NORWICH NORTHERN DISTRIBUTOR ROUTE

PRELIMINARY ASSESSMENT OF ALTERNATIVE EASTERN CORRIDOR OPTIONS

March 2005

Prepared by Technical Group

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Norwich Northern Distributor Route

Preliminary Assessment of Alternative Eastern Corridor Options

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Executive Summary

The Norwich Area Transport Strategy public consultation in 2003 included three eastern route corridor options for a Northern Distributor Road. As a result of the consultation, various alternatives to these corridors were put forward by members of the public, local authorities and other organisations. The alternatives consisted of 3 variants of the consultation corridor options and 6 new routes further east of these. This report documents the work which took place in the spring and summer of 2004 to assess all the eastern alternatives at a Stage 1 level in line with 23 sub-objectives set out in the national Government's New Approach to Appraisal (NATA), asking the question 'does the alternative route provide any tangible benefits over the consultation route?'

The following route options were compared:

- the pink consultation route compared with an alternative pink route;
- the yellow consultation route compared with an alternative yellow route;
- the blue consultation route compared with an alternative blue routes;
- the routes referred to in this report as the Nursery and Heath Farm routes compared with the consultation route;
- the routes referred to in this report as the Heath Farm route compared with the further eastern routes.

The assessments concluded that the following route options should be taken forward to a second consultation in autumn 2004:

- The alternative pink route between the A140 and the B1150, the consultation pink route between the B1150 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Pink Route);
- The alternative yellow route between the A140 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Yellow Route);
- The original blue route between the A140 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Blue Route).

These route options were then subjected to a stage 2 Environmental Assessment prior to the consultation.

1.0 INTRODUCTION

1.1 A review of the Norwich Area Transport Strategy (NATS) was carried out in 2003 and the Norwich Northern Distributor Route (NDR) was included as part of the Preferred Strategy. A consultation on NATS was carried out in Autumn 2003 and this included three eastern route corridor options for the NDR.

1.2 As a result of the consultation various alternatives to these corridors were put forward by members of the public, local authorities and other organisations. These suggestions are shown on plan R1C093-R1-298 in Appendix A. Some of the alternatives were minor variations to the original corridors. These tended to have very localised effects and could either be incorporated with the consultation routes or be given full consideration during detailed development of a preferred route, if appropriate. The remainder involved either significant deviation from the original corridors or completely new route corridors. This report assesses all the major eastern alternatives at a Stage 1 level in line with the national Government's New Approach to Appraisal (NATA).

2.0 THE ALTERNATIVE ROUTE CORRIDORS

2.1 The eastern alternatives suggested as a result of the consultation have been classified into two groups for comparison purposes. These are:

- **Eastern Consultation Routes and Variations:** This group compares the three eastern route corridors, which were put out to consultation, with significant variations on these routes.
- **Far Eastern Alternatives:** This compares the alternatives which were suggested further east of the consultation routes between the A47 and Plumstead Road. Alternatives are identified in this report by names relating to distinguishing features or places that they pass.

A list and description of all the alternatives within each group is shown in Appendix B. The two comparison groups are also shown on Plans R1C093-R1-264 and 265 in Appendix C.

2.2 Alternatives not discussed in this report are:

- Western Options. These are considered in a separate report.
- Possible variations at Norwich Airport. These are considered in a separate report.

3.0 PURPOSE OF THE REPORT

3.1 The purpose of this report is to document the analysis which took place in the spring and summer of 2004 to determine whether the alternatives suggested provide any significant benefits over the original consultation options so that the best eastern route options were taken forward to a Stage 2 consultation in autumn 2004, pending the outcome of the Stage 2 Environmental Assessment.

3.2 The assessment was based on information from

- Stage 1 Environmental Assessment
- Stage 1 Appraisal Summary Tables
- SATURN traffic model and TUBA economic assessment

based on a level of assessment that was appropriate at the time.

4.0 METHODOLOGY – OBJECTIVES

4.1 Each route corridor has been assessed according to the 5 key Government objectives and under the 23 sub-objectives set out in NATA. The methodology applied to these objectives for this assessment is as follows:

4.2 Environment

4.2.1 Noise:

At this stage, quantitative information on levels of noise is unavailable. However, a qualitative analysis of the number of residences lying within 300m of the corridor options gives an indication of how many properties would suffer an increase in noise. Also, a preliminary assessment of the decrease in traffic on the existing road network as a result of each option enables a comparison of noise reduction to be made between the options. The estimated changes in traffic were assessed using the SATURN (Simulation and Assignment of Traffic to Urban Road Networks) traffic model for Norwich and the results are given in Appendix D.

4.2.2 Local Air Quality:

At this stage, quantitative information on levels of PM_{10} and NO_2 is unavailable, although initial work carried out on the Stage 2 Environmental Assessment indicates that the air quality limits and objectives for these two pollutants would not be breached. A qualitative analysis of the number of residences lying within 50m and 200m of the corridor options gives an indication of how many properties may suffer an increase in these pollutants, although this may be counterbalanced to some extent by the decrease in traffic on the existing road network.

4.2.3 Greenhouse Gases:

At this stage, quantitative information on levels of CO_2 is unavailable. However, CO_2 emissions can be expected to increase with both the do-minimum scenario, and with any of the corridor options as traffic would grow.

4.2.4 Landscape:

At this stage, a broad indication has been given of the impacts on landscape character and the probable levels of visual intrusion. Ringland and the River Wensum valley are the most sensitive and of the highest quality in landscape terms.

4.2.5 Townscape:

None of the routes affects townscape.

