travelling between Manby Road Junction and Rosper Road Junction, or between Rosper Road Junction and the Port of Immingham, to accelerate to speeds approaching 70mph.
 - Providing full SSD for a 120kph design speed would require a more expensive bridge beneath the railway.
- 7.1.8.9. It has been decided that a speed restriction of 50mph (corresponding to a design speed of 85kph) would be appropriate for this section of carriageway, between approximately CH 4000 and the Port of Immingham entrance. The horizontal radius of the carriageway on the approach to Manby Road roundabout has been reduced to 255m, which is a **relaxation** of 2 steps below the desirable minimum; this physical constraint will help to reduce vehicle speed to below 50mph. This relaxation is permitted as full SSD of 160m will be retained for vehicles throughout the 50mph zone.
- 7.1.8.10. The horizontal radius of the carriageway from CH 4670 to CH 4960 is 510m, which is the desirable minimum radius and does not require any relaxations or departures.
- 7.1.8.11. Vertical alignment can also be achieved throughout the 50mph zone without the requirement for relaxations or departures.

7.1.9. Option 2

Segment 1A - As Option 1.

Segment 2B

- 7.1.9.1. As Option 1, but instead of a left in left out junction at Ulceby Road, a roundabout is proposed; designed in accordance with TD16/07.

Segment 3 - As Option 1.

Segment 4A - As Option 1.

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7.1.10. Option 4

Segment 1A - As Option 1.

Segment 2D

7.1.10.1. As Option 3, although with link roads from the new roundabout to Top Road and Habrough Road.

7.1.10.2. The link roads to Top Road and Habrough Road from Ulceby Roundabout have been designed in accordance with TD9/93. Both link roads have a design speed of 100kph, which corresponds to the national speed limit for S2 roads (60mph). Details of the design features are shown in [Table 7.2](#).

Table 7.2: Design details for Segment 2D (links to Top Road and Habrough Road)

Item	Recommended standard	Reference	Proposed standard	Departure required	Comments
Top Road link design speed	100B	TD9/93 Table 2	100B	No	
Top Road link cross section	S2	TD27/05 Fig. 4-3a	S2	No	
Top Road link SSD	215m desirable minimum SSD	TD9/93 Table 3	215m	No	
Top Road link horizontal alignment	720m desirable minimum radius	TD9/93 Table 3	200m (CH100 to 220) 510m (CH580 to 1080)	No	200m curve is less than 4 steps below desirable minimum radius. 510m curve is 1 step below desirable minimum. Both of these curves are relaxations and are acceptable according to Para 3.4 of TD9/93
Top Road link vertical alignment	Absolute minimum sag K value 37	TD9/93 Table 3	100	No	
Habrough Road link design speed	100B	TD9/93 Table 2	100B	No	
Habrough Road link cross section	S2	TD27/05 Fig. 4-3a	S2	No	
Habrough Road link SSD	215m desirable minimum SSD	TD9/93 Table 3	215m	No	
Habrough Road link horizontal alignment	720m desirable minimum radius	TD9/93 Table 3	225m (CH140 to 410)	No	This is approx. 3.5 steps below the desirable minimum and is a relaxation. Acceptable according to Para 3.4 of TD9/93
Habrough Road link	Desirable minimum crest	TD9/93 Table 3	100	No	

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Item	Recommended standard	Reference	Proposed standard	Departure required	Comments
vertical alignment	K value 100 Absolute minimum sag K value 37		100		

Segment 3 - As Option 1.

Segment 4A - As Option 1.

7.1.11. Option 7

Segment 1C

7.1.11.1. A '2 bridge roundabout' layout is proposed for Brocklesby Junction; designed in accordance with TD22/06, using peak hourly flows from the core growth scenario traffic forecast figures. The merge and diverge layouts are the same as for Segment 1A (Details of the proposed design are provided in [Table 7.1](#)).

Segment 2D - As Option 4.

Segment 3 - As Option 1.

Segment 4C

7.1.11.2. It is proposed to upgrade the existing Manby Road Roundabout to a signal controlled roundabout. A new link (S2) will be provided from this roundabout directly north to Rosper Road, passing underneath the railway. The existing access directly from the north of the roundabout is to be moved to enable access from the new link road to Rosper Road. The existing Rosper Road/A160 junction will be closed.

7.1.11.3. It has been decided that a speed restriction of 40mph (corresponding to a design speed of 70kph) would be appropriate for this section of carriageway, between approximately CH 4000 and the Port of Immingham entrance (including the new link to Rosper Road) for the following reasons:

- Addition of a new link road to the north of the signalised roundabout will require the eastern arm (A160 to port) to be moved south. Visibility to the roundabout for vehicles travelling west from the port will be restricted by the railway bridge. The maximum achievable SSD for this arm of the roundabout is 120m, which is suitable for a design speed of 70kph. In order to improve visibility at this location,

it would be necessary to construct a new railway bridge to the northwest of the existing bridge.

- The eastern arm of the roundabout will have a horizontal radius of 180m, which is a **relaxation** of 2 steps below desirable minimum for a design speed of 70kph.
- The new link from the north of the roundabout to Rosper Road will pass underneath the railway. The carriageway level beneath the new railway bridge will need to be more than 3m lower than the roundabout, requiring small radius horizontal curves to achieve a flowing alignment. From the roundabout, a crest curve with a K value of 31.5 (above desirable minimum for 70kph), followed by a sag curve with a K value of 20 (absolute minimum for 70kph) is achievable. No relaxations or departures are required for the vertical alignment of this section of the A160.
- Access to the site to the north of Manby Road roundabout is to be moved to the new link road. This access is only 70m north of the signalised roundabout, however full visibility of 120m (desirable minimum SSD for 70kph) can be achieved from the A160 to the east, and from the south of the roundabout.
- If a design speed above 70kph is used, numerous departures would be required; there would also be significant safety implications due to the reduced carriageway standards.

7.1.12. Option 9

Segment 1C - As Option 7.

Segment 2E

7.1.12.1. Segment 2E includes the provision of D2AP carriageway between Brocklesby Junction and about 200m to the east of the existing Top Road Junction, dissected by a new roundabout located off-line, about 250m southwest of the existing Top Road Roundabout. It is proposed to utilise as much of the existing asset as possible to minimise construction cost, land take requirements and environmental impact. The new junction situated between (and to replace) Ulceby Road Junction and Top Road Roundabout is proposed to be an at-grade 100m diameter normal roundabout, designed in accordance with TD16/07.

7.1.12.2. The A160 has a horizontal radius of 720m between CH 740 and the new roundabout at CH 1820, and again between the roundabout and CH 2140, a **relaxation** of one

step below the desirable minimum radius. Minimum visibility along these sections of the A160 is 215m which is also a **relaxation** of one step below the desirable minimum SSD. Also, to the east of the new roundabout the vertical crest curve has a K value of 100, a **relaxation** of one step below desirable minimum.

- 7.1.12.3. Although the combination of relaxations in SSD and horizontal curvature are permitted on the mainline, sub-standard visibility is not permitted on the immediate approach to junctions (according to paragraph 1.26 of TD9/93) and so a **departure** is needed on the eastbound approach to the new roundabout. This departure could only be eliminated by increasing the width of the 7.475m central reserve by 5.4m to 12.875m, but this would be undesirable for environmental, cost and aesthetic reasons.
- 7.1.12.4. On the westbound approach to the new roundabout there are **two associated departures**. One is due to the combination of relaxations in SSD and vertical curvature (according to paragraph 1.24 of TD9/93), but this is because the desirable minimum SSD for all design speeds give their crest K values, for instance the minimum distance that can be seen over a desirable minimum crest curve is the desirable minimum SSD for that design speed. The other **departure** is due to the relaxations in SSD and vertical curvature on the immediate approach to a junction (according to paragraph 1.26 of TD9/93). These departures are fixed due to physical constraints.
- 7.1.12.5. The central reserve has been widened locally to be able to achieve these mainline Stopping Sight Distances.
- 7.1.12.6. The link roads to Ulceby Road, Top Road and Habrough Road from the new roundabout have been designed in accordance with TD9/93. These link roads have a design speed of 100kph, which corresponds to the national speed limit for S2 roads (60mph). Details of the design features are shown in [Table 7.3](#).

