HIGHWAYS AGENCY

A12 Lowestoft Study

Lake Lothing Third Crossing Feasibility Study

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Version: 0.1

This report has been prepared for the Highways Agency by **Faber Maunsell Limited.**

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Executive Summary

Background

Faber Maunsell – Transportation Engineering has been commissioned by the Highways Agency to undertake the A12 Lowestoft Third River Crossing Feasibility Study.

Faber Maunsell previously produced two reports for Suffolk County council in 2007 and 2008, the Lake Lothing Crossing Report and the Lowestoft Infrastructure Review.

From the Lake Lothing Crossing Report it was decided that a central crossing point would provide the most direct link to the existing spine road.

Aims of the Study

- To undertake preliminary work to help to determine whether a third river crossing scheme and the allied infrastructure identified in the Lowestoft Infrastructure Review have potential to go forward for funding via the Regional Funding Allocation (RFA) process.
- To undertake a sufficient level of engineering design of the roads and bridges necessary to provide a reasonable degree of confidence of their costs.
- To produce a sound cost estimate of the infrastructure based on these designs.
- To carry out traffic modelling in order to establish the benefits of the infrastructure package.
- To arrive at a benefit/cost ratio for the complete package sufficient to place the scheme at pre-options stage.

Existing Situation – The A12 Corridor

The A12 corridor from Ipswich is of single carriageway standards and currently follows the South Lowestoft Relief Road through its junction with Horn Hill, along Belvedere Road and crosses into Station Square on an existing bascule bridge.

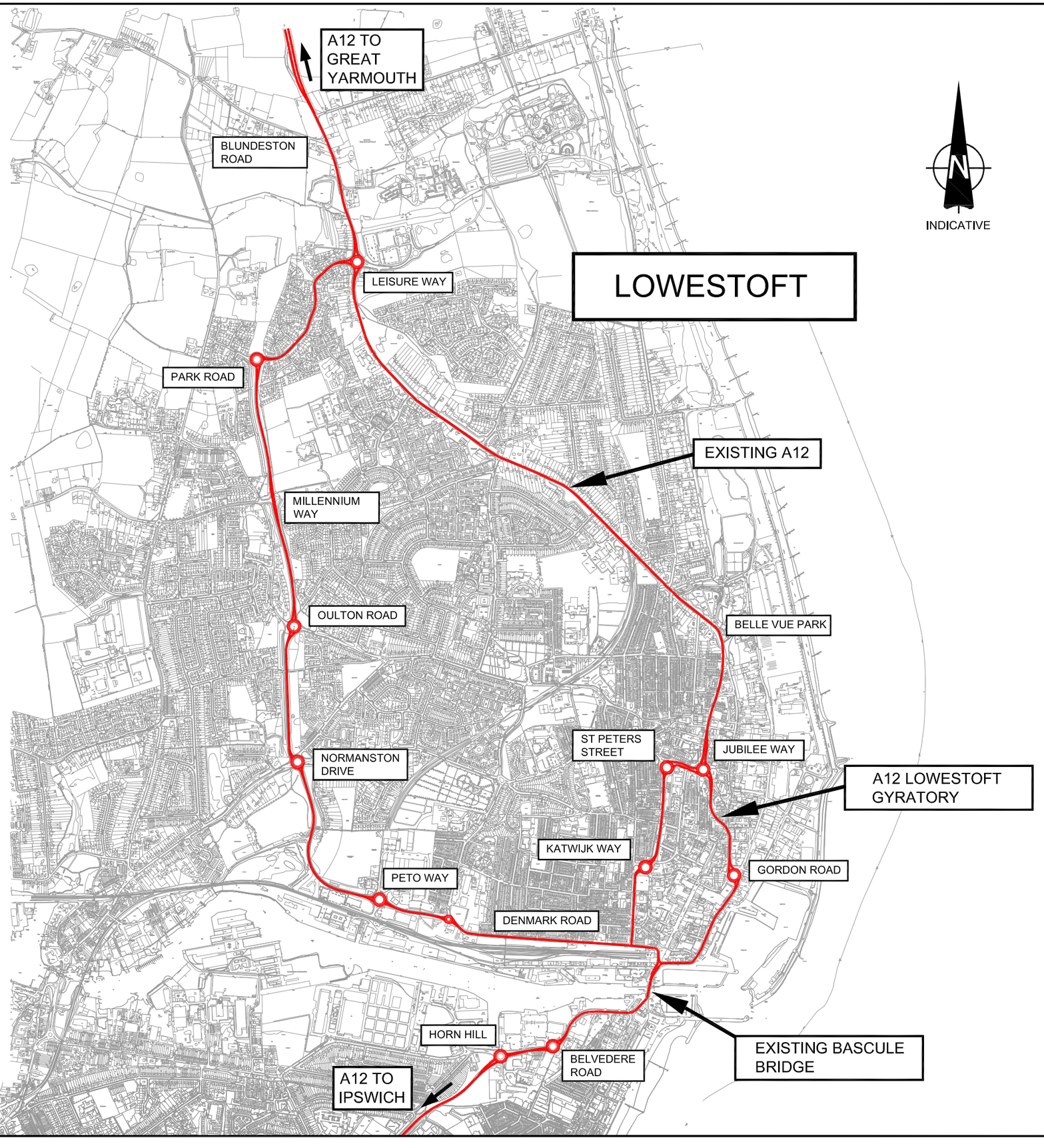
From Station Square the A12 route is through Katwijk Way, St Peters Roundabout and Jubilee Way, reaching Yarmouth Road at Belle Vue Park. The A12 Yarmouth Road becomes dual carriageway beyond Blundeston Road junction.

The A12 northwards from just south of the Bascule Bridge is a trunk road and is the responsibility of the Highways Agency. The A12 to the south is managed by Suffolk County Council.

Denmark Road is currently congested at various times of the day due to the presence of residential properties on its frontage and the busy traffic signalised junction with Katwijk Way at the eastern end.