4.2.6 Heritage of Historic Resources:

At this stage, only a desk based assessment has been undertaken. A number of the corridor options significantly adversely affect the historic resource. There is the potential for unknown buried archaeological finds. These impacts remain uncertain until they can be more precisely defined with further archaeological work such as geophysical survey or trial trenching. The precise level of impact on the cultural heritage resource is therefore not fully known at this stage.

4.2.7 Biodiversity:

Where the corridor options cross the River Wensum significant adverse impacts are predicted. However, full ecological surveys have not yet been completed to identify the impacts absolutely. Impacts would also occur at a local level affecting biodiversity.

4.2.8 Water:

Where the corridor options cross through a river valley, detrimental effects would arise. However, these are not considered to be insurmountable although special measures may be required. For all routes it has been assumed that sustainable drainage methods would be implemented.

4.2.9 Physical Fitness:

A footpath/cycleway is proposed along the whole length of the road, which may encourage walking/cycling. However, the corridor options may also have some detrimental effect on the landscape and sever/curtail some Public Rights of Way, which could deter some walkers, cyclists or horseriders, although wherever possible suitable crossings would be provided.

4.2.10 Journey Ambience:

Uninterrupted travel on a modern dual carriageway through the countryside would improve journey ambience, with only the provision of at grade roundabouts along the route likely to cause stress to drivers.

4.3 Safety

4.3.1 Accidents:

Quantitative information on accident savings is unavailable at this stage. An early study identified that an NDR would save up to 60 Personal Injury Accidents per year in the Norwich area by removing traffic from congested urban areas and relocating it on a modern dual carriageway. In reality, the actual number of accidents saved would depend on how effective the NDR is at redistributing the traffic, and it is anticipated that the further the road is from Norwich, the less attractive it would be and the less it would reduce congestion in the city.

4.3.2 Security:

At this stage, it is assumed for all the corridor options that there would be a number of lay-bys but it is not proposed to provide emergency telephones or lighting. The proposed footpath/cycleway provided along the length of the road would not be lit and may be separated from the road by landscaping. Bridges and underpasses would be designed for pedestrian and cyclist use where appropriate.

4.4 Economics

4.4.1 Public Accounts:

This information is available from preliminary TUBA (Total User Benefit Analysis) assessments carried out during the spring/summer 2004 on some of the corridors. For those alternatives which have not been directly modelled, the Present Value Cost (PVC) has been estimated on a pro-rata basis to the nearest equivalent modelled option.

4.4.2 Business Users and Providers:

This information is available from preliminary TUBA assessments carried out during the spring/summer 2004 on some of the corridors. For those options which have not been modelled, it has been assumed that the Present Value Benefit (PVB) is that of the nearest equivalent corridor. The TUBA default profiles have been used for the allocation of benefits between the Business Users and the Consumer Users below.

4.4.3 Consumer Users:

This information is available from TUBA assessments of some of the corridors. For those options which have not been modelled, it has been assumed that the PVB is that of the nearest equivalent corridor. The TUBA default profiles have been used for the allocation of benefits between the Business Users above and the Consumer Users.

4.4.4 Reliability:

This information is available from a preliminary assessment of the SATURN model.

4.4.5 Wider Economic Impacts:

All the corridor options would enhance access to Norwich International Airport and support planned development around the Norwich Area and enhance the economic vitality of North Norfolk.

4.5 Accessibility

4.5.1 Option Values:

Option Values 'are associated with unexpected use of a transport facility which is not built into the forecasts produced by the modelling stage, and would otherwise not appear in the appraisal as a benefit'. It is assumed that no new transport options are created by the NDR.

4.5.2 Severance:

The corridor options have been assessed for severance to pedestrians, cyclist and equestrians.

4.5.3 Access to the Transport System:

It is assumed that all the corridor options may improve local public transport through reduced congestion in the northern suburbs. Also longer distance bus services may use the NDR to access the best corridor into the city.

4.6 Integration

4.6.1 Transport Interchange:

It has been assumed that all options would facilitate passenger and freight interchange at Norwich International Airport. Access to various Park and Ride sites would also be enhanced. However, no additional transport interchange is to be provided.

4.6.2 Land-Use Policy:

The various County Council and District Council policies have been grouped into 11 categories:

(i) to protect the quality and character of the landscape, countryside and general environment;
(ii) to protect important landscape areas;
(iii) environmental improvements to urban areas;
(iv) protection of areas of employment;
(v) protection of areas of housing;
(vi) development of Norwich Airport;
(vii) to enhance and protect public highways for the purposes of movement of goods and people;
(viii) to protect waste facilities;
(ix) to protect mineral resources;
(x) to protect the environment from pollution;
(xi) to protect land for public use.

The policies which are either positively or negatively affected by the corridor options have been identified.

4.6.3 Other Government Policies:

It has been assumed that all corridor options would have the same impact on national objectives.

5.0 METHODOLOGY – CORRIDOR OPTIONS

5.1 The methodology on how each group of corridor options has been assessed is as follows:

5.1.1 Eastern Consultation Routes and Alternatives:

For the environmental, safety, accessibility and integration objectives, each of the consultation routes and alternatives was assessed between the north-east corner of the airport and the A47. However, for the economy objective, a whole NDR has been assessed with the costs being based on the each of the consultation options combined with the Heath Farm route between the A47 and the C284 and the western red route, that being an 'average' western route. Similarly, the traffic information has been determined on the same basis. The three alternative routes, have not been modelled as it has been assumed that these would attract similar levels of traffic to their respective consultation routes.