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Table 7.3: Design details for Segment 2E (links to Ulceby Road, Top Road and Habrough Road)

Item	Recommended standard	Reference	Proposed standard	Departure required	Comments
Ulceby Road link design speed	100B	TD9/93 Table 2	100B	No	
Ulceby Road link cross section	S2	TD27/05 Fig. 4-3a	S2	No	
Ulceby Road link SSD	215m desirable minimum SSD	TD9/93 Table 3	215m	No	
Ulceby Road link horizontal alignment	720m desirable minimum radius	TD9/93 Table 3	1440m (CH280 to 370) 740m (CH510 to 630) 1025m (CH715 to 855)	No	
Ulceby Road link vertical alignment	Ab/Des Min: sag K value 26 hog K value 100	TD9/93 Table 3	26 100	No	
Top Road link design speed	100B	TD9/93 Table 2	100B	No	
Top Road link cross section	S2	TD27/05 Fig. 4-3a	S2	No	
Top Road link SSD	215m desirable minimum SSD	TD9/93 Table 3	215m	No	
Top Road link horizontal alignment	720m desirable minimum radius	TD9/93 Table 3	720m (CH70 to 395 & CH490 to 575)	No	
Top Road link vertical alignment	Ab/Des Min: sag K value 26 hog K value 100	TD9/93 Table 3	26 150	No	
Habrough Road link design speed	100B	TD9/93 Table 2	100B	No	
Habrough Road link cross section	S2	TD27/05 Fig. 4-3a	S2	No	
Habrough Road link SSD	215m desirable minimum SSD	TD9/93 Table 3	215m	No	
Habrough Road link horizontal alignment	720m desirable minimum radius	TD9/93 Table 3	720m (CH220 to 585)	No	
Habrough Road link vertical alignment	Ab/Des Min: sag K value 26 hog K value 100	TD9/93 Table 3	26 175	No	

Segment 3

7.1.12.7. It is not proposed to amend the mainline A160 carriageway alignment in segment 3. However, it is proposed to provide a new road bridge over the A160 at approximately

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CH2770 linking Town Street to the north and south of the A160, providing direct pedestrian and vehicular access between the 2 halves of South Killingholme.

7.1.12.8. Five options are currently being considered by North Lincolnshire Council for the overbridge, with Option 3 being preferred (see Drg. No. W11231/01/903 in Appendix A). Details of the design features are shown in [Table 7.4](#).

Table 7.4: Design details for Town Street overbridge Option 3

Item	Recommended standard	Reference	Proposed standard	Departure required	Comments
Connector road type	Compact connector road	TD 40/94 Para 6.7	Compact connector road	No	
Connector road design speed	30kph	TD 40/94 Para 6.5	30kph	No	
Connector road horizontal alignment	40m desirable minimum radius	TD 40/94 Table 6/1	40m	No	
Connector road vertical alignment	sag K value 2.3 (lit) hog K value 3.3	TD 40/94 Table 6/1	2.3 3.3	No	
Connector road max. gradient	Desirable Max. 6% Absolute Max. 8%	TD 9/93 Para 4.2	8%	No	
Headroom under new bridge	5.3m + S	TD 27/05 Table 6/1	5.3m minimum (no sag below)	No	
Connector road through visibility	33m	TD40/94 Table 6/2	33m	No	
Junction radii	10m	NLCCs Guide Para 3.2.4	10m	No	
North junction vis. (X = 2.4m)	90m	NLCCs Guide Para 3.2.4	To left = 44m To right = 57m	Yes	Still considered safe due to low design speeds of Town Street and School Road
South junction vis. (X = 4.5m)	90m	NLCCs Guide Para 3.2.4	90m to left and right	No	
Connector road width on straights	3.3m lane + 0.3m hatch + 3.3m lane	TD40/94 Table 6/4	3.3m lane + 0.3m hatch + 3.3m lane	No	
Connector road width on bends	3.3m lane + 1.9m hatch + 3.3m lane	TD40/94 Table 6/3	3.3m lane + 1.9m hatch + 3.3m lane	No	
Connector road west verge / f/way	2m f/way + 0.5m verge	NLCCs Guide Para 3.2.4	2m f/way minimum	No	
Connector road east verge / f/way	2m verge	NLCCs Guide Para 3.2.4	2m verge	No	

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Segment 4C - As option 7.

7.1.13. Summary of Departures and Relaxations

7.1.13.1. [Table 7.5](#) summarises the relaxations and departures which are likely to be required for each of the scheme options. The numbers in [Table 7.5](#) indicate the number of relaxations or departures that are required at each location.

Table 7.5: Summary of Departures and Relaxations

LOCATION		OPTION									
		1		2		4		7		9	
		Departure	Relaxation	Departure	Relaxation	Departure	Relaxation	Departure	Relaxation	Departure	Relaxation
Brocklesby Junction	E/B Diverge slip road										
	E/B Merge slip road										
	W/B Diverge slip road										
	W/B Merge slip road										
	Junction										
Ulceby Junction	A160 mainline - Horizontal radius		1		1		1		1		1
	A160 E/B - SSD	1		1		1		1		1	
	A160 W/B – SSD & Vertical Curvature									2	
Link roads	Top Road link – Horizontal radius						2		2		
	Habrough Road link – Horizontal radius						1		1		
	Ulceby Road link										
Manby/Rosper Road	A160 mainline - Horizontal radius		2		2		2		1		1
	A160 mainline – Vertical curvature										
	A160 mainline – SSD										
	Rosper Road – Horizontal Radius								2		2
Other	Town Street overbridge north junction visibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	
TOTAL		1	3	1	3	1	6	1	7	5	4

8. ENVIRONMENT

8.1. Summary of Environmental Assessment Chapters

8.1.1. Each scheme has been ranked from 1 to 5 for each environmental chapter from the Environmental Assessment Report (Report Ref W11231/PCF2/20.4, dated October 2009). A score of 1 indicates the lowest impact on the sub-objective by the scheme proposals and a score of 5 indicates the highest impact on the sub-objectives by the scheme proposals.

8.1.2. All environmental rankings are based upon consideration of a combination of the results of the DMRB and WebTAG quantitative and qualitative assessments using professional Environmentalist judgment.

Air Quality

8.1.3. For Air Quality, a DMRB HA207/07 assessment was carried out alongside the TAG air quality assessment; the ranking for Air Quality takes into consideration the findings of the DMRB Local Air Quality Assessment, DMRB Regional Air Emissions Assessment, and the WebTAG Local Air Quality and Greenhouse Gases assessments.

8.1.4. None of the options are predicted to result in exceedances in the annual mean NO₂ and PM₁₀ objectives of the EU Air Quality Standards. **Options 2 and 4** are predicted to result in a worsening in local air quality for properties in South Killingholme; the other options are predicted to experience an improvement. Of the five options, **Option 9** is predicted to have the most significant positive impact on air quality. **Option 4** is the least preferred.

Cultural Heritage

8.1.5. In terms of the Cultural Heritage assessment, from all available information, all of the five options considered are likely to have an adverse impact on Cultural Heritage. In terms of the options with the least impact, **Options 1 and 2** have been assessed as Slight adverse which is favourable over the other options which are predicted to have a Moderate adverse effect. The least favoured option is **Option 9** due to this option having the largest footprint.

Materials

- 8.1.6. No published DMRB guidance is currently available for the Materials chapter of the Environmental Assessment Report; therefore the environmental impact of materials used in the scheme options has not been assessed.

Ecology and Nature Conservation

- 8.1.7. Taking into consideration the overall significance of effects on the ecology and nature conservation resource, the only difference between all the five options is that Options 7 and 9 require more land take in the field to the west of Rosper Road where a swamp would be lost. The overall significance of effects for Options 4, 7 and 9 is Moderate Adverse. The preferred options are Options 1 and 2 with an overall significance of effects of Slight adverse.
- 8.1.8. It is noted that a significant number of water vole are present adjacent to the A160 and Rosper Road, which will require relocation prior to construction.