As part of longer term aspirations to upgrade the route corridor through north Lowestoft, sections of the northern spine road (Peto Way and Millennium Way) have been constructed. A corridor exists between Park Roundabout and Blundeston Road junction and has been reserved for the Phase V section of the spine road. Once completed this route will provide a possible alternative corridor to the A12. In the meantime, Bentley Drive, a residential road on the northern fringes of Lowestoft currently suffers from the presence of through traffic on the spine road with destinations further north.

The following page shows the key plan of the existing road network.



INDICATIVE

Rev	Date	Detail	Made	Chk'd

Client: HIGHWAYS AGENCY

Project: A12 LOWESTOFT STUDY

Title: KEY PLAN
Existing Road Network

Design:	DJB	CAD:	DJB
Chk'd:	RGH	App'd:	RGH
Date:	Oct 08	Scale:	NTS

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Proposed Infrastructure Schemes

Potential road schemes have already been reviewed. These would improve existing traffic conditions and also accommodate future predicted levels of growth. These medium-term measures which have been investigated include:

- Phase V Spine Road
- Denmark Road
- Southern Access Road

These measures would form part of the local highway network and provide relief to the forecasted traffic congestion as well as enable the regeneration of Lowestoft, as reviewed in Lowestoft Infrastructure Review, Options Study by FM (see Section 2).

Third River Crossing – Bascule Bridge Features

It is proposed that the crossing would be formed with a lifting (bascule) bridge.

The lifting span is proposed as a twin leaf counterweighted back span bascule. The decks are proposed in all steel construction to minimise self weight. Each leaf will consist of two tapering depth box girders with an orthotropic steel deck consisting of stiffened plate and channel section cross members.

The high level over Lake Lothing will permit vessels with an air draught up to 8.5m above Mean High Water Spring tide level to pass freely under the bridge when in the closed (open to road traffic) position. This will allow smaller craft to pass, thus reducing the number of openings (road closures) and minimising traffic disruption.

Total Works Estimate Costs – Typical Outline Third River Crossing and Infrastructure Costs (Jan 2007 Base Date)

Phase V Spine Road	£7,655,998
Denmark Road	£6,163,505
Southern Access Road	£18,207,125
River Crossing	£37,809,558

45% optimism bias, 10% risk and VAT included.
Land and demolition costs and inflation are not included.

Traffic Modelling and Economics – Benefit/Cost Ratios

The economic analysis has been based on the following assumptions:

- 60 year appraisal period (2019 – 2078)
- No change in traffic conditions over appraisal period
- Annualisation assumed to be equivalent to the AM peak hour x 1500
- HGV benefits excluded (they form only 4% of traffic in the AM)

Scenario 1 (Benefits of Local Schemes):
Do Minimum (DM) = 2022 Network + Area Action Plan (AAP)
Do Something (DS) = DM + SAR + Phase V + Denmark Road

Scenario 2 (Benefits of Central Crossing):
Do Minimum = 2022 Network + AAP + SAR + Phase V + Denmark Road
Do Something = DM + Central Crossing

Scenario 3 (Benefits of Central Crossing & Local Schemes):
Do Minimum = 2022 Network + AAP
Do Something = DM + Central Crossing + SAR + Phase V + Denmark Road

60 Year Appraisal Summary (Excluding any developer contributions):

	Scenario 1*	Scenario 2	Scenario 3
Present Value of Benefits (PVB)	**76.092**	**103.449**	**176.823**
Present Value of Costs (PVC)	**30.698**	**30.723**	**61.280**
Net Present Value (NPV)	**45.394**	**72.726**	**115.543**
Benefit Cost Ratio (BCR)	**2.48**	**3.37**	**2.89**

*The appraisal period for scenario 1 is 2017-2076.
Construction price inflation included in PVC.
Land, preparation and supervision costs included.

Range Forecasting

Following the publication of the Nichols and National Audit Reports in 2007 which reviewed how major schemes are procured and delivered by the Highways Agency and in conjunction with the Department for Transport a revised form of scheme cost estimates have been developed.

The East of England Regional Assembly has been reviewing regional transport priorities following a request by Ministers to provide an update on advice on those transport schemes that it considers to be a priority for regional funding allocations.

In providing trunk road scheme information to the region to help with their assessment of priorities, the Highways Agency has re-assessed scheme costs on all applicable trunk road proposals in line with the new Range Forecast methodology. In respect to proposals for a third river crossing, scheme costs have been estimated to fall within the range of £49m to £81m with a central figure of £65m (Jun 2006 Base year – No inflation).

These figures will change the economics of the proposed crossing. However since the development of the scheme is at an early stage, the economic appraisal undertaken is considered to be a reasonable indication of the likely benefits of the scheme. If the scheme were to be progressed, then further detail analysis and review would be undertaken as the scheme is developed.

It should be noted that the difference in scheme cost estimates is due to a change from previous techniques of applying Optimism Bias and Risk to the use instead of the Plus Risk range (a virtual risk register) and Plus Uncertainty Range (which considers factors outside of the scope of the project such as political and other elements).

1 Introduction

1.1 Background

Faber Maunsell (FM) has been commissioned by the Highways Agency to carry out a study of a possible third crossing at Lake Lothing, Lowestoft. Traffic forecasts for Lowestoft in 2022 indicate a number of serious congestion issues and suggest that financial investment in transport infrastructure is required.

Lowestoft town centre experiences congestion at peak periods, largely as a result of the concentration of employment sites in this area.

The new South Lowestoft Relief Road that has recently been completed has helped to reduce traffic levels on London Road South, a key regeneration priority area. Further ambitious regeneration proposals in Lowestoft will require new transport infrastructure and services to support it. It is recognised that a high proportion of local journeys are made from the southern side of the town to destinations in the central areas, using the existing bascule bridge.

Many of the traditional local industries that contributed to Lowestoft's former prosperity such as shipbuilding, canning factories, ship repair facilities, the coastal trade, coal transportation by rail and oil rig support have declined or disappeared.

The effect is that Lake Lothing (the inner harbour) has become an area of industrial decay, with redundant shipyards and their facilities being left in decline. This is a key area for regeneration for high quality employment within the local development framework area action plan.

Lowestoft market receives 90% of its fish supplies delivered by refrigerated trucks and trailers designed for 44 tonnes and being 15.5m in length, using the river crossing adjacent to the Harbour entrance. After the fish are sold at the market they are delivered to retail outlets by refrigerator van or small truck.