4.1.4 Eastern Route Options:

For the environmental, safety, accessibility and integration objectives, each of the alternative options was assessed only between Plumstead Road and the A47. However, for the economy objective, a whole NDR has been assessed with the costs being based on each of the options combined with the eastern consultation blue route between the north-east corner of the airport and Plumstead Road and the western red route. The traffic information has been determined by modelling the consultation route, Heath Farm route, The Grange route and Cucumber Lane 1 only combined with the consultation eastern blue and western red routes. Consequently the economic information for these routes has been derived by computed modelling, whereas for the remaining three alternative eastern routes, it is interpolated.

6.0 ASSESSMENTS & CONCLUSIONS – EASTERN CONSULTATION ROUTES & ALTERNATIVES

6.1 In this chapter, as shown on drawing R1C093-R1-264, the following route options are compared using the 23 NATA sub-objectives:

- **the pink consultation route compared with an alternative pink route** to determine whether the pink alternative provides any overall benefits to the pink consultation route;
- **the yellow consultation route compared with the alternative yellow route** to determine whether the yellow alternative provides any overall benefits to the yellow consultation route;
- **the blue consultation route compared with the alternative blue route** to determine whether the blue alternative provides any overall benefits to the blue consultation route;

6.2 The assessment was carried out on the following sub-objectives:

- Noise
- Air Quality
- Landscape
- Heritage
- Biodiversity
- Water Environment
- Journey Ambience
- Cost to the Public Accounts (PVC)
- Transport Economic Efficiency – Consumers and business users (PVB). These two objectives have been combined
- Severance

6.3 The remaining twelve sub-objectives are:

- Greenhouse Gases
- Townscape
- Physical Fitness
- Accidents
- Security
- Reliability
- Wider Economic Impacts
- Option Values
- Access to the Transport System
- Transport Interchange
- Land-use Policy
- Other Government Policies

These are considered to be consistent across all the options at this stage and so have not been included in the assessments.

6.3 The pink consultation route compared with an alternative pink route

6.3.1 The difference between the pink route and its alternative is given in Appendix B and shown on Plan R1C093-R1-264 in Appendix C.

6.3.2 Noise:

The **alternative pink route** appears more favourable than the consultation route with 119 properties within 300m of the route compared with 227 properties.

6.3.3 Air quality:

The **alternative pink route** appears more favourable than the consultation route with 47 properties within 200m of the route compared with 53 properties.

6.3.4 Landscape:

Both routes affect the urban fringe, partially enclosed arable land and extensive woodland areas. They impact on the parkland associated with Sprowston Manor and on properties in Thorpe End and Thorpe St. Andrew. On balance, the **consultation pink route** is more favourable with respect to landscape as it lies more within the urban fringe than the alternative.

6.3.5 Heritage:

Both routes affect the former parkland associated with Sprowston Manor and the historic landscape of Quaker Farm. The alternative pink route also runs along the edge of the historic parkland surrounding Rackheath Hall. On balance, the **consultation pink route** is more favourable.

6.3.6 Biodiversity:

Both routes affect a significant number of hedgerows and ancient trees affecting local biodiversity. Protected species such as bats and great crested newts are likely to be present. The consultation route crosses a County wildlife site. The alternative pink route runs adjacent to an area of Ancient Woodland at Bulmer Coppice. Consequently, **neither route** appears more favourable.

6.3.7 Water Environment:

There are no watercourses or floodplains affected and part of each route passes over of an aquifer. The alternative pink route crosses a closed landfill site with the risk of contaminating groundwater. On balance, the **consultation pink route** is more favourable.

6.3.8 Journey Ambience:

Uninterrupted travel on a modern dual carriageway with 8 at-grade roundabouts along the consultation route and 7 at-grade roundabouts along the alternative route, would provide improved journey ambience. The consultation route requires an additional roundabout on the Buxton Road to provide for the change in the direction of the route, where the alternative route can continue. Consequently **alternative pink route** is slightly more favourable.

6.3.9 PVC:

The **alternative pink route** appears more favourable than the consultation route with an interpolated PVC of £232.0M compared with an interpolated PVC of £234.5M.

6.3.10 PVB:

As both routes have not been modelled, it is assumed that their PVBs would be the same at £775.5M. Consequently **both routes** appear equally favourable.

6.3.11 PVB/PVC:

Although not a sub-objective within the Appraisal Summary Tables, the ratio of PVB to PVC is a useful comparison figure for the economic information. In this case it is 3.31 for the alternative route and 3.34 for the consultation route.

6.3.12 Severance:

The consultation route separates Thorpe End from the Norwich urban area. No communities or PROWs are severed by either route but both sever a cycleway. On balance, the **alternative pink route** appears more favourable.

6.3.13 Any other issues:

None.

6.3.14 Conclusion:

- In environmental terms, the alternative route appears to be the better route for noise, air quality and journey ambience, while the consultation route is more favourable for landscape, cultural heritage and water. On balance the pink consultation route is the better route;
- In safety terms, both routes have equal advantage;
- In economic terms, the alternative route appears to cost less and consequently has a more favourable PVB/PVC ratio;
- In accessibility terms, the alternative route appears to be the better route;
- In integration terms, both routes have equal advantage;
- In terms of other issues, both routes have equal advantage.

6.3.15 Recommendation:

While the alternative pink route has some advantage over the consultation route in terms of proximity to properties and the severance of Thorpe End from Norwich, the consultation route is a better route environmentally. However, the impact on properties of the consultation route could be significantly reduced by adopting the alternative route between the airport and the B1150. It was therefore recommended that ***the consultation pink route between the A47 and the B1150 and the alternative route between the B1150 and the A140*** *should be taken forward to the Stage 2 consultation.*

6.4 The yellow consultation route compared with an alternative yellow route

6.4.1 The difference between the yellow route and its alternative is given in Appendix B and shown on Plan R1C093-R1-264 in Appendix C.