Landscape and Visual Impacts

- 8.1.9. The Study area has been split into eight local landscape character areas (LLCA). Within these LLCAs the baseline quality of the landscapes ranges from Good to Poor. For all five scheme options, the overall sensitivity of the existing landscape/townscape character to change would be low. However in terms of ranking, i.e. the overall significance of impact plus the overall significance of visual impact, **Option 9** is the least preferred option i.e. has the greatest adverse impact and **Option 1** has the lowest and is thus the favoured option.

Community and Private Assets – Community Effects

- 8.1.10. Options 1, 2 and 9 are considered to have the least effect upon severance, and hence the key route at Town St, between community facilities and South Killingholme. The provision of a vehicular overbridge within Option 9 also offers enhanced journey opportunities to and from community facilities, therefore **Option 9** is the favoured option and **Options 4 and 7** are the least favoured.

Community and Private Assets – Land Use

- 8.1.11. Options with the largest footprint are considered to have the greatest effect upon land use, therefore **Option 9** is the least favoured option and **Option 1** is the most favoured option.

Noise and Vibration

- 8.1.12. The overall noise impacts for the options have been rated in terms of the WebTAG appraisal, which enables a ranking of the scheme options in terms of impact on noise and vibration. **Option 2** is the least favoured and **Option 9** is the most favoured.

Effects on all Travellers – Severance and Driver Stress

- 8.1.13. Currently, driver stress is assessed as High on the single carriageway sections of the A160 and Low on the section of dual carriageway. All options will result in low driver stress for the entire route. **Options 1 and 2** are considered to have the least effect on severance and **options 4 and 7** are considered to be the worst.

Effects on all Travellers – Disruption due to Construction

- 8.1.14. The ranking for this topic has been ascertained through a combination of study of various components including traffic management, buildability and demolition requirements amongst others. **Options 1 and 2** are the most favoured given their smaller scale, and **Option 9** is ranked as the least favoured option.

Geology and Soils

- 8.1.15. The ranking for this topic has been determined by combining the impact scores for assessment of the scheme options on Geology and Soils and potential land contamination. **Options 1 and 2** are assessed as having the lowest impact, **Options 4** is assessed as having the highest impact, **7 and 9** are assessed as having an equal impact to each other (although higher than for Options 1 and 2 and lower than Option 4).

Road Drainage and the Water Environment

- 8.1.16. **Options 4 and 7** pass directly over ponds/lakes as shown to be currently present on OS maps and are therefore assessed as having a moderate adverse effect on these features in the absence of mitigation. The other options are assessed as having lower impact on the water environment than options 4 and 7; the options with the smallest footprints are considered to have the lowest impact, therefore **Option 1** has the lowest impact. Current data availability is a limitation to the water environment assessment. It is recommended that the assessment is revisited following the selection of the preferred option and detailed design of the drainage systems to confirm and build upon the assessment already carried out.

8.2. Overall Environmental Impact

8.2.1. There is no guidance available to provide a score for the overall environmental impact of each option. In order to provide an indication of the relative environmental impact of the scheme options, scores for each chapter have been added together to give an overall score. These are to be used with caution as no consideration of the relative significance (or weighting) of each of the environmental chapters has been made. A summary of the scheme scores are shown on [Table 8.1](#) overleaf alongside a discussion for each of the Environmental topics.

Table 8.1: Summary of Environmental Assessment Scores

	Air Quality	Cultural Heritage	Materials	Ecology and Nature Conservation	Landscape and Visual Impacts	Community and Private Assets		Noise and Vibration	Effects on all Travellers		Geology and Soils	Road Drainage and the Water Environment	Total Score	Overall rank
						Community Effects	Land Use		Severance and Driver Stress	Disruption due to Construction				
Option 1	2	1	n/a	1	1	3	1	4	1	1	1	1	17	1
Option 2	4	1	n/a	1	2	3	2	5	1	1	1	2	23	2
Option 4	5	3	n/a	3	4	5	3	3	5	4	5	4	44	5
Option 7	3	4	n/a	4	3	5	4	2	5	3	3	4	40	4
Option 9	1	5	n/a	5	5	1	5	1	3	5	3	3	37	3

9. SUSTAINABILITY

9.1. Introduction

9.1.1. A Sustainability Assessment has been undertaken for the A160 Port of Immingham Improvement scheme by Pell Frischmann Consultants Ltd. (PFC). This section summarises the Sustainability Report (Report Ref W11231/PCF2/50).

9.1.2. There is currently no requirement under the PCF to undertake a sustainability assessment; however this is highly likely to be a future requirement, once sustainability assessment methods become more established. A number of strategies relating to sustainable targets have been published by the Department for Transport (DfT), HA and other Government Departments and Agencies, as described in the Sustainability Report (Report Ref W11231/PCF2/50). A methodology has been developed by PFC and agreed with the HA in order to demonstrate how these strategies may be implemented during the Option Selection Stage of a highway project.

9.2. Methodology

Highways Agency Environmental Assessment Framework

9.2.1. In 'NATA (New Approach To Appraisal) Refresh: Appraisal for a Sustainable Transport System', the DfT provides several targeted areas for improvement of the Appraisal process as outlined in the report 'Delivering a Sustainable Transport System '(DaSTS). These DaSTS areas for improvement include issues relating to sustainability which are not currently covered within the Appraisal Summary Table (AST) framework.

9.2.2. Research has highlighted two issues to be at the core of sustainability:

- Resource use and depletion;
- Assimilative capacity of the air, soil and water in regards to contamination.

9.2.3. From the above two issues, several metrics emerge as measures of sustainability that as mentioned above are not well qualified by the current AST. These include;

- Fuel use
- Green house gases (and carbon costs)
- Water use.

- 9.2.4. Other sustainability metrics, primarily those of emissions rates of air toxics (NO₂, PM) and impacts on the water environment through run-off volume and through loading of contaminants into water bodies (such as oil and petrol), are already covered within the existing AST. It has therefore been recommended that the three issues not adequately addressed are assessed within a separate sustainability section of the AST, and will provide both qualitative and quantitative metrics of assessment that can be compared against national benchmarks.
- 9.2.5. The three sustainability metrics listed above are functions of quite detailed information on the construction materials and practises, information which is usually only developed after an option has been selected.
- 9.2.6. Based on this the methodology that will be used within this assessment, we perform the Sustainability Appraisal part of the AST using reasonable national average materials and construction practices for similar road sections, and move consideration of alternative materials and construction practices to a later, more detailed design stage after a preferred Option has been selected.
- 9.2.7. The rationale behind this approach allows the option appraisal to assess whether any of the different Options for resolving transport problems have implications for the sustainability metrics. The assessment determines whether these different Options, if all built with the same materials and construction practices, differentiate with respect to their impacts on sustainability.
- 9.2.8. Once a preferred Option has been selected, based on this assumption of common materials and construction practices, it will then be possible to consider the sustainability of different materials and construction practices for the chosen Option alone.
- 9.2.9. In order to determine the embodied energy and Carbon cost of construction and maintenance works, a number of research papers have been considered, as described in the Sustainability Report. Similarly, appropriate figures for calculating vehicle emissions and water use have been determined in this way.

9.3. Results of Sustainability Assessment

- 9.3.1. The results of the sustainability assessment are provided in [Table 9.1](#).

Table 9.1: Results of Sustainability Assessment

Metric	Option 1	Option 2	Option 4	Option 7	Option 9
Carbon Footprint - cm (x1000 tCO ₂)	34	36	40	40	44
Carbon Footprint - op (x1000 tCO ₂)	2,840	2,942	3,212	3,329	3,476
Carbon Footprint TOTAL (x1000 tCO ₂)	2,874	2,978	3,252	3,369	3,520
Fuel Use - cm (x1000 l)	479	496	542	562	586
Fuel Use - op (x1000 l)	1,136,000	1,177,000	1,285,000	1,332,000	1,390,000
Fuel Use TOTAL (x1000 l)	1,136,000	1,177,000	1,286,000	1,332,000	1,391,000
Carbon Cost - cm (m£)	1.532	1.598	1.802	1.819	1.973
Carbon Cost - op (m£)	127.8	132.4	144.6	149.8	156.4
Carbon Cost TOTAL (m£)	129.3	134.0	146.3	151.6	158.4
Water Use (x1000 l)	5,626	5,963	7,244	6,899	8,156

cm – construction and maintenance of road way, op – operational use of road way.