1.2 Regeneration of Lowestoft and Lake Lothing Third Crossing

1.2.1 Lowestoft Urban Regeneration Company Area Action Plan Preferred Option January 2007 – 1st East

The Preferred Option Report is the latest of a series of documents which have been produced as part of Waveney District Council's Area Action Plan (AAP) documents. It follows the Baseline Report in January 2006 and the Strategic Framework Report in February 2006. The report has been done with compliance to the Planning Policy Statement 12 (PPS12) which states that 'Area Action Plans should be used to provide the planning framework for areas where significant change or conservation is needed'.

The main partners for 1st East, an urban regeneration company (URC) set up to lead in the regeneration of the Lake Lothing Area are the local councils and the East of England Development Agency (EEDA). English Partnerships retains an interest in the regeneration aims being the main ambassador of the URC movement and its associated regeneration activity despite not being a core-funder of the URC.

The Preferred Options were based on further technical work and evaluation, including a Sustainable Appraisal/ Strategic Environmental Assessment and the results of a consultation exercise carried out in 2006. The consultation included post-back questionnaires, web questionnaires, emails, letters, post cards and 'design your own' master plans.

The AAP details the economic, social and environmental issues in the Waveney District and the URC area.

The Plan also lists the Lowestoft objectives which are to reconnect the historic town to the sea, reconnect the town centre to Lake Lothing, improve the north-south connectivity and transform the Inner Harbour. To achieve these objectives, 1st East has identified six areas of interest: East of England Park, Fisher's Wharf, Peto Square, Kirkley Waterfront, Brooke Peninsula and Lake Lothing. Land use will include, in particular:

Fisher's Wharf

- 50,000m^2 of which 37,000m^2 of mixed use (including 10,000m^2 retail)
- 180 dwellings
- Marina

Peto Square

- 122,000m^2 of which 84,000m^2 of mixed use (including 10,000m^2 retail)
- 380 dwellings

Kirkley Waterfront

- Up to 110,000m^2
- 350 dwellings
- Waveney Office Campus / CEFAS – 1000 jobs

Brooke Peninsula

- 13,500m^2 of mixed use (leisure, small scale employment and community related)
- 500 dwellings

Lake Lothing West

- 800 jobs

The Plan details the considerations in each preferred option, i.e. Spatial Strategy and Development Principles. Also discussed in particular detail are the key intervention areas. The preferred option indicates the development to be carried out in these areas, comparing the local plan with the preferred option. It also suggests the infrastructure which would be required for the implementation of the development.

The main opportunities with the implementation of the proposed AAP are the potential for waterfront development and the potential to create development value by the substitution of residential and mixed use development for low intensity industrial and storage uses.

The key constraints for the delivery are the inherent lack of demand for commercial property in locations close to the town centre due to public investment in out of town locations, the timing of the new transport infrastructure which would be required for access to new development, the limited public funding available and the time it takes to secure public investment in transport infrastructure.

Potential road schemes have already been reviewed in the work for Suffolk County Council. These are predicted, in conjunction with sustainable transport measures, to improve existing traffic conditions and also accommodate future predicted levels of growth. These medium-term measures which have been investigated include:

- Phase V Spine Road
- Denmark Road
- Southern Access Road (SAR)
- Pedestrian/Cycle Bridges across Lake Lothing

These measures form part of the local highway network and provide relief to the forecasted traffic congestion as well as enable the regeneration of Lowestoft, as reviewed in Lowestoft Infrastructure Review, Options Study by FM (see Section 2).

1.2.2 *Lake Lothing Third Crossing*

The AAP suggested that a new crossing be built over Lake Lothing as a long-term solution to provide better access to the Lake area, support regeneration and an improved environment in Lowestoft, as well as remove through traffic from around the currently congested bascule bridge. This would make it possible to improve the pedestrian environment in the town centre and meet expectations for ease of movement and journey reliability against a background of increasing traffic levels.

A new crossing would link the Southern Relief Road with medium-term road schemes such as Phase V Spine Road and Southern Access Road, removing through-traffic from the town centre and providing strong support for the regeneration objectives in Lowestoft.

To allow for shipping movements, a bridge with lifting or swinging spans would be required for the crossing rather than a high level clear span structure.

2 Previous Studies

2.1 Introduction

This section reviews previous relevant studies which were used as references in line with the vision to regenerate Lowestoft, to improve the existing infrastructure and increase accessibility across the town.

2.2 Lake Lothing Crossing Proposal Review – Faber Maunsell (April 2007)

The report investigated the feasibility and costs of implementing a third crossing of Lake Lothing. This was in connection with the masterplan produced for 1st East covering re-development of areas north and south of Lake Lothing.

Two locations for a crossing point (Central and Eastern) were investigated and costed as part of the report, further subdivided as Central Crossings (options 1 – 3) and an Eastern Crossing requiring relocation of the Railway Station. Discussion with Associated British Ports (ABP) indicated that all the alternative options would require opening bridges and for the Eastern Crossing might allow the existing bascule bridge to be utilised for pedestrian and public transport.

Several options were investigated in this report. A common factor in all the options identified was the construction of a Southern Access Road serving new development on the southern borders of the lake.

The report recommended that all the options should be examined in more detail and taken to presentation and discussion with authorities and the public before making a selective decision on how to proceed.

2.3 Lowestoft Infrastructure Review, Options Study – Faber Maunsell (June 2008)

This report investigated the medium-term measures and previously identified highway schemes aimed at reducing congestion in Lowestoft:

Phase V Spine Road

A design centreline for the scheme was outlined by Suffolk County Council (SCC) in 1991. Phase V would complete the previously constructed section of the Spine Road (Peto Way and Millennium Way), thus providing much needed relief to through traffic on Bentley Drive.

The new Yarmouth Road roundabout would take traffic away from Blundeston Road, and properties to the north end of the new spine road would be served by dedicated service roads. This design would take through traffic away from the front of these properties.

The Southern end of the spine road would be within 14 metres of the Park Meadows private housing development, but this will be in cutting so visual disturbance is minimised.