6.4.2 Noise:

The **alternative yellow** route appears slightly more favourable than the consultation route with 92 properties within 300m of the route compared with 101 properties.

6.4.3 Air quality:

The **alternative yellow** route appears more favourable than the consultation route with 49 properties within 200m of the route compared with 54 properties.

6.4.4 Landscape:

Both yellow routes pass through partially enclosed arable farmland with pockets of well wooded arable farmland, giving rise to areas of good landscape quality that would be adversely affected by the road. The alternative route passes through less wooded landscape than the consultation routes. Isolated properties and residents of Thorpe St Andrew, Thorpe End would experience substantial visual intrusion from both routes and the original consultation route would also have some visual impact on Spixworth. On balance, **the alternative yellow route** is more favourable.

6.4.5 Heritage:

Three areas of historic parkland associated with Beeston Hall, Rackheath Hall and Red Hall Farm would be significantly affected by these routes. However, as the alternative route only skirts Beeston Park and Red Hall Farm the impact is smaller than with the consultation route. On balance, **the alternative yellow** route is more favourable.

6.4.6 Biodiversity:

Both routes affect a significant number of hedgerows and ancient trees affecting local biodiversity. Protected species such as bats and great crested newts are likely to be present. Both routes run adjacent to an area of Ancient Woodland at Bulmer Coppice. Consequently, **neither route** appears more favourable.

6.4.7 Water Environment:

There are no watercourses or floodplains affected and part of each route passes over of an aquifer. Both routes cross a closed landfill site with the risk of contaminating groundwater. Consequently, **neither route** appears more favourable.

6.4.8 Journey Ambience:

Uninterrupted travel on a modern dual carriageway with 6 at-grade roundabouts along both the original and the alternative routes provides improved journey ambience on both routes Consequently, **neither route** appears more favourable.

6.4.9 PVC:

The **consultation yellow route appears** more favourable than the alternative with an interpolated PVC of £173.9M compared with an interpolated PVC of £178.6M.

6.4.10 PVB:

As both routes have not been modelled, it is assumed that their PVBs would be the same at £659.4M. Consequently **both routes** appear equally favourable.

6.4.11 PVB/PVC:

Although not a sub-objective within the Appraisal Summary Tables, the ratio of PVB to PVC is a useful comparison figure for the economic information. In this case it is 3.79 for the consultation route and 3.69 for the alternative route.

6.4.12 Severance:

Both routes sever a cycleway. As a result, **neither route** is more favourable.

6.4.13 Any other issues:

None.

6.4.14 Conclusion:

- In environmental terms, the alternative route appears to be the better route, having the advantage in terms of noise, air quality, landscape and heritage;
- In safety terms, both routes have equal advantage;
- In economic terms, the consultation route appears to cost slightly less and consequently has a more favourable PVB/PVC ratio;
- In accessibility terms, both routes have equal advantage;
- In integration terms, both routes have equal advantage;
- In terms of other issues, the both routes appear to be the same.

6.4.14 Recommendation:

*The **alternative yellow route** is costs slightly more than the consultation route but is much significantly favourable than in environmental terms and should be taken forward to consultation. It was therefore recommended that the **alternative yellow route** should be taken forward to the Stage 2 consultation.*

6.5 The blue consultation route compared with an alternative blue route

6.5.1 The difference between the blue route and its alternative is given in Appendix B and shown on Plan R1C093-R1-264 in Appendix C.

6.5.2 Noise:

The **alternative blue route** appears marginally more favourable than the consultation blue route with 167 properties within 300m of the route compared with 168 properties.

6.5.3 Air quality:

The **alternative blue route** appears more favourable than the consultation route with 80 properties within 200m of the route compared with 88 properties.

6.5.4 Landscape:

The landscape is predominately open arable farmland except from a small area surrounding the tributary of the River Bure which is of attractive landscape quality. Isolated properties and residents of Spixworth, Rackheath, Thorpe End and Thorpe St Andrew would experience substantial visual intrusion from both routes, although Spixworth Plantation helps to screen the consultation route from the village of Spixworth. On balance, the **blue consultation route** appears more favourable.

6.5.5 Heritage:

Two areas of historic parkland associated with Beeston Hall and Rackheath Hall would be affected by these routes. Both routes run adjacent to Rackheath Hall's historic parkland. Although both would split the parkland north of Beeston Hall, the parkland that would be severed is now in agricultural production. The consultation route would impact on the setting of red Hall Farm. On balance, the **alternative route** is more favourable.

6.5.6 Biodiversity:

Both routes affect a significant number of mature trees and hedgerows would lost or severed, affecting local biodiversity. Protected species, such as bats and great crested newts would be affected. Consequently, **neither route** appears more favourable.

6.5.7 Water Environment:

Both routes overlie part of the chalk aquifer. With adequate mitigation measures in place there should be no affect on ground water. However, both routes are immediately adjacent to The Springs which forms a tributary of the River Bure. Consequently **both routes** appear equally favourable.

6.5.8 Journey Ambience:

Uninterrupted travel on a modern dual carriageway with 6 at grade roundabouts along the route provides improved journey ambience on both routes. Consequently both **routes** appear equally favourable.

6.5.9 PVC:

The **consultation route** appears more favourable than the alternative route with an interpolated PVC of £166.0M compared with an interpolated PVC of £166.7M.

6.5.10 PVB:

As both routes have not been modelled, it is assumed that their PVBs would be the same at £622.9M. Consequently **both routes** appear equally favourable.