9.3.2. The results demonstrate that there are differences in the sustainability metrics between the 5 options considered. In order of decreasing sustainability, the ordering of options is 1, 2, 4, 7 and 9. The difference between the high and low values for carbon emissions (a representative metric for sustainability) is 20% of the mean value across the 5 options. The sustainability metrics here should be considered relative values, as there are no established benchmarks against which to compare the absolute values. Also, as described earlier in this report, the Options stage does not contain sufficiently detailed specification of materials or construction practices to allow other than an approximation to the metrics; hence the need to view these metrics as relative measures of sustainability across the Options considered.

10. BUILDABILITY

10.1. Introduction

10.1.1. Contractor input was sought to assess Options 1, 2, 4, 7 and 9 in terms of the buildability issues relating to each of the 5 options. The items assessed included:

- Health & Safety Issues;
- Forms of Construction;
- Temporary Works considerations;
- Programme constraints including those by 3rd parties;
- Traffic Management during the construction phase;
- Implications with existing Statutory Undertakers Apparatus;
- Works to new and existing structures;
- Drainage Implications;
- Environmental impacts and constraints;
- Risk and Opportunities.

10.2. Health & Safety Issues

10.2.1. As well as the more specific major Health & Safety issues that are discussed within this section, other more obvious issues which should be considered during the life of the project are listed below:

- Traffic Management & Works adjacent to Live Traffic;
- Traffic Management (site);
- Working at Height;
- Working alongside ponds, drainage ditches and other watercourses;
- Fire arrangements;
- Lifting Operations;
- Contaminated Ground;
- Excavations;
- Confined spaces;
- Temporary Works;
- Site security;
- Manual Handling.

Railway Interface

- 10.2.2. Close liaison with Network Rail is essential at an early stage in the projects life to ensure their specific requirements and restrictions, in respect of works on and around their operational railway between Manby Road and Rosper Road are met.
- 10.2.3. Work Package Plans (WPP) for all operations affecting the railway must be approved by Network Rail several weeks in advance of the works which should include the methodology to be used and contingencies for any foreseeable problems that may arise.
- 10.2.4. Sufficient time should also be allowed to implement any railway possessions and sufficient time should be allowed for a qualified Track Engineer to inspect the railway lines prior to handback and re-opening to trains.

Overhead Electricity Cables and Pylons

- 10.2.5. The main hazardous overhead electricity cables are a group of National Grid electrical cables passing over the A180 (T) at Brocklesby Interchange in a north-south direction and one of the pylons is situated within the centre of the existing loop of the interchange.
- 10.2.6. Other overhead Yorkshire Electricity Distribution Limited (YEDL) electricity cables pass over the A160 as detailed below:
- approximately 500m north of Brocklesby Interchange;
 - approximately 290m west of the existing Ulceby Road Junction in a north-westerly to south-easterly direction which also crosses the A1077 Ulceby Road.
- 10.2.7. It is essential that these overhead cables and pylons are considered during the construction methodology and take account of any minimum clearance and safety zones as described within National Grid requirements and the Health and Safety Executive (HSE) information sheet – Working safely near overhead power lines.

Underground Services

- 10.2.8. A considerable number of underground services are present adjacent to and passing beneath the existing A180 and A160, especially at junctions with side roads and accesses, some of which will require major diversionary and / or protection works to enable safe construction of the works.
- 10.2.9. Other major services that are potentially affected include oil and gas pipelines which travel adjacent to and across the A160 dual carriageway, Manby Road and

Rosper Road. The requirements of each of the owners / operators should be taken into consideration to ensure safe construction of the works.

- 10.2.10. It will be beneficial to carry out an underground mapping exercise at an early stage in the scheme's life to establish the exact line and depth of all underground services that could potentially be affected during the construction works. This would allow any diversionary and / or protection works to be incorporated during the design stages.
- 10.2.11. New Roads and Street Works Act (NRSWA) C2 Preliminary Inquiries have been obtained from the SU companies and trial pits are being carried out to establish the line and depth of the major services potentially affected by the scheme options. Following the trial pits, an assessment will be required to determine which SU apparatus will be affected and C3 Draft Schemes and Budget Estimates should be requested for all potential SU diversionary and / or protection works.

10.3. Forms of Construction

Railway Bridge

- 10.3.1. All options will require a new bridge to be constructed beneath the existing operational railway. Options 1, 2 and 4 propose to construct the new railway bridge alongside the existing structure, with construction carried out alongside live traffic and closures being required for critical activities such as the bridge deck installation. The new railway bridge in the other options (7 and 9) is an independent structure and would not impact directly on live traffic or the existing railway bridge.
- 10.3.2. Consideration should also be given to Options 1, 2 and 4 to enable construction of the new railway bridge alongside the existing structure due to the increased likelihood of previously unknown underground obstructions which will introduce significant programme risk if discovered.
- 10.3.3. A further buildability constraint would be the stability of the existing structure during the construction of the new structure within Options 1, 2 and 4 which should be considered during the design stages and monitored during the construction phase.
- 10.3.4. Although Options 7 and 9 would reduce the effect on the existing Network Rail infrastructure on and around the railway since the new structure is sited further

from the points (and resulting signalling implications), the proposed carriageway will be at a lower level since the railway is lower at this point and as a result, careful consideration should be given during the drainage design as groundwater problems may occur during construction.

- 10.3.5. Prior to commencement of construction, dilapidation surveys should be carried out with Network Rail to include:
- a geometrical survey of the existing rail tracks;
 - a survey of the existing infrastructure;
 - a survey of the existing railway bridge.

10.3.6. The new bridge will require careful planning to minimise the effect on the operational railway, possibly through 72 hour T3 possessions which may require booking with Network Rail up to 3 years in advance of the works.

Brocklesby Interchange

- 10.3.7. The new interchange proposes to provide a new structure alongside the existing structure for Options 1, 2 and 4 and an independent structure to the west of the existing for Options 7 and 9.
- 10.3.8. The main buildability constraints associated with each of the options are the National Grid overhead power lines and pylons, one of which is currently sited within the centre of the existing loop to the south side of the A180.
- 10.3.9. Heights of the cables are being determined in relation to the existing ground level and until such a time when this information is available, it is not known whether the new highway alignment will encroach into the safety clearance zones or not and as a result, a major diversion by the Statutory Undertaker may be required.
- 10.3.10. Another buildability constraint is the construction of the central pier which will need to take account of the existing overhead power lines when installing the trench supports and the plant required. It would be beneficial to eliminate deep excavations at this location during the design to give both safety and economic benefits.
- 10.3.11. A further buildability constraint would be the stability of the existing structure during the construction of the new structure within Options 1, 2 and 4 which should be considered during the design stages and monitored during the construction phase.

Town Street Footbridge

- 10.3.12. Options 1, 2, 4 and 7 propose a new footbridge to connect the 2 halves of Town Street which will be severed by the closure of the central reserve gap.
- 10.3.13. The main buildability constraints are the numerous Statutory Undertakers apparatus present within the verges of the east and westbound verges of the A160 and it is inevitable that these will require diversionary and / or protection works prior to construction.
- 10.3.14. Further consideration should also be given to the programming of the A160 closures during the installation of the bridge deck to ensure appropriate traffic management and diversion routes are in place.

Town Street Vehicular Overbridge

- 10.3.15. Option 9 proposes a new vehicular overbridge to connect the two halves of Town Street which will be severed by the closure of the central reserve gap.
- 10.3.16. The main buildability constraint is the construction of the new bridge within close proximity to existing buildings and condition surveys of the existing properties should be undertaken prior to the works.
- 10.3.17. Another buildability constraint will be the existing Statutory Undertakers apparatus present within the westbound verge which will, inevitably require diversionary and / or protection works to allow construction of the bridge supports.
- 10.3.18. Further consideration should also be given to the programming of the A160 closures during the installation of the bridge deck to ensure appropriate traffic management and diversion routes are in place.

10.4. Traffic Management

- 10.4.1. All Traffic Management will be carried out by a specialist Contractor who will require close liaison with the Contractor to ensure safe and efficient Traffic Management to ensure:
- The safe passage of motorists and Non Motorised Users;
 - There is no conflict between construction plant and the public;
 - The safe construction of the scheme.
- 10.4.2. This will be vital at the existing junctions where up to 4 links of traffic are to be managed and where pedestrian crossing points exist.