Northbound traffic using the existing A12 could be diverted to the new spine road. This would have a beneficial effect on properties along Bentley Drive and Yarmouth Road (A12), reducing the amount of through traffic in the area.

Denmark Road

A preliminary alignment for a scheme at Denmark Road was originally prepared by SCC. The intention was to provide a new section of carriageway parallel to the existing Denmark Road in order to provide relief to housing frontages and to concentrate traffic on the improved highway between Rotterdam Road Roundabout and Katwijk Way.

Currently some properties along Denmark Road do not have private parking. By moving Denmark Road southwards, a service road would be made available to these properties for access and parking. Landscaping would also be possible, which would enhance the amenity of the area.

The construction of the new Denmark Road, along with the Area Action Plan, would encourage much-needed development and investment in the area.

Southern Access Road (SAR)

The SAR is required primarily to open up major development south of Lake Lothing and to form a link between Saltwater Road in the west and the Lowestoft Southern Relief Road (opened in 2006) in the east. It is pivotal in the success of Waveney Campus, Brooke Peninsula and other areas indicated in the proposed AAP by 1st East in terms of providing access to the developments. Traffic for the development area would use the SAR, leaving Victoria Road for local residents and through traffic in the east-west direction.

Pedestrian/Cycle Bridge across Lake Lothing

Alternative sitings for a lifting (bascule) bridge for pedestrian and cyclists have been identified over Lake Lothing. A westerly setting would link the Waveney Campus area with Commercial Road. A more easterly siting would link the ASDA Superstore area with Commercial Road. A pedestrians and cycles swing bridge sited near the existing A12 bascule bridge.

The bridge would provide important linkage between the town centre and the inner harbour of Lake Lothing for pedestrian and cyclists. Both residential and business areas would benefit from increased accessibility.

2.4 Lake Lothing Regeneration – Peter Colby Commercials Limited (January 2007)

The report was created by Peter Colby Commercials Group which is a privately owned holding company with subsidiaries in commercial vehicle dealerships, vehicle rentals, road and rail freight transport, manufacturing and property development. It is gathered from the report that the Peter Colby Commercials Group have made a substantial investment in Lowestoft.

The report gives a very useful background to Lake Lothing; its development in the 19th Century and its subsequent decline since the last war. It also outlines the current situation with the completion of the South Lowestoft relief road that Peter Colby Commercials Ltd consider requires a third river crossing in order to achieve its aim of alleviating traffic problems in the area. The report also states that 1st East have accepted that a strategy is needed for regeneration of the Waterfront areas of Lowestoft including Lake Lothing.

The Peter Colby scheme (which involves construction of a tidal barrage) would probably not be viable and they have not as yet discussed it with Environment Agency. It is envisaged that EA would probably object to any form of barrage as they are carrying out their own assessment of flood risk and are proposing other schemes in the vicinity.

3 Transport Strategy for Lowestoft to 2021

3.1 General

Suffolk County Council has developed a transport strategy for Lowestoft comprising of a range of travel behaviour and infrastructure measures as detailed below. The aim of the strategy is to influence travel behaviour and provide alternatives to the car for many local journeys. This is predicted to achieve a 15% reduction in traffic levels compared to those predicted for 2022 by transport modelling undertaken. Currently, the County and District Council are currently working with Sustrans on a large-scale personalised travel planning project in Lowestoft to assist residents in making the shift away from the private car to more sustainable modes of transport.

Smarter choices:

- TravelSmart project
- Workplace and school travel plans
- Residential travel plans
- Parking restraint

Cycling

- Cycle networks
- Road crossings
- Route information
- Pedestrian/cycle bridge(s)

Public transport

- New quality bus routes
- Effective bus priority
- Park and ride
- Waterbus
- Train frequency and quality

Walking

- Walking routes
- Road crossings
- Pavement quality
- Pedestrian/cycle bridge(s)

3.2 Basic Aims

The aims of the transport strategy are to:

- Reduced traffic demand
- Improved accessibility
- Better place to live and work

3.3 Medium Term Strategies

There are also medium term strategies for the following new access roads:

- Lake Lothing Southern Access Road
- Local improvement to allow re-routing of A12 trunk road

3.4 Long Term Strategy

If the transport strategy realises its potential, then the need for further transport infrastructure may not be needed. Consequently, the future aspiration of a **third river crossing for road traffic** will not only be depend on future funding but also would be reliant on the degree of success of the above policies.

4 Infrastructure

4.1 Phase V Spine Road

4.1.1 *Background*

The construction of the final section of Lowestoft Spine Road has been programmed for many years. Full soil surveys were carried out in 1990 and land has been purchased to enable construction of the majority of the 7.3m width single carriageway link between Parkhill and Yarmouth Road. In the interim period new housing in Bentley Drive has been steadily constructed, making the case for completion of the new highway necessary to divert traffic away from the increasingly busy residential area.

A design centreline for the scheme was proposed by Suffolk County Council in 1991. Phase V would complete the previously constructed section of the Spine Road, thus providing much needed relief to through traffic on Bentley Drive. The land for the project is largely in the ownership of SCC, only requiring the acquisition of some minor properties to complete the scheme corridor.

Faber Maunsell have reworked the scheme on a similar centreline and have calculated quantities for the roadworks, earthworks and all ancillary items. See Appendix B for drawing number 60033531_TNRE_05.