6.5.11 PVB/PVC:

Although not a sub-objective within the Appraisal Summary Tables, the ratio of PVB to PVC is a useful comparison figure for the economic information. In this case it is 3.77 for the consultation route and 3.72 for the alternative route.

6.3.12 Severance:

Both routes sever a cycleway. As a result **neither route** appears more favourable.

6.5.13 Any other issues:

None.

6.5.14 Conclusion:

- In environmental terms, the alternative route is the slightly better route in terms of noise, air quality and heritage, while the consultation route appears to be the better route in terms of landscape;
- In safety terms, both routes have equal advantage;
- In economic terms, the consultation route appears to cost slightly less and consequently has a more favourable PVB/PVC ratio;
- In accessibility terms, both routes appear to have equal advantage
- In integration terms, both routes have equal advantage;

6.5.15 Recommendation:

Although, the alternative blue route is marginally more favourable than the consultation blue route in some environmental terms, the benefits it does provide are counterbalanced by the severe visual impact the alternative route would have on Spixworth. On balance, it was therefore recommended that the ***consultation blue route*** *should be taken forward to the Stage 2 consultation.*

7.0 ASSESSMENTS & CONCLUSIONS – FAR WESTERN ALTERNATIVES

7.1 In this chapter the following route options as shown on drawing R1C093-R1-265 are compared using the 23 NATA sub-objectives:

- **The Nursery route and the Heath Farm route compared with the consultation route** to determine whether the two nearest far eastern alternatives provide any significant benefits over the consultation route;
- **The Heath Farm route compared with the further eastern routes** to determine whether any of the four furthest eastern routes provide any significant benefits over the nearer far western routes;

7.2 The assessment was carried out on the following sub-objectives:

- Noise
- Air Quality
- Landscape
- Heritage
- Biodiversity
- Water Environment
- Journey Ambience
- Cost to the Public Accounts (PVC)
- Transport Economic Efficiency – Consumers and business users (PVB). These two objectives have been combined
- Severance

7.3 The remaining twelve sub-objectives:

- Greenhouse Gases
- Townscape
- Physical Fitness
- Accidents
- Security
- Reliability
- Wider Economic Impacts
- Option Values
- Access to the Transport System
- Transport Interchange
- Land-use Policy
- Other Government Policies

are considered to be consistent across all the options at this stage and so have not been included in the assessments.

7.3 The Nursery route and the Heath Farm route compared with the consultation route

7.3.1 The difference between the consultation routes and these two additional routes is given in Appendix B and shown on Plan R1C093-R1-265 in Appendix C. The assessment of these routes is between Plumstead Road and the A47.

7.3.2 Noise:

The **Heath Farm route** appears more favourable than the Nursery route and the consultation route with 32 properties within 300m of the route compared with 34 and 42 properties respectively.

7.3.3 Air quality:

The **Heath Farm route** and **Nursery route** are more favourable than the Consultation route with each having 8 properties within 200m of the route compared with 24 properties.

7.3.4 Landscape:

All three routes lie within ordinary to attractive open farmland and have similar visual impacts on local farms, although the Heath Farm route impacts on a greater number.. Consequently, the **consultation and Nursery routes** appear slightly more favourable.

7.3.5 Heritage:

No ancient monuments, listed buildings or conservation areas would be affected. Consequently, **none of the routes** appears more favourable.

7.3.6 Biodiversity:

On all routes a number of hedgerows would be severed contributing to the fragmentation of habitat affecting local biodiversity. Consequently, **none of the routes** appears more favourable.

7.3.7 Water Environment:

No watercourses, floodplains affected although the routes pass over a major aquifer. Consequently, **all routes** appear equally favourable.

7.3.8 Journey Ambience:

Uninterrupted travel on a modern dual carriageway with a maximum of only 2 at grade roundabouts along the consultation route, 1 roundabout along the Nursery route and no roundabouts along the Heath Farm route provides improved journey ambience on all three routes. On balance, the **Heath Farm route** appears slightly more favourable.

7.3.9 PVC:

The **Nursery route** with an interpolated PVC of £163.7M appears more favourable than the consultation route with an interpolated PVC of £166.0M and Heath Farm with a calculated PVC of £168.7M.

7.3.10 PVB:

As the Nursery and consultation routes have not been modelled, it is assumed that the PVB of the Heath Farm route of £622.9M would apply to **all routes**.

7.3.11 PVB/PVC:

Although not a sub-objective within the Appraisal Summary Tables, the ratio of PVB to PVC is a useful comparison figure for the economic information. In this case it is 3.80 for the Nursery route, 3.75 for the consultation route and 3.69 for the Heath Farm route.

7.3.12 Severance:

None of the routes severs any communities. Both the Nursery and Heath Farm routes sever a Public Right of Way. The Nursery and consultation route would sever the Business Park to some extent, causing a conflict between local and longer distance traffic. On balance, the **Heath Farm route** appears more favourable.

7.3.13 Other Issues:

The consultation and Nursery routes both impact on development at the Broadland Business Park. Both these routes join the A47 at the Postwick junction, giving only limited scope for improvement by means of a second bridge. The Heath Farm route joins the A47 approximately 300m from the Postwick junction which would allow it to be extended and improved.

7.3.14 Conclusion:

- In environmental terms, the Heath Farm route appears to be the better route in terms of noise, air quality and journey ambience. However is it marginally the least favourable in terms of landscape.
- In safety terms, all three routes have equal advantage;
- In economic terms, the Nursery route appears to cost least and has the most favourable PVB/PVC ratio, followed by the consultation route then the Heath Farm route;
- In accessibility terms, the Heath Farm route is the best route;
- In integration terms all three routes have equal advantage.
- In terms of other issues, the Heath Farm route is the best route.