- 10.4.3. Maintenance of 2 lanes through the works will be required along the A180 which will be narrow lanes although specific operations will need to reduce this to 1 lane during night time operations.
- 10.4.4. The full closure of the A180 and A160, with suitable traffic management and diversion routes will be required during specific operations such as during the construction of the bridge decks etc.
- 10.4.5. Since the A160 is not currently a Public Service Agreement (PSA) route, lane closures are possible during off peak daytime hours along the dual carriageway section.
- 10.4.6. Along the existing single carriageway section of the A160, it is anticipated that works along this stretch will be carried out when the traffic is switched over to the newly constructed eastbound carriageway, to allow daytime works to continue. However, should works be required prior to the switch of traffic, then these will have to be carried out during night time operations under traffic signal control.

10.5. Implications with existing Statutory Undertakers Apparatus

- 10.5.1. A considerable number of Statutory Undertakers (SU) apparatus are present throughout the A160 and A180 which will be affected by each of the 5 options assessed.
- 10.5.2. The main SU apparatus potentially affected are listed below:
- i. National Grid overhead electricity pylon crossing the A180 (T) at Brocklesby Interchange in a north-south direction;
 - ii. 1 No. National Grid Gas pipelines crossing the A180 (T), west of Brocklesby Interchange in a north-south direction;
 - iii. 3 No. National Grid Gas, 1 No. EON, 1 No. ConocoPhillips pipelines crossing the A160 single carriageway, west of Top Road / Habrough Road Roundabout in a north-west to south-east direction;
 - iv. 1 No. GPSS pipelines travelling along the A160 dual carriageway to a point within the centre of Manby Road Roundabout where it splits and continues along Humber Road and A1173 Manby Road;
 - v. 1 No. Air Products pipeline travelling adjacent to the railway embankment to the east of Manby Road Roundabout;
 - vi. 1 No. Air Products, 1 No. Associated Petroleum Terminals, 1 No. Humber Oil Refinery pipelines crossing the A1173 Manby Road, south of Manby Road Roundabout;
 - vii. 1 No. Air Products, 1 No. TotalFina, 1 No. ConocoPhillips, pipelines crossing the A160 dual carriageway between Eastfield Road and Manby Road roundabout;

- viii. Various overground and underground Anglian water / British Telecom / Yorkshire Electricity Distribution Ltd / Virgin Media / National Grid Gas apparatus crossing and / or adjacent to the A160 and A180, especially at or around the junctions along the A160;
- 10.5.3. Although each of the 5 scheme options vary in terms of design & alignment, the SU apparatus detailed within sections i, ii, iii, v and viii above will almost certainly require major diversionary and / or protection works to allow the construction of the scheme.
- 10.5.4. The lead in periods relating to each SU diversionary and / or protection works can be significant which will have a bearing on the overall scheme programme.
- 10.5.5. NRASWA C2 Preliminary Enquiries have been obtained from the SU companies and trial pits are being carried out to establish the line and depth of the major services potentially affected by the scheme options. Following the trial pits, an assessment will be required to determine which SU apparatus will be affected and C3 Draft Schemes and Budget Estimates should be requested for all potential SU diversionary and / or protection works.

10.6. Programme constraints including those by 3rd parties

- 10.6.1. The scheme programme will be affected by:
- i. The railway possession required for the construction of the new bridge beneath the railway for the link between Manby Road roundabout and Rosper Road which may require booking with Network Rail up to 3 years in advance of the works;
 - ii. Statutory Undertakers lead in periods for diversionary and / or protection works as detailed at section 11.5 above;
 - iii. Seasonal activities such as earthworks, ecological mitigation and site clearance.

10.7. Drainage Implications

- 10.7.1. At present, the majority of the highway surface runoff is collected by channels and gullies which outfall directly into existing drainage ditches alongside the existing carriageways throughout the A160 and A180.
- 10.7.2. There is currently very little information available regarding the existing drainage except:
- As built drawings at Brocklesby Interchange;
 - And inspection reports for the culverts along the A160 and A180.

- 10.7.3. A drainage survey is currently being procured to establish the existing drainage network which will be used during the design stage.
- 10.7.4. It is not yet known whether the existing drainage system will be replaced with a positive drainage system which incorporates oil interceptors / storage tanks / penstocks etc or whether new drainage ditches will be required. Further consultation needs to be carried out with the Environment Agency and the Internal Drainage Board on these issues, however, it may still be a requirement to provide new drainage ditches in order to re-habitat wildlife such as water voles which are present in the existing ditches within the area.
- 10.7.5. The proposed link road between Manby Road Roundabout and Rosper Road will be at a lower level since the railway is lower at this point and as a result, careful consideration should be given during the drainage design and groundwater problems during construction.

10.8. Environmental impacts and constraints

Construction activity

- 10.8.1. Environmental impacts caused by construction activities include noise, dust, potential for spillage etc which would be identified and assessed, together with mitigation measures prior to commencement of the works.
- 10.8.2. Since existing drainage ditches are present throughout the A160 and A180, careful consideration should be given to the storage of plant and materials with appropriate spill kits and measures in place should an environmental incident occur.

Contaminated Ground

- 10.8.3. Areas around the A160 have been subject to major industrial development and the possibility of historical ground conditions cannot be discounted, especially at the eastern end of the site in the vicinity of the refineries.
- 10.8.4. It is therefore recommended that appropriate sampling and testing be carried out to identify areas of material that may require remediation or removal to a licensed tip.

Ecology

- 10.8.5. The existing drainage ditches have been identified as inhabiting water voles which will require re-locating prior to the commencement of construction works.

10.8.6. Following the relocation, the works areas should be protected to prevent migration into the works areas which will have to be undertaken with Natural England's approval.

Archaeology

10.8.7. Site walkovers, Geophysical surveys and trenching are being carried out to establish areas of Archaeology which may require further investigation during the design and / or construction phase.

10.9. Conclusion

10.9.1. From the assessment of buildability carried out during the Contractor's input, the main buildability issues when comparing Options 1, 2, 4, 7 and 9 are the:

- construction of the new bridge beneath the railway which will require railway possessions during the construction works;
- existing overhead and underground services, including gas and oil pipelines which will require diversionary and / or protection works throughout the scheme to enable the construction works;

10.9.2. The overall construction period for the 5 options is very similar although the following factors may well influence the durations and overall project duration:

- The railway possession(s) required for the construction of the new bridge beneath the railway for the link between Manby Road roundabout and Rosper Road which may require booking with Network Rail up to 3 years in advance of the works;
- Statutory Undertakers lead in periods for diversionary and / or protection works;
- Seasonal activities such as earthworks, ecological mitigation and site clearance.

10.9.3. Options 7 and 9 require the location of the new bridge beneath the railway to be constructed remotely from the existing structure over Humber Road and as such, the advantages are:

- Reduced railway interface;
- Simpler method of construction;
- Reduced risk from underground obstructions;
- Removes the concerns relating to working adjacent to the existing structure.

11. TRAFFIC, ECONOMICS & COSTS

11.1. Summary of Traffic Analysis

11.1.1. Traffic Data

11.1.1.1. PFC developed a SATURN² model to forecast traffic flows along the A160. Transport surveys were carried out to provide and input to the development of the model, details can be found in the Traffic Survey Report produced in October 2008 (ref: W11231/VAA/RT01). A Local Model Validation Report was produced in February 2009 (ref: W11231/VAA/RT02) detailing the model development. The A160 SATURN model includes the AM, Interpeak and PM peak periods, and has a 2008 base year.

11.1.1.2. In order to carry out the economic, environmental and operational assessments of the five scheme options, traffic forecasts have been produced for the five scheme options for the opening and design years (2015 and 2030 respectively). Assessments have been carried out based on a core traffic growth scenario, controlled by TEMPRO³ growth. The forecast traffic flows using the core growth scenario are the basis of the Economic assessment and the Environmental assessment.

11.1.2. Core Growth Scenario

11.1.2.1. After consultation with HA NetServ, it has been agreed that the core scenario will be carried out with development traffic growthed to the TEMPRO level but with the trips skewed towards the zones which contain the development sites.