4.1.2 *Costings*

	BASE DATE Jan 2007 (1Q07)		**1Q07 Rate (£)**	**1Q07 Amount (£)**
1.	**Roadworks**			
a)	Single 7.3m wide carriageway	14,436m^2	168.19	2,427,927
b)	Balancing pond	4,500m^2	9.04	40,697
2.	**Sundry Items**			
	Accommodation works, Work for SU's and Environmental Mitigation	*5% of item 1*	2,468,603	123,403.16
3.	**Preliminaries & Traffic Management**			
	Preliminaries & traffic management	*36% of items 1 to 2*	2,592,033	933,132
4.	**Works Total**	*Items 1 to 3*		3,525,165
5.	**Preparation and Supervision**			
	Preparation	*12% of item 4*	423,020	
	Supervision	*5% of item 4*	176,258	
	Design	*4.5% of item 4*	158,632	
		21.5%		757,911
6.	**Total Works Estimate**			**4,283,076**
	Cost excluding contingency/risk and Optimism Bias uplift		**£**	**4,283,076**
	Contingency		**10%**	**428,308**
	Optimism Bias Uplift applicable at Stage 1 (TPI Entry)		**45%**	**2,120,123**
	Non Recoverable VAT		**£**	**824,492**
	TOTAL WORKS ESTIMATE		**£**	**7,655,998**

4.2 Denmark Road

4.2.1 *Background*

A preliminary alignment for a scheme at Denmark Road was originally prepared by SCC. The intention is to provide a new section of carriageway parallel to the existing Denmark Road in order to provide relief to housing frontages and to concentrate traffic on the improved highway between Rotterdam Roundabout and Katwijk Way.

A new layout has been developed for Denmark Road between Rotterdam Road in the west and Katwijck Way in the east where recent reconstruction of the existing signal controlled junction was carried out as part of the A12 Lowestoft Gyratory scheme (designed by Faber Maunsell in 2006). The new design of Denmark Road assumes that it will be relocated south of its existing alignment, leaving the existing carriageway as a service road. Rotterdam Road Roundabout would be enlarged and extended to allow for better circulation of traffic and to allow for the new connection of Denmark Road. See drawing number 60033531_TNRE_04 in Appendix B.

There is sufficient width for a footway/cycleway and landscaping features such as small trees for screening purposes.

Further opportunities exist such as an extended Rail Station bus/taxi transport interchange, car park and footbridge to Commercial Road but these have not been costed in the proposals for this report.

4.2.2 *Costings*

	BASE DATE Jan 2007(1Q07)		**1Q07 Rate (£)**	**1Q07 Amount (£)**
1.	**Roadworks**			
a)	Single 7.3m wide carriageway	9,139m^2	201.83	1,844,506
2.	**Other Items**			
	Work to top of tunnel access shafts	3 nr	50,000	150,000
3.	**Sundry Items**			
	Accommodation works, Work for SU's and Environmental Mitigation	*5% of item 1*	1,844,506	92,225.30
4.	**Preliminaries & Traffic Management**			
	Preliminaries & traffic management	*36% of items 1 to 3*	2,086,731	751,223
5.	**Works Total**	*Items 1 to 4*		2,837,955
6.	**Preparation and Supervision**			
	Preparation	*12% of item 5*	340,555	
	Supervision	*5% of item 5*	141,898	
	Design	*4.5% of item 5*	127,708	
		21.5%		610,160
7.	**Total Works Estimate**			**3,448,115**
	Cost excluding contingency/risk and Optimism Bias uplift		**£**	**3,448,115**
	Contingency		**10%**	**344,811**
	Optimism Bias Uplift applicable at Stage 1 (TPI Entry)		**45%**	**1,706,817**
	Non Recoverable VAT		**£**	**663,762**
	TOTAL WORKS ESTIMATE		**£**	**6,163,505**

4.3 Southern Access Road

4.3.1 *Background*

The southern side of Lake Lothing is set to be transformed with three major developments: Waveney Campus, Brooke Peninsula and Kirkley Waterfront.

Waveney Campus is a £50 million investment, bringing together up to 1000 staff from CEFAS, WDC and SCC in a landmark administrative and state-of-the-art scientific complex.

The Brooke Marina proposal is for a mixed use scheme, bringing up to 650 quality waterfront homes as well as a care facility, working quayside, a slipway for leisure craft, new marina and a new pedestrian cycle bridge across Lake Lothing, linking in to the existing cycle network.

Kirkley Waterfront is a new high-quality business and light industry park with a new East-West link road together with Waveney Campus, as well as an enhanced area of open space stretching to the waterfront with all quays open to the public.

Following these proposals by 1st East and others to develop the area south of Lake Lothing previously occupied by various industries, it was realised that a separate access spine road would have to be set in place to connect the new development locations to Saltwater Road and Victoria Road in the west and to Waveney Drive in the east in order to form an appropriate link to the newly opened Lowestoft Southern Relief Road. The existing series of roads leading to the proposed development areas off Victoria Road are of inadequate widths to offer a sufficient level of service and have poorly arranged junctions, making them unsuitable for this purpose.

Drawing number 60033531_TNRE_03 in Appendix B shows the design which has a new level crossing and roundabout link to Saltwater Road, thus allowing the old Victoria Road Level Crossing to be closed.

4.3.2 *Costings*

	BASE DATE Jan 2007 (1Q07)		**1Q07 Rate (£)**	**1Q07 Amount (£)**
1.	**Roadworks**			
a)	Single 7.3m wide carriageway	18,640m^2	211.92	3,950,124
b)	Balancing pond	1,750 m^2	9.04	15,826
2.	**Other Items**			
	Railway Level Crossing		2,000,000	2,000,000
3.	**Sundry Items**			
	Accommodation works, Work for SU's and Environmental Mitigation	*5% of item 1*	3,965,951	198,298
4.	**Preliminaries & Traffic Management**			
	Preliminaries & traffic management	*36% of items 1 to 3*	6,164,248	2,219,129
5.	**Works Total**	*Items 1 to 4*		8,383,378
6.	**Preparation and Supervision**			
	Preparation	*12% of item 5*	1,006,005	
	Supervision	*5% of item 5*	419,169	
	Design	*4.5% of item 5*	377,252	
		21.5%		1,802,426
7.	**Total Works Estimate**			**10,185,804**
	Cost excluding contingency/risk and Optimism Bias uplift		**£**	**10,185,804**
	Contingency		**10%**	**1,018,580**
	Optimism Bias Uplift applicable at Stage 1 (TPI Entry)		**45%**	**5,041,973**
	Non Recoverable VAT		**£**	**1,960,767**
	TOTAL WORKS ESTIMATE		**£**	**18,207,125**

5 Lake Lothing Third Crossing

5.1 Road Approaches

Following work carried out by Faber Maunsell in their previous report it has been decided that the crossing would be located centrally at Lake Lothing, linking to a new roundabout on the new SAR, as this is the most likely option and has the highest return. The road would be carried on an opening structure across Lake Lothing passing over the railway on a new structure and connecting to Peto Way on the existing Spine Road system on the northern side adjacent to Bannatynes Sports Centre.