7.3.15 Recommendation:

*Although it is more expensive that the consultation and Nursery routes, the Heath Farm route has some environmental advantages, does not impact on Broadland Business Park and provides the potential for significant improvements to the Postwick junction. It was therefore recommended that the **Heath Farm route** should be combined with the pink, yellow and blue routes to be taken forward to the Stage 2 consultation.*

7.4 The Heath Farm route compared with the further eastern routes

7.4.1 The differences between these routes to the east of Norwich are given in Appendix B and shown on Plan R1C093-R1-265 in Appendix C. The assessment of these routes is between Plumstead Road and the A47.

7.4.2 Noise:

The **Heath Farm route** appears more favourable than the other routes with 32 properties within 300m of the route compared with the Church Road route (37), The Grange route (38), the Cucumber Lane 1 route (43) and the Cucumber Lane 2 route (117).

7.4.3 Air quality:

The **Heath Farm route** appears more favourable than the other routes with 8 properties within 200m of the route compared with the Church Road, The Grange and Cucumber Lane 1 routes (15), and Cucumber Lane 2 route (47).

7.4.4 Landscape:

The Heath Farm and The Grange routes have landscape character that is open farmland and its quality varies from ordinary to attractive. The Church Road and Cucumber Lane routes 1 and 2 have landscape that is high quality being more enclosed and intimate. Properties in Witton and Great Plumstead would experience adverse visual intrusion from the Cucumber Lane routes 1 and 2. On balance, the **Heath Farm & The Grange routes** are the most favourable.

7.4.5 Heritage:

The Cucumber Lane routes 1 and 2 each impact on the setting of grade II listed buildings. The remaining routes do not impact on any ancient monuments, listed buildings or conservation areas. On balance, the **Heath Farm, Church Road and The Grange routes** are the most favourable.

7.4.6 Biodiversity:

All routes affect existing hedgerows but no significant wildlife habitats have been identified. Consequently, **all routes** are equally unfavourable.

7.4.7 Water Environment:

The Cucumber Lane 1 impacts on Witton Run which is a tributary of the River Yare and overlies a major aquifer. All remaining routes pass over the major chalk aquifer. Consequently, the **Cucumber Lane 2, The Grange, Church Road and Heath Farm routes** are more favourable.

7.4.8 Journey Ambience:

Uninterrupted travel on a modern dual carriageway with no at grade roundabouts provides improved journey ambience on all five routes. Consequently **all routes** are equally favourable.

7.4.9 PVC:

The **Grange route** appears more favourable than the other routes with a calculated PVC of £167.2M compared with the Cucumber Lane route 1 (£168.2M – calculated), the Heath Farm route (£168.7M – calculated), the

Cucumber Lane 2 route (£170.9M – interpolated) and the Church Road route (£176.5M – interpolated).

7.4.10 PVB:

As the Cucumber Lane 2 and the Church Road routes have not been modelled, it is assumed that the PVB of the Cucumber Lane 2 route would be the same as the Cucumber Lane 1 route at £584.4M and that the Church Road route would be the same as The Grange route at £608.8M. **Heath Farm route** is the most favourable route with a PVB of 622.9.

7.4.11 PVB/PVC:

Although not a sub-objective within the Appraisal Summary Tables, the ratio of PVB to PVC is a useful comparison figure for the economic information. In this case it is 3.69 for the Heath Farm route, 3.64 for the Grange route, 3.47 for the Cucumber Lane 1 route, 3.45 for the Church Road route and 3.42 for the Cucumber Lane 2 route.

7.4.12 Severance:

The Cucumber Lane route 1 severs the Great Plumstead Hospital allocated housing from Great Plumstead village. The Heath Farm route and Cucumber Lane route 1 sever one Public Right of way compared with all remaining routes severing 2 Public Rights of Way. All the routes with the exception of the Heath Farm route sever grade 1 agricultural land. On balance, the **Heath Farm route** is the most favourable.

7.4.13 Other Issues:

None identified.

7.4.14 Conclusion:

- In environmental terms, the Heath Farm route is better than the remaining routes in terms of noise and air quality, and is jointly the best route in terms of landscape, heritage and water;
- In safety terms, all five routes have equal advantage;
- In economic terms, the Grange route appears to cost least. However, the Heath Farm route has the most favourable PVB/PVC ratio, followed by the Grange route then the Cucumber Lane 1,Church Road and Cucumber Lane 2;
- In accessibility terms, the Heath Farm route has the most advantage;
- In integration terms, all routes have equal advantage.

7.4.15 Recommendation:

*Other than the Grange route which costs slightly less, none of the other eastern options has benefits over the Heath Farm route. It was therefore recommended that the **Health Farm route** only should be combined with the pink, yellow and blue routes to be taken forward to the Stage 2 consultation.*

7.0 RECOMMENDATIONS

7.1 It was recommended that the following eastern options be taken forward for the 2004 consultation:

- The alternative pink route between the A140 and the B1150, the consultation pink route between the B1150 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Pink Route);
- The alternative yellow route between the A140 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Yellow Route);
- The original blue route between the A140 and the C284 combined with the Heath Farm route between the C284 and the A47 (as the Consultation 2004 Blue Route).

These route options were then subjected to a stage 2 Environmental Assessment prior to the consultation.