11.1.2.2. Traffic growth factors for the scenario years will take account of three main effects:

- TEMPRO growth for cars taking into account local growth variations
- National Transport Model (NTM⁴) growth for other vehicle types

² SATURN (Simulation and Assignment of Traffic to Urban Road Networks) is a network analysis program and is a combined simulation and assignment model. A Saturn model consists of a network which is made up of nodes and links. Traffic is assigned to the network in the form of traffic matrices.

³ TEMPRO (Trip End Model PROjections) is a program which is provided by the by Department for Transport. It is a modelling tool that looks at the growth in trip ends, using actual and forecast data supplied by the Department for Transport.

⁴ National Transport Model - an analytical and policy-testing tool. - It provides a systematic means of comparing the national consequences of alternative national transport policies or widely-applied local transport policies, against a range of background scenarios which take into account the major factors affecting future patterns of travel.

- Development growth focussed in specific area of North and North East Lincolnshire (from the South Humber Bank Transport Strategy)

11.1.2.3. WebTAG Unit 3.15.2 suggests that an appropriate allowance should be used to compensate for economic uncertainty. The guidance suggests a range about the central forecast of $\pm 2.5\%$ for forecasts one year ahead, rising to $\pm 15\%$ for forecasts 36 years ahead.

11.1.2.4. The following two equations have been applied, in accordance with the WebTAG Unit 3.15.2 guidance (described above in Section 11.1.2.3), to produce 'Optimistic' and 'Pessimistic' growth scenarios:

$$GrowthFactor_{2024}^{HighLevel} = GrowthFactor_{2024}^{CentralLevel} * (\sqrt{N} * +2.5\%)$$

Equation 11.1

$$GrowthFactor_{2024}^{LowLevel} = GrowthFactor_{2024}^{CentralLevel} * (\sqrt{N} * -2.5\%)$$

Equation 11.2

where N is the number of years (Future Year- Base Year).

11.1.2.5. The Base or Do Nothing (DN) networks comprise the highway networks as they stood in 2008, the year in which Pell Frischmann undertook the SATURN model development.

11.1.2.6. There are currently very few planned network improvements to be implemented in the local area prior to the scheme opening in 2015 and during the period between 2015 and 2030. The only improvement known at this stage are traffic signal junction improvements to the existing signals at A160/ Eastfield Road junction. However, no details exist at this stage and as such, the junction remains the same as the base, with some improvements made to the timings.

11.1.2.7. The future year scenario matrices have been assigned to the Do Minimum (DM) and the eight Do Something (DS) option networks to create forecast year assignments. Full details of the forecasting methodology and the forecasts can be found in the Forecasting Report produced in September 2009 (ref: W11231/REP/3.5/02).

11.1.3. Traffic Forecasting Results

11.1.3.1. The forecast A160 mainline AADT traffic flows (2-way) for the design year are summarised in [Table 11.1.1](#).

Table 11.1.1: Core growth scenario A160 Link Flows (2030 AADT)

Link	DM	DS1	DS2	DS4	DS7	DS9
A160 Brocklesby Junction to Ulceby Junction	18,598	21,621	20,879	20,082	21,069	20,423
A160 Ulceby Junction to Top Road Roundabout	19,483	21,624	21,629	13,778	13,837	20,423
A160 Top Road Roundabout to Eastfield Road Junction	14,750	15,079	15,573	13,778	13,837	15,451
A160 Eastfield Road Junction to A1173 Manby Road Roundabout	11,643	9,843	10,262	10,969	10,787	10,440
A160 A1173 Manby Road Roundabout to Rosper Road Junction	11,312	11,448	11,397	11,329	7,613	7,613

- 11.1.3.2. The results demonstrate that in the majority of scenarios, the highest flows occur on the section of A160 between Brocklesby and Ulceby Junctions, with an AADT (2030) of 18,598 (Do Minimum) and 20,815 (average Do Something). The existing AADT flow on the A160 between Brocklesby Junction and Ulceby Junction is 12,410, therefore the core growth scenario traffic flows are forecast to increase by approximately 68% by 2030.
- 11.1.3.3. The 24-hour Annual Average Weekday Traffic flows (AAWT) are more important to the A160 given the port of Immingham operations and industrial complexes within the area and immediately adjacent to the A160. The AAWT flows represent a more robust traffic level when accommodating the design of new junctions and dual carriageway sections. The forecast A160 mainline AAWT traffic flows (2-way) for the design year are summarised in [Table 11.1.2](#).

Table 11.1.2: Core growth scenario A160 Link Flows (2030 AAWT)

Link	DM	DS1	DS2	DS4	DS7	DS9
A160 Brocklesby Junction to Ulceby Junction	22,538	26,202	25,303	24,336	25,533	24,750
A160 Ulceby Junction to Top Road Roundabout	23,611	26,205	26,211	16,697	16,769	24,750
A160 Top Road Roundabout to Eastfield Road Junction	17,874	18,273	18,873	16,697	16,769	17,512
A160 Eastfield Road Junction to A1173 Manby Road Roundabout	14,110	11,929	12,437	13,293	13,072	12,652
A160 A1173 Manby Road Roundabout to Rosper Road Junction	13,708	13,874	13,811	13,729	9,226	9,226

Journey Times

- 11.1.3.4. Journey time routes were investigated in the future Do Minimum and Do Something models for the AM peak (AM), PM peak (PM) and inter-peak period (IP). Journey times were identified for journeys between Brocklesby junction and the Port of Immingham entrance in both eastbound and westbound directions.
- 11.1.3.5. [Table 11.1.3](#) shows the modelled journey time savings (in minutes) of each option compared against the do-minimum model, for the design year (2030).

Table 11.1.3: Summary of journey time savings for 2030 (core growth scenario)

Route/ Direction	Peak Time	Journey time savings (2030) for do-something options compared against do-minimum (minutes)					Journey time (2030) for do minimum model (minutes)
		1	2	4	7	9	
A160 E/B	AM	6.52	6.63	6.45	6.68	6.71	13.42
A160 W/B	AM	0.35	0.29	0.19	0.27	0.28	7.23
A160 E/B	IP	0.01	-0.01	0.01	0.12	0.11	6.74
A160 W/B	IP	0.74	0.66	0.68	0.69	0.69	7.62
A160 E/B	PM	7.47	7.45	7.44	7.61	7.34	14.22
A160 W/B	PM	2.27	2.25	2.23	2.27	2.12	2.12

- 11.1.3.6. The models indicate that journey times along the A160 are generally lower for all Do Something options than the Do Minimum for all years and time periods. The majority of time savings occur where the existing single sections of A160 have been dualled (between Brocklesby Junction and Top Road), and through improved optimisation of signals at Eastfield Road Junction.

11.2. Summary of Economic Analysis

11.2.1. Background to Economic Assessment

11.2.1.1. The economic assessment have been undertaken using a combination of counts conducted in 2008 and forecast traffic flows from the A160 SATURN model for the schemes. The overall benefits of the improvement scheme and the results have been presented in the relevant WebTAG worksheets. The benefits include journey time benefits and vehicle operating costs, accident benefits attributable to the scheme, and delays and accidents during construction and maintenance. The appraisal has been carried out in accordance with the WebTAG Units 3.4 and 3.5, TUBA⁵ guidance, COBA⁶ and QUADRO⁷ guidance. Full details of the economic assessment can be found in the Economic Assessment Report produced in October 2009 (Ref: W11231/REP/3.1/01).

11.2.2. Transport User Benefits

11.2.2.1. In accordance with WebTAG guidance on the Transport Economic Efficiency Sub-objectives (Unit 3.5.2), the Transport User Benefit Appraisal program, TUBA (Version 1.7b) has been used to estimate the benefits derived from a scheme in terms of time and vehicle operating cost savings. TUBA assesses the whole life costs and benefits of transport schemes using matrices of costs, in terms of distance and time, and trips from the traffic model. The program calculates user benefits and changes in revenues and produces indicators of a projects worth.

11.2.2.2. TUBA appraisals have been carried out for each of the five scheme options for the core growth scenario. The outputs are in the form of Transport Economic Efficiency (TEE) tables.