Proposed crossing location, looking eastwards from railway footbridge.

5.2 Structure Details

5.2.1 *General:*

Details of the proposed crossing are shown on the General Arrangement Drawing 60033531-ST-01-01, included in Appendix B. The road cross-section over the bridge comprises a 7.3m wide single carriageway with 3.5m wide verges each side. The verge widths allow for a combined cycleway and footway over the bridge. A speed limit of 30mph has been assumed. 1.4m high cycleway parapets are provided, with 1.8m solid high containment parapets over the railway. Lighting is provided over the full length. Surface water drainage over the structure is proposed to be with continuous kerb drainage units, with down pipes at selected land pier positions.

5.2.2 *Span Arrangement:*

The overall length of the viaduct is 305m. The South Abutment springs from the road embankment north of the proposed new roundabout on the Southern Access Road. The viaduct climbs to a crest in the middle of the Lake Lothing water at +12.0m AOD, from which it descends to a level sufficient to clear the railway and terminating in the North Abutment.

The span arrangement derives from the opening span of 30 metres clear between pier fendering. This is wider than the existing waterway width at the harbour entrance but allows for larger vessels having to steer to keep within in the deep water adjacent to the north side berths. The main piers for the bascule bridge accommodate the bridge lifting machinery and counterweights chambers and each of these piers occupy 12.5m of the overall length of the structure.

To minimise works within the water, approach spans of 47.5m are adopted on each side. These allow a clear quay side width of approximately 8m between the first land piers and the waters edge, with minimum headroom of 5.3m. This span arrangement maximises the clear water within the Lake. The approach spans reduce to 36.0m and then typically 24.0m. The end span over the railway is 19.0m. Under the north viaduct, a minimum headroom of 5.3m is provided. Under the south viaduct, the headroom over 5.3m is provided from about Chainage 70 to the waters edge.

5.2.3 *Approach Spans:*

The approach spans are proposed as conventional fabricated steel girder and composite reinforced concrete deck construction. Six girders are provided over the width of the deck, with 1.0m deck edge cantilevers. Steel construction is proposed rather than concrete beams to minimise deck structural depth and thus maximise headroom. The piers are each proposed to be three lozenge shaped columns, each carrying one pair of girders. Foundations are expected to require piles down to firm strata and conventional reinforced concrete bored piles have been assumed.

Ducts for power and communications and water services to the bascule bridge will be provided in the verges.

5.2.4 *Bascule Bridge:*

The lifting span is proposed as a twin leaf counterweighted back span bascule. The decks are proposed in all steel construction to minimise self weight. Each leaf will consist of two tapering depth box girders with an orthotropic steel deck consisting of stiffened plate and channel section cross members.

The back spans with counterweights are accommodated in the pier machinery rooms. Each bridge leaf will be raised by hydraulic rams under each main box girder. In the down position (open to traffic) the ends of each leaf will engage at midspan by means of hydraulically operated steel nose bolts, which will form a structural pin connection between the two halves of the bridge.

In the open position, the bridge will provide a clear width of 30m for vessels to pass.

The high level over Lake Lothing will permit vessels with an air draught up to 8.5m above Mean High Water Spring tide level to pass freely under the bridge when in the closed (open to road traffic) position. This will allow smaller craft to pass, thus reducing the number of openings (road closures) and minimising traffic disruption. The high level crossing over the water also allows the downswing of the counterweight, the lifting machinery and the floor of the machinery rooms all to be accommodated above high water level.

In plan the piers for the bascule bridge are extended laterally to serve two purposes. They are shaped to deflect ship collision and they provide a means of access through side doors into the machinery rooms. One of these side extensions will serve to accommodate the Control Building. Access to the Control Building will from road verge level, through secure gates/doors. Apart from the main control centre at the top, the Control Building will include mess facilities and toilets and will provide access to the machinery room.

The piers are proposed to be constructed in reinforced concrete and founded on tubular steel piles.

On the approaches to the bascule bridge, traffic signals are mounted on ‘goal post’ gantries over the carriageway. Lifting barriers and automatic swing gates will close access to the bascule lifting. Pedestrian guardrails between the verge and the carriageway will ensure segregation of pedestrians and vehicles queuing during road closure.

5.2.5 *Construction and Buildability:*

The land based foundations and piers would be built using normal construction techniques. Construction of the approach spans would be by conventional beam and slab bridge methods. Beams will be stabilised in the temporary condition by lifting in braced pairs. Permanent deck

formwork would be employed and the deck concreted. This form of construction reduces the risks associated with working at height. Large crane lifts would be needed to place the long 47.5m approach spans.

The river piers piles would be installed by plant mounted either on jack up or floating barges. For access to the pier construction for men and machinery, a temporary bridge could be installed from each shore to the respective piers. This could either be supported on temporary piers in the water or consist of floating pontoons. To construct the main pier reinforced concrete, collars could be attached to the tubular steel piles to support precast concrete slabs or other permanent formwork. This would provide a safe work platform in the dry to fix reinforcement and carry out main concreting, apart from the concrete fender wall, which extends below high water level. These units could be precast to fit over pile collars structural continuity achieved by concreting during low water. All concrete would be placed by pumping from the shore.

The steel bascule decks would be fabricated in the workshop and transported complete to the site by barge. The back span counterweight kentledge would be pre-installed in the machinery room in readiness for the deck installation. The decks would be lifted in position by barge mounted crane and the counterweights installed by hoist. An alternative to a barge mounted crane to lift in the decks would be to mount a large mobile crane on the approach spans. However, this could entail substantial strengthening of these spans for what would be a temporary condition.