Appendix A

Appendix B

Appendix B – List of the Eastern Alternative Routes

ROUTE NAME	DIFFERENCE TO CONSULTATION ROUTE
Eastern Consultation Routes and Alternatives	
Consultation Eastern Pink	N/A
Consultation Eastern Yellow	N/A
Consultation Eastern Blue	N/A
Alternative Eastern Pink	Travelling eastwards from the airport, the route travels in a continuous curve to Buxton Road. It then follows the pink consultation route to the A1151, from where it travels eastwards to meet the yellow route at Salhouse Road and then follows the yellow route to the A47
Alternative Eastern Yellow	Travelling eastwards from the airport, the route travels in a continuous curve to where the pink route meets Buxton Road. It then travels eastwards to meet the yellow consultation route at the A1151, then follows the yellow route to the A47
Alternative Eastern Blue	Between Quaker Lane to the B1150, the route is located slightly further north towards Spixworth.
Far Eastern Alternatives	
Cucumber Lane Route 1	From the junction at Plumstead Road, the route goes south-eastwards to the A47 at Cucumber Lane.
Cucumber Lane Route 2	From the junction at Middle Road, the route goes south-eastwards to the A47 at Cucumber Lane.
Church Road Route	From the junction at Middle Road, the route goes south-eastwards to the A47 midway between Church Road and Mill Road.
The Grange Route	From the junction at Middle Road, the route goes south-eastwards to the A47 midway between Church Road and Brundall Low Road.
Heath Farm Route	From the junction at Middle Road, the route goes southwards to the A47 at a junction on the Postwick slip road at Oaks Lane
The Nursery Route	From the junction at Middle Road, the route goes southwards, around the east side of the nursery to Broadland Way.

Appendix C

Appendix D

Table D1 Changes in traffic on various existing roads with the modelled western NDR options (2025)

	Eastern Consultation			Far Eastern Alternatives	
	Red-Pink	**Red-Yellow**	**Red-Blue**	**Red-the Grange**	**Red-Cucumber Lane 1**
Northern Radial Routes					
A1074 Dereham Rd	-12%	-12%	-12%	-12%	-12%
A1067 Drayton Rd	-16%	-14%	-15%	-15%	-14%
A140 Cromer Rd	11%	11%	11%	11%	12%
B1150 N Walsham Rd	-14%	-16%	-11%	-9%	-10%
A1151 Wroxham Rd	-10%	-24%	-30%	-28%	-25%
A1042 Yarmouth Rd	-12%	-11%	-10%	-10%	-12%
Average	**-9%**	**-11%**	**-11%**	**-10%**	**-10%**
Southern Radial Routes					
A146 Trowse Bypass	3%	3%	3%	2%	1%
A140 Ipswich Rd	2%	5%	5%	5%	3%
A11 Newmarket Rd	-1%	1%	0%	0%	1%
B1108 Watton Rd	4%	4%	5%	5%	4%
Average	**2%**	**3%**	**3%**	**3%**	**2%**
Inner Ring Road					
Grapes Hill	-1%	-1%	-1%	0%	-1%
Queen's Road	1%	1%	1%	1%	1%
Riverside Road	-1%	1%	1%	3%	5%
Average	**0%**	**0%**	**0%**	**1%**	**1%**
Outer Ring Road					
Boundary Rd	-11%	-12%	-12%	-12%	-11%
Martineau Lane	3%	4%	4%	3%	1%
Mousehold Lane	-15%	-5%	-3%	-3%	-4%
Colman Rd	-4%	-3%	-2%	-3%	-2%
Average	**-7%**	**-4%**	**-4%**	**-4%**	**-5%**
Northern Suburbs					
Hellesdon Rd	-15%	-18%	-16%	-18%	-15%
Middleton's Lane	-44%	-36%	-35%	-34%	-35%
White Woman Lane	19%	16%	-57%	-57%	-56%
Church Lane	-91%	-67%	-69%	-69%	-67%
Fifers Lane	-32%	-31%	-32%	-31%	-32%
Woodside Rd	-48%	-59%	-61%	-61%	-61%
Average	**-36%**	**-35%**	**-41%**	**-41%**	**-41%**

	Eastern Consultation			Far Eastern Alternatives	
	Red-Pink	**Red-Yellow**	**Red-Blue**	**Red-the Grange**	**Red-Cucumber Lane 1**
Northern Rural					
Ringland Road	-91%	-90%	-90%	-90%	-90%
Spixworth Road	-51%	-54%	-55%	-57%	-55%
Church Rd	-57%	-80%	-80%	-67%	-60%
Average	**-64%**	**-72%**	**-72%**	**-69%**	**-66%**
Inside Outer Ring Road South					
Bracondale	-5%	-4%	-4%	-4%	-5%
Hall Rd	2%	1%	2%	2%	2%
Ipswich Rd	-3%	0%	1%	0%	0%
Newmarket Rd	-1%	0%	0%	0%	0%
Unthank Rd	2%	1%	2%	2%	3%
Earlham Rd	2%	2%	2%	1%	1%
Average	**-1%**	**-1%**	**0%**	**0%**	**0%**
Inside Outer Ring Road North					
Dereham Rd	2%	3%	3%	3%	3%
Drayton Rd	-6%	-3%	-2%	-3%	-3%
Aylsham Rd	-3%	-2%	-1%	-1%	-1%
Catton Grove Rd	1%	2%	2%	4%	5%
Constitution Hill	15%	13%	10%	11%	11%
Sprowston Rd	12%	4%	2%	2%	3%
Gurney Rd	-10%	-3%	-1%	-1%	-1%
Plumstead Rd	-2%	-8%	-13%	-11%	-11%
Carrow Rd	-1%	-3%	-2%	-2%	-4%
Average	**1%**	**0%**	**0%**	**0%**	**0%**
A47 NSB					
West of Longwater	10%	11%	12%	14%	16%
Longwater - B1108	-1%	1%	2%	3%	4%
B1108 - A11	-8%	-5%	-5%	-4%	-4%
A11 - A140	-8%	-7%	-7%	-7%	-8%
A140 – A146	-1%	0%	0%	-1%	-7%
A146 – Postwick	6%	7%	6%	5%	-2%
East of Postwick	4%	4%	3%	5%	2%
Average	**0%**	**1%**	**1%**	**2%**	**0%**