11.2.2.3. The latest scheme costs have been prepared by the Highways Agency in September 2009 (as reported in Section 11.3). A spend profile was provided for each option. Inflation has been adjusted to remove the 2.5% per annum that is automatically assumed by TUBA, following the guidance contained within

⁵ TUBA (Transport User Benefit Appraisal) – computer program used to estimate the benefits derived from a scheme in terms of time and vehicle operating cost savings. TUBA assesses the whole life costs and benefits of transport schemes using matrices of costs, in terms of distance and time, and trips from the traffic model. The program calculates user benefits and changes in revenues and produces indicators of a project's worth.

⁶ COBA (COst Benefit Analysis) – computer program which compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and accidents), and expresses the results in terms of a monetary valuation.

⁷ QUADRO (Queues And Delays at ROadworks) - computer program used to assess the journey time benefits, vehicle operating costs and accident benefits during construction and maintenance for a scheme and compares this to the do minimum scenario.

WebTAG Unit 3.5.9. The inflation profile provided by the HA has then been added to the costs. The results of the TUBA assessments for can be found in the Economic Appraisal Report (Report Ref W11231/REP/3.1/01, dated October 2009).

11.2.3. COBA Accident Analysis

- 11.2.3.1. The latest version of the COBA11 computer program in 'accident only mode' has been used to calculate the accident benefits accrued by each of the five scheme options. The assessment has been carried out in accordance with the guidance set out in WebTAG Unit 3.4.1 (July 2008). Forecast traffic flows have been taken from the A160 SATURN model for the opening year of each of the scheme options. The forecast growth rates applied to COBA have been taken from the forecasts developed for this assessment.
- 11.2.3.2. The COBA network covers the length of the A160 between its junction with the A180 and Immingham Docks including all junctions along the route. The A180 is included for 900m either side of Brocklesby junction. Top Road, East Halton Road, Chase Hill Road, Eastfield Road and Rosper Road have also been included.
- 11.2.3.3. COBA data files have been constructed in accordance with the advice contained in Section 3.1 of WebTAG Unit 3.4.1. Each COBA input file includes the base year network and traffic flows from the SATURN model, a Do Minimum network and 2015 traffic flows and a Do Something network and traffic flows. Traffic growth rates have been derived using factors contained within the forecasts.
- 11.2.3.4. The latest complete five-year period of accident records have been used in this assessment. The records show there have been 57 Personal Injury Accidents (PIAs) within the confines of the COBA study area. The proportion of KSI accidents is 24.6%. [Table 2.1](#) in Section 2.1.2 shows the breakdown of accidents by severity and year. The accident benefits (core growth scenario) as a result of improving the A160 can be found in the Economic Appraisal Report (PFC, 2009).

11.2.4. QUADRO Assessment

- 11.2.4.1. The current version of the QUADRO4 computer program (release 9) has been used to assess the economic dis-benefits due to traffic delays experienced during construction of the schemes and the economic benefits from ongoing maintenance over a 60 year period.

- 11.2.4.2. The QUADRO assessment will only model the parts of the construction that require significant traffic management. The timescales for the construction of the scheme options are summarised in the Economic Appraisal Report (PFC, 2009).
- 11.2.4.3. The Do Minimum maintenance profile consists of any works needed on the A160 without the implementation of an improvement scheme. The Do Minimum profile consists of resurfacing and reconstructing the A160 from Brocklesby junction to the Immingham ports. The Do Something schedule consists of the works required to build the scheme together with the future maintenance of the A160 with the proposed scheme.
- 11.2.4.4. The benefits associated with delays and accidents during construction and future maintenance for all five options are summarised in the Economic Appraisal Report (Report Ref W11231/REP/3.1/01, dated October 2009). All options derive a benefit during construction, with Option 9 achieving the highest benefit. For the Do Something maintenance, Options 1 to 4 result in dis-benefits and Options 7 and 9 show benefits.

11.2.5. Analysis of Monetised Costs and Benefits

- 11.2.5.1. [Table 11.2.1](#) shows the overall performance of the scheme with accident benefits included for the P50 assessment. It can be seen from Table 7.8 that the benefits from the appraisal outweigh the costs with a BCR ranging from 4.4 to 11.7 in the scheme options.

Table 11.2.1. AMCB Assessments (Core Scenario).

Option	Accidents	Consumer Users	Business Users	Carbon Benefits	Present Value of Benefits	Investment Costs	Indirect Tax Revenue	Present Value of Costs	BCR
1	5,638	47,989	218,159	-6,201	265,585	60,133	-32,864	27,269	9.7
2	6,683	40,297	193,135	-1,921	238,194	60,486	-6,336	54,150	4.4
4	9,967	48,084	239,509	-5,200	292,360	66,990	-27,003	39,987	7.3
7	10,078	54,147	275,807	-6,087	333,945	60,370	-31,850	28,520	11.7
9	10,294	56,646	288,955	-5,911	349,984	64,628	-30,913	33,715	10.4

Costs in multiples (£1000s)

11.2.6. Conclusion

- 11.2.6.1. The BCRs for option 1, 2, 4 and 7 indicated in [Table 11.2.1](#) show a significant increase from the BCRs that were calculated in the Options Identification stage; this is investigated further in Section 11.4 below.

11.3. Summary of Cost Estimates

11.3.1. Options estimates were revised for the recommended options and Option 9 in September 2009 by HA Commercial. Economic Summaries for each option are included in Appendix D. A breakdown of the scheme costs is included in [Table 11.3.1](#) below.

Table 11.3.1: A160 Improvements – Immingham Scheme Cost Summary – September 2009

Option	Preparation and Supervision cost (£m)	Works cost (£m)	Lands cost (£m)	Total (£m)	BCR
1	10.3	86.4	6.2	102.9	9.7
2	10.3	87.1	6.1	103.5	4.4
4	10.3	98.2	6.2	114.7	7.3
7	10.3	84.5	8.3	103.1	11.7
9	10.1	93.5	7.0	110.6	10.4

11.4. Consideration of Revised Cost Estimates and Economics

11.4.1. The economic benefits for options 1, 2, 4 and 7 have remained unaltered from those calculated during PCF Stage 1; however the cost estimates have been revised. The substantial change in BCRs since the previous cost estimates could not be explained by the change in estimates alone so an explanation was sought.

11.4.2. On further examination of the BCR calculations undertaken during PCF Stage 1, it was discovered that inflation had unintentionally been applied to the works costs twice – once by HA Commercial in producing the range forecast summaries which were input into TUBA which also applied a 2.5% inflation. The result was an increase in the Present Value of Costs (PVC) and lowering the BCR for each option. This was a simple misunderstanding error. In order to determine the significance of this error, the BCR's for options 1 to 8 have been recalculated using the PCF Stage 1 range forecasts suitably deflated before input into TUBA. The results of this exercise are included in [Table 11.4.1](#) below.

Table 11.4.1: Recalculation of Stage 1 BCRs

Option	BCR (calculated in stage 1)	Ranking (from BCR calculated in stage 1) 1 is highest	BCR (re-calculated using Stage 1 costs)	Ranking (from re-calculated BCR) 1 is highest
1	4.7	3	8.2	3
2	2.9	6	4.1	6
3	3.2	5	4.8	5
4	4.4	4	7.1	4
5	2.3	7	3.4	7
6	5.1	2	8.3	2
7	7.3	1	13.4	1
8	2.2	8	3.2	8

11.4.3. [Table 11.4.1](#) indicates that although an error occurred in the calculation of the BCR's during PCF Stage 1, this did not impact on the relative ranking of BCRs between the options or choice of options recommended for Public Consultation in the TAR.

11.4.4. The PCF Stage 2 BCRs (as shown in [Table 11.2.1](#)) are not directly comparable to the BCRs calculated in Stage 1, due to the error in applying inflation as described above in Section 11.4.2. However, the re-calculated stage 1 BCRs (as shown in [Table 11.4.1](#)) are directly comparable with the Stage 2 BCRs; this comparison indicates that the BCRs for Options 1, 2 and 4 have increased slightly, as a result of the revised range forecast estimates being slightly lower for these options. The BCR for Option 7 has reduced as a result of its range forecast estimate increasing.

12. CONCLUSIONS

12.1. Introduction

12.1.1. This Conclusion summarises the main findings of the Scheme Assessment Report, in order to recommend an option for the Preferred Route Announcement.