5.3 Costs

	BASE DATE Jan 2007 (1Q07)			1Q07 Rate £	1Q07 Amount £
1.	**ROADWORKS**				
a)	Single 7.3m wide carriageway	4531m^2		211.92	960,143
2.	**STRUCTURES**				
a)	Bascule Bridge				7,593,492
b)	Approach Viaducts				5,631,283
c)	Retaining Wall	300m^2		376.35	112,906
3.	**SUNDRY ITEMS**				
	Accommodation works, Work for SU's and Environmental Mitigation		*5% of item 1*	960,143	48,007.16
4.	**Preliminaries & Traffic Management**				
	Preliminaries & traffic management		*36% of items 1 to 3*	14,345,832	5,164,499
5.	**Works Total**		*Items 1 to 4*		19,510,331
6.	**Preparation and Supervision**				
	Preparation		*12% of item 5*	2,341,240	
	Supervision		*5% of item 5*	975,517	
	Design		*4.5% of item 5*	877,965	
			21.5%		4,194,721
7.	**Total Works Estimate**				**23,705,052**
	Cost @ 1Q07 excluding Contingency/RISK and Optimism Bias uplift			**£**	**23,705,052**
	Contingency 10%			**10%**	**2,370,505**
	Optimism Bias Uplift applicable at Stage 1 (Scheme Entry) 45%				**11,734,001**
	Non Recoverable VAT included in land cost				**-**
	TOTAL WORKS ESTIMATE			**£**	**37,809,558**

5.4 Alternatives:

5.4.1 *Overhead counterweighted bascule:*

This would be a feasible alternative to the low profile back span counterweighted bascule illustrated in this outline design. An advantage of such bridges is usually that the machinery room can be accommodated in a shallower substructure chamber. In this case, with the elevated road at +12.0m A.O.D., this is not a requirement and the main difference would be visual. Given the already high vertical alignment of the proposed crossing, the overhead counterweight arms and bridge support would tower about 16m above the quay level. This would suit a wish for an imposing land mark structure but could also be considered aesthetically intrusive and over dominating.

5.4.2 *Reduced Navigation Width, Single Span Bascule:*

The proposal has been developed with the passage of larger commercial vessels in mind. If the lift bridge is only required for leisure craft, the 30m width provided could be reduced by providing a single leaf bascule, providing about half this width or less. It is noted that the upstream Mutford crossing provides a clear width of 7m. The main advantage of this alternative would be to significantly reduce the costs of the bascule section, although there would be some corresponding increase in the approach viaduct costs.

6 Traffic Forecasts and Economic Assessments

6.1 Traffic Forecasts

Appendix A show the traffic forecasts for AM peak traffic at year 2022 with AAP development only and with AAP development, new bascule bridge and proposed infrastructure.

The main changes to the forecasted traffic with the new bascule bridge and proposed infrastructure are:

Route	Northbound	Southbound	Eastbound	Westbound
Victoria Road			902 to 374 (-59%)	
Belvedere Road	1561 to 915 (-41%)	1023 to 623 (-39%)		
Existing Bascule Bridge	1921 to 1464 (-23%)	1480 to 981 (-34%)		
Denmark Road			400 to 267 (-28%)	694 to 95 (-76%)
Lowestoft Gyratory east	520 to 511 (-2%)	910 to 48 (-47%)		
Lowestoft Gyratory west	530 to 577 (+9%)	599 to 429 (-28%)		
Jubilee Way	308 to 239 (-22%)	877 to 551 (-37%)		
Peto Way	680 to 1430 (+110%)	497 to 1507 (+203%)		
Southern Access Road			1051 (new)	1107 (new)
New Bascule Bridge	1591 (new)	1248 (new)		

The Third Crossing and proposed infrastructure would provide relief to traffic congestion in Lowestoft town centre, with traffic use on Belvedere Road, existing Bascule Bridge, Lowestoft Gyratory and Jubilee Way all reduced.

Peto Way, which is underused currently, would provide an essential link to the new bascule bridge.

The Southern Access Road would serve the new lakeside development, providing relief to Victoria Road, which is inadequate for future traffic volume.

6.2 Economic Assessment

An economic assessment was carried out in November 2008 shortly before the scheme was presented to the MP. It should be noted that the input to this assessment contained costings prepared generally in accordance with the requirements of the Nichols Report and had an allowance for Optimism Bias (45%) as well as land, supervision and preparation costs. The assessment has been based on the 2022 AM peak hour model with the Area Action Plan (AAP) development as proposed in 2007. An opening year of 2019 has been assumed for the Third Crossing, with construction commencing in 2017. Construction price inflation was included in calculating the Present Value of Costs (PVC).

The economic analysis has been based on the following assumptions:

- 60 year appraisal period (2019-2078)
- No change in traffic conditions over appraisal period
- Annualisation assumed to be equivalent to the AM peak hour x 1500
- HGV benefits excluded (they form only 4% of traffic in the AM)

Three economic assessments have been undertaken:

Scenario 1 Benefits of Local Schemes
Do Minimum (DM) = 2022 Network + AAP
Do Something (DS) = DM + SAR + Phase V Spine Road + Denmark Road Improvement

Scenario 2 Benefits of Third Crossing
Do Minimum = 2022 Network + AAP + SAR + Phase V Spine Road + Denmark Road Improvement
Do Something = DM + Third Crossing

Scenario 3 Benefits of Third Crossing & Local Schemes
Do Minimum = 2022 Network + AAP
Do Something = DM + Third Crossing + SAR + Phase V Spine Road + Denmark Road Improvement

The following table summaries the economic appraisal output for each of the three scenarios.

	Scenario 1*	Scenario 2	Scenario 3
Present Value of Benefits (PVB)	**76.092**	**103.449**	**176.823**
Present Value of Costs (PVC)	**30.698**	**30.723**	**61.280**
Net Present Value (NPV)	**45.394**	**72.726**	**115.543**
Benefit Cost Ratio (BCR)	**2.48**	**3.37**	**2.89**

*The appraisal period for scenario 1 is 2017-2076.

Any future stages of work would include updates to the forecast planning developments in Lowestoft and therefore the above economic analysis should be considered as a draft.

6.3 Range Forecasting

Following the publication of the Nichols and National Audit Reports in 2007 which reviewed how major schemes are procured and delivered by the Highways Agency and in conjunction with the Department for Transport a revised form of scheme cost estimates have been developed.

The East of England Regional Assembly has been reviewing regional transport priorities following a request by Ministers to provide an update on advice on those transport schemes that it considers to be a priority for regional funding allocations.