	Eastern Consultation			Far Eastern Alternatives	
	Red-Pink	**Red-Yellow**	**Red-Blue**	**Red-the Grange**	**Red-Cucumber Lane 1**
Additional - Northern Suburbs					
Hall Lane	-19%	-29%	-35%	-37%	-38%
Drayton Rd	-100%	-98%	-97%	-94%	-92%
Blue Boar Lane	-91%	-89%	-88%	-88%	-89%
Average	**-74%**	**-75%**	**-76%**	**-76%**	**-77%**
Additional Sites [2]					
Ringland Rd, Taverham	-99%	-100%	-100%	-100%	-100%
Taverham Ln, Costessey	-97%	-97%	-97%	-97%	-97%
Costessey Ln, Drayton	-66%	-68%	-70%	-70%	-69%
Reepham Rd, Horsford	-39%	-33%	-31%	-30%	-29%
Holt Rd, Horsford	4%	1%	0%	0%	0%
Crostwick Ln, Spixworth	97%	102%	100%	99%	100%
Lodge Ln, Old Catton	-23%	-32%	-27%	-30%	-17%
Salhouse Rd, Sprowston	-7%	-2%	-3%	1%	4%
Plumstead Rd E, Thorpe St Andrew	10%	6%	8%	9%	11%
Green Ln E, Rackheath	11%	-14%	-92%	-93%	-98%
Average	**-9%**	**-12%**	**-20%**	**-20%**	**-18%**

Table D2 Predicted Annual Average Daily Traffic using the modelled western NDR options (2025)

	Eastern Consultation			Far Eastern Alternatives	
	Red-Pink	**Red-Yellow**	**Red-Blue**	**Red-the Grange**	**Red-Cucumber Lane 1**
A47 – Ringland Lane	30431	30202	30122	31175	33447
Ringland Lane - A1067	30430	30203	30122	31171	33445
A1067 - Reepham Rd	28860	28049	28063	29138	31559
Reepham Rd - A140	27793	25528	25029	25696	27432
A140 – Buxton Rd	36988	32222	31352	31775	32640
Buxton Rd - B1150	36985	32221	31347	31774	32639
B1150 - A1151	46851	35438	34627	34075	33455
A1151 - Salhouse Rd	47431	40220	36033	35263	34542
Salhouse Rd - B1140	33051	28790	34199	33059	31974
B1140 - A47	33050	31793	29988	27695	26709
Average	**35187**	**31467**	**31088**	**31082**	**31784**

Appendix E

Appendix F

Table F1: Summary of Assessments for Eastern Consultation Routes and Alternatives.

	Pink	Alt Pink	Yellow	Alt Yellow	Blue	Alt Blue
Noise	227	119	101	92	168	167
	properties within 300m of route					
Air Quality	53	47	54	49	88	80
	properties within 200m of route					
Greenhouse Gases	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Landscape	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Townscape	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Historic Resources	Moderate adverse	Moderate Adverse	Severe adverse	Severe adverse	Moderate adverse	Moderate adverse
Biodiversity	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse	Moderate adverse
Water Environment	Neutral	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Physical Fitness	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Journey Ambience	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Accidents	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Security	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Public Accounts	£234.5M*	£232.0M*	£174.8M*	£178.6M*	£166.0M*	£167.6M*
Business Users	£434.3M*	£434.3M*	£369.3M*	£369.3M*	£348.8M*	£348.8M*
Consumers	£341.2M*	£341.2M*	£290.1M*	£290.1M*	£274.1M*	£274.1M*
Reliability	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Wider Impacts	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Option Values	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Severance	Moderate adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Access	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Transport interchange	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Land-use Policy	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Other Policies	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial

** Estimate*

Impact is common to all 6 route options

Table F2: Summary of Assessments for the Far Eastern Alternatives.

	Eastern Consultation	The Nursery	Heath Farm	The Grange	Church Road	Cucumber Lane 2	Cucumber Lane 1
Noise	42	34	32	38	37	117	43
	Properties within 300m of route						
Air Quality	24	8	8	15	15	47	15
	properties within 200m of route						
Greenhouse Gases	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Landscape	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Moderate adverse	Moderate adverse
Townscape	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Historic Resources	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse	Slight adverse
Biodiversity	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse
Water Environment	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Slight adverse
Physical Fitness	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Journey Ambience	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Accidents	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Security	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Public Accounts	£166.0M*	£163.7M*	£168.7M	£167.2M	£176.5M*	£170.9M*	£168.2M
Business Users	£348.8M*	£348.8M*	£348.8M	£340.9M	£340.9M*	£327.3M*	£327.3M
Consumers	£274.1M*	£274.1M*	£274.1M	£267.9M	£267.9M*	£257.1M*	£257.1M
Reliability	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial	Large beneficial
Wider Impacts	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Option Values	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Severance	Moderate adverse	Moderate adverse	Slight adverse	Slight adverse	Slight adverse	Slight adverse	Moderate adverse
Access	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Transport interchange	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial
Land-use Policy	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Other Policies	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial	Slight beneficial

** Estimate*

Impact is common to all 7 route options