12.1.2. In the **PCF Stage 1 Option Identification stage** 8 options were identified and assessed in a Technical Appraisal Report (TAR) published in April 2009. The TAR identified 4 preferred options, 1, 2, 4 and 7 with **Option 7 being the clear leader** having a significantly higher Benefit to Cost Ratio and also being the safest option. Option 7 arose from a Value Engineering exercise incorporating what were considered the best features of the other options, together with improvements at Brocklesby Junction and the layout at Manby/Rosper Road Junctions (as described in Section 5.5). The report recommended all four preferred options be taken forward into the PCF Stage 2 Option Selection stage and Public Consultation; the four non-preferred options were also put before the public to demonstrate the extent of options assessed.

12.2. Summary of findings of Scheme Assessment Report

12.2.1. Section 6 of this report summarises the outcome of the 12 week **public consultation exercise**. The consultation responses indicated an **overall preference for Option 7**; however the issue of perceived negative impact on access to South Killingholme resulting from closure of its A160 central reserve crossover at Town Street, and the combining of Habrough roundabout and Ulceby Junction towards the west near to Ulceby Junction dominated the consultation responses. Clear advice from NetServ was that due to the projected rapid increase in traffic flow projected, the dual carriageway A160 should not have uncontrolled central reserve crossovers on safety grounds. In order to address the issue of access to South Killingholme various solutions were examined. These resulted in **Option 9 being developed**, as detailed in Section 6.8. Based on Option 7 it moves Ulceby Junction towards the existing Habrough Roundabout location and replaces the South Killingholme footbridge with a road bridge linking the two halves of South Killingholme. It is considered that these changes to Option 7 will satisfy the South Killingholme residents' access concerns.

12.2.2. The April 2009 TAR has been redrafted, post public consultation, to update the economics of the options incorporating updated range forecasts and additional environmental data resulting from further ecological, cultural heritage, air quality and noise assessment work. The Post Public Consultation Supplementary TAR looks at five options; the four previously preferred options and Option 9. The key features of the options are described below:

- Option 1 - an at-grade solution with simple left-in/left-out movements catered for at Ulceby Road.
- Option 2 - an at-grade solution with a roundabout at Ulceby Road allowing all movements.
- Option 4 - an at-grade solution with a roundabout at Ulceby Road having links to both Top Road and Habrough Road
- Option 7 - the Value Engineering workshop at-grade preferred solution, with a single roundabout interchange at Brocklesby junction and link road to Rosper Road from Manby Road roundabout
- Option 9 - was developed to address local comment **following the July 2009 public consultation**. Based on Option 7 it moves Ulceby Junction towards the existing Habrough roundabout location and replaces the South Killingholme footbridge with a road bridge linking the two halves of South Killingholme.

12.2.3. The cost range forecasts were updated for Option 1, 2, 4 and 7 and a range forecast produced for Option 9. Economic assessments were also updated to reflect these changes.

12.2.4. The key outcomes of the economic and environmental assessments are summarised in [Table 12.1](#).

Table 12.1: Summary of Environmental and Economic Assessments

Option	BCR	NPV (£m)	Environmental Impact Ranking (1 = lowest impact)	P50 Forecast Cost (£m)	Accident Benefit Ranking (1 = highest benefit)
1	9.7	238.3	1	102.9	5
2	4.4	184.0	2	103.5	4
4	7.3	252.4	5	114.7	3
7	11.7	305.4	4	103.1	2
9	10.4	316.3	3	110.6	1

12.3. Analysis of Results

12.3.1. The Value for Money (VfM) guidance advice to ministers classifies BCR scores as follows:

- BCR > 2.0 represents high VfM.
- BCR 1.5 – 2.0 represents medium VfM.
- BCR 1.0 – 1.5 represents low VfM.
- BCR < 1.0 represents poor VfM.

12.3.2. [Table 12.1](#) indicates that all options considered have BCRs > 2 which range between 4.4 and 11.7.

12.3.3. It should be noted that during the process of updating the economic appraisal it was discovered that for the April 2009 report on which the TAR was based there had been an element of double counting of inflation when the TUBA runs were completed; this had the effect of underestimating the magnitude of BCR values reported in the April 2009 TAR. However, the relative BCR ranking between the options was unaffected and the conclusions and recommendations of options for public consultation are still valid. A more detailed explanation of this, including corrected PCF Stage 1 BCRs for all options is included in Section 11.4.

12.3.4. The Government’s New Approach To Appraisal (NATA) refresh will require a change in approach to calculation of BCR, in which the Indirect Tax resulting from a scheme will be included in the Present Value of Benefits (PVB) rather than as at present where it is used in reducing the Present Value of Costs (PVC). The effect is to change the BCR values. Whilst this requirement does not become mandatory until April 2010 the calculations have been made in [Table 12.2](#) below for comparison:

Table 12.2: Summary of Economic Assessments using NATA Refresh guidance, which will become mandatory in April 2010

Option	Revised PVC (£m)	Revised PVB (£m)	NPV (£m)	BCR
1	60.1	298.4	238.3	5.0
2	60.5	244.5	184.0	4.0
4	67.0	319.4	252.4	4.8
7	60.4	365.8	305.4	6.1
9	64.6	380.9	316.3	5.9

- 12.3.5. NATA refresh stresses that Net Present Value (NPV) should also be given higher importance than hitherto in choosing options.
- 12.3.6. Option 7 was the favoured option from the April 2009 TAR and public consultation and review and updating of the economic and environmental considerations has not changed this. However, the public consultation did highlight the option's shortcomings in its provision for access to the village of South Killingholme; it was felt by the residents that closure of the Town Street central reserve gap would have meant significant detours and the combination of Habrough roundabout and Ulceby junction near to the current Ulceby Junction would cause "rat running" along unsuitable roads in the village, on both sides of the A160. The design team now feel there is some validity in the residents concerns and that, as a result, option 7 as presented to the public was no longer viable. The post public consultation Option 9 has all the effectiveness of option 7 in meeting the requirements of the scheme objectives and at the same time resolves the residents concerns whilst still meeting the NetServ requirement to close the central reserve crossings on safety grounds for the future volumes of traffic.

13. THE RECOMMENDED ROUTE (IN CONFIDENCE)

13.1. The scheme objectives are:

- Improving access to the Port of Immingham
- Reducing congestion on the A160
- Improving safety

13.2. The technical appraisal of Options 1, 2, 4, 7, and 9 has shown that all options meet the scheme objectives to varying degrees. The significant journey time savings (as indicated in [Table 11.1.3](#)) show that all options meet the objectives of 'Improving access to the Port of Immingham' and 'Reducing congestion on the A160 by halving the journey time at peak times between the A180 and the Port of Immingham entrance. All options also meet the objective of 'Improving Safety', providing accident benefits (indicated in [Table 11.2.1](#)) resulting from a reduction of the number of accidents, as well as by the closure of all central reserve crossings. **Option 9** shows both the **highest accident** and **combined accident and user benefits**.

13.3. Option 7 has the highest BCR at 11.7; however, it also has local access issues at South Killingholme as raised by local residents during the Public Consultation (as detailed in Section 6). **Option 9** has the **second highest BCR** at 10.4 and is the **only option which addresses the local access issues**.

13.4. **Option 9** has the **3rd highest environmental impact** but a lower impact than Option 7 (as indicated in [Table 12.1](#)).

13.5. The NATA refresh guidance for calculating BCR, which will be used from April 2010, has also been considered for all options, as shown in [Table 12.2](#). Using NATA refresh the BCRs for Options 7 and 9 will be 6.1 and 5.9 respectively; this indicates that the value of benefits provided by Options 7 and 9 are very similar. NATA refresh also requires that, to help give an initial indication of the overall welfare of a scheme, an increased emphasis be given to the Net Present Value (NPV); **Option 9** has the **highest NPV** of all options considered at **£316m**.

13.6. The range forecast for **Option 9** gives a **mid range estimate of £111m** which is **within the total budget of £125m**, which comprises £95m from the Regional Funding Allocation and £30m from Central Government Funding.

13.7. **Option 9** is recommended to be the route published in the Preferred Route Announcement.