In providing trunk road scheme information to the region to help with their assessment of priorities, the Highways Agency has re-assessed scheme costs on all applicable trunk road proposals in line with the new Range Forecast methodology. In respect to proposals for a third river crossing, scheme costs have been estimated to fall within the range of £49m to £81m with a central figure of £65m as detailed below.

£m (Jun 2006)	A	B	C	D = B + C
RANGE DESCRIPTIONS	ESTIMATE @ CONSTANT PRICES (NO INFLATION, NO PROGRAMME RISK)	ESTIMATE @ OUTTURN (NO PROGRAMME RISK, INFLATION INCLUDED)	PROGRAMME RISK RANGE @ OUTTURN	ESTIMATE @ OUTTURN (INCLUDING PROGRAMME RISK)
RANGE MINIMUM	49	73	4	77
CENTRAL ESTIMATE	65	98	8	105
RANGE MAXIMUM	81	122	11	133

These figures will change the economics of the proposed crossing. However since the development of the scheme is at an early stage, the economic appraisal undertaken is considered to be a reasonable indication of the likely benefits of the scheme. If the scheme were to be progressed, then further detail analysis and review would be undertaken as the scheme is developed.

It should be noted that the difference in scheme cost estimates is due to a change from previous techniques of applying Optimism Bias and Risk to the use instead of the Plus Risk range (a virtual risk register) and Plus Uncertainty Range (which considers factors outside of the scope of the project such as political and other elements).

7 Summary and Conclusions

7.1 General Summary

Following completion of the Lowestoft Southern Relief Road and various improvements to North Lowestoft, including the A12 Lowestoft Gyratory and other works, a third crossing of Lake Lothing still remains to be considered for implementation. This report has brought together several infrastructure schemes currently under investigation together with the third crossing scheme which is considered to offer the best location and easiest form of connection to the existing and proposed local road network.

7.2 Lake Lothing Third Crossing

It is envisaged that the third crossing would be sited at a point central on Lake Lothing between the existing swing bridge at Saltwater Way and the existing bascule bridge at Station Square. The new bridge would be sited so that its direction would be due north, connecting from a new roundabout on the Southern Access Road to a new roundabout on Peto Way, adjacent to Bannatynes Gym. The crossing would involve spanning the existing railway at a height sufficient to clear overhead catenary cables and would therefore require an elevated approach with the road carried on viaduct. A bascule bridge is proposed (giving clearance to all shipping) and is envisaged to be of a twin leaf steel construction.

7.3 Infrastructure

The highway schemes identified through previous reporting are all aimed at reducing congestion in the area and consist of:

Phase V Spine Road routed between Park Roundabout and Blundeston Road, providing much needed relief to through traffic on Bentley Drive.

Denmark Road Improvement, a new section of single carriageway parallel to the existing road between Rotterdam Road Roundabout and Katwijk Way Junction.

Southern Access Road, routed between Saltwater Road in the west and Lowestoft Southern Relief Road in the east, opening up major development south of Lake Lothing.

7.4 Costs

Detailed cost breakdown has been prepared by the Faber Maunsell Quantity Surveyor for all the above infrastructure works utilising methodology in accordance with the Nichols Report. The costs include, in addition to the works costs, preparation, supervision, VAT, optimism bias and risk (where applicable).

The costs (Jan 2007) are assembled in the following table.

Phase V Spine Road	£7,655,998
Denmark Road	£6,163,505
Southern Access Road	£18,207,125
River Crossing	£37,809,558

7.5 Traffic Forecasts and Economic Assessment

Traffic forecast for AM peak traffic at year 2022 with AAP development showed significant reduction to town centre traffic if the Third Crossing and proposed infrastructure were built. This reduction is particularly significant for southbound traffic, the existing bascule bridge would see 34% reduction and Lowestoft Gyratory (east) would see 47% reduction.

Figures also show that the new Third Crossing and SAR would be well-used.

From the 60 Year Appraisal Summary (Excluding any developer contributions):

	Scenario 1 Benefits of Local Schemes	**Scenario 2** Benefits of Third Crossing (Constructed after Local Schemes)	**Scenario 3** Benefits of Third Crossing & Local Schemes (Constructed as one package)
Indicative Benefit Cost Ratio (BCR)	**2.48**	**3.37**	**2.89**

7.6 **Range Forecasting**

As stated, the original costings for this report were carried out generally in accordance with the Nichols Report and are quoted as inclusive of 45% Optimism Bias. However a range forecasting exercise has been carried out by the Highways Agency in line with the DfT range Forecast methodology new for the river crossing element of the scheme. This indicates a range of costs, utilising current forecasting techniques of between £49M and £81M, with a central estimate of £65m (Base year Jun 2006 – No inflation). Obviously forecasts based on the Range Minimum would present the highest levels of BCR which could be expected.

The revised figures will change the economics of the proposed crossing. However since the development of the scheme is at an early stage, the economic appraisal undertaken is considered to be a reasonable indication of the likely benefits of the scheme. If the scheme were to be progressed, then further detail analysis and review would be undertaken as the scheme is developed

7.7 **Conclusions**

The roads infrastructure schemes included in the foregoing report are all considered feasible for further consideration and future Public Consultation. The schemes could either be implemented when funds allow or be packaged together and taken through the planning process for implementation.

Clearly, the Third Crossing scheme will depend on the roads infrastructure being available as a do-minimum network in order for the appropriate connections to be made and for the approaches to the bridge to be accommodated.

In certain scenarios a positive benefit/cost ratio has been predicted, assuming an implementation period for the complete project to be between 2017 and 2019. In the light of these positive values the scheme may be worthy of further investigation and refinement of estimates in accordance with Highways Agency's Range Forecasting in due course. However, any major scheme project such as the Third Crossing should only be taken forward taking into account the sustainable package of measure being developed by Suffolk County Council. This is predicted to achieve a 15% reduction in traffic levels compared to those predicted for 2022 by transport modelling undertaken and may influence the future need for the crossing.

Furthermore, with the application of HA Range Forecasting and with a range of costs there would be a subsequent range of benefit/cost ratios which will have to be considered.